3A GROUP
CONSTRUCTION | MANAGEMENT | BUILDING SERVICES

SAFETY MANUAL

JANUARY 2024 REVISION

TABLE OF CONTENTS

1 SAFETY & HEALTH POLICY 26

1.1 SAFETY POLICY 27
1.2 PROGRAM OBJECTIVES 28

2 RESPONSIBILITY 29

2.1 EXECUTIVE MANAGEMENT 30
2.2 COMPLIANCE 30
2.3 SAFETY COORDINATOR RESPONSIBILITY 30
2.4 SUPERVISOR'S SAFETY RESPONSIBILITY 31
2.5 EMPLOYEE RESPONSIBILITIES 31

3 DISCIPLINARY POLICY 33

3.1 INTRODUCTION 34
3.2 PURPOSE 34
3.3 RESPONSIBILITIES 34
3.4 REQUIREMENTS 34
3.5 CIRCUMSTANCES LEADING TO DISCIPLINARY ACTION 35
3.6 PROCEDURE: 35
3.7 SUPERVISION SANCTIONS: 36
3.8 SUMMARY 36
3.9 SUPERVISORS' DISCIPLINARY ACTION 36

4 SAFETY ORIENTATION 37

4.1 NEW EMPLOYEE ORIENTATION 38
4.2 NEW EMPLOYEE CHECKLIST INSTRUCTIONS 38
4.3 EMPLOYEE SAFETY ORIENTATION GUIDELINE 38
4.4 SAFETY POLICY 38
4.5 EMPLOYEE RESPONSIBILITIES FOR SAFETY 38
4.6 EMPLOYEE SAFETY ORIENTATION GUIDELINE 39
4.7 EMPLOYMENT DOCUMENTS 41
4.8 ORIENTATION CHECKLIST FOR NEW EMPLOYEES 42
4.9 SAFETY & HEALTH PROGRAM 42
4.10 EMPLOYEE ACKNOWLEDGEMENT FORM 43
4.11 EMPLOYEE RECOGNITION 44

5 ACCIDENT/LOSS REPORTING PROCEDURES 45

5.1 PURPOSE 46
5.2 OBJECTIVES 46
5.3 PROCEDURE 46

5.4 SERIOUS EMERGENCY REPORTING 47
5.5 HANDLING NON-SERIOUS ACCIDENTS 47
5.6 FIRST AID TREATMENT 48
5.7 PROPERTY/EQUIPMENT DAMAGE 48
5.8 VEHICLE ACCIDENT REPORTING 48
5.9 CITIZEN/PUBLIC ACCIDENTS (NON-AUTO) 48
5.10 ACCIDENT INVESTIGATION REPORT 48
5.11 RECORDKEEPING 49
5.12 EMPLOYEE INJURIES 49
5.13 VEHICLE, PROPERTY DAMAGE, AND PUBLIC LIABILITY ACCIDENT REPORTS 49

6 ACCIDENT INVESTIGATION 50

6.1 ACCIDENT / INJURY INVESTIGATION 51
6.2 EMPLOYEE ACCIDENTS 51
6.3 DEFINITIONS 52
6.4 CHECK THE SCENE 52
6.5 WRITE IT DOWN 52
6.6 COLLECT THE EVIDENCE 52
6.7 INTERVIEW WITNESS 52
6.8 INTERVIEW THE VICTIM 52
6.9 WEIGH THE EVIDENCE 53

7 HAZARD IDENTIFICATION & ASSESMENT 55

7.1 PURPOSE 56
7.2 KEY RESPONSIBILITIES 56
7.3 HAZARD AND RISK IDENTIFICATION 56
7.4 REVIEW OF HAZARD ASSESSMENT 57
7.5 RISK ASSESSMENT 57
7.6 3A GROUP RISK ASSESSMENT MATRIX 58
7.7 RISK CONTROLS/METHODS TO ENSURE IDENTIFIED HAZARDS ARE ADDRESSED AND MITIGATED 58
7.8 EMERGENCY CONTROL OF HAZARDS 59
7.9 CERTIFICATION OF HAZARD ASSESSMENT 59
7.10 JOB SAFETY ANALYSIS (JSA) 59
7.11 SITE SPECIFIC HSE PLAN (SSSP) 59
7.12 REVIEW PROCESS 59
7.13 WORKSITE HAZARD ASSESSMENT FORM 60
7.14 JOB SAFETY ANALYSIS FORM 61

8 EMERGENCY ACTION PLAN 63

8.1 PURPOSE 64
8.2 EMERGENCY RESPONSE PLANNING, ISSUING AND ANNUAL REVIEW GUIDELINES 64
8.3 REVIEWING THE EMERGENCY ACTION PLAN WITH EMPLOYEES 64
8.4 PROCEDURE 65
8.5 PLANNING FOR EMERGENCIES: 65

8.6 GENERAL EMERGENCY PROCEDURE GUIDELINES 65
8.7 REVIEWING THE EMERGENCY ACTION PLAN WITH EMPLOYEES 65
8.8 PROCEDURES FOR EMERGENCY EVACUATION PLANNING 66
8.9 POTENTIAL EMERGENCIES 66
8.10 GUIDANCE PROCEDURES FOR POTENTIAL EMERGENCIES 66
8.11 EMERGENCY ACTION PLAN 67
8.12 ALARM SYSTEM 68
8.13 COMMUNICATIONS 68
8.14 FIRE EMERGENCY, EXPLOSION, OR CHEMICAL SPILL 68
8.15 SUPERVISOR'S RESPONSIBILITIES 68
8.16 EMERGENCY COORDINATOR'S RESPONSIBILITIES 68
8.17 EMERGENCY CONTINGENCY PLAN 69
8.18 EMERGENCY RESPONSE PROGRAM MANAGEMENT 69
8.19 DUTIES 70

9 EMPLOYEE SUGGESTIONS 74

9.1 INTRODUCTION 75
9.2 PURPOSE 75
9.3 PROCEDURE 75

10 FIRST AID 76

10.1 PURPOSE 77
10.2 SCOPE 77
10.3 RESPONSIBILITIES 77
10.4 PLANNING 77
10.5 MEDICAL RESPONSE 77
10.6 SUPPLIES AND EQUIPMENT 78
10.7 TRANSPORTATION 78
10.8 TRAINING 79

11 FIRE PREVENTION 80

11.1 PURPOSE 81
11.2 SCOPE 81
11.3 RESPONSIBILITIES 81
11.4 GENERAL REQUIREMENTS 81
11.5 PROCEDURE 82
11.6 LABELING OF FIRE EXTINGUISHERS 82
11.7 MAINTENANCE 82
11.8 INSPECTION, MAINTENANCE AND TESTING 83
11.9 FLAMMABLE AND COMBUSTIBLE LIQUID AND MATERIALS 83
11.10 SCRAP RECEPTACLE - TYPE, LOCATION AND USE 84
11.11 TYPE 84
11.12 FIRE AND EXPLOSION HAZARDS 84
11.13 FIRE AND EXPLOSION PREVENTION 84

11.14 SPECIFIC HAZARDS 84
11.15 TRAINING AND EDUCATION 85
11.16 TRAINING DOCUMENTATION 85
11.17 SITE EMERGENCY TELEPHONE LIST 86

12 OSHA REFERENCES 88

12.1 OSHA REPORTS AND SPECIAL REQUIREMENTS 89
12.2 SPECIAL OSHA REQUIREMENTS 89
12.3 POSTING REQUIREMENTS 90
12.4 OTHER SUGGESTED POSTINGS 90
12.5 STATES WITH APPROVED PLANS 91
12.6 OSHA/STATE CONSULTATION PROJECT DIRECTORY 93

13 ABRASIVE BLASTING 110

13.1 GENERAL SAFETY 111
13.2 SCOPE 111
13.3 PROCEDURE 111
13.4 GENERAL 111
13.5 EQUIPMENT HANDLING 111
13.6 AIR COMPRESSORS 111
13.7 BLAST POT 112
13.8 HOSES AND CONNECTORS 112
13.9 NOZZLES AND REMOTE CONTROLS 112
13.10 OPERATOR SIGNALS 113
13.11 RESPIRATOR USE 113
13.12 ENVIRONMENTAL CONTROLS 113
13.13 PERSONAL PROTECTIVE EQUIPMENT 113
13.14 DUST HAZARDS 116
13.15 EXAMPLES OF THE TYPES OF ABRASIVES USED IN BLASTING OPERATIONS 117
13.16 EXAMPLES OF COATINGS REMOVED IN BLASTING OPERATIONS 118
13.17 HOUSEKEEPING 118
13.18 BLAST CLEANING ENCLOSURES 118
13.19 BLAST CLEANING ENCLOSURES AND RECOMMENDED AIR VELOCITIES 119
13.20 SPECIFIC OPERATING REQUIREMENTS 120
13.21 BLASTING CABINETS 120
13.22 BLAST CLEANING ROOMS 121
13.23 AIR BLASTING 121
13.24 BLAST CLEANING NOZZLES 121
13.25 INSPECTION AND MAINTENANCE 121

14 AERIAL LIFT SAFETY 126

14.1 INTRODUCTION 127
14.2 HAZARDS 127
14.3 GENERAL DISCUSSION 128

14.4 MAINTENANCE 128
14.5 OPERATIONS 128
14.6 BEFORE OPERATION 129
14.7 WORKPLACE INSPECTIONS 129
14.8 PRESTART INSPECTION 129
14.9 OPERATION 130
14.10 RESPONSIBILITIES 130
14.11 WORK SUPERVISORS 131
14.12 HAZARDS CONTROL DEPARTMENT 132
14.13 DOCUMENTATION 132
14.14 TRAINING 132
14.15 FACILITY POINTS OF CONTACT 132
14.16 WORK SMART STANDARDS 133
14.17 OTHER REQUIREMENTS ..... ERROR! BOOKMARK NOT DEFINED.
14.18 APPENDIX A 134
14.19 APPENDIX B - PLATFORM LIFT EQUIPMENT INSPECTION CHECKLIST 134
14.20 APPENDIX C 136
14.21 APPENDIX D 137
14.22 APPENDIX E 138
14.23 APPENDIX F - OPERATOR WARNINGS AND INSTRUCTIONS 139
14.24 APPENDIX G 141

15 ARC FLASH PROTECTION POLICY 142

15.1 PROTECTING YOU AND YOUR WORKERS 143
15.2 DEFINITIONS 143
15.3 PROTECTION AGAINST ARC FLASH 143
15.4 ARC FLASH HAZARD ASSESSMENT 147
15.5 DETERMINE ELECTRICAL ARC FLASH HAZARD BOUNDARY 148
15.6 CREATING A SAFE WORK ZONE 153
15.7 PERSONAL PROTECTIVE EQUIPMENT 153
15.8 CARE AND MAINTENANCE OF PPE 158
15.9 OTHER HIGH VOLTAGE REQUIREMENTS 159

16 ASBESTOS 160

16.1 POLICY 161
16.2 DEFINITION 161
16.3 REACTIONS 161
16.4 SAFETY PRECAUTIONS 161

17 ASSURED EQUIPMENT GROUNDING 163

17.1 PURPOSE 164
17.2 DEFINITIONS 164
17.3 RESPONSIBILITIES 164
17.4 PROCEDURES AND GUIDELINES TO ELIMINATE INJURIES 164

18 BACKHOE AND LOADER SAFETY 167

18.1 SCOPE 168
18.2 BEFORE USING THE MACHINE 168
18.3 PRE-OPERATIONS CHECKLIST 168
18.4 INSPECTING THE LOADER 169
18.5 OPERATING THE LOADER 169
18.6 OPERATING THE BACKHOE 170
18.7 SAFE STOPPING PROCEDURE 170
18.8 SKID LOADER SAFETY 170
18.9 GENERAL SAFETY 170
18.10 ENTRY 171
18.11 OPERATION 171
18.12 EXIT 171
18.13 MAINTENANCE 171

19 CHEMICAL DIP TANKS 173

19.1 DIPPING AND COATING OPERATIONS 174
19.2 INTRODUCTION/OVERVIEW 174
19.3 USE OF DIP TANKS 174
19.4 TYPICAL DIP TANK OPERATIONS 174
19.5 OSHA REGULATIONS 174
19.6 IDENTIFYING HAZARDS 174
19.7 ROUTES OF ENTRY 175
19.8 PHYSICAL HAZARDS 175
19.9 PROTECTION AGAINST HAZARDS 175
19.10 MECHANICAL VENTILATION 176
19.11 RECIRCULATING EXHAUST AIR 176
19.12 PERSONAL PROTECTIVE EQUIPMENT 176
19.13 EMERGENCY PROCEDURES 177
19.14 EMERGENCY PREPAREDNESS 178
19.15 SAFE WORK PRACTICES 178
19.16 CLEANING A DIP TANK 178
19.17 FLAMMABLE AND COMBUSTIBLE LIQUIDS 178
19.18 FIRE PROTECTION 179
19.19 CONTROL IGNITION SOURCES 179
19.20 OTHER SAFE PRACTICES 179
19.21 SPECIFIC DIPPING AND COATING OPERATIONS 180

20 COMBUSTIBLE DUST 185

20.1 DEFINITION OF DUST 186
20.2 DEFINITION OF COMBUSTIBLE DUST (NFPA 654) 186
20.3 DUST IDENTIFIED IN THE NEP 186
20.4 ASSEMBLE A REVIEW TEAM. 187
20.5 CONFIRM COMBUSTIBLE DUST HAZARD CONTROLS ARE IN PLACE. 187
20.6 MATERIALS USED AND PAST INCIDENTS 187

20.7 DUST CONTROL MEASURES 188
20.8 MINIMIZE ESCAPE OF DUST FROM PROCESS EQUIPMENT OR VENTILATION SYSTEMS 188
20.9 IGNITION CONTROL MEASURES 189
20.10 PREVENTION MEASURES 189
20.11 DAMAGE CONTROL MEASURES 190
20.12 PROTECTION MEASURES 190
20.13 PROTECTION MEASURES—PHYSICAL 190

21 CONCRETE SAFETY 191

21.1 POLICY AND SCOPE 192
21.2 PERSONAL PROTECTIVE EQUIPMENT 192
21.3 GENERAL EQUIPMENT 194
21.4 FORMS AND SHORING 194
21.5 PRE-STRESSED AND POST-STRESSED CONCRETE OPERATIONS 195
21.6 MASONRY WORK 195
21.7 BRICKS AND MASONRY BLOCKS 195
21.8 LADDERS AND SCAFFOLDING 195
21.9 GENERAL REQUIREMENTS FOR CONCRETE & MASONRY OPERATIONS 195

22 CONFINED SPACE 197

22.1 INTRODUCTION 198
22.2 PURPOSE 198
22.3 DEFINITIONS 198
22.4 SCOPE 198
22.5 HAZARDS 199
22.6 GENERAL (PERSONAL GUIDELINES) 199
22.7 PROCEDURES FOR CONFINED SPACE ENTRY 199
22.8 RESPONSIBILITIES 199
22.9 PRE-ENTRY 201
22.10 ISSUANCE/REVIEWING OF PERMIT 203
22.11 TERMINATION AND CLOSING OR CANCELLING OF PERMITS 203
22.12 PRECAUTIONS 203
22.13 MULTIPLE EMPLOYER PROCEDURE 206
22.14 EMERGENCY AND RESCUE. 206
22.15 PERMIT-REQUIRED CONFINED SPACE RESCUE: 207
22.16 NON-ENTRY RESCUE 207
22.17 TRAINING 207
22.18 SUMMARY 208
22.19 SAFETY WATCH INSTRUCTIONS 209
22.20 REQUIREMENTS OF THE SAFETY WATCH 209

23 CRANE SAFETY 210

23.1 PURPOSE 211
23.2 SCOPE 211

23.3 KEY RESPONSIBILITIES 211
23.4 EMPLOYEES 211
23.5 PROCEDURE 211
23.6 OPERATOR QUALIFICATION 212
23.7 LOAD CHART 212
23.8 MODIFYING EQUIPMENT 212
23.9 PRIOR TO LIFTING 212
23.10 MARKING BOUNDARIES 213
23.11 OVERHEAD POWER LINES 213
23.12 ASSEMBLING/DISASSEMBLING EQUIPMENT 214
23.13 HANDLING THE LOAD 214
23.14 SIZE OF LOAD 214
23.15 ATTACHING THE LOAD 214
23.16 LOAD LIFTING MANUAL 214
23.17 SAFE LIFTING 215
23.18 LOG BOOK PROCEDURE 215
23.19 INSPECTIONS 216
23.20 NEW EQUIPMENT 216
23.21 DAILY 216
23.22 MONTHLY 217
23.23 YEARLY 217
23.24 RIGGING 217
23.25 RIGGING BREAKING STRENGTH AND LOAD RATING 217
23.26 RIGGING INSPECTION AND REJECTION CRITERIA 218
23.27 SLINGS 218
23.28 HOOKS 218
23.29 OPERATIONAL PROCEDURES 219
23.30 RIGGING A LOAD 219
23.31 SIGNALING 220
23.32 TRAINING: 220
23.33 SLING INSPECTION FORM 221

24 CRYSTALLINE SILICA EXPOSURE CONTROL 222

24.1 INTRODUCTION 223
24.2 HEALTH HAZARDS ASSOCIATED WITH SILICA EXPOSURE 223
24.3 SILICA EXPOSURES AT 3A GROUP 223
24.4 STATEMENT OF PURPOSE 224
24.5 RESPONSIBILITIES 224
24.6 EXPOSURE LIMITS 225
24.7 RISK IDENTIFICATION 225
24.8 RISK ASSESSMENT 225
24.9 RISK CONTROL 226
24.10 EDUCATION AND TRAINING 227
24.11 SAFE WORK PROCEDURES 229
24.12 DOCUMENTION 231

25 DRUG AND ALCOHOL FREE WORKPLACE 233

25.1 PURPOSE 234
25.2 SCOPE 234
25.3 GENERAL PROVISIONS 234
25.4 EMPLOYEE ASSISTANCE PROGRAM 234
25.5 PROGRAM REQUIREMENTS (MINIMUM) 234
25.6 PRE-EMPLOYMENT 234
25.7 REASONABLE SUSPICION 234
25.8 RANDOM TESTING 235
25.9 POST ACCIDENT TESTING 235
25.10 ABSTINENCE MONITORING 235
25.11 ALCOHOL 235
25.12 LEGAL DRUGS 235
25.13 ILLEGAL DRUGS 235
25.14 DISCIPLINARY ACTION 235
25.15 CUSTOMER OR OWNER REQUIREMENTS 236
25.16 SEARCHES 236
25.17 SCOPE AND PROCESS 236
25.18 PROCEDURES FOR HANDLING SEIZED PROPERTY 236
25.19 DISPOSITION OF UNCOOPERATIVE EMPLOYEES 237
25.20 VOLUNTARY REHABILITATION 237
25.21 CONTRACT PERSONNEL 237
25.22 EMPLOYEE'S REPORTING REQUIREMENTS - LEGAL DRUGS 237
25.23 DEFINITIONS 237
25.24 PROCEDURES 238
25.25 EDUCATION AND TRAINING 238
25.26 NOTIFICATION 238
25.27 TYPES OF DRUG TESTING 238
25.28 PRE-EMPLOYMENT TESTING 238
25.29 UNFIT CONDITION 239
25.30 INCIDENT ON DUTY 239
25.31 REASONABLE SUSPICION TESTING 240
25.32 RANDOM TESTING 240
25.33 POST ACCIDENT TESTING 241
25.34 ABSTINENCE MONITORING 241
25.35 ALCOHOL AND DRUG SCREENING FOR SAFETY SENSITIVE JOBS 241
25.36 PROHIBITED DRUGS 241
25.37 FEDERAL DRUG SCREEN LIMITS FOR ILLICIT DRUGS 242
25.38 CUSTOMER REQUIREMENTS 242
25.39 POSITIVE TEST RESULTS OR REFUSAL TO TEST 242
25.40 RE-EMPLOYMENT 243
25.41 EMPLOYEE ASSISTANCE PROGRAM 243
25.42 THE TESTING FOR DRUGS 243
25.43 DRUG TESTING LABORATORY 243
25.44 RECORDKEEPING 244
25.45 RETENTION OF SAMPLES 244
25.46 RETESTING 244
25.47 MEDICAL REVIEW OFFICER 245
25.48 ACKNOWLEDGEMENT OF DRUG & ALCOHOL PREVENTION PROGRAM 246

26 ELECTRICAL SAFETY 247

26.1 PURPOSE 248
26.2 SCOPE 248
26.3 DEFINITIONS 248
26.4 RESPONSIBILITIES 250
26.5 SAFE WORK PRACTICES 250
26.6 INSPECTIONS 250
26.7 REPAIRS 250
26.8 EXTENSION CORDS 251
26.9 OUTLETS 251
26.10 MULTIPLE OUTLET BOXES 251
26.11 DOUBLE INSULATED TOOLS 251
26.12 SWITCHES, CIRCUIT BREAKERS, AND DISCONNECTS 252
26.13 LADDERS & PORTABLE LADDERS 252
26.14 ENERGIZED AND OVERHEAD HIGH VOLTAGE POWER LINES & EQUIPMENT 252
26.15 CONFINED OR ENCLOSED WORK SPACES 252
26.16 ENCLOSURES, BREAKER PANELS, AND DISTRIBUTION ROOMS 252
26.17 LOCK OUT/TAG OUT 253
26.18 CONTRACTORS 253
26.19 FIRE EXTINGUISHERS 253
26.20 ELECTRIC SHOCK-CPR 253
26.21 ELECTRIC WELDERS 253
26.22 EQUIPMENT GROUNDING 254
26.23 ASSURED GROUNDING 254
26.24 GROUND FAULT CIRCUIT INTERRUPTERS 254
26.25 TRAINING 254
26.26 PERSONAL PROTECTIVE EQUIPMENT & SAFEGUARDS FOR PERSONNEL PROTECTION 255

27 ERGONOMICS AND CUMULATIVE TRAUMA DISORDERS 256

27.1 INTENDED USE OF PROGRAM 257
27.2 POLICY 257
27.3 RESPONSIBILITIES 257
27.4 PROGRAM COMPONENTS 258
27.5 MSD REPORTING PROCEDURES 258
27.6 HAZARD ANALYSIS 259
27.7 HAZARD CONTROL 259
27.8 ENGINEERING CONTROLS 260
27.9 WORK PRACTICE CONTROLS 260
27.10 COMPUTER/TYPING COMFORT 260
27.11 POSTURE AND POSITIONING 260
27.12 WORK ENVIRONMENT 261
27.13 EYE CARE 261
27.14 ADMINISTRATIVE CONTROLS 262
27.15 TRAINING 263
27.16 PROGRAM EVALUATION 263
27.17 RECORDKEEPING 263

27.18 GUIDE TO OFFICE ERGONOMICS 265

28 EXCAVATION, TRENCHING, AND SHORING 266

28.1 PURPOSE 267
28.2 SCOPE 267
28.3 DEFINITIONS 267
28.4 KEY RESPONSIBILITIES 268
28.5 PROCEDURE 268
28.6 UTILITIES AND PRE-WORK SITE INSPECTION 269
28.7 PROTECTION OF THE PUBLIC 269
28.8 PROTECTION AGAINST FALLS 269
28.9 PROTECTION OF WORKERS IN EXCAVATIONS 269
28.10 PERSONAL PROTECTIVE EQUIPMENT 270
28.11 PROTECTION FROM HAZARDS ASSOCIATED WITH WATER ACCUMULATION 270
28.12 STABILITY OF ADJACENT STRUCTURES 271
28.13 SOIL TYPES 272
28.14 DAILY INSPECTION 273
28.15 TRAINING 273

29 FALL PROTECTION PLAN 274

29.1 PURPOSE 275
29.2 SCOPE 275
29.3 DEFINITIONS 275
29.4 RESPONSIBILITIES 279
29.5 PROCEDURE 279
29.6 MINIMUM STANDARDS 280
29.7 STOPPING A FALL 281
29.8 PROTECTION FROM FALLING OBJECTS 281
29.9 PORTABLE LADDERS 282
29.10 FALL PROTECTION PLAN 283
29.11 CONTROLLED ACCESS ZONES 283
29.12 SAFETY MONITORING SYSTEM 284
29.13 INCIDENT INVESTIGATIONS 284
29.14 TRAINING 284

30 GAS CYLINDERS AND COMPRESSED GASES 285

30.1 PURPOSE: 286
30.2 SCOPE 286
30.3 KEY RESPONSIBILITIES 286
30.4 PROCEDURE 286
30.5 CYLINDER IDENTIFICATION 286
30.6 HANDLING 286
30.7 STORING 286
30.8 USE 287

30.9 INSPECTION OF COMPRESSED GAS CYLINDERS 287
30.10 LEAKING CYLINDERS 288
30.11 TRANSPORTATION 288
30.12 EMPTY CYLINDER MARKING 288
30.13 ENGINEERING CONTROLS 288
30.14 SAFETY RULES 288
30.15 COMPRESSED GAS CYLINDER MAINTENANCE FORM 290
30.16 COMPRESSED GAS CYLINDER INSPECTION FORM 291

31 HAND AND PORTABLE POWER TOOLS 292

31.1 POLICY 293
31.2 AUTHORITY AND RESPONSIBILITY 293
31.3 GENERAL SAFETY PRECAUTIONS 293
31.4 HAND TOOLS 294
31.5 POWER TOOLS 294
31.6 GUARDS 295
31.7 SAFETY SWITCHES 295
31.8 ELECTRIC TOOLS 296
31.9 POWERED ABRASIVE WHEEL TOOLS 296
31.10 PNEUMATIC TOOLS 296
31.11 POWDER-ACTUATED TOOLS 297
31.12 HYDRAULIC POWER TOOLS 297
31.13 ERGONOMICS 298
31.14 HAND AND PORTABLE TOOL INFORMATION SHEET 298
31.15 PERSONAL PROTECTIVE EQUIPMENT 298

32 HAZARD COMMUNICATION / GHS 299

32.1 PURPOSE 300
32.2 INTRODUCTION 300
32.3 SCOPE 300
32.4 RESPONSIBILITIES 300
32.5 PROCEDURE 301
32.6 PICTOGRAMS AND HAZARDS 302
32.7 EXAMPLE LABEL 303
32.8 MULTI-EMPLOYER JOB SITES AND/OR MULTI WORK SITE 304
32.9 TRAINING 304
32.10 IMPLEMENTATION REQUIREMENT 305

33 HAZARDOUS WASTE MANAGEMENT 306

33.1 TITLE AND PURPOSE 307
33.2 SITE COORDINATOR 307
33.3 STORAGE OF HAZARDOUS SUBSTANCE 307
33.4 HAZARDOUS WASTES DISPOSAL PROCEDURES AND REGULATIONS 307
33.5 DISCLOSURE PROCEDURE FOR EMERGENCY RESPONDERS AND EMERGENCY 308

33.6 RESPONSE PLAN FOR HAZARDOUS SPILLS 308
33.7 HAZARDOUS CHEMICAL (PRODUCT) INVENTORY 309
33.8 LIST OF APPROVED VENDORS 310
33.9 HAZARDOUS WASTE EVACUATION PLAN 311
33.10 SIGNAL TO BE USED 311
33.11 EVACUATION SHUTDOWN 311
33.12 EMPLOYEE ACCOUNTING 311
33.13 RESCUE AND MEDICAL DUTIES 311
33.15 REPORTING RELEASES OF HAZARDOUS WASTE AND EMERGENCIES 312

34 HAZARDOUS SPILL PREVENTION & RESPONSE 313

34.1 PURPOSE 314
34.2 SCOPE 314
34.3 REQUIREMENTS 314
34.4 OIL SPILL HISTORY 318
34.5 FACILITY INSPECTIONS 320
34.6 MAINTENANCE INSPECTIONS 321
34.7 EMPLOYEE TRAINING 322
34.8 RECORD KEEPING OF INCIDENTAL SPILLS 323
34.9 APPENDICES 323

35 HEARING CONSERVATION 325

35.1 PURPOSE 326
35.2 SCOPE 326
35.3 DEFINITIONS 326
35.4 KEY RESPONSIBILITIES 326
35.5 PROCEDURE 326
35.6 HEARING CONSERVATION PROGRAM 326
35.7 MONITORING PROCEDURES TO BE USED WHEN EXPOSURE LIMITS EXCEED THE ESTABLISHED LEVEL 327
35.8 SURVEYS 327
35.9 SOUND LEVEL SURVEYS 327
35.10 EXPOSURE SURVEYS: 327
35.11 SIGNAGE 328
35.12 AUDIOMETRIC TESTING 328
35.13 BASELINE TESTING GUIDELINES 328
35.14 ANNUAL TESTING GUIDELINES 328
35.15 STEPS THAT ARE TAKEN WHEN STANDARD THRESHOLD SHIFT OCCURS 328
35.16 REQUIRED RECORDKEEPING 328
35.17 HEARING PROTECTION DEVICES 329
35.18 TRAINING 329

36 HEAT STRESS/ILLNESS PREVENTION PLAN 330

36.1 PURPOSE 331
36.2 OBJECTIVES 331

36.3 DEFINITIONS 331
36.4 REQUIREMENTS 332
36.5 PROVISION OF WATER 332
36.6 ACCESS TO SHADE 332
36.7 CONTROL MEASURES 332
36.8 TRAINING 333
36.9 OSHA QUICK CARD – PROTECT YOURSELF HEAT STRESS 334

37 HEAVY EQUIPMENT 336

37.1 PURPOSE 337
37.2 KEY RESPONSIBILITIES 337
37.3 PROCEDURE 337
37.4 INSPECTION 337
37.5 DEFECTIVE EQUIPMENT 338
37.6 SAFE OPERATING REQUIREMENTS 338
37.7 HEAVY EQUIPMENT GENERAL SAFE PRACTICES 339
37.8 ROCK CRUSHERS. 341
37.9 ROCK CRUSHERS PART II 341
37.10 ROCK DRILLING OPERATIONS. 342
37.11 SAFETY PRECAUTIONS WHEN TRANSPORTING EMPLOYEES USING MACHINERY AND/OR EQUIPMENT 343
37.12 MAINTENANCE 344
37.13 TRAINING 344
37.14 RECORDS 345
37.15 DOCUMENTATION 345

38 HIGH PRESSURE WATER (HYDRO) JETTING SYSTEMS IN CONSTRUCTION 346

38.1 SCOPE 347
38.2 PURPOSE 347
38.3 RELATED DOCUMENTS 347
38.4 DEFINITIONS 348
38.5 GENERAL PRINCIPLES 350
38.6 PERSONAL PROTECTIVE CLOTHING 350
38.7 HEAD PROTECTION 350
38.8 EYE PROTECTION 350
38.9 BODY PROTECTION 351
38.10 HAND PROTECTION 351
38.11 FOOT PROTECTION 351
38.12 HEARING PROTECTION 351
38.13 RESPIRATORY PROTECTION 351
38.14 TRAINING 351
38.15 REFRESHER TRAINING 352
38.16 OPERATIONAL PROCEDURE 353
38.17 PLANNING 353
38.18 CHECKLIST 353
38.19 SYSTEM CONTROL 353
38.20 WORK AREAS 353

38.21 HOOK-UP 354
38.22 HOSES 354
38.23 FITTINGS 354
38.24 NOZZLES 354
38.25 PRE-FLUSHING 354
38.26 ELECTRICAL EQUIPMENT 354
38.27 JETTING OPERATION 354
38.28 SYSTEM PRESSURIZATION 355
38.29 REACTION FORCE 355
38.30 HAND GUN OPERATIONS 356
38.31 LANCING AND PIPE CLEANING 357
38.32 WORK STOPPAGE 357
38.33 INCIDENTS AND ACCIDENTS 358
38.34 COMMUNICATION 358
38.35 INSPECTION CARE AND MAINTENANCE 359
38.36 GENERAL 359
38.37 MAINTENANCE 359
38.38 PUMP UNIT 359
38.39 FILTERS AND STRAINERS 359
38.40 HOSE ASSEMBLIES 359
38.41 RE-END HOSE ASSEMBLIES ..... ERROR! BOOKMARK NOT DEFINED.
38.42 SERVICING 360
38.43 REPAIRS 360
38.44 TOOLS 360
38.45 COMPATIBILITY 360
38.46 MAINTENANCE RECORD 361
38.47 PERMANENT CLEANING AREAS 361

39 LADDERS & STAIRWAYS 363

39.1 GENERAL REQUIREMENTS 364
39.2 KEY RESPONSIBILITIES 364
39.3 PROCEDURE 364
39.4 INSPECTION 364
39.5 CARE 365
39.6 LADDER SAFE WORK PRACTICES 365
39.7 STAIRWAYS 366
39.8 STAIRRAILS AND HANDRAILS 366
39.9 LADDERS 367
39.10 PORTABLE LADDERS 368
39.11 FIXED LADDERS 368
39.12 CAGES FOR FIXED LADDERS 369
39.13 WELLS FOR FIXED LADDERS 369
39.14 SAFETY DEVICES AND RELATED SUPPORT SYSTEMS FOR FIXED LADDERS 369
39.15 MOUNTING LADDER SAFETY DEVICES FOR FIXED LADDERS 370
39.16 USE OF ALL LADDERS 370
39.17 STRUCTURAL DEFECTS 371
39.18 GLOSSARY 371

40 LANDSCAPING / GARDENING SAFETY 372

40.1 MATERIAL HANDLING AND BACK SAFETY 373
40.2 WOOD CHIPPER AND SHREDDER SAFETY 373
40.3 HEDGE TRIMMER SAFETY 374
40.4 POSTHOLE DIGGER SAFETY 374
40.5 HAND-HELD POSTHOLE DIGGER SAFETY 375
40.6 TRACTOR-MOUNTED POSTHOLE DIGGER SAFETY 375
40.7 SAFE OPERATING PROCEDURES FOR GARDEN TRACTORS 375
40.8 GARDEN TRACTORS WITH ROTARY MOWER ATTACHMENT 376
40.9 FRONT-END LOADER SAFETY 376
40.10 ROTARY TILLER SAFETY 377
40.11 GRASS TRIMMER AND BRUSH CUTTER SAFETY PROCEDURES 377
40.12 LANDSCAPING/LAWN MAINTENANCE WORK 378
40.13 OPERATING RIDING LAWN MOWERS 379
40.14 PULLING LOADS SAFELY 379
40.15 TRIMMING TREES SAFELY 379

41 LASER SAFETY 381

41.1 INTRODUCTION 382
41.2 MANUAL ORGANIZATION 382
41.3 SAFETY PRECAUTIONS FOR CLASS 3 AND 4 LASERS 382
41.4 CLASS 3 (EYE AND SPECULAR REFLECTION HAZARD) 382
41.5 CLASS 4 (FIRE, EYE AND SKIN HAZARD, DIFFUSE REFLECTION HAZARD) 383
41.6 LASER INVENTORY FORM 384
41.7 SECTION 1 : LASER SAFETY PROGRAM 385
41.8 INDIVIDUAL LASER USERS 385
41.9 PRINCIPAL INVESTIGATORS 385
41.10 LASER SAFETY COMMITTEE (LSC) 385
41.11 LASER SAFETY OFFICER (LSO) 385
41.12 ENVIRONMENTAL HEALTH AND SAFETY (EH&S) 386
41.13 PURCHASING 386
41.14 MEDICAL SURVEILLANCE 386
41.15 SECTION 2: CLASSIFICATION AND CONTROL 387
41.16 HAZARD CLASSIFICATION 387
41.17 THE FOUR LASER HAZARD CLASSES, ALONG WITH THEIR SUBDIVISIONS, ARE: 387
41.18 LASER HAZARD CLASSES 388
41.19 MAXIMUM PERMISSIBLE EXPOSURE 388
41.20 NOMINAL HAZARD ZONE (NHZ) 389
41.21 LASER HAZARD CONTROL MEASURES 389
41.22 CONTROL MEASURES FOR THE LASER HAZARD CLASSES 390
41.23 ENGINEERING CONTROLS 391
41.24 ADMINISTRATIVE CONTROLS 392
41.25 DEVELOPMENTAL GUIDELINES FOR A LASER SAFETY PROCEDURE 393
41.26 BEAM ALIGNMENT 393
41.27 NON-BEAM HAZARD CONSIDERATIONS 394
41.28 TRAINING 394

41.29 Authorized Operating Personnel List 395
41.30 Service Personnel Training 395
41.31 Indoor Laser Controlled Area 395
41.32 Warning Signs and Labels 395
41.33 Personal Protective Equipment 396
41.34 Factors Common to Laser Accidents 398
41.35 SECTION 3: NON-BEAM HAZARDS 398
41.36 Electrical 398
41.37 General Guidelines on Electrical Safety 399
41.38 Capacitors 400
41.39 Explosion 400
41.40 Fire 400
41.41 Optical Radiation (other than laser beam) 400
41.42 Ionizing Radiation 400
41.43 Gas Safety 401
41.44 Dyes and Solutions 401
41.45 Precautions for Handling Dyes/Solvents 403
41.46 Additional Precautions for Dye Work with Moderate ("M") Controls 404
41.47 Additional Precautions for Dye Work with Strict ("S") Controls 405
41.48 Other Considerations 406

42 MACHINE GUARDING 407

42.1 GUIDELINES FOR MACHINE SAFEGUARDING 408
42.2 Types and Points of Hazardous Machine Operations 408
42.3 Safeguarding Requirements 408
42.4 Types of Machine Safeguards 408
42.5 COMMON ELEMENTS FOR SAFEGUARDING ALL MACHINES 409
42.6 Involving the Employee 409
42.7 Conducting the Job Hazard Analysis 409
42.8 Breaking Down the Job 409
42.9 Identifying Hazards 410
42.10 Recommending Safe Procedures and Protection 410
42.11 Revising the Job Hazard Analysis 411
42.12 Cooperation and Assistance 411
42.13 Training 412
42.14 Standards That Are Common 413
42.15 SPECIFIC REQUIREMENTS FOR WOODWORKING MACHINES 414
42.16 Overview 414
42.17 Standards 414
42.18 SPECIFIC REQUIREMENTS FOR METAL WORKING MACHINES 416
42.19 Standards 416
42.20 METHODS OF MACHINE SAFEGUARDING 417
42.21 Devices 418
42.22 Safeguarding by Location/Distance 420

43 OVERHEAD CRANES 422

43.1 TRAINING 423
43.2 PERSONAL PROTECTIVE EQUIPMENT 424
43.3 GENERAL CONDUCT OF OPERATORS 424
43.4 DOS AND DON'TS 426

44 PERSONAL PROTECTIVE EQUIPMENT 428

44.1 PURPOSE 429
44.2 SCOPE 429
44.3 KEY RESPONSIBILITIES 429
44.4 PROCEDURE 430
44.5 EYE PROTECTION 430
44.6 FACE SHIELDS 431
44.7 HEAD PROTECTION 431
44.8 HEARING PROTECTION 431
44.9 HAND PROTECTION 432
44.10 FOOT PROTECTION 433
44.11 FALL PROTECTION 433
44.12 ELECTRICAL PROTECTION 433
44.13 WORKSITE HAZARD ASSESSMENT 433
44.14 MONITORING 434
44.15 TRAINING 434
44.16 RETRAINING 434
44.17 DOCUMENTATION 434

45 RESPIRATORY PROTECTION PROGRAM 435

45.1 PURPOSE 436
45.2 SCOPE 436
45.3 RESPIRATORY PROGRAM ADMINISTRATOR 436
45.4 MEDICAL REQUIREMENTS 437
45.5 MEDICAL EVALUATION PROCEDURES 437
45.6 SUPPLEMENTAL INFORMATION FOR THE PLHCP 437
45.7 MEDICAL DETERMINATION 438
45.8 ADDITIONAL MEDICAL EVALUATIONS 438
45.9 WORK SITE PROCEDURES 438
45.10 RESPIRATOR SELECTION CRITERIA 439
45.11 HAZARD IDENTIFICATION 439
45.12 CHARACTERISTICS OF HAZARDOUS OPERATION OR PROCESS 439
45.13 GASEOUS CONTAMINANTS 439
45.14 PARTICULATE CONTAMINANTS 439
45.15 SELECTION OF RESPIRATOR 440
45.16 CONCENTRATION AND TYPE OF CONTAMINANT 440
45.17 LOCATION OF HAZARDOUS AREA 440
45.18 WORKER ACTIVITY 440
45.19 TYPES OF RESPIRATORS 440
45.20 BRAND AND MODELS 441
45.21 ESTIMATE OF EXPOSURES AND CONTAMINANT INFORMATION 441

45.22 RESPIRATOR FIT TESTING 441
45.23 USER SEAL CHECK 443
45.24 POSITIVE PRESSURE CHECK 443
45.25 NEGATIVE PRESSURE CHECK 443
45.26 TEST EXERCISES 444
45.27 QUALITATIVE FIT TEST (QLFT) PROTOCOLS 445
45.28 QUANTITATIVE FIT TEST (QNFT) PROTOCOLS 446
45.29 PORTACOUNT FIT TEST REQUIREMENTS 447
45.30 PORTACOUNT TEST INSTRUMENT 447
45.31 USE, MAINTENANCE AND CARE OF RESPIRATORS 447
45.32 VOLUNTARY USE 449
45.33 WORKPLACE MONITORING 450
45.34 RECORDKEEPING 450
45.35 PROGRAM EVALUATION 450
45.36 TRAINING 451
45.37 RETRAINING 451
45.38 3A GROUP QUALITATIVE RESPIRATORY FIT TEST RECORD SHEET 452

46 RIGGING & MATERIALS HANDLING 453

46.1 PURPOSE 454
46.2 SCOPE 454
46.3 KEY RESPONSIBILITIES 454
46.4 PROCEDURE 454
46.5 RIGGING TOOLS AND DEVICES 455
46.6 JACKS 455
46.7 JACKS – INSPECTION 456
46.8 BLOCKING AND CRIBBING 457
46.9 ROLLERS 457
46.10 INCLINED PLANES 457
46.11 LEVER-OPERATED HOISTS OR COME-ALONGS 458
46.12 CHAIN HOISTS 458
46.13 CHAIN HOIST – SAFETY PRECAUTIONS 459
46.14 GRIP ACTION HOISTS OR TIRFORS 459
46.15 ELECTRIC WIRE ROPE HOISTS, ELECTRIC CHAIN HOISTS, PENDANT CRANES 460
46.16 WINCHES 461
46.17 ANCHORAGE POINTS 461
46.18 LOAD ON STRUCTURE 461
46.19 BEAMS 461
46.20 BEAM CLAMPS 462
46.21 SLINGS 462
46.22 WELDED LUGS 462
46.23 TRAINING AND EDUCATION 462

47 SAFETY/INCENTIVE PROGRAM 464

47.1 WHY HAVE A SAFETY/INCENTIVE PROGRAM? 465
47.2 SALESPEOPLE RESPOND TO INCENTIVES 465

47.3 INCENTIVES ARE THE ENGINE TO A SAFETY PROGRAM 465
47.4 TEAMWORK WORKS TO REDUCE INJURIES 465
47.5 COMPONENTS OF YOUR SAFETY/INCENTIVE PROGRAM 465
47.6 WHO PARTICIPATES IN THE PROGRAM? 466
47.7 BEFORE YOU BEGIN YOUR PROGRAM 467
47.8 BEGINNING YOUR PROGRAM 468
47.9 RUNNING THE MONTHLY AWARDS RAFFLE 468
47.10 TIPS AND HELPFUL HINTS 469

48 SANDBLASTING SAFETY & SILICA EXPOSURE 472

48.1 INSPECTION PROCEDURES 473
48.2 ABRASIVE MATERIAL TOXICITY 473
48.3 SILICOSIS IS CATEGORIZED INTO THREE TYPES: 473
48.4 HAZARDS OF STATIC ELECTRICITY AND EXPLOSIVE MIXTURES 474
48.5 SETUP PROCEDURES 474
48.6 SHUT DOWN PROCEDURES 474
48.8 PERSONAL HYGIENE 475
48.9 PRECAUTIONS AND SPECIAL SITUATIONS 475
48.10 HOSES 475
48.11 DEAD MAN SWITCHES/VALVES 475
48.12 ELECTRIC EQUIPMENT 475
48.13 BREATHING AIR FILTERS 476
48.14 HOSE AND COUPLINGS 476
48.15 SANDBLASTING IN CONFINED SPACES 476
48.16 MODIFICATION OF SANDBLASTING EQUIPMENT 476
48.17 RESPIRATORY PROTECTION EQUIPMENT GUIDELINES 476
48.18 TRAINING 477
48.19 TESTING AND CERTIFICATION 477

49 SCAFFOLDING SAFETY 478

49.1 PURPOSE 479
49.2 SCOPE 479
49.3 DEFINITIONS 479
49.4 KEY RESPONSIBILITIES 480
49.5 PROCEDURE 480
49.6 INSPECTIONS 481
49.7 MANDATORY SIGNS AND TAGS FOR DEFECTS FOUND 481
49.8 MODIFICATIONS 481
49.9 TRAINING REQUIREMENTS 482
49.10 HAZARDS ASSOCIATED WITH THE USE OF SCAFFOLDS 482
49.11 DUTIES OF A COMPETENT PERSON ASSEMBLING/DISASSEMBLING SCAFFOLDING 483

50 SLIPS, TRIPS & FALLS 485

50.2 HIGHER RISK AREAS 486

50.3 INSPECTIONS 486
50.4 HAZARD CONTROL MEASURES 487
50.5 SLIP-RESISTANT FOOTWEAR 488
50.6 FLOOR MAINTENANCE PROCEDURES 489
50.7 TRAINING 489
50.8 GENERAL HOUSEKEEPING / SAFE WORK PRACTICES 489
50.9 FLOOR MAINTENANCE PROCEDURES 489
50.10 RECORDKEEPING 489
50.11 SLIP, TRIP AND FALL HAZARDS –CHECKLIST 490
50.12 OTHERS 490
50.13 BUILDING PERIMETER / STAIRWAYS/SPECIAL AREAS 490
50.14 DESIGN GUIDLINES 490
50.15 HANDRAILS 490
50.16 STAIRWAYS 491
50.17 RAMPS 491
50.18 LOADING DOCK 491
50.19 LIGHTING 492

51 SHORT SERVICE EMPLOYEE PROGRAM 493

51.1 PURPOSE 494
51.2 IMPORTANCE 494
51.3 SCOPE 494
51.4 DEFINITIONS 494
51.5 RESPONSIBILITIES 494
51.6 SUPERVISOR RESPONSIBILITIES 495
51.7 MENTOR RESPONSIBILITIES 495
51.8 SHORT SERVICE EMPLOYEE RESPONSIBILITIES 495
51.9 HSE COORDINATOR RESPONSIBILITIES 496
51.10 ORIENTATION 496
51.11 TRAINING 496
51.12 IDENTIFICATION SYSTEM 497
51.13 DOCUMENTATION 497
51.14 SSE QUALITY ASSESSMENT AND CONTROL 497

52 TRAFFIC CONTROL FLAGGER PROCEDURES 502

52.1 GENERAL REQUIREMENTS 503
52.2 FLAGGING POSITION 503
52.3 EQUIIPMENT 503
52.4 SINGLE FLAGGER 504
52.5 TWO FLAGGERS 504
52.6 FLAGGER PROCEDURES 505

53 VEHICLES - INDUSTRIAL TRUCKS (FORKLIFTS) 506

53.1 PURPOSE 507

53.2 SCOPE 507
53.3 DEFINITIONS 507
53.4 KEY RESPONSIBILITIES 507
53.5 PROCEDURE 507
53.6 SAFETY GUARDS 508
53.7 TRAINING 508
53.8 CERTIFICATION 509
53.9 OPERATIONS 509
53.10 TRAVELING 510
53.11 LOADING 510
53.12 OPERATION OF THE TRUCK 510
53.13 MAINTENANCE AND INSPECTION OF FORKLIFTS 511

54 VEHICLES - MAINTENANCE 512

54.1 GENERAL 513
54.2 MECHANICAL HOIST/LIFTS 513
54.3 JACKS 513
54.4 OPERATION AND MAINTENANCE: 513
54.5 TIRE REPAIRS (MULTI-PIECE AND SINGLE PIECE RIM WHEELS) 514
54.6 EMPLOYEE TRAINING: 514
54.7 TIRE SERVICING EQUIPMENT 514
54.8 WHEEL COMPONENT ACCEPTABILITY 515
54.9 CONTROLLING MOVING VEHICLES/TRAFFIC 515

55 VEHICLES - DRIVING SAFETY 516

55.1 PURPOSE 517
55.2 KEY RESPONSIBILITIES 517
55.3 VEHICLE AND TRANSPORTATION RELATED 517
55.4 DRIVING SAFETY 517
55.5 EMPLOYEES DRIVING VEHICLES ARE REQUIRED TO FOLLOW SAFE DRIVING PRACTICES: 518
55.6 DRIVERS ARE TO BE PREPARED BEFORE LEAVING: 518
55.7 VEHICLE REQUIREMENTS 518
55.8 TRANSPORTATION 519
55.9 TRAFFIC CONTROL 519
55.10 ATV VEHICLES 520

56 VEHICLES - FLEET 521

56.1 RESPONSIBILITIES 522
56.2 VEHICLE OPERATOR RESPONSIBILITIES 523
56.3 DRIVER SELECTION 524
56.4 ACCIDENT INVESTIGATION 526
56.5 VEHICLE ACCIDENT REVIEW 527
56.6 DEFENSIVE DRIVING POLICY 531
56.7 DEFENSIVE DRIVING PROCEDURES 531

56.8 FOG 532
56.9 RAIN 532
56.10 ICE. 533
56.11 NIGHT DRIVING. 534

57 WELDING SAFETY PROGRAM 535

57.1 PURPOSE 536
57.2 SCOPE 536
57.3 DEFINITIONS 536
57.4 KEY RESPONSIBILITIES 536
57.5 PROCEDURE 537
57.6 FIRE PREVENTION MEASURES 537
57.7 CONFINED SPACE 538
57.8 FUMES, GASES AND DUST 539
57.9 PERSONAL PROTECTION 539
57.10 CLEANING COMPOUNDS 540
57.11 CYLINDERS 541
57.12 ARC WELDING AND CUTTING 542
57.13 RESISTANCE WELDING 542
57.14 TRANSMISSION PIPELINE 542
57.15 OXYGEN FUEL GAS WELDING AND CUTTING: 543
57.16 FIRE WATCH REQUIREMENTS 543
57.17 FIRST AID EQUIPMENT 543
57.18 TRAINING 543

58 WORKING NEAR WATER 544

58.1 PURPOSE 545
58.2 SCOPE 545
58.3 PROCEDURE 545
58.4 SLIPS, TRIPS AND FALLS 547
58.5 MACHINERY AND EQUIPMENT HAZARDS 548
58.6 HOISTS, CRANES AND DERRICKS 548
58.7 FIRE HAZARDS 549
58.8 TRAINING 550

59 WORKPLACE SECURITY PROGRAM 551

59.1 SECURITY OFFICERS 552
59.2 TRAFFIC CONTROL 552
59.3 ENFORCEMENT 552

60 WORKPLACE VIOLENCE PREVENTION PLAN 557

60.1 POLICY 558
60.2 PURPOSE 558

60.3 DEFINITIONS 558
60.4 RESPONSIBILITY 559
60.5 COMPLIANCE 559
60.6 COMMUNICATION 559
60.7 HAZARD ASSESSMENT 560
60.8 HAZARD CORRECTION 562
60.9 TRAINING AND INSTRUCTION 564
60.10 RECORDKEEPING 564
60.11 INCIDENT REPORT FORM 566

61 WORKPLACE VISITORS 567

61.1 GENERAL REQUIREMENTS 568
61.2 DEFINITIONS 568
61.3 RESPONSIBILITY FOR POLICY AND PROCEDURES 568
61.4 METHOD/PRACTICE 569
61.5 PERSONAL PROTECTIVE EQUIPMENT (PPE) 569
61.6 SAMPLE VISITORS POLICY 569
61.7 SAMPLE POINTS TO COVER 571

1 SAFETY & HEALTH POLICY

1.1 SAFETY POLICY

3A Group has established this written safety program in accordance with OSHA Regulations. It is our policy to provide a safe and healthful workplace for our employees, to observe all Local and Federal Laws and Regulations and to provide an environment as free as possible from recognized hazards. We have and will continue to maintain and implement a comprehensive employee Injury and Illness Prevention Program (IIPP).

Incident prevention is our goal. This safety program is designed to train our employees to follow safe practices and to recognize and correct unsafe working conditions. We are always working towards improvement. Safety is a part of each employee's job. Active participation and adherence to the Safety Program is a condition of each employee's employment. No employee is required to work at a job that he or she knows is not safe; therefore, we must work to make every workplace safe by detecting and correcting unsafe working conditions as well as the detection of unsafe work practices.

The main objectives of 3A Group's Safety Program are:

- To protect people (employees, and others), property, and the environment from potential hazards
- To provide a flexible, uniform policy of safety management consistent with the requirements of the government safety, health, and environmental regulations
- To establish and maintain an effective Injury and Illness Prevention Program involving all levels of the organization including managers, supervisors, and employees
- To cooperate and assist clients, customers, and others involved in the work area to maintain a safe and healthful workplace

It is our goal to eliminate accidents and injuries. Because of the many different hazards of our industry, we must maintain a constant safety awareness to achieve this goal.

If a job cannot be performed safely, it must not be done until it can be done safely.



Ernie X. Albino
President
Date: 1/4/2024

1.2 PROGRAM OBJECTIVES

The success of the **3A GROUP's SAFETY AND HEALTH PROGRAM** depends on the sincere, constant, and cooperative effort of all Plan officials, management, and employees. Their active participation and support of the safety program and implementation of its procedures will make it a success.

Annual review:

The following objectives and goals have been established to gauge the success of our program, as a minimum guideline, and will be reviewed annually by the Safety Coordinator to evaluate the Plan's safety performance:

Objectives:

1. To provide a Safety and Health Program consistent with good operating practices and maintain compliance with applicable safety and health regulations.
2. To create an attitude of safety consciousness in management, supervision, and employees: We will establish a spirit of cooperation and teamwork throughout all operations regarding all health and safety matters.

In order to accomplish these objectives, our safety program will include:

1. Preplanning for safety in every portion of the operation through the active cooperation and participation of management personnel. We will draw upon their experience and expertise to anticipate and mitigate or eliminate accident-producing situations.
2. Provide mechanical and physical safeguards to the maximum extent possible in compliance with government regulations, i.e., State or Federal OSHA, Fire Codes, etc.
3. Conduct a program of safety and health inspections to discover and correct unsafe working conditions or practices including any new processes or materials that have entered the workplace; to control health hazards; and to comply fully with the safety and health standards for each job, operation, and facility.
4. Training for all employees on good safety and health practices in current and new exposures.
5. Providing the necessary personal protective equipment and instructions for its use and care.
6. Developing and enforcing safety and health rules and requiring all employees to cooperate with these rules as a condition of employment.
7. Investigating every accident promptly to find its cause and correcting the problem in order to prevent recurrence.

Limitations:

All operations are not the same, and the policies and procedures set forth in this manual need to be tailored to the specific operations and characteristics of each operation. The successful implementation of this manual will largely **depend on the enthusiasm and common sense of each supervisor and coordinator.**

2 RESPONSIBILITY

ASSIGNMENT OF RESPONSIBILITY

2.1 EXECUTIVE MANAGEMENT

Management will oversee the administration of the safety and health program. Any member is committed to providing a safe and healthful place of employment for all employees. In addition, it is the primary goal of administrative management to comply with all applicable State, Federal, and local safety and health regulations.

Management will rely on the involvement and participation of all management representatives to fulfill their individual responsibilities in the administration, coordination, and implementation of the safety and health program.

It is without question that management would hope that all employees comply with the safety and health program voluntarily. Should any individual fail to comply with their responsibility for the safety and health of their workforce, they will be held accountable within the guidelines and restrictions of the disciplinary program outlined within this program.

2.2 COMPLIANCE

All workers, including managers and supervisors, are responsible for complying with safe and healthful work practices. Our system of ensuring that all workers comply with these practices include one or more of the following practices:

- Informing workers of the provisions of our IIPP.
- Evaluating the safety performance of all workers.
- Recognizing employees who perform safe and healthful work practices.
- Providing training to workers whose safety performance is deficient.
- Disciplining workers for failure to comply with safe and healthful work practices.

2.3 SAFETY COORDINATOR RESPONSIBILITY

The Safety Coordinator will advise management, as well as the supervisors and employees, of unsafe conditions and problems related to accident prevention and recommendations for safety and health. The Safety Coordinator will assist and advise management and supervision in how best to provide a safe work environment, necessary safety equipment needed on the job, safety training that may be required, or sample safety inspections in the interest of accident prevention. advise and train employees in the safe use of any new equipment or hazards introduced into the workplace.

The duties of the Safety Coordinator will include but are not limited to the following activities:

1. The development and administration of the safety and health program.
2. Development of methods and procedures for the implementation of the program.
3. Provide support and direction in the training and development of personnel.
4. Monitor the implementation of the program and develop means of accountability for the enforcement of the program.
5. The Safety Coordinator will publish and distribute the minutes of any safety meetings to appropriate management staff covering new dangers that may have entered the workplace.
6. Monitor the supervisor's performance in the investigation of accidents and documentation.
7. Monitor corrective action necessary to prevent recurrence.
8. Assist in the preparation of safety and health bulletins, posters, and publicity as needed

2.4 SUPERVISOR'S SAFETY RESPONSIBILITY

Each supervisor, and every employee with supervisory authority, has full responsibility for the safe actions of their employees under their control and the safe performance of machines and equipment within their operating area. The full potential of an effective safety program can only be realized when all levels of supervision cooperate in all phases of the program. The following is a list of responsibilities of each Supervisor:

1. Each supervisor must assume full responsibility and authority to enforce the provisions of this SAFETY POLICY AND PROCEDURES MANUAL AND PROGRAM DISCIPLINARY POLICIES.
2. Each supervisor must assume full responsibility for the safe and healthful working areas for his/her employees in the new safe practices of the equipment or materials.
3. Each supervisor must be fully accountable for preventable injuries, collisions, and liabilities caused by his employees.
4. Each supervisor must make sure the necessary safety equipment and protective devices for each job are available, used, and maintained properly.
5. Each supervisor must take the initiative in recommending correction of deficiencies noted in work procedures, equipment, facilities, employee job training, or attitudes that adversely affects our efforts to control accidents and injuries including new dangers.
6. Each supervisor must be firm in the enforcement of work policies by being impartial in taking disciplinary action, as defined in this IIPP against those who fail to conform. And at the same time each supervisor is encouraged to be prompt with positive recognition to those who perform well.
7. Each supervisor must ensure that each employee is fully trained for the job he is assigned to do, that each employee is familiar with published procedures and work rules, and that each employee certifies in writing that he or she understands compliance is mandatory. This is especially important when working with new equipment or hazards.
8. Each supervisor must ensure that each new employee receives, reads, and understands the company CODE OF SAFE PRACTICES. A copy of the Code, signed by the new employee, must be forwarded to the Safety Coordinator. A copy of the Code, signed by the employee, shall be given to the employee.
9. Each supervisor must continually observe and evaluate job conditions and work procedures to detect and correct any unsafe conditions and/or unsafe work practices.
10. Each supervisor should periodically meet personally with each employee to review and discuss safety policies and procedures that pertain to their jobs and the operations.
11. Should an employee have a work-related injury or illness, it is the responsibility of the supervisor to investigate the claim and provide the necessary "Employee Report of Injury" form to the employee when informed of the injury or illness.
12. Each supervisor must fully cooperate with the Safety Coordinator, Insurance Company Safety Personnel, and OSHA Compliance Officers in shutting down operations considered to be an imminent danger to employees, or in removing personnel from hazardous jobs when they are not wearing or using prescribed protective equipment.
13. Each supervisor must attend any management Safety Meetings when held and participate in the promotion of safety awareness.
14. Each supervisor should encourage their employees to participate in the recognition, correction, or reporting of any safety or health problems without fear of reprisal.

NOTE: In the absence of any supervisors, the president and management will administer the above responsibilities.

2.5 EMPLOYEE RESPONSIBILITIES

All employees are required, as a condition of employment, to develop and exercise safe work habits in the course of their work to prevent injuries to themselves, their fellow workers, and conserve material resources and time.

The items listed below are part of the employee responsibilities as outlined by OSHA. However, they are only minimum guidelines. It is important that each employee assist in the safety program on a voluntary basis. Failure to do so will mean that disciplinary guidelines will be implemented.

1. Promptly report to your supervisor all accidents, near misses and injuries occurring within the course of their employment.
2. Cooperate with and assist in investigation of accidents to identify correctable cause and to prevent reoccurrence.
3. Promptly report to their supervisor all unsafe actions, practices, or conditions they observe.
4. Become familiar with and observe approved safe work procedures during their work activities, especially when working with any new dangers entering the workplace.
5. Always keep work areas clean and orderly.
6. Avoid engaging in any horseplay and avoid distracting others.
7. Obey all safety rules and follow published work instructions.
8. Wear protective equipment when working in hazardous areas or jobs, and/or as required by supervision.
9. Inspect all equipment prior to use and report any unsafe conditions to your supervisor immediately.
10. Submit any suggestions for accident prevention, without fear of reprisal, which may assist in improved working conditions or work practices to your immediate supervisor. Pay special attention when working with any new procedures, equipment, chemicals or jobs that are new to the operation of the company.

3 DISCIPLINARY POLICY

DISCIPLINARY POLICY

3.1 INTRODUCTION

This policy is intended to provide rules and guidelines for administering disciplinary action to employees, who violate safety rules and procedures or who, by their record or actions, indicate a disregard for safety.

Safety related disciplinary action will be administered through the Safety Coordinator.

3.2 PURPOSE

The purpose of this policy is to enhance safety awareness in all employees, and to motivate them to perform their work safely, in accordance with established safety rules, procedures, and instructions.

3.3 RESPONSIBILITIES

It is the responsibility of each, and every person employed by 3A Group to work in a safe and efficient manner. The safety system provides guidelines and procedures to help ensure that safe work practices are observed. If any employee violates provisions of the 3A Group safety system or works in a manner that threatens his own health and safety or the health and safety of the employees around him, he will be subject to disciplinary action, up to and including termination of employment.

The safety manager, operations managers, supervisors and foremen hold positions responsible for enforcing the safety system and for issuing disciplinary action as required by this section of the safety manual.

3A Group is committed to safety and senior management holds all supervisory staff responsible and accountable for safety within their respective areas.

Physical inspections by 3A Group officials or insurance representatives shall occur. Company officials must conduct periodic inspections of work areas to ensure compliance with safety rules and policies.

3.4 REQUIREMENTS

Safety is a core value and a condition of employment at 3A Group. The following actions constitute a safety violation:

- Not following verbal or written safety procedures, guideline or rules of 3A Group or our clients
- Horse play, failure to wear required PPE, and or abuse of PPE
- Being under the influence of drugs or alcohol during work
- Bringing weapons on the job site
- Failure to report incidents or injuries
- Attempted or actual physical force to cause injury, threatening statements or other actions to cause an employee to feel they are at risk of injury.

3.5 CIRCUMSTANCES LEADING TO DISCIPLINARY ACTION

Listed below are conditions that could be considered for disciplinary action under the provisions of this policy:

1. Violation of a supervisor's safety related instructions.
2. Violation of established safety rules and/or procedures.
3. Violation of instructions on posted safety related signs.
4. Obvious unsafe actions as may be indicated by the improper use of equipment, horseplay or practical joking, poor housekeeping practices, etc.
5. Lack of concern toward safety instructions and programs.

The above circumstances are not intended to be all-inclusive. Any other circumstances that indicate an employee's disregard for their own safety, the safety of others, or the neglect of proper care for equipment, may also result in disciplinary action under the provisions of this policy.

3.6 PROCEDURE:

1. This program is effective as of the revision date of this Safety Manual.
2. The twelve (12) month period is a continuous period.
3. Whenever a supervisor, or other member of management observes an employee committing an unsafe act or creating or allowing a hazardous condition to exist, a Safety Violation Notice should be completed. A copy of the violation form should be retained in the employee's personnel folder, and each time a new violation form is received, the employee's file will be reviewed for previous violations. Where previous violations appear during a 12-month period, the sanctions listed below will be implemented.
4. The Safety Coordinator will investigate any violation of the safety procedures and any accident where the cause is not clear. Their recommendation as to cause, preventable or non-preventable, will be made to the management.
5. If the employee feels they have been treated unjustly, they will be allowed to appeal the decision. The appeal will be reviewed by the Safety Coordinator, and the employee's supervisor.

The following procedures will be following after issuing a safety violation notice:

- The first offense will result in a verbal warning. The employee will be met with and informed that he or she is being issued a verbal warning and informed of the infraction, rule or procedure that was violated and the corrective action to be taken. Proper procedure will be discussed to clarify the situation and allow the employee to correct his behavior. The person making this verbal warning will inform the operations manager of his branch that this warning has been issued so the operations manager may make a written record of the warning.
- The second offense will result in a written reprimand and additional training. The reprimand will be written on the standard Safety Reprimand form (see below) and will describe the unsafe activity or behavior that needs correction. Refer to the section of the safety program that was violated (when applicable). The employee receiving the reprimand has the right to submit a written rebuttal to the reprimand. The employee must sign the reprimand. The reprimand and any rebuttal will become a part of the employee's employment records.
- The third offense will result in another written reprimand (using the standard form) and punitive layoff, the duration of which will be decided at the time of the disciplinary action and is to be weighed by the severity of the offense. Again, the employee may submit a written rebuttal to the reprimand. The employee must sign the reprimand. The reprimand and any rebuttal will become a part of the employee's employment records.

- The fourth offense may result in the termination of the offending employee.

The above actions are to be placed against a sliding twelve-month scale. If an employee receives a reprimand on January 1 and commits his fourth offense on or before December 31st of the same year, he is terminated. The employee does not have to commit the same violation each time to receive further reprimands. He could receive a verbal reprimand for smoking in a no smoking area on his first offense and get a written reprimand for his second offense which might be a forklift violation and yet another for failing to use proper personal protective equipment. He will be terminated upon his fourth offense in the last twelve months.

In the case of serious safety violations such as by-passing guarding or other unsafe activities that put the violator or other employees at serious risk of injury, the manager may move the violator directly to the second or third warning level. If the violator's actions put him or others at risk of death or dismemberment the manager has the option to terminate him with no further warning.

3.7 SUPERVISION SANCTIONS:

The above sanctions also apply to supervision who will also be subject to disciplinary action: when their employee receives some form of disciplinary action as noted above, or who demonstrate negligence in their implementation or enforcement of written policy. Any member of supervision may be subject to these disciplinary guidelines as an individual or as a member of management.

3.8 SUMMARY

The above disciplinary actions are a minimal guideline. Depending on the circumstances or the severity of the violation or incident, any level of discipline, which is most appropriate for the time and action up to, and including termination, employee or supervision, may be implemented.

3.9 SUPERVISORS' DISCIPLINARY ACTION

As a member of management, you will be in the position to enforce the Safety Policies in this manual.

Many of us consider the acts of Discipline and Enforcement difficult and uncomfortable to administer. However, you must remember that when it comes to a broken bone, a severed limb, or the death of our co-workers, it is impossible to place a value on these things.

The first definition of "Discipline" in the dictionary is "Instruction". Another definition is "Training that corrects, molds, and perfects".

The following statement was taken from the Dow Chemical Safety and Health Program. It will be the foundation of our Disciplinary Policy:

"ASKING ME TO OVERLOOK A SIMPLE SAFETY VIOLATION WOULD BE ASKING ME TO COMPROMISE MY ENTIRE ATTITUDE TOWARD THE VALUE OF ONE'S LIFE."

4 SAFETY ORIENTATION

SAFETY ORIENTATION

4.1 NEW EMPLOYEE ORIENTATION

1. All new workers will receive safety orientation, no later than the first workday on the job.
2. The employee's Supervisor will provide the orientation. The orientation will be documented on the "Orientation Checklist for New Employees" form.
3. Each person assigned to a job must sign the indoctrination form upon receiving instruction from the supervisor.
4. The responsible supervisor must also sign the forms signifying the employee was given orientation.
5. In addition to orientation material made available, each supervisor must explain the safety criteria for individual jobs.
6. A signed copy of the new employee orientation form will be maintained at the office.

4.2 NEW EMPLOYEE CHECKLIST INSTRUCTIONS

The supervisor should complete the following form indicating they have explained the Safety policy, programs, procedures, and requirements as indicated, to the new employee prior to the employee beginning their job assignment.

The enclosed form is used as a matter of personnel policies and procedures and is part of the overall program.

By using this checklist, you ensure the new employee is properly instructed in the safety rules that apply to their job assignment.

4.3 EMPLOYEE SAFETY ORIENTATION GUIDELINE

Each supervisor is responsible to discuss with each new employee the following items in their entirety. Each of the following elements should be reviewed with each employee personally by either reading or general discussion, unless other means are available.

4.4 SAFETY POLICY

Located in the front of the Safety Manual, review with each employee.

4.5 EMPLOYEE RESPONSIBILITIES FOR SAFETY

All employees are required, as a condition of employment and as outlined in the OSHA regulations, to develop and exercise safe work habits in the course of their work to prevent injuries to themselves and their fellow workers. It is the policy of 3A Group that all employees shall:

- Immediately report to their supervisor, all accidents, near misses and injuries, no matter how slight occurring within the course of their employment.
- Cooperate with and assist in investigation of accidents to identify correctable causes and to prevent recurrence.
- Promptly report to their supervisor all unsafe actions, practices, or conditions they observe.
- Become familiar with and observe approved safe work procedures during their work activities.
- Always keep work areas clean and orderly.
- Avoid engaging in any horseplay and avoid distracting others.

- Obey all safety rules and follow published work instructions.
- Wear personal protective equipment when working in hazardous operations area, and/or as required by the supervisor.
- Inspect all equipment prior to use and report any unsafe conditions to their immediate supervisor.
- Submit any suggestions for accident prevention, without fear of reprisal, to their immediate supervisor, which may assist in improved working conditions or work practices.

4.6 EMPLOYEE SAFETY ORIENTATION GUIDELINE

4.6.1 USE OF EQUIPMENT

We have established special guidelines for the use of special equipment. Only trained and authorized employees are permitted to operate this equipment.

4.6.2 FIRST AID EQUIPMENT

First Aid supplies are kept in the office. Should you have an injury, no matter how slight, report it to your supervisor immediately. With minor injuries it is important to reduce the potential of infection or more serious complications by reporting the incident immediately. First Aid can then be given to minimize any serious problem.

4.6.3 FIRST AID RESPONDERS

At least one person, designated by management, will be on duty during business hours who has been first aid trained. All employees are also encouraged to become first aid trained as a benefit to themselves and their families.

4.6.4 EMPLOYEE CONDUCT

The company has established and endorsed various rules and regulations for the safety of their employees. However, sometimes it is necessary to impose sanctions or restrictions on an employee who is not following proper work procedures, safety procedures or other elements of stated policy.

Each supervisor is held accountable for their employee's proper work performance. Thus, it is the supervisor's responsibility to hold the employee accountable for their performance.

Each employee's voluntary compliance with these rules will assist in providing a safe and productive worksite. On the other hand, the rules and regulations must and will be strictly enforced.

4.6.5 ALCOHOL AND DRUG ABUSE POLICY

The organization has established an "alcohol and non-prescription drug abuse policy" for the protection of its workforce and resources. No one is permitted on a site who may be using, selling, or handling alcohol or drugs. Employees suspected of being "under the influence" are subject to search and screening.

4.6.6 HAZARD COMMUNICATION

The use of hazardous chemicals may be a part of some jobs. On any job where it is known to have hazardous chemicals or employees are required to work with hazardous chemicals, the employees will be instructed in the "Hazard Communication Training" program. The purpose of the program is to inform and train employees how to work safely with hazardous chemicals.

4.6.7 SANITATION AND PERSONAL HYGIENE

Employees are encouraged to maintain good personal hygiene, especially after handling hazardous chemicals, hazardous wastes, and other potentially harmful material. Washing facilities are available in various areas for cleaning your hands. Personal protective equipment and gloves may reduce the exposure and must be worn when required.

4.6.8 SPECIAL CHEMICAL HAZARDS

Certain other chemicals used on the job are "extremely hazardous". Most employees will not be exposed to them during normal operations or work. However, your supervisor will provide you with special information to safely handle these chemicals should it be necessary that an employee work with the chemicals or on equipment that is exposed to them.

4.6.9 SPECIAL TRAINING

Special safety training in the use of equipment, new procedures, new equipment, or other items may be required periodically. Any employees involved in these jobs or equipment use will be required to complete this special training prior to beginning the job.

4.6.10 PERSONAL PROTECTIVE EQUIPMENT

Safety Glasses: It is a company policy that all employees wear safety glasses when working with chemicals or tools.

Other types of personal protective equipment will be assigned as the job may require.

4.6.11 SPECIAL CLOTHING

When working with some chemicals on some jobs, it requires that employees wear protective clothing. This may include long sleeve shirts, wrist and arm gauntlets, and gloves. The company will normally provide these items. Your supervisor will inform you of the individual requirements for the job when the occasion arises. On most jobs, employees not wearing any shirt or wearing a T type shirt will not be allowed to work.

4.6.12 SAFETY RULES

(Read Safety Rules that apply to the job and employee. - See Procedures above).

4.7 EMPLOYMENT DOCUMENTS

The new immigration law of 1986 requires that all employees hired after November 6, 1986, must provide proof of work eligibility. Applicants will be required to submit originals of one document from Group "A" or, one document from both Group "B" and Group "C".

GROUP A

- ✓ U. S. PASSPORT
- ✓ CERTIFICATE OF U. S. CITIZENSHIP
- ✓ UNEXPIRED FOREIGN PASSPORT WITH UNEXPIRED WORK AUTHORIZATION ENDORSEMENT OF THE ATTORNEY GENERAL 1-551 ALIEN REGISTRATION RECEIPT CARD WITH PHOTOGRAPH.

GROUP B

- ✓ SOCIAL SECURITY CARD (ABSENT NO-WORK ENDORSEMENT)
- ✓ U. S. BIRTH CERTIFICATE OR CERTIFICATE ESTABLISHING U. S. SAFETYITY AT BIRTH.
- ✓ OTHER DOCUMENT APPROVED BY ATTORNEY GENERAL AUTHORIZING EMPLOYMENT BY THE APPLICANT IN THE U. S.

GROUP C

- ✓ STATE DRIVER'S LICENSE
- ✓ OTHER FORM OF STATE OR LOCAL GOVERNMENT I. D. WITH PHOTOGRAPH.
- ✓ OTHER DOCUMENT APPROVED BY THE ATTORNEY GENERAL AUTHORIZING EMPLOYMENT IN THE U. S.

4.8 ORIENTATION CHECKLIST FOR NEW EMPLOYEES

1.____ I-9 Form for employment completed and signed (Proof of citizenship on file, per attached requirements.) (Office Personnel also)
2.____ W-4 Form completed
3.____ Social Security Card presented. (Maintain copy in employee file)
4.____ Drivers' License (if applicable, presented and expiration date checked and written on application)
5.____ References checked as on application. (All Personnel)
6.____ Reviewed job hours and starting time.
7.____ Overtime policy explained, as applicable.
8.____ Starting wages and explain Company paydays.
9.____ Wages adjustments explained (As applicable).
10.____ Holidays, sick time and vacation explained. (As applicable)
11.____ Smoking policy reviewed; designated areas reviewed.
12.____ Parking explained - on site or other.
13.____ Meals and break periods explained.
14.____ Explained where employee's restrooms are located.
15.____ Probationary period explained, as applicable.
16.____ Informed of labor laws (as posted)

4.9 SAFETY & HEALTH PROGRAM

1. ___ Discussed the company safety program and received copy of applicable safety rules for the job or customer rules.
2. ____Reviewed and discussed the Company Safety & Health
3. ____Procedures Manual and applicable items for employee.
    a. ___ Safety & Health Policy
    b. ___ "Code of Safe Practices"
    c. ___ Disciplinary Policy & Enforcement Practices
    d. ___ Accident Reporting Procedures
    e. ___ Reporting Unsafe Conditions
    f. ___ Proper Lifting Techniques
    g. ___ Special Protective Equipment Requirements

4. ____Shown location of fire alarms, fire extinguishers, fire exits, and evacuation plan.
5. ____Discussed job training requirements and how assignments are made, reviewed job description and trained for this job (copy attached)
6. ____Provided safety glasses, gloves, etc. if required.
7. ____Discussed proper clothing for the job.
8. ____Given instructions regarding:
    a. ___ Personal appearance.
    b. ___ Proper Footwear.

I have discussed and understood all above statements and instructions.

DATE:_____ SUPERVISOR:_____

EMPLOYEE: _____

copies to: office (original) - supervisor - safety coordinator

4.10 EMPLOYEE ACKNOWLEDGEMENT FORM

CODE OF SAFE PRACTICES

I _____(PRINT) hereby acknowledge that I have received, read, and understood the "Code of Safe Practices" for 3A Group**.**

I agree to conform to all practices, safety rules, and regulations relating to safe work performance.

I understand that my failure to follow these safety procedures will result in disciplinary action up to and including discharge.

I further understand that:

1. It is my responsibility to report all unsafe conditions or violations of the Code of Safe Practices to my supervisor or other management personnel in order to minimize the potential of injury to my fellow workers.

2. I am encouraged to inform my immediate superior of any hazards on the job without fear of reprisal, and that should my assistance create any such action or related intimidation, that I am encouraged to contact the Safety Coordinator or management by phone or mail.

_____ _____
Signature of Employee Date

_____ _____
Signature of Supervisor Date

copies to office (original), safety coordinator, and employee

4.11 EMPLOYEE RECOGNITION

4.11.1 ENCOURAGE POSITIVE PERFORMANCE

Monitoring performance is a constant reminder that safety should be always practiced. Proper safety practices will result in an easier job, and better working conditions for everyone. Each supervisor, as an example setter, is held responsible for monitoring performance.

Whenever an unsafe practice is observed, it must be immediately brought to the attention of the employee. On the other hand, when an employee is observed trying to approach a problem in a safe manner, a gesture of recognition and approval should be immediately made.

Performance is monitored to encourage safety consciousness and to convince employees that unsafe working habits will not be tolerated. Where a continued failure to comply with safety procedures is observed, the employee **will** receive a written warning from their supervisor according to written policy. See the disciplinary policy for establishing corrective action.

4.11.2 SAFETY AWARDS AND RECOGNITION

3A Group will periodically conduct incentive programs to recognize the significant contributions that have a positive impact on the safety and health program. Awards will be established for individual accomplishments, for the recognition of groups of employees, or by job location. These programs are designed to stimulate interest and recognize special achievement and personal contributions to the safety program and concepts.

5 ACCIDENT/LOSS REPORTING PROCEDURES

ACCIDENT/LOSS REPORTING PROGRAM

5.1 PURPOSE

To establish a standard system for the notification and reporting of accidents involving occupational injury or illness, property damage of public or private property.

5.2 OBJECTIVES

1. To obtain the information necessary for the local, state and federal agencies and the insurance carriers.
2. To inform management of accidents resulting in serious employee injury or illness and property damage.

5.3 PROCEDURE

GENERAL REQUIREMENTS

Timely reporting, within 8 hours of any accident or loss is mandatory. The supervisor must thoroughly investigate the cause of each accident or loss occurring within their area of operation and record their findings and recommendations on the appropriate reporting form. The office copy should be critically reviewed and signed by the Safety Coordinator, where applicable. A copy may be retained in the supervisor's file for their record.

REPORTING EMPLOYEE INJURIES

1. Regardless of the degree of injury, the employee must report to his supervisor or in writing on the State "Employee's Claim for Worker's Compensation Benefits" (DWC - 1) that he was injured. **THIS FORM MUST BE COMPLETED WITHIN 24 HOURS AS REQUIRED BY YOUR STATE OF OPERATION**.

   First aid/medical treatment will be provided or arranged for by the supervisor. If necessary, the injured employee will be taken to the designated medical facility as applicable.

2. The supervisor must complete the form "ACCIDENT INVESTIGATION REPORT" within 24 hours. Once the supervisor is told by the employee or is aware of the work-related injury, **IT MUST BE REPORTED TO THE OFFICE WITHIN 24 HOURS EVEN IF THEY THINK THE INJURY**:

   a. Is minor.
   b. Or might have been caused by unsafe actions such as inattention.
   c. Or negligence.
   d. Or aggravated an old injury.
   e. Or is not work-related.

If the supervisor thinks any of the four above items are applicable, it should be stated on the "report" forms. **AT NO TIME SHOULD A SUPERVISOR WITHHOLD OR HINDER THE FILING OF AN EMPLOYEE INJURY REPORT TO THE OFFICE.**

1. A SUPERVISOR MUST **NOT** ALLOW AN EMPLOYEE TO RETURN TO WORK AFTER AN OCCUPATIONAL INJURY OR OCCUPATIONAL ILLNESS UNLESS THEY RECEIVE A SIGNED AUTHORIZATION TO RETURN TO

WORK FROM THE TREATING PHYSICIAN. IF THE INJURED EMPLOYEE HAS BEEN OFF WORK MORE THAN 30 CALENDAR DAYS AND IS IN A NON-SEDENTARY POSITION, HE/SHE WILL BE REQUIRED TO TAKE A SPECIAL PHYSICAL EXAM.

Upon their return to work, we will make every attempt to put employees to work within the limitations specified by the treating physician.

2. BECAUSE OF THE COMPLEXITY OF WORKER'S COMPENSATION LAWS, RULES, AND PROCEDURES, THE SUPERVISOR SHOULD NOT ATTEMPT TO ANSWER ANY QUESTIONS ABOUT WORKERS' COMPENSATION INSURANCE. REFER THE INJURED EMPLOYEE TO THE OFFICE.

5.4 SERIOUS EMERGENCY REPORTING

Serious emergencies are accidents that are life threatening or require more than routine first aid. If it is necessary to call for emergency medical service and transportation outside of the facility, by dialing the number **911**, tell them you have a **serious accident.** Describe the nature of the accident, i.e. burn, fall, electrical shock, cut, etc.

Tell them the **accident location.** Give them directions to the accident site, especially the specific location. If the location is difficult to find, send an employee to meet and direct emergency vehicles.

Insist on an immediate response. Note the time you called and with whom you talked. Make sure transportation for the injured to a doctor or a hospital is immediately dispatched. Give the doctor and/or hospital notice that the injured is in transit to them.

Attend to the injured. Make sure that there is no chance of further injury to the injured employee or anyone else. Provide immediate first aid as necessary until the emergency personnel arrive.

Clear and secure the area so that emergency treatment can be administered to the employee and there is clear access to the accident site for emergency vehicles and personnel.

After the injured has been removed from the area, **rope off the area** and do not allow access to anyone until completion of all investigations, and authorization to proceed by the Safety Coordinator.

Report to the office any sudden severe illness or injury occurring to employees during regular hours requiring **EMERGENCY MEDICAL TREATMENT** (such as possible heart attacks, strokes, seizures, fainting, serious injuries, etc.). These must be reported to the Safety Coordinator and Personnel Department **by telephone** as soon as possible. They should then contact the family of the injured employee.

OSHA NOTIFICATION. Serious injuries must also be reported to OSHA **within 24 hours**. Serious injury is defined as "any injury or illness which requires inpatient hospitalization for a period in excess of 24 hours for other than medical observation or in which an employee suffers loss of any member of the body or any serious degree of permanent disfigurement". In the event of death, the incident shall be reported to OSHA **within 8 hours**.

5.5 HANDLING NON-SERIOUS ACCIDENTS

Provide first aid for the injured employee. First aid supplies are available in the kits provided in the office.

Arrange for the employee to be seen by a doctor if there is any question that the first aid treatment may not be adequate. If the employee receives medical treatment he may not return to work unless he has a release from the doctor or treatment center.

All non-serious accidents and injuries are warning signs that a serious accident may occur. Report all non-serious accidents **(see ACCIDENT REPORTING SECTION**) as soon as possible to the Safety Coordinator and the Office, but don't delay in taking corrective action at the site.

5.6 FIRST AID TREATMENT

The priority in the treatment of an injured employee is to obtain proper medical attention. In an extreme emergency, immediate first aid may be necessary.

Normally we send our employees to a medical facility where first aid treatment is readily available. If there may be a delay in getting to a medical facility or that there is not one reasonably accessible to provide treatment to the injured, a person with a valid certificate in **FIRST AID** training must be available at the site.

Each shift must have always at least one supervisor on site who is trained in First Aid. First Aid Training should be American Red Cross or American Heart Association, or their equivalent. Employees are encouraged to be CPR trained also.

5.7 PROPERTY/EQUIPMENT DAMAGE

When property or equipment, including vehicles, is damaged or stolen, it must be reported on the proper report form provided by our insurance company. A formal investigation should follow within **24 hours**. The "ACCIDENT INVESTIGATION REPORT" should be used and filled out immediately.

5.8 VEHICLE ACCIDENT REPORTING

1. When an employee is involved in a collision while operating a company or personal vehicle during business hours, he/she must call the police to the scene for investigation. Supervision must not interfere with police investigation.
2. The supervisor of the employee must also investigate the collision and complete the appropriate **"ACCIDENT INVESTIGATION REPORT"** within **24 hours**.
3. Employees, supervisors and Safety Coordinator must follow the Vehicle Policy.

5.9 CITIZEN/PUBLIC ACCIDENTS (NON-AUTO)

Public accidents must be reported on blue "General Liability Accident Report" (long form) and forwarded to the Safety Coordinator within **24 hours** of the time the incident occurred. The "Accident Investigation Report" form should also be completed within **24 hours**. However, when there is a serious injury, it must be reported by telephone immediately to the Office and followed by the reports listed above.

5.10 ACCIDENT INVESTIGATION REPORT

This report is to be used for the reporting or investigation of serious employee accidents/injuries, accidents involving property damage, or vehicle accidents, and any others.

5.11 RECORDKEEPING

All accidents or injuries of any type must be recorded, logged, and filed in their respective office and personnel folders as may be applicable.

5.12 EMPLOYEE INJURIES

5.12.1 OSHA LOG OF RECORDABLE INJURIES

When an injury occurs, which is more than a first aid injury (See definition below), this would be classified as a "recordable injury" by OSHA definition. This log of injuries will be maintained by the Office on the OSHA log (see OSHA Record-keeping Guidelines).

(NOTE: A "FIRST AID" injury is one which only minor injuries occur, and which can normally be handled by a trained first aid person. This also includes initial treatment and a one-time follow-up visit even if treated by a physician. However, once prescription medication is provided or stitches are required, the injury is then required to be classified as a "recordable injury" per OSHA.)

5.12.2 FIRST REPORT OF INJURY

A copy of the State "First Report of Injury" form must be attached to the Supervisor's "Accident Investigation Report" for all accidents entered on the OSHA log by the office and must be retained for at least 5 years.

5.13 VEHICLE, PROPERTY DAMAGE, AND PUBLIC LIABILITY ACCIDENT REPORTS

All other accidents and injuries reported to the office will be kept in separate accident files in order to maintain and monitor the accident history for each type category, I.E. vehicle accidents, customer property damage, and public liability. The files will identify the persons involved, i.e., driver, etc., site/location, supervisor, a short description of the accident, injury, time, date, and estimated cost.

6 ACCIDENT INVESTIGATION

ACCIDENT INVESTIGATION

6.1 ACCIDENT / INJURY INVESTIGATION

The employee's supervisor and Safety Manager are responsible for performing an investigation to determine and correct the cause(s) of the incident. Specific procedures that can be used to investigate workplace accidents and hazardous substance exposures include:

- Interviewing injured personnel and witnesses
- Examining the injured employee's workstation for causative factors
- Reviewing established procedures to ensure they are adequate and were followed
- Reviewing training records of affected employees
- Determining all contributing causes to the accident
- Taking corrective actions to prevent the accident/exposure from reoccurring
- Recording the findings, corrective actions taken, and the date the corrective actions were taken.

Investigations reports will include recommendations for corrective action(s) if necessary, to prevent the accident or exposure from reoccurring. 3A Group will review investigations of occupational accidents and causes of incidents resulting in occupational injury, occupational illness, or exposure to hazardous substances and, where appropriate, submit suggestions to management for the prevention of future incidents.

ALL ACCIDENTS MUST BE INVESTIGATED BY THE SUPERVISOR OR SAFETY COORDINATOR

A supervisor's Accident Investigation Report form must be filled out, signed by the supervisor, and then sent to the Safety Coordinator for each and every accident.

The main purpose of the investigation is not to determine who was at fault, but to understand what occurred and how to prevent it from happening again.

A sample copy of the Supervisor's Accident Investigation Report has been included in this manual. Additional copies are available from the Safety Coordinator or the office.

6.2 EMPLOYEE ACCIDENTS

All accidents regardless of whether they result in injury should be thoroughly investigated by the employee's immediate Supervisor and reported to the Office within **24 hours.** This should include "near miss" accidents. The investigation should be extensive enough to allow the Supervisor to suggest practical corrective action.

A written report should be made which includes:

1. Injured employee's statement concerning the accident.
2. Statements from other witnesses.
3. Complete description of the accident including the type of work in which the employee was involved.
4. Evaluation of unsafe conditions and acts.
5. Recommendations for action to prevent similar accidents.

6.3 DEFINITIONS

Industrial Injury:
An injury arising out of and during employment.

Occupational Illness:
A disease caused by specific hazardous conditions or materials when there is a direct relationship between the conditions under which the work is performed and the occupational disease.

PROCEDURES FOR INVESTIGATING AN ACCIDENT/LOSS

6.4 CHECK THE SCENE

1. Begin where the accident occurred. The first step is to carefully examine where the injury occurred.
2. Reconstruct as much as possible the chain of events leading up to the injury and attempt to determine the single event that caused the injury. Have the employee tell you what happened. If necessary, have him/her show you up to the point where the injury occurred. DO NOT let them do the part of the incident that resulted in the injury.
3. Draw a diagram of the location if it will be helpful in arriving at a conclusion.
4. Sketch in machinery, equipment and any other nearby physical objects, together with the places where witnesses were standing.

6.5 WRITE IT DOWN

1. Make notes on all facts that may relate to the cause of the injury. As an example: employee had complained of dizziness or employee had not used proper equipment, etc.
2. Write down any procedure used, i.e. unsafe act, or unsafe procedure, etc.
3. Write down any unsafe conditions in the work area, i.e. defective tools or faulty equipment noted.
4. Write down other items such as: the time of your investigation, the lighting conditions, the weather conditions, if pertinent a description of supplementary evidence, and conversations having a bearing on the case.

6.6 COLLECT THE EVIDENCE

If an injury or near miss occurs when machine parts or structures fail, it is essential to determine what failed and why. This can frequently be done without laboratory analysis and corrective action can be initiated without great expense. If, however, a detailed study is determined to be essential, then all components must be collected and submitted for study immediately if cost of analysis is economically feasible.

6.7 INTERVIEW WITNESS

It is important to interview witnesses at the scene or as soon thereafter as possible. Make brief notes and identify who gave the information.

6.8 INTERVIEW THE VICTIM

1. Timing is important. If the injury is minor, the interview should be made as soon as the investigation of the scene and a review of the medical report are complete.
2. If the injury is serious, selecting the right time is a judgment factor. Too soon afterward and the victim may be confused and inaccurate; waiting too long may cause them to be cautious and evasive. Let the employee tell the story as they wish without actual interrogation, but a complete picture should be encouraged. The

interview must be complete, and it may be necessary to question the employee or witnesses several times to verify information and stories.

6.9 WEIGH THE EVIDENCE

1. It is essential to eliminate any inconsistencies in the testimony of the injured or witnesses even if further questioning is required.
2. When assembled, all facts should be reviewed for completeness before submission on the "Accident Investigation Report" Form to the Office.

ACCIDENT INVESTIGATION REPORT

EMPLOYEE INJURY OR ILLNESS	DATE	FLEET OR PROPERTY DAMAGE		
NAME		PROPERTY DAMAGED		
OCCUPATION	PART OF BODY	ESTIMATED COST		ACTUAL COST
NATURE OF INJURY OR ILLNESS		NATURE OF DAMAGE		VEHICLE SPEED
OBJECT/ EQUIPMENT/ ELEMENT INFLICTING INJURY OR ILLNESS		OBJECT/ EQUIPMENT INFLICTING DAMAGE		REGISTRATION NO.
PERSON WITH MOST CONTROL OF OBJECT/ EQUIPMENT/ ETC.		PERSON WITH MOST CONTROL - INFLICTING DAMAGE		
JOB OR ACTIVITY AT TIME OF ACCIDENT		DEPARTMENT		
EXACT LOCATION		DATE OF OCCUR.	TIME AM/PM	DATE REPORTED

DESCRIBE CLEARLY HOW THE ACCIDENT OCCURRED (WHAT HAPPENED?) FOR ALL MOTOR VEHICLE ACCIDENTS, DRAW A DIAGRAM ON THE OTHER SIDE

THE CAUSE OF THE ACCIDENT: WHAT ACTS, FAILURE TO ACT, AND / OR CONDITIONS CONTRIBUTED MOST DIRECTLY TO THIS ACCIDENT? DESCRIBE UNSAFE ACTS AND/OR UNSAFE CONDITIONS

EXPLAIN SPECIFICALLY WHY THESE ACTS AND/OR CONDITIONS EXISTED?

LOSS SEVERITY POTENTIAL			PROBABLE RECURRENCE RATE		
☐ MINOR	☐ SERIOUS	☐ MINOR	☐ FREQUENT	☐ OCCASIONAL	☐ RARE

WHAT ACTION HAS OR WILL BE TAKEN TO PREVENT RECURRENCE? (LIST ITEMS, THEN PLACE AND "X" BY ITEMS COMPLETED AND DATE)

SUPERVISOR OF INJURED PERSON	DATE	REVIEWED BY MANAGER	DATE

7 HAZARD IDENTIFICATION & ASSESMENT

SAFETY INSPECTIONS/HAZARD CORRECTION PROCEDURES

7.1 PURPOSE

- To provide guidelines for identifying, assessing and controlling workplace hazards.
- To ensure the potential hazards of new processes and materials are identified before they are introduced into the workplace.
- To identify the jobs/tasks which require risk assessment.

7.2 KEY RESPONSIBILITIES

As specified within this program.

3A Group must assess a work site and identify existing or potential hazards before work begins at the work site or prior to the construction of a new work site

7.3 HAZARD AND RISK IDENTIFICATION

The hazard identification process is used for routine and non-routine activities as well as new processes, changes in operation, products or services as applicable.

The Safety Manager shall conduct a baseline worksite hazard assessment which is a formal process in place to identify the various tasks that are to be performed and the accompanying identified potential hazards. The results are included in a report of the results of the hazard assessment and the methods used to control or eliminate the hazards identified. The hazard assessment report must be signed and have the date on it.

Inputs into the baseline hazard identification include, but are not limited to:

- Scope of work.
- Legal and other requirements.
- Previous incidents and non-conformances.
- Sources of energy, contaminants and other environmental conditions that can cause injury.
- Walk through of work environment.

Hazards identifications (as examples) are to include:

- Working Alone
- Thermal Exposure
- Isolation of Energy
- Hearing Protection
- Musculoskeletal Disorders
- Bloodborne Pathogens
- Confined Spaces
- Driving
- General Safety Precautions
- And any other established policy or procedure by 3A Group
- Any other site-specific work scope

3A Group has a formal process for identifying potential hazards. Processes are in place to identify potential hazards using JSA's, JHA's, facility wide or area specific analysis/inspections.

All identified hazards are assessed for risk and risk controls are assigned within the worksite hazard assessment for that specific hazard.

Employees and/or sub-contractors are actively involved in the hazard identification process. The 3A Group program provides processes to ensure employees and/or sub-contractors are actively involved in the hazard identification process and hazards are reviewed with all employees concerned.

Employees are trained in the hazard identification process. Employees will be trained in the hazard identification process including the use and care of proper PPE.

Unsafe hazards must be reported immediately and addressed by the supervisor. The supervisor discusses the worksite hazard assessment with employees at the respective work location during the employee's documented orientation.

7.4 REVIEW OF HAZARD ASSESSMENT

Existing worksite hazard identifications are formally reviewed annually or repeated at reasonably practicable intervals to prevent the development of unsafe and unhealthy working conditions and specifically updated when new tasks are to be performed that have not been risk assessed, when a work process or operation changes, before the construction of a new site or when significant additions or alterations to a job site are made.

The respective supervisor or project manager advises the Safety Manager when additional hazards are introduced into the workplace to revise planning and assessment needs.

7.5 RISK ASSESSMENT

Hazards are classified and ranked based on severity. The program identifies hazards are classified/prioritized and addressed based on the risk associated with the task. (See the risk analysis matrix outlining severity and probability).

7.6 3A GROUP RISK ASSESSMENT MATRIX

CONSEQUENCE					PROBABILITY				
					A	B	C	D	E
Severity	People	Assets	Environment	Reputation	Not Done	Rarely	Once a week	Several Times in a Week	Multiple Times in a Day
0	No health effect	No damage	No effect	No impact					
1	Slight health effect	Slight damage	Slight effect	Slight impact					
2	Minor health effect	Minor damage	Minor effect	Limited impact					
3	Major health effect	Localized damage	Localized effect	Considerable impact					
4	Single fatality	Major damage	Major effect	National impact					
5	Multiple fatalities	Extensive damage	Massive effect	Global impact					

Key	Manage for continuous improvement (Low)	Incorporate risk reduction measures (Medium)	

7.7 RISK CONTROLS/METHODS TO ENSURE IDENTIFIED HAZARDS ARE ADDRESSED AND MITIGATED

The following describes how identified hazards are addressed and mitigated:

- Risk assessed hazards are compiled with and addressed and mitigated through dedicated assignment, appropriate documentation of completion, and implemented controls methods including engineering or administrative controls and PPE required into the worksite hazard assessment of the site specific HSE plan. No work will begin before the worksite assessment is completed. Additionally, no risk assessed as High (Intolerable) shall be performed.
- If an existing or potential hazard to workers is identified during a hazard assessment 3A Group must take measures to eliminate the hazard, or if elimination is not reasonably practicable, control the hazard. If reasonably practicable, 3A Group must eliminate or control a hazard using engineering controls. If a hazard cannot be adequately controlled using engineering controls, 3A Group must use administrative controls that control the hazard to a level as low as reasonably achievable. If the hazard cannot be adequately controlled using engineering and/or administrative controls, 3A Group must ensure that the appropriate personal protective equipment (PPE) is used by workers affected by the hazard. 3A Group may use a combination of engineering controls, administrative controls, and personal protective equipment if there is a greater level of worker safety because a combination is used.

7.8 EMERGENCY CONTROL OF HAZARDS

Only those employees competent in correcting emergency controls of hazards may be exposed to the hazard and only the minimum number of competent employees may be exposed during hazard emergency control. An example is a gas leak in a building. Only those personnel with training on fire safety, gas supply shut off and other related controls will attempt to resolve the emergency control of a hazard. 3A Group will make every possible effort to control the hazard while the condition is being corrected or under the supervision of client emergency response personnel in every emergency.

7.9 CERTIFICATION OF HAZARD ASSESSMENT

The Safety Manager completes and signs the certification of hazard assessment for the worksite hazard assessment (also see PPE Program) and includes it within the site specific HSE plan. Hazard assessments are reviewed annually and updated when new tasks are to be performed that have not been risk assessed.

7.10 JOB SAFETY ANALYSIS (JSA)

For those jobs with the highest injury or illness rates, jobs that are new to our operation, jobs that have undergone major changes in processes and procedures or jobs complex enough to require written instructions will have a Job Safety Analysis performed. Completed JSAs are available from the Safety Manager.

7.11 SITE SPECIFIC HSE PLAN (SSSP)

Each work location has a site specific HSE plan. Each employee reporting to a location shall receive a documented orientation from a 3A Group supervisor that includes the SSSP for that site. The SSSP contains the 3A Group Health and Safety Policy, site specific safety requirements as well as a PPE matrix and a signed site-specific worksite hazard assessment for that location, which the 3A Group has a responsibility to provide.

7.12 REVIEW PROCESS

The hazard assessment program will be reviewed to ensure no new hazards derived from the corrective measures. The review shall include a management of change consideration as well.

The safety committee shall be involved in the review process as well.

7.13 WORKSITE HAZARD ASSESSMENT FORM

CERTIFICATE OF HAZARD ASSESSMENT STATEMENT FOR _*form shall be signed*_ **SITE**

I certify a worksite hazard assessment was performed for this facility on *date* by the 3A Group Safety Manager.
(Signature on File)

- **Task: Indicate Task Group** (*Additional Tasks shall be listed in each site specific HSE plan)*

TASKS	RISK LEVEL	HAZARDS	ENGINEERING OR ADMINISTRATIVE CONTROLS	PPE (Refer to PPE Matrix)
List individual task	***Use Risk Matrix***	***Identify hazards associated with task***	• ***List procedures that apply*** • ***List appropriate engineering controls*** • ***List procedures or other administrative controls***	***List appropriate PPE***
Example: Washing Parts	MED	Chemical Exposure (Skin, Eyes, Body)	• 3A Group PPE Procedure • No smoking;	Chemical gloves, splash proof goggles chemical apron
			•	
			•	
			•	
			•	
			•	
			•	

7.14 JOB SAFETY ANALYSIS FORM

Location / Dept:		Date:	New? ☐	Revision ☐	JSA NO:
Task			Supervisor:		
			Analysis By:		
Team Members			Reviewed By:		
			Approved By:		

Specific rules and procedures to be followed (Safe Work Practice Number ____):

Sequence of Basic Job Steps	Potential Injury or Hazards	Recommendations to Eliminate or Reduce Potential Hazards.

CHECK ITEMS REQUIRED TO DO THIS JOB:

Safety Glasses	☐	Leather Gloves	☐	Face Shield	☐	Fire Extinguisher	☐	Atmospheric Testing	☐
Hard Hats	☐	Work Vest	☐	Goggles (type?)	☐	Lockout/Tagout	☐	Traffic Control	☐
Safety Shoes	☐	Fall Harness	☐	Flame Resistant Clothing	☐	Warning signs	☐	Other	☐

• *INSTRUCTIONS FOR COMPLETING THE JOB SAFETY ANALYSIS FORM*

Select an employee to help you with the JSA: someone who is experienced in the job, willing to help and a good communicator. The employees play an important role in helping you identify job steps and hazards. In summary, to complete this form you should consider the purpose of the job, the activities it involves, and the hazards it presents. In addition, observing an employee performing the job, or "walking through" the operation step by step may give additional insight into potential hazards. Here's how to do each of the three parts of a Job Safety Analysis:

SEQUENCE OF BASIC JOB STEPS	POTENTIAL HAZARDS	RECOMMENDED ACTION OR PROCEDURE
Examining a specific job by breaking it down into a series of steps or tasks, will enable you to discover potential hazards employees may encounter. Each job or operation will consist of a set of steps or tasks. For example, the job might be to move a box from a conveyor in the receiving area to a shelf in the storage area. To determine where a step begins or ends, look for a change of activity, change in direction or movement. Picking up the box from the conveyor and placing it on a hand truck is one step. The next step might be to push the loaded hand truck to the storage area (a change in activity). Moving the boxes from the truck and placing them on the shelf is another step. The final step might be returning the hand truck to the receiving area. Be sure to list all the steps needed to perform the job. Some steps may not be performed each time; an example could be checking the casters on the hand truck. However, if that step is generally part of the job it should be listed.	A hazard is a potential danger. The purpose of the Job Safety Analysis is to identify ALL hazards – both those produced by the environment or conditions and those connected with the job procedure. To identify hazards, ask yourself these questions about each step: Is there a danger of the employee striking against, being struck by, or otherwise making injurious contact with an object? Can the employee be caught in, by or between objects? Is there a potential for slipping, tripping, or falling? Could the employee suffer strains from pushing, pulling, lifting, bending, or twisting? Is the environment hazardous to safety and/or health (toxic gas, vapor, mist, fumes, dust, heat, or radiation)? Close observation and knowledge of the job is important. Examine each step carefully to find and identify hazards – the actions, conditions, and possibilities that could lead to an accident. Compiling an accurate and complete list of potential hazards will allow you to develop the recommended safe job procedures needed to prevent accidents.	Using the first two columns as a guide, decide what actions or procedures are necessary to eliminate or minimize the hazards that could lead to an accident, injury or occupational illness. Begin by trying to: (1) engineer the hazard out; (2) provide guards, safety devices, etc.; (3) provide personal protective equipment; (4) provide job instruction training; (5) maintain good housekeeping; (6) ensure good ergonomics (positioning the person in relation to the machine or other elements). List the required or recommended personal protective equipment necessary to perform each step of the job. Give a recommended action or procedure for each hazard. Serious hazards should be corrected immediately. The JSA should then be changed to reflect the new conditions. Finally, review your input on all three columns for accuracy and completeness with affected employees. Determine if the recommended actions or procedures have been put in place. Re-evaluate the job safety analysis as necessary.

8 EMERGENCY ACTION PLAN

EMERGENCY ACTION PLAN

8.1 PURPOSE

To establish a system for the planning and implementation of emergency procedures.

Each 3A Group location shall have a written Emergency Action Plan, appropriate to the hazards of the workplace, to respond to an emergency that may require rescue or evacuation.

Each Emergency Action Plan shall be prepared to reflect all known probable emergency conditions which may arise from within the workplace and from adjacent workplaces, the minimum of which will include fire or other emergencies.

Provisions must be made for prompt medical attention in case of serious injury. The location and phone number of emergency service providers will be posted in the office and provided to each supervisor to keep in their vehicles.

The emergency action plan must be available to all employees to review. An emergency action plan must be in writing, kept in the workplace and available to employees for review. However, if a site has 10 or fewer employees the plan may be orally to employees.

8.2 EMERGENCY RESPONSE PLANNING, ISSUING AND ANNUAL REVIEW GUIDELINES

Emergency Procedures shall be issued and discussed with all new/transferred personnel upon arrival for assignment.

Emergency Action Plans shall be established, implemented, reviewed, maintained and updated annually in conjunction with:

- Client emergency services department requirements.
- 3A Group safety staff and management.
- The requirement to ensure the plan is up to date to reflect current circumstances at the workplace.

The plan is to be reviewed before the job and when conditions warrant and should be used for routine and non-routine emergencies as well as changes in operation, and products or services which warrant new emergencies situations.

8.3 REVIEWING THE EMERGENCY ACTION PLAN WITH EMPLOYEES

A review of the emergency action plan should occur with employees:

- When the plan is developed, or the employee is assigned initially to a job.
- When the employee's responsibilities under the plan change.
- When the plan is changed.

8.4 PROCEDURE

8.5 PLANNING FOR EMERGENCIES:

The company, under the direction of the Safety Coordinator, will establish an emergency plan. The supervisor and Safety Coordinator will oversee:

1. Supervising the development of plans and coordinating the planning with appropriate authorities.
2. Setting up cooperative emergency plans and arrangements with the customer's plans, if any.
3. Consulting with local police and fire department as applicable.
4. Putting the basic procedures in written form.
5. Keeping the plans simple and up to date.
6. Arranging for special training of employees as needed.
7. Instructing personnel in the company, in their responsibilities in case of fire or any emergency.

8.6 GENERAL EMERGENCY PROCEDURE GUIDELINES

The safety coordinator will follow the Emergency Procedure guidelines listed below, at minimum, when completing the procedures for the company. The following procedures, when appropriate, can be established for any **job** as may be applicable or amended as necessary to meet their needs.

Emergency Response Planning, Issuing and Annual Review Guidelines

Emergency Procedures shall be issued and discussed with all new/transferred personnel upon arrival for assignment.

Emergency Action Plans shall be established, implemented, reviewed, maintained and updated annually in conjunction with:

- Client emergency services department requirements.
- 3A Group safety staff and management.
- The requirement to ensure the plan is up to date to reflect current circumstances at the workplace.

The plan is to be reviewed before the job and when conditions warrant and should be used for routine and non-routine emergencies as well as changes in operation, and products or services which warrant new emergencies situations.

8.7 REVIEWING THE EMERGENCY ACTION PLAN WITH EMPLOYEES

A review of the emergency action plan should occur with employees:

- When the plan is developed, or the employee is assigned initially to a job.
- When the employee's responsibilities under the plan change.
- When the plan is changed.

8.8 PROCEDURES FOR EMERGENCY EVACUATION PLANNING

The emergency action plan must include procedures for emergency evacuation. An emergency action plan must include at a minimum procedure for emergency evacuation, including type of evacuation and exit route assignments.
The individual site evacuation procedure shall be appropriate to the risk must be developed and implemented to:

- Notify staff, including the first aid attendant of the nature and location of the emergency,
- Evacuate employees safely and procedures to account for all employees after evacuation,
- Check and confirm the safe evacuation of all employees,
- Notify the fire department or other emergency responders, and
- Notify adjacent workplaces or residences which may be affected if the risk of exposure to a substance extends beyond the workplace. Notification of the public must be in conformity with the requirements of other jurisdictions, including provincial and municipal agencies.

8.9 POTENTIAL EMERGENCIES

The emergency action plan must include procedures for reporting a fire or other emergency. An emergency action plan must include at a minimum procedure for reporting a fire or other emergency. Each location shall conduct a risk assessment for hazards posed by potential hazardous substances from accidental release, fie or other such emergencies that could cause an evacuation or rescue and list the potential emergencies for 3A Group operations. Procedures for each of these potential emergencies shall be contained within the Emergency Action Plan. Examples include:

- Fire
- Gas Leaks/Chemical Spills
- Bomb Threats
- Medical Emergencies
- Explosion
- Workplace Violence

8.10 GUIDANCE PROCEDURES FOR POTENTIAL EMERGENCIES

8.10.1 FIRE

- Warn others in the immediate area. Notify the appropriate emergency response personnel by phone or radio and pull the nearest fire alarm if present.
- If nearby staff have been trained, and it is safe to do so, fight the fire using a portable fire extinguisher. Remember, if in doubt get out.
- Evacuate the premises via the nearest exit and proceed to the nearest Emergency Assembly Area.
- Re-enter only after the Emergency Coordinator has given an ALL CLEAR.

8.10.2 GAS LEAKS/CHEMICAL SPILLS –

- Upon smelling or noticing a gas leak or unusual vapors, or a chemical spill:
- Pull fire alarm (if present) or sound warning and evacuate the premises via the nearest exit
- Proceed to the Emergency Assembly Area
- Contact local emergency response personnel by phone or radio
- Re-enter only after the Emergency Coordinator has given an ALL CLEAR.

If employees are required to control a release of a hazardous substance, to perform cleanup of a spill, or to carry out testing before re-entry, 3A Group shall provide:

- Adequate written safe work procedures and documented training.
- Appropriate personal protective equipment which is readily available to employees and is adequately maintained, and
- Material or equipment necessary for the control and disposal of the hazardous substance.

8.10.3 BOMB THREATS

- If a threat is received by phone, mail or other means, get as much information as possible.
- If the threat is received by phone, try to keep the person on the line for as long as possible. Do not hang up the phone, even after the call has been terminated.
- Contact local emergency response personnel by phone or radio.
- If a suspicious device is identified, evacuate the immediate area and notify local emergency response personnel.

8.10.4 MEDICAL EMERGENCIES

- Call for assistance by phone or radio. Give the exact location and details of the medical emergency.
- If qualified, provide basic first aid, and keep the person comfortable. Do not move the person. Do not leave him/her unattended.
- Arrange for emergency medical transportation based on the medical planning portion of the site's Emergency Action Plan.

8.10.5 EXPLOSIONS

- Get down on the floor, take shelter under tables or desks, and protect your face and head against flying glass and debris.
- Once it is safe to do so, evacuate the premises via the nearest exit and proceed to the nearest Emergency Assembly Area.
- Re-enter only after the Emergency Coordinator has given an ALL CLEAR.

8.10.6 WORKPLACE VIOLENCE

- Notify security immediately by phone or radio and report the occurrence.
- Do NOT attempt to physically intervene. Protect yourself first at all costs.

8.11 EMERGENCY ACTION PLAN

8.11.1 NOTIFICATION

The person first encountering the emergency condition should notify the telephone operator and give the **LOCATION** and **DESCRIPTION** of the emergency. (See the "Site Emergency Phone List") **Upon verification of the need to evacuate the facility, the evacuation alarm will be sounded.**

8.11.2 ALARM & EMERGENCY COMMUNICATION

Each Emergency Action Plan for 3A Group shall contain methods to address alarms and communications in case of an emergency. For off-site locations, the method of emergency notification should be identified and reviewed with workers prior to commencing work activities.

8.12 ALARM SYSTEM

A system must be in place to alert employees. The alarm system shall be distinctive and recognizable as a signal to evacuate the work area or perform actions designated under the emergency action plan. For sites with 10 or fewer employees in a particular workplace, direct voice communication is an acceptable procedure for sounding the alarm provided all employees can hear the alarm. Each Emergency Response plan will describe how to activate an alarm and what to do after either activating or hearing an alarm.

Personnel responding to any alarm shall avoid complacency. Every alarm should be treated as an actual incident until proven otherwise. Treating and responding to alarms as a routine happening can result in injuries, fatalities and destruction of property.

8.13 COMMUNICATIONS

3A Group responders and security use telephones, cell phones and radios in conjunction with emergency response.

8.14 FIRE EMERGENCY, EXPLOSION, OR CHEMICAL SPILL

If a fire is discovered or an explosion occurs, the supervisor must:

- Remove their people from the immediate area of the fire and evacuate to the pre-designated safe area.
- Notify the telephone operator to sound the alarm (or call 911 as instructed), stating the location of the fire and what is burning or the actual emergency. Then notify the Emergency Coordinator.
- Make a head count of employees at the assigned assembly area to ensure that they are all there.
- Return to the fire and attempt to extinguish it only if you have been trained to do so.
- Assign an employee to meet and direct the fire department to the location of the fire.
- Notify the Safety Coordinator and office immediately of any fire that involved personnel, equipment, or liability.

If a chemical spill occurs, in addition to the above steps make every effort to contain the spill to as small of an area as possible without further endangerment to human health or the environment.

8.15 SUPERVISOR'S RESPONSIBILITIES

1. Inspect the site for any possible hazardous conditions, i.e., fires, electrical shorts, plumbing leaks, structural damage, etc.
2. Determine casualties, provide any assistance possible, and review with the Safety Coordinator information and status to make notifications to the emergency services as needed.
3. Notify the office, of your situation and status.
4. DO NOT ATTEMPT AN EVACUATION OF THE AREA UNLESS ORDERED BY THE LOCAL FIRE OR POLICE DEPARTMENT.

8.16 EMERGENCY COORDINATOR'S RESPONSIBILITIES

Whenever there is an imminent or actual emergency at the corporate offices, the Emergency Coordinator or one of the alternates shall immediately:

1. Notify all personnel and evacuate the buildings.
2. Notify the Fire Department if their help might be needed.

3. Make every reasonable effort to contain the fire or chemical spill to as small an area as possible, and keep incompatible chemicals separated without further endangerment to human health or the environment.
4. Identify what caused the emergency (which chemical or fire), exact source, and amount of released material.
5. Assess all possible hazards to human health or the environment, considering direct and indirect effects of the release, fire or explosion, such as toxic or irritating gases, water runoff from chemical agents used to control the emergency, etc.

8.17 EMERGENCY CONTINGENCY PLAN

If the emergency could threaten human health or the environment, and assessment indicates evacuation of the local areas is advisable, contact the FIRE DEPARTMENT @ 911 immediately and assist them however possible.

Also notify the STATE OFFICE OF EMERGENCY SERVICES (800) 852-7550 and report the following:

- ✓ Name and telephone number.
- ✓ Company name and address.
- ✓ Time and type of incident.
- ✓ Name and quantity of materials.
- ✓ Extent of injuries, if any; and
- ✓ Possible hazards to others or the environment.

1. When the emergency is under control, cleanup or neutralization can begin using appropriate tools, safety equipment, and outside services as necessary, depending on the type of emergency. All hazardous materials must be cleaned up, stored properly or hauled to an appropriate dump site for disposal.
2. Before normal operations begin again, all tools, emergency equipment and devices listed on the Emergency Equipment List must be operational and ready for use. The **ENVIRONMENTAL HEALTH DEPARTMENT** must also be notified.
3. Within 15 days after an emergency that requires implementing the contingency plan, a written report must be completed and sent to the **ENVIRONMENTAL HEALTH DEPARTMENT** and a copy will be kept for our files. The report must contain the following:
   - Owner's Name, address, and telephone number.
   - Company name, address, and telephone number.
   - Date, time, and type of emergency.
   - Name and quantity of materials involved.
   - Extent of injuries, if any.
   - Assessment of actual or potential hazards to human health or the environment, if applicable; and
   - Estimated quantity and disposition of waste resulting from the emergency.

8.18 EMERGENCY RESPONSE PROGRAM MANAGEMENT

Contact information will be provided to employees who need additional information pertaining to the plan or to their respective duties. The 3A Group site manager may be contacted by employees who need more information about the plan or an explanation of their duties under the plan.

For this Emergency Action Plan guidance the Emergency Coordinator will be designated by the 3A Group Project Manager. His/her alternate will be the 3A Group Project Safety Supervisor or otherwise designated by the Project Manager.

Employees performing rescue or evacuation must wear personal protective clothing and equipment appropriate to the hazards likely to be encountered.

8.19 DUTIES

8.19.1 EMERGENCY COORDINATOR

The 3A Group Emergency Coordinator ensures that:

- Evacuation drills are conducted on an annual basis.
- Inspections of facilities are performed monthly.
- All necessary repairs of components for evacuation paths are completed.
- Plans for the modification of any part of an evacuation path are reviewed.
- An up-to-date list of Fire Wardens is maintained.
- Radios and reflective vests and other response equipment are available.

During an evacuation or evacuation exercise, the 3A Group Emergency Coordinator:

- Coordinates activities in accordance with either local authorities or the client Security and ERT as required.
- Coordinates Fire Wardens and informs them the nature of the emergency via handheld radios.

Following an evacuation or evacuation exercise, the 3A Group Emergency Coordinator:

- Notifies Fire Wardens that it is safe to re-enter the building.
- Prepares a report following an evacuation (actual or drill).
- Reports to management for follow up or corrective actions.

8.19.2 3A GROUP PROJECT SAFETY SUPERVISOR

Assist the 3A Group Emergency Coordinator when requested.

8.19.3 FIRE WARDENS

- Be equipped with radios and reflective vests. The equipment is to be handed into the 3A Group Emergency Coordinator and reissued to the next oncoming Fire Warden for the designated area.
- Be familiar with exits and muster stations for their responsible area.
- Direct residents safely out of the building to the designated muster station or to an alternate location.
- Sweep their effected area, ensuring that the alarms are properly functioning and that residents evacuate safely.
- To account for all employees after evacuation the fire wardens or designated personnel shall complete a head count and reconcile the evacuees with the attendance or daily housing report at the assigned muster station or alternate location.
- Radio unaccounted for personnel to Security.
- Notify personnel that they may re-enter the building when permission has been given by the appropriate authorities.

8.19.4 RESIDENTS, CONTRACTORS & VISITORS

All employees, users, contractors and visitors will follow the instructions of the Fire Wardens, Security, ERT, Safety Personnel, managers and supervisors when asked to evacuate the building.
Know the two safest and most direct evacuation routes from their work area(s).
Know the designated evacuation assembly point for the building.

EMERGENCY COORDINATORS

PRIMARY COORDINATOR

NAME _____

WORK# _____

HOME# _____

FIRST ALTERNATE

NAME _____

WORK# _____

HOME# _____

SECOND ALTERNATE

NAME _____

WORK# _____

HOME# _____

THIRD ALTERNATE

NAME _____

WORK# _____

HOME# _____

One of the Emergency Coordinators will always be available. The Primary Coordinator is to notify one of the alternates if he will be out of town, on vacation, etc.

1.1 LIST OF EMERGENCY EQUIPMENT AND SUPPLIES

COORDINATOR DATE

ITEM	QUANTITY	LOCATION

9 EMPLOYEE SUGGESTIONS

EMPLOYEE SAFETY & HEALTH SUGGESTIONS

9.1 INTRODUCTION

On occasion, employees may not notify anyone of impending danger or hazards on the job. This may be due to a fear of reprisal, fear of rejection, lack of encouragement by their supervisor, or many other reasons.

An informal, and when desired, anonymous method will provide another means for a bashful employee to inform us of important safety information.

9.2 PURPOSE

1. The "EMPLOYEE SAFETY & HEALTH SUGGESTION FORM" is to be used by employees to formally report hazards not handled directly by their superior or for the presentation of suggestions to improve the safety & health of their job.

2. The form is designed to be used to ensure that:

   a. The employee is provided with a means of reporting a safety or health problem **without fear of reprisal**.

   b. Feedback is provided to the employees on their suggestions, whether positive or negative.

9.3 PROCEDURE

Management and supervision should encourage employees to utilize the Safety & Health Suggestion Form at any time they would like to make a safety or health suggestion or observation.

The forms will be made available within the facility where employees may easily find them. The location will be readily identifiable and a means for depositing the completed forms provided. The deposit "boxes" will be made secure so that only the person(s) designated by the Safety Coordinator can collect them.

The forms should be collected daily. For if a hazard of imminent danger was to go unnoticed, the potential for a serious accident increase. Any suggestion found to identify a condition of imminent danger would require that immediate corrective action be taken. Otherwise, all other items will follow the same procedures for corrective action as those noted during regular inspections. The Safety Coordinator will make a review of the suggestions.

If the employee has given their identity, it is important for the Safety Coordinator to provide a response on the action to be taken. The employee should also be thanked for their participation.

10 FIRST AID

FIRST AID

10.1 PURPOSE

The purpose of this program is to establish the minimum first aid supplies, equipment and actions to properly respond to injuries.

10.2 SCOPE

This program is applicable to all 3A Group employees while engaged in work at 3A Group facilities and/or facilities operated by others.

10.3 RESPONSIBILITIES

- It is the responsibility of the site manager to ensure that first aid kits are provided and maintained.
- All employees are responsible for using first aid materials in a safe and responsible manner.
- The HSE Manager is responsible for corresponding with the Red Cross or an equivalent to keep employee training levels current.

10.4 PLANNING

The site manager will:

- Ensure that a minimum of one employee, with a valid certificate, shall be present to render first aid at all times work is being performed if medical assistance is not available within 3-4 minutes.
- Ensure that provisions shall have been made prior to commencement of a project for prompt medical attention, including transportation, in case of serious injury.
- Ensure adequate first aid supplies and equipment are easily accessible when required.
- Ensure that in areas where 911 is not available, the telephone numbers of the physicians, hospitals, or ambulances to be used shall be conspicuously posted.

10.5 MEDICAL RESPONSE

All minor first aid is to be self-rendered. Because of the risks presented by certain Bloodborne pathogens, no one is allowed to tend the minor injuries of another.

In the absence of an infirmary, clinic, hospital, or physician, that is reasonably accessible in terms of time and distance to the worksite, which is available for the treatment of injured employees, a person who has a valid certificate in first aid shall be available at the worksite to render first aid. A valid certificate in first-aid training must be obtained from the U.S. Bureau of Mines, the American Red Cross or equivalent training that can be verified by documentary evidence.

Employees authorized to render first aid will always observe universal precautions. (Universal Precautions means that the aid giver treats all bodily fluids as if they were contaminated).

If 911 is not available refer to the list of posted phone numbers for prearranged medical response providers. All 3A Group authorized first responders shall have a cell phone as a means of communications; otherwise, handheld radios or telephones shall be used as a means of communication.

10.6 SUPPLIES AND EQUIPMENT

First aid supplies shall be easily accessible when required. Always follow the manufacturer's instructions when using the materials in the first aid kit.

All 3A Group first aid kits contain appropriate items determined to be adequate for the environment in which they are used and if on a construction site are stored in a weatherproof container with individual contents sealed from the manufacturer for each type of item.

3A Group is responsible to ensure the availability of adequate first aid supplies and to periodically reassess the availability for supplies and to adjust its inventories. First Aid kits are to be inspected:

- On the first working day of each week to verify that they are fully stocked and that no expiration dates have been exceeded, and
- Before being sent out to each job, and
- Replace any items that have exceeded their expiration dates or that have been depleted.

Where the eyes or body of any person may be exposed to injurious corrosive materials, a safety shower and/or eye wash (suitable facilities) or other suitable facilities shall be provided within the work area. Ensure expiration dates are checked and water used in storage devices is sanitized.

An assessment of the material or materials used shall be performed to determine the type flushing/drenching equipment required. At client job sites, portable or temporary stations must be established prior to the use of corrosive materials.

10.7 TRANSPORTATION

Based on the first responder's assessment of the injuries involved, decide whether the injured requires to be taken directly to a hospital's emergency room, occupational medicine provider or administer first aid on location.

Examples of serious injuries that result in the injured being transported to a medical provider are those resulting in severe blood loss, possible permanent disfigurement, head trauma, spinal injuries, internal injuries and loss of consciousness. Keep in mind that the needs and wellbeing of the injured are the first priority.

Proper equipment for prompt transportation of the injured person to a physician or hospital or a communication system for contacting necessary ambulance service shall be provided.

Choices to consider include private automobile, company vehicle, helicopter, crew boat, EMS vehicles including medevac helicopters, or any other transportation that can provide safe transportation to the hospital or doctor's office in order to provide medical attention to the injured in the quickest manner without any additional complications or injuries to the injured employee.

Transportation needs must be preplanned and coordinated with the transportation provider prior to an incident requiring such service.

10.8 TRAINING

Volunteers or selected employees are trained by the American Red Cross or equivalent in CPR and first aid. Each of these trained and certified employees are equipped with protective gloves and other required paraphernalia.

11 FIRE PREVENTION

FIRE PROTECTION

11.1 PURPOSE

The purpose of this program is to provide fire extinguisher procedures to ensure equipment is operable and employees have the knowledge to safely operate in case of a fire incident.

11.2 SCOPE

Applies to all 3A Group employees and all 3A Group locations.

11.3 RESPONSIBILITIES

The Safety Manager is responsible for developing procedures for the use and care of fire extinguishers and for developing a training program for the proper use of these devices. The Manager is responsible for implementing fire extinguisher training at his location. The shop foremen are responsible for enforcing the provisions of this section of the safety manual. All employees are responsible for following these provisions.

11.4 GENERAL REQUIREMENTS

1. Portable fire extinguishers must be maintained in a fully charged and operable condition and always kept in their designated places when they are not being used.
2. Portable extinguishers shall be visually inspected monthly and subjected to a maintenance check annually
3. Extinguishers must be conspicuously located where they will be readily accessible and immediately available for use.
4. The selection of fire extinguishers for a given situation will depend upon the characteristics of a potential fire, the construction and occupancy of the individual property, the vehicle or hazard to be protected, ambient-temperature conditions, and other factors.
5. The number of extinguishers required must be determined by reference to the layout criteria included in this manual.
6. Only UL or FM approved fire extinguishers are permitted.
7. Only employees who have been trained in their proper use are permitted to use fire extinguishers.
8. All welding work must have a capable "fire watch" assigned to the area to monitor for and prevent fires.
9. All fire extinguishers are to be kept at their designated locations. In case of fire, follow information on emergency reaction poster.
10. Access to extinguishers, sprinkler risers, switch boxes, fire alarms, and exits are to be kept clear and unobstructed at all times.
11. Fire doors are not to be blocked and must be in operating condition at all times.
12. Any damaged or apparently used fire protection equipment must be promptly reported to the area supervisor.

11.5 PROCEDURE

Portable fire extinguishers shall be provided for employee use and selected and distributed based on the classes of anticipated workplace fires and on the size and degree of the hazard which would affect their use. Fire extinguishers used by this company are for four classes of fires:

- Class A Fire Extinguishers. Use on ordinary combustibles or fibrous material, such as wood, paper, cloth, rubber and some plastics. Travel distance for employees to any extinguisher is 75 feet (22.9 m) or less.
- Class B Fire Extinguishers. Use on flammable or combustible liquids such as gasoline, kerosene, paint, paint thinners and propane. Travel distance from the Class B hazard area to any extinguisher is 50 feet (15.2 m) or less.
- Class C Fire Extinguishers. Use on energized electrical equipment, such as appliances, switches, panel boxes and power tools. Travel distance from the Class C hazard area to any extinguishing agent is 50 feet (15.2 m) or less.
- Class D Fire Extinguishers. Use on combustible metals, such as magnesium, titanium, potassium and sodium. Travel distance from the combustible metal working area to any extinguishing agent is 75 feet (22.9 m) or less.

11.6 LABELING OF FIRE EXTINGUISHERS

Fire extinguishers are to be mounted in easily accessible locations that are indicated by a sign that reads "Fire Extinguisher". Fire extinguishers are to be located so that no employee will ever be more than 75 feet from an extinguisher. No equipment, boxes or product may be placed (even temporarily) in the way of a fire extinguisher.
Each fire extinguisher will be assigned a unique number.

11.7 MAINTENANCE

All fire extinguishers shall be mounted no higher and no lower than four (4) feet from the floor. All fire extinguishers shall be maintained as follows:

1. Numbered to identify their proper location
2. Fully charged and in operable condition
3. Clean and free of defects
4. Readily accessible always
5. At regular intervals, not less than annually, or when specifically indicated by an inspection, extinguishers must be thoroughly examined and/or recharged or repaired to ensure operability and safety or replaced as needed.
6. Extinguishers removed from their locations to be recharged must be replaced by spare extinguishers during the period they are gone.
7. Each extinguisher must have a durable tag securely attached to show the maintenance or recharge date and the initial or signature of the person who performs this service.
8. Any fire extinguisher that shows a loss of pressure during the monthly inspection will be inspected and re-charged by certified personnel. Completed fire extinguisher inspection logs will be maintained in the safety files and become a part of the safety records. They are to be maintained for 5 years.

11.8 INSPECTION, MAINTENANCE AND TESTING

All fire extinguishers are to be visually inspected by 3A Group employees monthly. All fire extinguishers are to receive an annual maintenance check by certified personnel from a fire extinguisher dealer. Fire extinguishers are to be inspected and re-charged by certified personnel after any use. Any fire extinguisher that shows a loss of pressure during the monthly inspection will be inspected and re-charged by certified personnel. Completed fire extinguisher inspection logs will be maintained in the safety files and become a part of the safety records. They are to be maintained for 5 years.

11.8.1 USE

In the event of a fire, one employee will get the nearest fire extinguisher and use it to attempt to put the fire out. All other employees in the immediate area will prepare to evacuate if needed. All other employees in the building need to be advised that a fire is in progress.

The employee attempting to extinguish the fire will break the safety seal on the handle and pull the pin. The person will then aim his extinguisher at the base of the fire and discharge it with a sweeping motion from side to side; continuing until the fire is out or the extinguisher is emptied.

Remember that a standard fire extinguisher will be emptied in about 10 to 15 seconds. If the fire is not out when the extinguisher has been completely discharged, the employees must evacuate the area.

11.9 FLAMMABLE AND COMBUSTIBLE LIQUID AND MATERIALS

1. Flammable liquid containers must be clearly labeled and stored in a protected, separate area.
2. Flammable liquids must be used only in small quantities and in **approved (UL or FM)**, self-closing containers.
3. **Do NOT** refuel a hot or running engine. Clean up spills before restarting.
4. Never use gasoline as a cleaner or solvent. Anyone who may do so is subject to immediate discharge.
5. Use only the proper transfer equipment when transferring a flammable liquid such as gasoline for refueling
6. Never use an air hose for pressure to empty drums.

Lines or other containers holding gasoline, oil, grease and other flammable material must be thoroughly purged and tested for explosiveness by approved testing equipment before any burning or welding is done.

11.9.1 USE

In the event of a fire, one employee will get the nearest fire extinguisher and use it to attempt to put the fire out. All other employees in the immediate area will prepare to evacuate if needed. All other employees in the building need to be advised that a fire is in progress.

The employee attempting to extinguish the fire will break the safety seal on the handle and pull the pin. He will then aim his extinguisher at the base of the fire and discharge it with a sweeping motion from side to side; continuing until the fire is out or the extinguisher is emptied.

Remember that a standard fire extinguisher will be emptied in about 10 to 15 seconds. If the fire is not out when the extinguisher has been completely discharged, the employees must evacuate the area.

11.10 SCRAP RECEPTACLE - TYPE, LOCATION AND USE

This procedure outline types, location, and use of containers for trash, scrap metal, and similar materials.

11.11 TYPE

All receptacles must be constructed of metal or other suitable type containers of non-flammable materials. Paper or pasteboard cartons, wooden boxes or crates, and similar type containers must not be used for collection of combustible materials.
Receptacles located outside of buildings, for combustible trash must be located at least 15 feet from the building or combustible materials.

11.11.1 USE

Employees must be instructed to use trash barrels for the disposal for paper, lunch, remnants, and all small scraps of a combustible nature.
Cigarette and cigar butt, matches, etc., should never be thrown in trash receptacles.
Glass (broken, empty jars, etc.), scrap metal, and similar material should be placed in special trash containers.

11.12 FIRE AND EXPLOSION HAZARDS

There are three (3) elements necessary for a fire:

1. **Fuel** - Combustible material, i.e., wall coverings, paper products, furniture, etc. Flammable liquids, i.e., paints, thinners, lacquers, gasoline, and others.
2. **Heat** - Sufficient to raise the material to its ignition temperature. Primary causes can be cigarette smoking, electrical fires, grease fires, and fires caused by explosions.
3. **Oxygen** to sustain combustion. Oxygen is the one element that could be controlled by closing doors and isolating the fire as much as possible.

11.13 FIRE AND EXPLOSION PREVENTION

Each supervisor will be responsible for the following fire prevention activities:

1. Make routine inspections of fire prevention and protection systems regularly and keep in good operating condition.
2. Review evacuation routes, as applicable with employees on a regular basis for each work area. Follow the designated routes and know the pre-designated safe areas previously established.
3. Train key employees, if necessary, in the use of fire protection equipment (extinguishers, hose, etc.).
4. Be familiar with known hazards that may affect your operations inside and outside any building.
5. Coordinate with the public fire department on pre-fire plans, training and evacuation procedures, as they may apply.

11.14 SPECIFIC HAZARDS

11.14.1 SMOKING

Smoking is permitted in designated areas only. Don't use ashtrays as wastepaper receptacles, or don't use wastepaper receptacles as ashtrays.

11.14.2 ELECTRICAL

Make sure that all electrical cords are not frayed and that the connections with the receptacles and the machinery are intact. Do not overload wiring. If cords become warm, this is the first sign of a possible overload.

11.14.3 HOUSEKEEPING

1. Don't allow excess paper or combustible products to pile up in the open, near equipment, or buildings.
2. Don't allow materials or boxes to be placed in the way of exit travel.
3. Keep material away from access to electrical panels.

11.15 TRAINING AND EDUCATION

The purpose of this section is to establish training procedures which are necessary for the proper use and understanding of a fire extinguisher and incipient stage firefighting. Training will occur prior to initial assignment and at least annually thereafter.

On even numbered years this training will be conducted by a member of the local fire department (where possible) and will include "live fire" hands on use of the extinguisher. On odd number years this training will be conducted by the Safety Manager and will include a demonstration of the use of a fire extinguisher, without actually discharging the unit.

New employees will be given the odd number year training upon hire.

11.15.1 INITIAL TRAINING OUTLINE

- General principles of a fire
- Hazards employed with an incipient stage fire(s)
- When to "back off' (evacuate) of an incipient stage fire(s)
- General fire principles of a fire extinguisher
- Hazards employed with the use a fire extinguisher
- Use of a fire extinguisher

11.15.2 RETRAINING

Retraining shall reestablish employee proficiency and introduce new or revised control methods and procedures, as necessary. Retraining shall be provided for all authorized and affected employees whenever there is:

- An annual basis or
- A change in job assignment or
- 3A Group has reason to believe that there are deviations from or inadequacies in the employee's knowledge or use of fire extinguishers or fire prevention procedures.

11.16 TRAINING DOCUMENTATION

- All training will be documented, and each employee's understanding will be subject to a "hands-on" test.
- Documentation will consist of; as a minimum, the employee's name, the trainer's name, the date of the training, and an outline of training provided.

11.17 SITE EMERGENCY TELEPHONE LIST

NAME	TELEPHONE NUMBERS

Office _____

Fire Department _____

Local Law Enforcement Agencies _____

Nearby Hospitals
(Name & Address)

_____

Ambulance Services _____

American Red Cross _____

Chemical Transportation Emergency Center
(CHEMTREC 24-hour hotline) 800-424-9300

Electric Company (as applicable) _____

Gas Company (as applicable) _____

Water Company (as applicable) _____

Telephone Company (as applicable) _____

State or Local Building Inspection Departments _____

State and Local Civil Defense Agencies
(For emergency plan)

OSHA office _____

U.S. Weather Bureau _____

Key Personnel _____

12 OSHA REFERENCES

OSHA REFERENCES

12.1 OSHA REPORTS AND SPECIAL REQUIREMENTS

Every employer, with a few exceptions, must keep occupation injury and illness records for their employees. The recordkeeping forms are available in the booklet entitled the "Recordkeeping Requirements under the Occupational Safety and Health Act", published by the State, Occupational Safety & Health Administration. 3A Group is classified as one of the employers who must comply with this requirement.

The State Occupational Safety and Health Act prescribes the following mandatory requirements:

12.2 SPECIAL OSHA REQUIREMENTS

1. **Posting Requirement**: The law requires that employees be informed of the job safety and health protection provided under the Act. All employers must post and maintain in a conspicuous place of major travel (time clock, employee bulletin boards) copies at each establishment of the OSHA Notice, "Safety and Health Protection on the Job". This poster notice may be obtained from the State Occupational Safety and Health Administration Office.

   The poster briefly states the intent and coverage of the Act and the responsibilities of employers and employees to maintain safe and healthful working conditions.

2. **Recording Requirement**: Occupational injuries and illnesses must be recorded on OSHA Form #300, Log and Summary of Occupational Injuries and Illnesses. A new Log must be kept for each calendar year for the period of January 1 to December 31. Each "recordable" injury and illness must be entered on the Log within six (6) working days.

3. At the end of each calendar year, a summary of those entries on the Log (OSHA Form #300, Log and Summary of Occupational Injuries and Illnesses) must be made for the calendar year. The law requires that the Summary be posted "in the place or places where notices to the employees are customarily posted" for the period beginning February 1 and must remain in place until March 1, annually.

4. Supplementary Records of Each Occupational Injury or Illness (Form #101): Retention of the Workers' Compensation First Report of Injury submitted to the insurance carrier is acceptable in lieu of OSHA Form #101, providing that the Form contains all items that are found on the OSHA No. 101 Form

5. Employers must report orally or in writing to the nearest OSHA office within 24 hours, any case involving serious injury or death from an accident or health hazard that results in one or more fatalities or hospitalization.

   Serious injury is defined as "any injury or illness which requires inpatient hospitalization for a period in excess of 24 hours for other than medical observation or in which an employee suffers loss of any member of the body or any serious degree of permanent disfigurement.

6. The records must be retained for a period of at least five (5) years (7 years- Federal) following the end of the calendar year to which they relate and be made available to OSHA Compliance Officer upon request.

Note: 1. For detailed instructions in preparing these forms, refer to Record-Keeping Requirements pamphlet available from OSHA.

Note: 2. Records maintained by an employer and reports submitted pursuant to and in accordance with the requirements of an approved State Plan under Section 18 of the Act shall be regarded as compliance with this part of the Act.

Note: 3. There has been discussion by OSHA to change the current recordkeeping requirements. The new procedure will be simplified, with the elimination of Form #102, "Summary of Accident/Illness." New instructions and forms will be available or provided by the U.S. Department of Occupational Safety and Health Administration, when the new procedure is implemented.

12.3 POSTING REQUIREMENTS

___ OSHA Poster "Safety and Health Protection on the Job"
___ EMERGENCY PHONE NUMBERS
___ NOTICE OF WORKER'S COMPENSATION COMPANY
___ PAYDAY NOTICE
___ INDUSTRIAL WELFARE COMMISSION ORDERS
___ UNEMPLOYMENT AND DISABILITY INSURANCE
___ DISCRIMINATION ORDERS
___ OSHA CITATIONS (Individual site location)

12.4 OTHER SUGGESTED POSTINGS

___ EXIT SIGNS
___ ROOM CAPACITIES
___ FLOOR LOADING
___ SAFETY DATA SHEETS
___ EXPOSURE TO RADIATION OR SUBSTANCES
___ SUGGESTION BOX LOCATION

12.5 STATES WITH APPROVED PLANS

If your facility is in an OSHA-approved State-plan state, you must comply with the Hazard Communication requirements of the state. OSHA -approved state plans are required to promulgate standards that are "at least as effective" as the Federal rule, but they may differ in some respects. This Appendix provides information regarding the appropriate state offices to contact for more information.
State Plan States*

Jim Sampson, Commissioner
Alaska Department of Labor
P.O. Box 1149
Juneau, AK 99802
(907) 465-2700

Larry Etchechury, Director
Industrial Commission of Arizona
800 W. Washington
Phoenix, AZ 85007
(602) 255-5795

Ron Rinaldi, Director
California Department of Industrial Relations
525 Golden Gate Avenue
San Francisco, CA 94102
(415) 577-3356

Betty L. Tianti, Commissioner
Connecticut Department of Labor
200 Folly Brook Boulevard
Wethersfield, CT 06109
(203) 566-5123

Mario R. Ramil, Director
Hawaii Department of Labor and Industrial Relations
825 Mililani Street
Honolulu, HI 96813
(808) 548-3150

Donald W. Moreau, Commissioner
Indiana Department of Labor
1013 State Office Building
100 North Senate Avenue
Indianapolis, IN 46204
(317) 232-266

Allen J. Meier, Commissioner
Iowa Division of Labor Services
1000 E. Grand Avenue
Des Moines, IA 50319
(515) 281-3447

Carole Palmore, Secretary
Kentucky Labor Cabinet
U.S. Highway 127
South Frankfort, KY 40601
(502) 564-3070

Henry Koellein, Jr., Commissioner
Maryland Division of Labor and Industry Department of Licensing and Regulation
501 St. Paul Place
Baltimore, MD 21202-2272
(301) 333-4176

Elizabeth Howe, Director
Michigan Department of Labor
309 N. Washington
P.O. Box 30015
Lansing, MI 48909
(517) 373-9600

Raj M. Wiener, Acting Director
Michigan Department of Public Health
3500 North Logan Street
P.O. Box 30195
Lansing, MI 48909
(517) 335-8022

Ray H. Bohn, Commissioner
Minnesota Department of Labor and Industry
444 Lafayette Road
St. Paul, MN 55101
(612) 296-2342

Michael J. Tyler, Administrator
Nevada Department of Industrial Relations
Division of Occupational Safety and Health
Capitol Complex
1370 S. Curry Street
Carson City, NV 89710
(702) 885-5240

Michael J. Burkhart, Director
New Mexico Environmental Improvement Division Health and Environment
Department
P.O. Box 968
Santa Fe, NM 87504-0968
(505) 827-2850

Thomas F Hartnett, Commissioner
New York Department of Labor
One Main Street
Brooklyn, NY 11201
(718) 797 7281

John C. Brooks, Commissioner
North Carolina Department of Labor
4 West Edenton Street
Raleigh, NC 27603
(919) 733-7166

John A. Pompei, Administrator
Accident Prevention Division
Oregon Department of Insurance and Finance
Labor and Industries Building
Salem, OR 97310
(503) 378-3304

Carlos Rivera Santiago, Secretary
Puerto Rico Department of Labor and Human Resources
Prudencio Rivera Martinez Bldg.
505 Munoz Rivera Avenue
Hato Rey, PR 00918
(809) 754-2119-22

Edgar L. McGowan, Commissioner
South Carolina Department of Labor
3600 Forest Drive
P.O. Box 11329
Columbia, SC 29211-1329
(803) 734-9594

James R. White, Commissioner
Tennessee Department of Labor
ATTN: Robert Taylor
501 Union Building
Suite "A" - 2nd Floor
Nashville. TN 37219
(615) 741-2582

Douglas J. McVey, Administrator
Utah Occupational Safety and Health
160 East 300 South
P.O. Box 5800
Salt Lake City, UT 84110-5800
(801) 530-6900

Jeanne Van Vlandren, Commissioner
Vermont Department of Labor and Industry
120 State Street
Montpelier, VT 05602
(802) 828-2765

Paul Arnold, Commissioner
Virgin Islands Department of Labor
Box 890
Christiansted
St. Croix, VI 00820
(809) 773-1994

Carol Amato, Commissioner
Virginia Department of Labor and Industry
P.O. Box 12064
Richmond, VA 23241-0064
(804) 786-2376

Joseph A. Dear, Director
Washington Department of Labor and Industries
General Administration Building
Room 334 - AX-31
Olympia, WA 98504
(206) 753-6307

John Chambers, Assistant Administrator
Wyoming Department of Occupational Health and Safety
604 East 25th Street
Cheyenne, WY 82002
(307) 777-7786 or 777-7787

12.6 OSHA/STATE CONSULTATION PROJECT DIRECTORY

Consultation programs provide free services to employers who request help in identifying and correcting specific hazards, want to improve their safety and health programs, and/or need further assistance in training and education. Funded by OSHA and delivered by well-trained professional staff of state governments, consultation services are comprehensive, and include an appraisal of all workplace hazards, practices, and job safety and health programs; conferences and agreements with management; assistance in implementing recommendations; and a follow-up. appraisal to ensure that any required corrections are made.

In a typical review of a company's operation, the consultant will examine the structural condition of the building, check equipment such as forklifts, examine storage conditions, check control of toxic substances and other environmental hazards, and confer with management about employee supervision and job training. The ultimate benefits of a successful consultation experience may include a highly effective safety and health program as well as recognition by OSHA.

For more information on consultation programs, contact the appropriate office in your state listed in this Appendix.

Office and Address

Alabama
7(c)(1) Onsite Consultation Program
P.O. Box 2967
Tuscaloosa, Alabama 35486
(205) 348-3033

Alaska
Division of Consultation & Training LS&S/OSH
Alaska Department of Labor
3301 Eagle Street
Pouch 7-022
Anchorage, Alaska 99510
(907) 264-2599

Arizona
Consultation and Training
Division of Occupational Safety & Health
Industrial Commission of Arizona
P.O. Box 19070
800 West Washington
Phoenix, Arizona 85005
(602) 255-5795

Arkansas
OSHA Consultation
Arkansas Department of Labor
1022 High Street
Little Rock, Arkansas 72202
(501) 682-4522

California
CAL/OSHA Consultation Service
525 Golden Gate Avenue, 2nd Floor
San Francisco, California 94102
(415) 557-2870

Colorado
Occupational Safety & Health Section
Institute of Rural Environmental Health
Colorado State University
110 Veterinary Science Building
Fort Collins, Colorado 80523
(303) 491-6151

Connecticut
Division of Occupational Safety & Health Connecticut
Department of Labor
200 Folly Brook Boulevard
Wethersfield, Connecticut 06109
(203) 566-4550

Delaware
Occupational Safety and Health
Division of Industrial Affairs
Delaware Department of Labor
820 North French Street, 6th Floor
Wilmington, Delaware 19801
(302) 571-3908

District of Columbia
Office of Occupational Safety & Health
District of Columbia Department of Employment Services
950 Upshur Street, NW
Washington, D.C. 20011
(202) 576-6339

Florida

7(c)(1) Onsite Consultation Program
Bureau of Industrial Safety & Health
Department of Labor & Employment Security
LaFayette Building, Room 204
2551 Executive Center Circle, West
Tallahassee, Florida 32301
(904) 488

Georgia
7(c)(1) Onsite Consultation Program
Georgia Institute of Technology
O'Keefe Bldg. - Room 23
Atlanta, Georgia 30332
(404) 894-3806

Guam
OSHA Onsite Consultation
Government of Guam
3rd Floor InterSAFETY Trade Center
P.O. Box 9970
Tamuning, Guam 96911
(671) 646-9246

Hawaii
Division of Occupational Safety & Health
830 Punchbowl Street
Honolulu, Hawaii 96813
(808) 548-7510

Idaho
Safety & Health Consultation Program
Boise State University
Department of Commerce & Environmental Health 1910 University Dr., MG-110
Boise, Idaho 83725
(208) 385-3283

Illinois
Division of Industrial Services
Department of Commerce & Community Affairs
100 West Randolph St. - Suite 3-400
Chicago, Illinois 60601
(312) 917 2339

Indiana
Bureau of Safety, Education & Training
Indiana Division of Labor
1013 State Office Building
Indianapolis, Indiana 46204-2287
(317) 232-2688

Iowa
7(c)(1) Consultation Program
Iowa Bureau of Labor
1000 East Grand Avenue
Des Moines, Iowa 50319
(515) 281-5352

Kansas
Kansas 7(c)(1) Consultation Program
Kansas Department of Human Resources
512 West 6th Street
Topeka, Kansas 66603
(913) 296-4086

Kentucky
Consultation and Training
Kentucky OSH Program
Kentucky Labor Cabinet
U.S. Highway 127, South, Bay 4
Franktort, Kentucky 40601
(502) 564-6895

Louisiana
7(c)(1) Consultation Program
Louisiana Department of Labor
1001 North 23rd Street
P.O. Box 94094
Baton Rouge, LA 70804-9094
(504) 925-6005

Maine
Division of Industrial Safety
Maine Department of Labor
Labor Station 45
State Office Building
Augusta, Maine 04333
(207) 289-3331

Maryland
7(c)(1) Consultation Services
Division of Labor & Industry
501 Saint Paul Place
Baltimore, Maryland 21202
(301) 333-4218

Massachusetts
7(c)(1) Consultation Program
Division of Industrial Safety
Massachusetts Department of Labor & Industries
100 Cambridge Street
Boston, Massachusetts 02202
(617) 727-3567

Michigan
Special Programs Section
Division of Occupational Health
Michigan Department of Public Health
3500 N. Logan, PO. Box 30035
Lansing, Michigan 48909
(517) 335-8250

Michigan
Bureau of Safety and Regulation
Michigan Department of Labor
7150 Harris Drive, Box 30015
Lansing, Michigan 48909
(517) 322-1814

Minnesota
Consultation Division
Department of Labor & Industry
444 Lafayette Road, 5th Floor
St. Paul, Minnesota 55101
(612) 297-2393

Mississippi
7(c)(1) Onsite Consultation Program
Division of Occupational Safety & Health
Mississippi State Board of Health
307 West Lorenz Boulevard
Jackson, Mississippi 39213
(601) 987 3981

Missouri
Onsite Consultation Program
Division of Labor Standards
Department of Labor & Industrial Relations
621 East McCarty Street
Jefferson City, Missouri 65101
(314) 751-3403

Montana
Montana Bureau of Safety & Health
Division of Workers' Compensation
5 South Last Chance Gulch
Helena, Montana 59601
(406) 444-6424

Nebraska
Division of Safety, Labor & Safety Standards
Nebraska Department of Labor
State Office Building
301 Centennial Mall, South
Lincoln, Nebraska 68509-5024
(402) 471-4717

Nevada
Training and Consultation
Division of Occupational Safety & Health
4600 Kietzke Lane, Bldg. D-139
Reno, Nevada 89502
(702) 789-0546

New Hampshire
Onsite Consultation Program
New Hampshire Department of Labor
19 Pillsbury Street
Concord, New Hampshire 03301
(603) 271-3170

New Jersey
Division of Workplace Standards
New Jersey Department of Labor
CN054 110 East Front Street
Trenton, New Jersey 08625-0054
(609) 292-2313

New Mexico
OSHA Consultation
Occupational Health & Safety Bureau
1190 St. Francis Dr., Rm. 2200 No.
Santa Fe, New Mexico 87504-0968
(505) 827-2885

New York
Division of Safety and Health
New York State Department of Labor
One Main Street
Brooklyn, New York 11201
(718) 797-7646

North Carolina
North Carolina Consultative Services
North Carolina Department of Labor
Shore Memorial Building
214 West Jones Street
Raleigh, North Carolina 27603
(919) 733-2360

North Dakota
Division of Environmental Engineering
North Dakota State Department of Health
1200 Missouri Avenue, Room 304
Bismarck, North Dakota 58502-5520
(701) 224-2348

Ohio
Division of Onsite Consultation
Ohio Department of Industrial Relations
P.O. Box 825
2323 West 5th Avenue
Columbus, Ohio 43216
(614) 481-5697

Oklahoma
OSHA Division
Oklahoma Department of Labor
1315 Broadway Place - Rm. 301
Oklahoma City, Oklahoma 73103
(405) 235-053Q x240

Oregon
7(c)(1) Consultation Program
Employer Services, Room 204
Labor and Industries Building
Salem, Oregon 97310
(503) 378-2890

Pennsylvania
Indiana University of Pennsylvania
Safety Sciences Department
Uhler Hall
Indiana, Pennsylvania 15705
(412) 957-2561 /2396
(800) 382-1241 (Toll-free in State)

Puerto Rico
Occupational Safety & Health Office
Puerto Rico Department of Labor & Human Resources 505
Munoz Rivera Avenue, 2lst Floor
Hato Rey, Puerto Rico 00918
(809) 754-2134/2171

Rhode Island
Division of Occupational Health
Rhode Island Department of Health
206 Cannon Building
75 Davis Street
Providence, Rhode Island 02908
(401) 277-2438

South Carolina
7(c)(1) Onsite Consultation Program
Consultation & Monitoring, SC DOL
3600 Forest Drive
P.O. Box 11329
Columbia, South Carolina 29211
(803) 734-9599

South Dakota
S.T.A.T.E. Engineering Extension
Onsite Technical Division
South Dakota State University
Box 2218
Brookings, South Dakota 57007
(605) 688-4101

Tennessee
OSHA Consultative Services
Tennessee Department of Labor
501 Union Building, 6th Floor
Nashville, Tennessee 37219
(615) 741-2793

Texas
Occupational Safety & Health Division
Texas Department of Health
1100 West 49th Street
Austin Texas 78756
(512) 458-7287

Utah
Utah Safety & Health
Consultation Service
P.O. Box 45580
Salt Lake City, UT 84145-0580
(801) 530-6868

Vermont
Division of Occupational Safety & Health
Vermont Department of Labor & Industry
120 State Street
Montpelier, Vermont 05602
(802) 828-2765

Virginia
Virginia Department of Labor & Industry
P.O. Box 12064
205 N.4th Street
Richmond, Virginia 23241
(804) 785-5875

Virgin Islands
Division of Occupational Safety & Health
Virgin Islands Department of Labor
Lagoon Street
Frederiksted, VI 00840
(809) 7TZ-1315

Washington
Voluntary Services
Washington Department of Labor & Industries
1011 Plum Street, HC-462
Olympia, Washington 98504
(206) 586·0961

West Virginia
West Virginia Department of Labor
State Capitol, Building 3, Room 319
1800 E. Washington Street
Charleston, West Virginia 25305
(304) 34&7890

Wisconsin
Section of Occupational Health
Wisconsin Department of Health & Social Services
1414 E. Washington Avenue - Room 112
PO. Box 309
Madison, Wisconsin 53T01
(608) 266-8579

Wisconsin
Division of Safety and Buildings
Wisconsin Department of Industry,
Labor and Human Relations
1570 East Moreland Boulevard
Waukesha, Wisconsin 53186
(414) 521-5063

Wyoming
Occupational Health and Safety
State of Wyoming
604 East 25th Street
Cheyenne, Wyoming 82002
(307) 777-7786
(801) 530-6868

Other Relevant Addresses

Consultation Training Coordination
OSHA Training Institute
1555 Times Drive
Des Plaines, IL 60018
(312) 297-4810

Laboratory Services Agreement
Wisconsin Occupational Health
Laboratory
979 Jonathon Drive
Madison, Wisconsin 53713
(608) 263-8807

Don W. Harvey, Area Director
US Department of Labor - OSHA
Century Station Rm. 104
300 Fayetteville Street Mall
Raleigh, North Carolina 27601
Comm. Phone: 919-856-4770
FTS Phone: 672-4770

Columbia Area Office
James D. Borders, Area Director
US Department of Labor - OSHA
1835 Assembly Street Rm. 1468
Columbia, South Carolina 29201
Comm. Phone: 803-765-5904
FTS Phone: 677-5904

Jackson Area Office
A. DeJean King, Area Director
US Department of Labor - OSHA
Federal Building Suite 1445
100 West Capitol Street
Jackson, Mississippi 39269
Comm. Phone: 601-965-4606
FTS Phone: 490-4606

Fort Lauderdale Area Office
Jose J. Sanchez, Area Director
US Department of Labor - OSHA
Federal Building Rm. 302
299 East Broward Boulevard
Fort Lauderdale, Florida 33301
Comm. Phone: 305-527-7292
FTS Phone: 820-7292

Jacksonville Area Office
Richard M. Dayoub, Area Director
US Department of Labor - OSHA
3100 University Blvd. South Rm. 303
Jacksonville, Florida 32216
Comm. Phone: 904-791-2895
FTS Phone: 946-2895

Tampa Area Office
Lawrence J. Falck, Area Director
US Department of Labor - OSHA
700 Twiggs Street Rm. 624
Tampa, Florida 33602
Comm. Phone: 813-228-2821
FTS Phone: 826-2821

Nashville Area Office
Cois M. Brown, Area Director
US Department of Labor - OSHA
2002 Richard Jones Road Suite C-205
Nashville, Tennessee 37215
Comm. Phone: 615-736-5313
FTS Phone: 852-5313

Frankfort Area Office
John T. Phillips, Area Director
US Department of Labor - OSHA
John C. Watts Federal Building
Rm. 108
330W Broadway
Frankfort, Kentucky 40601
Comm. Phone: 502-227-7024
FTS Phone: None

Chicago - Region V (Indiana, Illinois, Michigan, Minnesota, Ohio and Wisconsin)
Chicago Regional Office

Michael Connors, Regional Administrator
US Department of Labor - OSHA
32nd Floor Rm. 3244
230 South Dearborn Street
Chicago, Illinois 60604
Comm. Phone: 312-353-2220
FTS Phone: 353-2220

Calumet City Area Office
Ronald J. McCann, Area Director
US Department of Labor - OSHA
1600 167th Street Suite 12
Calumet City, Illinois 60409
Comm. Phone: 312-891-3800
FTS Phone: 886-9887

Niles Area Office
Gary Anderson, Area Director
US Department of Labor - OSHA
6000 West Touhy Avenue
Niles, Illinois 60648
Comm. Phone: 312-631·8200
FTS Phone: None

Aurora Area Office
Kenneth Yoitz, Area Director
US Department of Labor - OSHA
344 Smoke Tree Business Park
North Aurora, Illinois 60542
Comm. Phone: 312-896-8700
FTS Phone: 886-7713

Peoria Area Office
Vacant
US Department of Labor - OSHA
2001 West Willow Knolls Road Suite #101
Peoria, Illinois 61614-1223
Comm. Phone: 309-671-7033
FTS Phone: 360-7033
Richard W. Taylor, District Supervisor
US Department of Labor - OSHA
218A West Main Street
Belleville, Illinois 62220
Comm. Phone: 618-277-5300
FTS Phone: None

Cincinnati Area Office
US Department of Labor - OSHA
Federal Office Building Rm. 4028
550 Main Street
Cincinnati, Ohio 45202
Comm. Phone: 513-684-3784
FTS Phone: 684-3784

Cleveland Area Office
William A. Thomas, Area Director
US Department of Labor - OSHA
Federal Office Building Rm.899
1240 East 9th Street
Cleveland,0hio 44199
Comm. Phone: 216-522-3818
FTS Phone: 942-3818

Columbus Area Office
James Vaughan, Area Director
US Department of Labor - OSHA
Federal Office Building Rm.634
200 North High Street
Columbus,0hio 43215
Comm. Phone: 614-469-5582
FTS Phone: 943-5582

Toledo Area Office
Arnis Andersons, Area Director
US Department of Labor - OSHA
Federal Office Building Rm.734
234 North Summit Street
Toledo,0hio 43604
Comm. Phone: 419-259-7542
FTS Phone: 979-7542

Indianapolis Area Office
Gerald Gravatt, Area Director
US Department of Labor - OSHA
Rm.423
46 East Ohio Street
Indianapolis, Indiana 46204
Comm. Phone: 317-269-7290
FTS Phone: 331-7290
Charles Burin, Area Director
US Department of Labor - OSHA
110 South 4th Street Rm. 425
Minneapolis, Minnesota 55401
Comm. Phone: 612-348-1994
FTS Phone: 777-1994

Lansing Area Office
William Funcheon, Area Director
US Department of Labor - OSHA
300 East Michigan Ave. Rm. 305
Lansing, Michigan 48933
Comm. Phone: 517-377-1892
FS Phone: 374-1892

Appleton Area Office
Melvin Lischefski, Area Director
US Department of Labor - OSHA
2618 North Ballard Road
Appleton, Wisconsin 54915
Comm. Phone: 414-734-4521
FTS Phone: None

Milwaukee Area Office
Gerald Cunningham, Area Director
US Department of Labor - OSHA
310 West Wisconsin Avenue, Suite 1180
Milwaukee, Wisconsin 53203
Comm. Phone: 414-291-3315
FTS Phone: 362-3315

Madison Area Office
Donald Brzowski, Area Director
US Department of Labor - OSHA
2934 Fish Hatchery Road, Suite 225
Madison, Wisconsin 53713
Comm. Phone: 608-264-5388
FTS Phone: 364-5388

Eau Claire District Office
Timothy Kobernat, District Supervisor
US Department of Labor - OSHA
Federal Building US Courthouse
500 Barstow Street Rm. B-9
Eau Claire, Wisconsin 54701
Comm. Phone: 715-832-9019
FTS Phone: None

Dallas - Region VI (Arkansas, Louisiana, New Mexico, 0klahoma and Texas)
Dallas Regional Office
Gilbert J. Saulter, Regional Administrator
US Department of Labor - OSHA
525 Griffin Street Rm. 602
Dallas, Texas 75202
Comm. Phone: 214-767-4731
FTS Phone: 729-4731

James T. Knorpp Area Director
US Department of Labor - OSHA
1425 West Pioneer Drive
Irving, Texas 75061
Comm. Phone: 214-259-6683
FTS Phone: 729-5347

Corpus Christi Area Office
Robert L. M. Hunter Jr., Area Director
US Department of Labor - OSHA
Government Plaza Rm.300
400 Mann Street
Corpus Christi, Texas 78401
Comm. Phone: 512-888-3257
FTS Phone: 529-3257

Austin Area Office
Nickie Nicholas, Area Director
US Department of Labor - OSHA
611 East 6th Street Rm.303
Austin, Texas 78701
Comm. Phone: 512-482-5788
FTS Phone: 770-5783

Lubbock Area Office
Dean McDaniel, Area Director
US Department of Labor - OSHA
Federal Building Rm.421
1205 Texas Avenue
Lubbock Texas 79401
Comm. Phone: 806-743-7681
FTS Phone: 738-7681

Houston Area Office
Gerald Baty, Area Director
US Department of Labor - OSHA
2320 LaBranch Street Rm.1103
Houston, Texas 77004
Comm. Phone: 713-750-1727
FTS Phone: 526-6727

Baton Rouge Area Office
Paul J. Hansen, Area Director
US Department of Labor - OSHA
Hoover Annex Suite 200
2156 Wooddale Boulevard
Baton Rouge, Louisiana 70806
Comm. Phone: 504-389-0474
FTS Phone: 687-0474

Little Rock Area Office
Glen R. Williamson, Area Director
US Department of Labor - OSHA
Savers Building Suite 828
320 West Capitol Avenue
Little Rock, Arkansas 72201
Comm. Phone: 501-378-6291
FTS Phone: 740-6291

Oklahoma City Area Office
William W. White, Jr., Area Director
US Department of Labor - OSHA
Main Place
420 West Main Suite 725
Oklahoma City, 0klahoma 73102
Comm. Phone: 405-231-5351
FTS Phone: 736-5351

Albuquerque Area Office
James W. Males, Area Director
US Department of Labor - OSHA
320 Central Avenue, SW, Suite 13
Albuquerque, New Mexico 87102
Comm. Phone: 505-776-3411
FTS Phone: 474-3411

Kansas City - Region VII (lowa, Kansas, Missouri and Nebraska)
Kansas City Regional Office
Roger Clark, Regional Administrator
US Department of Labor - OSHA
911 Walnut Street Rm.406
Kansas City, Missouri 64106
Comm. Phone: 816-426-5861
FTS Phone: 867-5861

Kansas City Area Office
John O. Schiltz, Area Director
US Department of Labor - OSHA
911 Walnut Street Rm.2202
Kansas City, Missouri 64106
Comm. Phone: 816-426-2756
FTS Phone: 867-2756

St. Louis Area Office
Denver Holt, Area Director
US Department of Labor - OSHA
4300 Goodfellow Blvd., - Building 105E
St. Louis, Missouri 63120
Comm. Phone: 314-263-2749
FTS Phone: 273-2749

Des Moines Area Office
Alonzo L. Griffin, Area Director
US Department of Labor - OSHA
210 Walnut Street Rm.815
Des Moines,1owa 50309
Comm. Phone: 515-284·4794
FTS Phone: 862-4794

Omaha Area Office
Ben Bare, Area Director
US Department of Labor - OSHA
Overland - Wolf Building Rm.100
6910 Pacific Street
Omaha, Nebraska 68106
Comm. Phone: 402-221-3182
FTS Phone: 864-3182

Wichita Area Office
Jeff Spahn, Area Director
US Department of Labor - OSHA
216 North Waco Suite B
Wichita, Kansas 67202
Comm. Phone: 316-269-6644
FTS Phone: 752-6644

Denver - Region VIII (Colorado, Montana, North Dakota, South Dakota, Utah and Wyoming)

Denver Regional Office
Byron R. Chadwick, Regional Administrator
US Department of Labor - OSHA
Federal Building Rm. 1576
1961 Stout Street
Denver, Colorado 80294
Comm. Phone: 303-844-9061
FTS Phone: 564-3061

Denver Area Office
Gerard Ryan, Area Director
US Department of Labor - OSHA
Tremont Center -1st Floor
333 West Colfax Ave.
Denver, Colorado 80204
Comm. Phone: 303-844-5285
FTS Phone: 564-5285
Toll Free: 1-800-332-5858

Billings Area Office
David J. DiTommaso, Area Director
US Department of Labor - OSHA
19 North 25th Street
Billings, Montana 59101
Comm. Phone: 406-657-6649
FTS Phone: 585-6649
Toll Free: 1-800-332-7087

Bismarck Area Office
Bruce C. Beelman, Area Director
US Department of Labor - OSHA
Federal Building Rm. 348
PO Box 2439
Bismarck, North Dakota 58502
Comm. Phone: 701-255-6690
FTS Phone: 783-4521

Salt Lake City Area Office
Robert Curtis, Area Director
US Department of Labor - OSHA
1781 South 300 West
Salt Lake City, Utah 84115
Comm. Phone: 801-524-5082
FTS Phone: 588-5082

San Francisco - Region IX (Arizona, California, Hawaii, Nevada)

San Francisco Regional Office
Frank Strasheim, Regional Administrator
US Department of Labor. - OSHA
71 Stevenson Street Rm: 415
San Francisco, California 94105
Comm. Phone: 415-995-5672
FTS Phone: 995-5672

Long Beach Area Office
Les Michael, Area Director
US Department of Labor - OSHA
400 Oceangate, Suite 530
Long Beach, California 90802
Comm. Phone: 213-514-6387
FTS Phone: 795-6387

Sacramento Area Office
Frances Toste, Area Director
US Department of Labor - OSHA
2422 Arden Way Suite A-1
Sacramento, California 95825
Comm. Phone: 916-646-9220
FTS Phone: None

San Diego Area Office
John Hermanson, Area Director
US Department of Labor - OSHA
9619 Chesapeake Dr. Suite 300
San Diego, California 92123
Comm. Phone: 619-569-9071
FTS Phone: None

Walnut Creek Area Office
Alan Traenkner, Area Director
US Department of Labor - OSHA
801 Ygnacio Valley Road, Suite 205
Walnut Creek, California 94596-3823
Comm. Phone: 415-943-1973
FTS Phone: None

West Covina Area Office
Leonard Limtiaco, Area Director
100 N. Citrus Ave., Suite 240
(Coast Savings Building)
West Covina, California 91791
Comm. Phone: 818-915-1558
FTS Phone: None

Los Angeles Area Office
Frank Grabitt, Area Director
US Department of Labor - OSHA
3325 Wilshire Blvd. - Suite 601
Los Angeles, California 90010
Comm. Phone: 213-252-7829
FTS Phone: 983-7829

San Jose Area Office
Marsha Grueber, Area Director
US Department of Labor - OSHA
950 S. Bascom Suite 3120
San Jose, California 95128
Comm. Phone: 408-291-4600
FTS Phone: 466-4600

Phoenix Area Office
Elliot Gilmore, Area Director
US Department of Labor - OSHA
3221 North l6th Street Suite 100
Phoenix, Arizona 85016
Comm. Phone: 602-241-2007
FTS Phone: 261-2007

Honolulu Area Office
Tom Marple, Area Director
US Department of Labor - OSHA
300 Ala Moana Boulevard Suite 5122
PO Box 50072
Honolulu, Hawaii 96850
Comm. Phone: 808-541-2685
FTS Phone: 551-2685

Seattle - Region X (Alaska, Idaho, Oregon and Washington)

Seattle Regional Office
James W. Lake, Regional Administrator
US Department of Labor - OSHA
Federal Office Building Rm. 6003
909 1st Avenue
Seattle Washington 98174
Comm. Phone: 206-442-5930
FTS Phone: 399-5930

Bellevue Area Office
Ronald T. Tsunehara, Area Director
US Department of Labor - OSHA
121 -107th Avenue, N.E.
Bellevue, Washington 98004
Comm. Phone: 206-442-7520
FTS Phone: 399-7520

Anchorage Area Office
Cindy Coe, Area Director
US Department of Labor - OSHA
Federal Building F210
701 C Street Box 29
Anchorage, Alaska 99513
Comm. Phone: 907-271-5152
FTS Phone: None

Boise Area Office
Ryan Kuehmichel Area Director
US Department of Labor - OSHA
Room 324, Federal Building/USCH
550 West Fort Street, Box 007
Boise, Idaho 83724
Comm. Phone: 208-334-1867
FTS Phone: 554-1867

Portland Area Office
Carl A. Halgren, Area Director
US Department of Labor - OSHA
1220 Southwest 3rd Avenue Rm.640·
Portland, 0regon 97204
Comm. Phone: 503-221-2251
FTS Phone: 423-2251

Other Relevant Addresses

OSHA Training Institute
(Training and education)
Harvey Harris, Director
Office of Training and Education
US Department of Labor
1555 Times Drive
Des Plaines, Illinois 60018
312-297-4810

Cincinnati Laboratory
(Technical equipment calibration and repair)
David B. Loebach, Director
OSHA Cincinnati Laboratory
USPO Building, Rm.108
5th & Walnut Streets
Cincinnati, 0hio 45202
513-684-2531

Salt Lake City Laboratory
(Chemical analyses of monitoring samples)
Floyd Madsen, Director
SLC Analytical Laboratory
Chemical Analyses of Monitoring Samples
P.O. Box 15200
1781 South 300 West
Salt Lake City, Utah 84115
801-524-5287**Health Response Unit, SLC**
(Health and industrial hygiene assistance)
Mike Larsen, Director
Health Response Unit - OSHA
P.O. Box 15200
1781 South 300 West
Salt Lake City, Utah 84115
801-524-5896

OSHA Regional Hazard Communication Coordinators

This Appendix contains a list of the Regional Coordinators for the Hazard Communication Standard and a directory of OSHA's Regional and Area Offices and other relevant addresses. These offices may be contacted for any further information on the Standard.

Region I **Boston Regional Hazard Communication Coordinator**
Ronald Ratney/Fred Malaby
US Department of Labor - OSHA
133 Portland St
Boston, Massachusetts 02114
Comm. Phone: 617-565-7164
FTS Phone: 835-7164

Region II **New York Regional Hazard Communication Coordinator (Acting)**

Michael Yarnell
US Department of Labor - OSHA
201 Varick Street, Room
670 New York, New York 10014
Comm. Phone: 212-337-2348
FTS Phone: 660-2348

Region III **Philadelphia Regional Hazard Communication Coordinator**

James Johnston
US Department of Labor - OSHA Gateway Building, Suite 2100
3535 Market Street
Philadelphia, Pennsylvania 19104 Comm. Phone: 215-596-1201
FTS Phone: 596-1201

Region IV **Atlanta Regional Hazard Communication Coordinator**

Cynthia Wolfe
US Department of Labor - OSHA
1375 Peachtree Street, N.E.
Suite 587
Atlanta, Georgia 30367
Comm. Phone: 404-347-3573
FTS Phone: 257-2281

Vacant
US Department of Labor - OSHA 32nd Floor, Room 3244
230 South Dearborn Street
Chicago, Illinois 60604
Comm. Phone: 312-353-2220
FTS Phone: 353-2220

Region VI **Dallas Regional Hazard Communication Coordinator**

Dean Wingo/Alexander Gimbel
US Department of Labor - OSHA
525 Griffin Square, Room 602
Dallas, Texas 75202
Comm. Phone: 214-767-4731
FTS Phone: 729-4752

Region VII **Kansas City Regional Hazard Communication Coordinator**

Glenn Taylor
US Department of Labor - OSHA
911 Walnut Street, Room 406
Kansas City, Missouri 64106
Comm. Phone: 816-426-5861
FTS Phone: 867-5861

Region VIII **Denver Regional Hazard Communication Coordinator**

John Healey
US Department of Labor - OSHA Federal Building, Room 1576
1961 Stout Street
Denver, Colorado 80294
Comm. Phone: 303-844-3061
FTS Phone: 564-3061

Region IX **San Francisco Regional Hazard Communication Coordinator**

Dean Ikeda
US Department of Labor - OSHA 71 Stevenson Street, Room 415 San Francisco, California 94105 Comm. Phone: 415-995-5672
FTS Phone: 995-5683

Region X **Seattle Regional Hazard Communication Coordinator**

Richard Terrill
US Department of Labor - OSHA
Federal Office Building, Room 6003
909 First Avenue
Seattle, Washington 98174
Comm. Phone: 206-442-5930
FTS Phone: 399-5930

OSHA Regional and Area Offices

Boston - Region I (Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island and Vermont)

Boston Regional Office
John B. Miles, Regional Administrator
US Department of Labor - OSHA
133 Portland Street
Boston, Massachusetts 02114
Comm. Phone: 617-565-7164
FTS Phone: 835-7164

Boston Area Office
Vacant
US Department of Labor - OSHA

400-2 Totten Pond Road 2nd Floor
Waltham, Massachusetts 02154
Comm. Phone: 617-647-8681
FTS Phone: 839-7681

Springfield Area Office
Ronald E. Morin Jr., Area Director
US Department of Labor - OSHA
1550 Main Street Rm. 532
Springfield, Massachusetts 01103-1493
Comm. Phone: 413-785-0123
FTS Phone: 836-9123

Concord Area Office
David C. May, Area Director
US Department of Labor - OSHA
Federal Building Rm. 334
55 Pleasant Street
Concord, New Hampshire 03301
Comm. Phone: 603-225-1629
FTS Phone: 834-4629

Providence Area Office
Kipp Hartmann, Area Director
US Department of Labor - OSHA
Federal Office Building
380 Westminister Mall Rm. 243
Providence, Rhode Island 02903
Comm. Phone: 401-528-4669
FTS Phone: 838-4667

Augusta Area Office
William O. Masters, Area Director
US Department of Labor - OSHA
40 Western Avenue Rm. 121
Augusta, Maine 04330
Comm. Phone: 207-622-8417
FTS Phone: 833-6417

Hartford Area Office
John J. Stanton, Jr., Area Director
US Department of Labor - OSHA
Federal Office Building
450 Main Street Rm. 508
Hartford, Connecticut 06103
Comm. Phone: 203-240-3152
FTS Phone: 244-3152

New York City - Region II (New Jersey, New York and Puerto Rico)

New York Regional Office
James W. Stanley, Regional Administrator
US Department of Labor - OSHA
201 Varick Street Rm. 670
New York, New York 10014
Comm. Phone: 212-337-2378
FTS Phone: 660-2378

Manhattan Area Office
Linda Forsyth, Area Director
US Department of Labor - OSHA
90 Church Street Rm. 1405
New York, New York 10007
Comm. Phone: 212-264-9840
FTS Phone: 264-9840

Long Island Area Office
Nancy Adams, Area Director
US Department of Labor - OSHA
990 Westbury Road
Westbury New York 11590
Comm. Phone: 516-334-3344
FTS Phone: 265-2909

Queens Area Office
Edward Scott, Area Director
US Department of Labor - OSHA
42-40 Bell Blvd 5th Floor
Bayside, New York 11361
Comm. Phone: 718-279-9060/9050
FTS Phone: None

Albany Area Office
John Tomich, Area Director
US Department of Labor - OSHA
Leo W. O'Brien Federal Building
Clinton Avenue & North Pearl Street
Rm. 132
Albany, New York 12207
Comm. Phone: 518-472-6085
FTS Phone: 562-6085

Syracuse Area Office
David Boyce, Area Director
US Department of Labor - OSHA

100 South Clinton Street Rm. 1267
Syracuse, New York 13260
Comm. Phone: 315-423-5188
FTS Phone: 950-5188

Buffalo Area Office
Richard Bradley, Area Director
US Department of Labor - OSHA
5360 Genesee Street
Bowmansville, New York 14026
Comm. Phone: 716-684-3891/4018
FTS Phone: 684-3896

Puerto Rico Area Office
US Department of Labor - OSHA
Triple S Building
1510 FD Roosevelt Ave.
Suite 5B
Guaynabo, PR 00968
Phone: 787-277-1560
Fax: 787-277-1567

Hasbrouck Heights Area Office
Efraim Zoldan, Area Director
US Department of Labor - OSHA
Teterboro Airport Professional Building
500 Route 17 Rm. 206
Hasbrouck Heights, New Jersey 07604
Comm. Phone: 201-288-1700
FTS Phone: None

Avenel Area Office
Dennis Gaughan, Area Director
US Department of Labor - OSHA
Plaza 35 (Suite 205)
1030 Saint Georges Avenue
Avenel, New Jersey 07001
Comm. Phone: 201-750-3270
FTS Phone: 750-3270

Camden Area Office
Harry Allendorf, Area Director
US Department of Labor - OSHA
Marlton Executive Park,
701 Route 73 South, Bldg. 2
Marlton, New Jersey 08053
Comm. Phone: 609-757-5181
FTS Phone: 488-5181

Dover Area Office
Charles Meister, Area Director
US Department of Labor - OSHA
2 East Blackwell Street
Dover, New Jersey 07801
Comm. Phone: 201-361-4050
FTS Phone: None

Philadelphia - Region III (Delaware, District of Columbia, Maryland, Pennsylvania, Virginia and West Virginia)

Philadelphia Regional Office
Linda R. Anku, Regional Administrator
US Department of Labor - OSHA
Gateway Building Suite 2100
3535 Market Street
Philadelphia, Pennsylvania 19104
Comm. Phone: 215-596-1201
FTS Phone: 596-1201

Philadelphia Area Office
Eduardas Skladaitis, Area Director
US Department of Labor - OSHA
US Custom House Rm. 242
Second & Chestnut Street
Philadelphia, Pennsylvania 19106
Comm. Phone: 215-597-4955
FTS Phone: 597-4955

Division of 11 (c) Programs
William Jensen
Supervisory Investigator
US Department of Labor - OSHA
Liberty Square 5th Floor
105 South 7th Street
Philadelphia, Pennsylvania 19106
Comm. Phone: 215-597-8064
FTS Phone: 597-8064

Pittsburgh Area Office
Gary Griess, Area Director
US Department of Labor - OSHA
Federal Building Rm. 2236
1000 Liberty Avenue
Pittsburgh, Pennsylvania 15522
Comm. Phone: 412-644-2903
FTS Phone: 722-2903

Erie District Office
John Stranahan, District Supervisor
US Department of Labor - OSHA
Rathrock Building Rm. 408
121 West l0th Street
Erie, Pennsylvania 16501-1462
Comm. Phone: 814-453-4351

Wilkes-Barre Area Office
Andrew Hedesh, Area Director
US Department of Labor - OSHA
Penn Place Rm. 2005
20 North Pennsylvania Avenue
Wilkes-Barre, Pennsylvania 18701
Comm. Phone: 717-826-6538
FTS Phone: 592-6538

Allentown District Office
George Tomchick, District Supervisor
US Department of Labor - OSHA
850 N. 5th Street
Allentown, Pennsylvania 18102
Comm. Phone: 215-776-4220
FTS Phone: 346-4220

Harrisburg Area Office
Robert Fink, Area Director
US Department of Labor - OSHA
Progress Plaza
49 North Progress Street
Harrisburg, Pennsylvania 17109
Comm. Phone: 717-782-3902
FTS Phone: 590-3902

Wilmington District Office
Lacy Sutton, District Supervisor
US Department of Labor - OSHA
Federal Office Building Rm. 1414
844 King Street
Wilmington, Delaware 19801
Comm. Phone: 302-573-6115
FTS Phone: 487-6115

Charleston Area Office
Perry D. Jones, Area Director
US Department of Labor - OSHA
550 Eagan Street Rm. 206
Charleston, West Virginia 25301
Comm. Phone: 304-347-5937
FTS Phone: 903-5937

Baltimore Area Office
Lawrence Liberatore, Area Director
US Department of Labor - OSHA
Federal Building Rm. 1110
Charles Center 31 Hopkins Plaza
Baltimore, Maryland 21201
Comm. Phone: 301-962-2840
FTS Phone: 922-2840

Norfolk District Office
Thomas Poe, District Supervisor
US Department of Labor - OSHA
Federal Office Building Rm. 835
200 Granby Mall
Mail Drawer 486
Norfolk, Virginia 23510
Comm. Phone: 804-441-3820
FTS Phone: 827-3820

Atlanta - Region IV (Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina and Tennessee)

Atlanta Regional Office
R. Davis Layne (Acting), Regional Administrator
US Department of Labor - OSHA
1375 Peachtree Street, N.E., Suite 587
Atlanta, Georgia 30367
Comm. Phone: 404-347-3573
FTS Phone: 257-3573/ 2281

Atlanta Area Office
Joseph L. Camp, Area Director
US Department of Labor - OSHA
Building 10 Suite 33
LaVista Perimeter Office Park
Tucker, Georgia 30084
Comm. Phone: 404-331-4767/0353
FTS Phone: 242-4767

Savannah District Office
Richard Graeser, District Supervisor
US Department of Labor - OSHA
1600 Drayton Street
Savannah, Georgia 31401
Comm. Phone: 912-944-4393
FTS Phone: 248-4393

Birmingham Area Office
Raymond C. Finney, Area Director
US Department of Labor - OSHA
Todd Mall
2047 Canyon Road
Birmingham, Alabama 35216
Comm. Phone: 205-731-1534
FTS Phone: 229-1541

Mobile District Office
David Barnhill, District Supervisor
US Department of Labor - OSHA
951 Government Street Suite 502
Mobile, Alabama 36604
Comm. Phone: 205-690-2131
FTS Phone: 537-2131

13 ABRASIVE BLASTING

ABRASIVE BLASTING

13.1 GENERAL SAFETY

13.2 SCOPE

This program covers all employees involved in abrasive blasting jobs. Whenever hazardous substances such as dusts, fumes, mists, vapors, or gases exist or are produced during construction work, their concentrations shall not exceed the limits specified in the "Threshold Limit Values of Airborne Contaminants – 1970" of the American Conference of Governmental Industrial Hygienists. When ventilation is used as an engineering control method, the system shall be installed and operated according to the requirements of 1926.57 (Ventilation).

13.3 PROCEDURE

13.4 GENERAL

Abrasives and the surface coatings on the materials blasted are shattered and pulverized during blasting operations and the dust formed will contain particles of respirable size. The composition and toxicity of the dust from these sources shall be considered in making an evaluation of the potential hazards.

Dust shall not be permitted to accumulate on the floor or on ledges outside of an abrasive blasting enclosure. Dust spills shall be cleaned up promptly. Aisles and walkways shall be kept clear of steel shot or similar abrasives which may create a slipping hazard.

13.5 EQUIPMENT HANDLING

Follow these guidelines when moving blasting equipment to prevent back strains and crushing injuries:

- Use a forklift, crane or other type of lifting device for transporting a blast machine; always use a lifting device when the machine contains abrasive.
- Never manually move a blast machine where abrasive has been spilled on hard surfaces or on a wet or slippery surface.
- Never attempt to manually move a blast machine containing abrasive.
- Always disconnect hoses from machines to avoid interference during moving.

13.6 AIR COMPRESSORS

- Air compressors must be located in a well-ventilated area. It must be able to contain large volumes of clean, toxicant-free air. This means the compressor must be placed up wind from the blasting operation and out of the range of dust and flying abrasives.
- Due to the high pressure that air compressors create, precautions must be taken to prevent unleashing of strong forces that can cause serious bodily injury.
- Air for abrasive blasting respirators must be free of harmful quantities of dust, mists, or noxious gases and must be inspected daily, prior to use and comply with CFR 1910.134(I) (Respiratory Protection).
- Never adjust the pressure setting on a compressor above the blast equipment maximum working pressure rating. The maximum working pressure rating is indicated on the manufacturer's metal identification plate. Employees shall not use compressed air for cleaning unless the pressure is reduced to less than 30 p.s.i.

13.7 BLAST POT

- Position blast pots and/or compressors on level ground. Machines operate best when they sit on level surfaces.
- For communication purposes place blast pot between the compressor and the surface to be blasted. This will enable the pot tender and operator to make visual contact.
- All couplings and pipefitting on the blast pot, compressor and hoses must be airtight.
- Blast pots must be inspected daily prior to use.

13.8 HOSES AND CONNECTORS

- Couplings must have safety wires in place and be secure as required by federal safety regulations. The operator shall be responsible to ensure that each coupling has safety wires in place.
- Whip checks must be installed at bull hose connections.
- Operator should hold onto the blast hose until the air pressure from the nozzle drops off to zero.
- Do not use hoses with soft spots.
- Never use tape to repair a blown-out hose.
- Immediately replace a hose if a blowout or leak occurs.
- Hose ends must come into contact with coupling gaskets to prevent leaks and to maintain static electricity conductivity.

13.9 NOZZLES AND REMOTE CONTROLS

- Blast nozzles shall be bonded and grounded to prevent the buildup of static charges. Where flammable or explosive dust mixtures may be present, the abrasive blasting enclosure, the ducts, and the dust collector shall be constructed with loose panels or explosion venting areas, located on sides away from any occupied area, to provide pressure relief in case of explosion following the principles set forth in the National Fire Protection Association Explosion Venting Guide. NFPA 68-1954.
- Organic abrasives which are combustible shall be used only in automatic systems.
- Blast cleaning nozzles shall be equipped with an operating valve which must be held open manually. A support shall be provided on which the nozzle may be mounted when it is not in use.
- All blast machines must be equipped with remote control systems to start and stop the blasting process.
- Never tape, strap, or tie down an air actuated remote-control lever or choke electric remote-control switch.
- If there is the slightest delay in reaction time of the handle lever or lever lock to open, check for dust and dirt build-up around pivot pins before resuming blasting. Also, test the tension on the lever springs, and replace them immediately if they do not respond rapidly.
- Substituting component pieces with other manufacturer's parts is not allowed.
- Inspect blast nozzles for wear and cracks on the inner liner. When a nozzle orifice is worn 1/16" larger than its original size, it should be replaced.
- Check nozzles and nozzle holders for deterioration of thread form. Threads on nozzles and their companion holders must not be cross-threaded, worn or distorted.
- Hoses that are being tied and lifted to blasting operations being conducted above grade, i.e., scaffolds, shall be depressurized to prevent accidental start-up.

13.10 OPERATOR SIGNALS

- On the job site, voice communication is often impossible. Even shouts cannot be heard over the noise of compressors and blasting. In addition, the operator's head will be enclosed in the helmet, which blocks out sound and limits vision. For these reasons, an industry wide standard set of hand and sound signals has been developed.
- Signals may be visual hand movements, flashing light, pulls on a rope or sounds made by banging a hammer or using a horn or electric buzzer.
- Every operator must become familiar with the signals to be used on the jobsite.

13.11 RESPIRATOR USE

- A specific work-site procedure shall be developed where respirators or CE blasting hoods/helmets are required to protect the health of the operator. A respiratory protection program shall be established wherever it is necessary to use respiratory protective equipment including worksite specific procedures and elements for required respirator use. Abrasive blasting respirators shall be worn by all abrasive blasting operators under certain conditions.
- Equipment for the protection of eyes, face and body shall be supplied to the operator when the respirator design does not provide such protection and to any other personnel working in the vicinity of abrasive blasting operations. This equipment shall conform to the requirements of 1926.102 (Eye and Face Protection).
- Equipment for protection of the eyes and face shall be supplied to any other personnel working in the vicinity of abrasive blasting operations.

13.12 ENVIRONMENTAL CONTROLS

- Organic abrasives which are combustible shall be used only in automatic systems. Where flammable or explosive dust mixtures may be present, the construction of the equipment, including the exhaust system and all electrical wiring, shall conform to the requirements of American National Standard Installation of Blower and Exhaust Systems for Dust, Stock, and Vapor Removal or Conveying, Z33.1-1961 (NFPA 91-1961), and Subpart S of 1926.57 (Ventilation).
- The work area must be inspected for exterior electrical power lines that may endanger operators.
- Operators should use care to avoid directly blasting power lines and insulators.
- Do not blast in atmospheres that contain flammable fumes.
- Take precautions at the work site to eliminate hazardous surface obstacles that may cause tripping hazards or interfere with worker mobility.
- Adequate ventilation must be provided for employees working within enclosures.
- Never operate compressor if hoses are frozen. When winter temperatures drop below freezing, check for ice prior to pressurizing hoses.
- Provide adequate drinking water for operators, especially during summer.

13.13 PERSONAL PROTECTIVE EQUIPMENT

RESPIRATORY EQUIPMENT (SEE SAIF CORPORATION RESPIRATORY PROTECTION GUIDELINES, SS-833)

The respirator worn should be certified by the National Institute of Occupational Safety and Health (NIOSH) 42 CFR Part 84 for protecting employees from dusts and other hazards produced during abrasive blasting operations. It must be worn by all personnel exposed to concentrations of particulate matter which is above the OSHA Permissible Exposure limits found in Toxic and Hazardous Substances. SAIF strongly

recommends that they be worn when the American Conference of Governmental Industrial Hygienists (ACGIH) established Threshold Limit Values are exceeded.

- Secure hoses by tying them to scaffolding or personnel platforms, when working from elevations, to prevent injury from hoses falling on other personnel working below or near blasting area.
- Before using any blasting abrasive, check the SDS to find out the chemical composition of the abrasive material.
- Equipment for the protection of eyes, face and body shall be supplied to the operator when the respirator design does not provide such protection and to any other personnel working in the vicinity of abrasive blasting operations. This equipment shall conform to the requirements of 1926.102 (Eye and Face Protection).
- Ventilation systems and dust collectors may be necessary in enclosed conditions.
- Noise from abrasive blast nozzles can be loud enough to damage the hearing of blasters and others on the work site. Workers must not be exposed to noise levels exceeding 80 decibels as an eight-hour time weighted average (80 dBA TWA); therefore all blasters shall wear earplugs.
- Blaster must wear heavy-duty gloves and steel toe boots.

Helmet lenses should be changed as soon as pitting or frosting takes place.

Below is a guide on the type of PPE to be provided during blasting operations.

Type	When
Abrasive Blasting Respirators - A supplied air or a continuous flow respirator constructed to cover and protect the operator's head, neck and shoulders from rebounding abrasive	Operators work in any of the following situations: • Inside blast cleaning rooms • Where silica sand is used in manual blasting operations • Where concentrations of toxic dust exceed the permissible exposure limits An abrasive respirator doesn't need to be worn if the operator is physically separated from the nozzle and blast by an exhaust ventilated enclosure
Filtering face piece	Short, intermittent or occasional dust exposures during the following tasks: • To protect the operator during abrasive blasting operations performed outside the enclosure or outdoors where non-silica abrasives are used on materials with low toxicity • Clean-up • Dumping dust collectors • Unloading shipments of sand at receiving areas when the following controls are not feasible – enclosures, exhaust ventilation or other means
Eye and face protection to both of the following • Blasting operators • Personnel working near blasting operations	Respirators worn during blasting operations don't provide eye and face protection
Gloves and aprons made of heavy canvas or leather; or equivalent protection	Operators are exposed to the impact of rebounding abrasives
Safety shoes – steel-toed	Heavy pieces of material are handled

13.14 DUST HAZARDS

Abrasives and the surface coatings on materials blasted are shattered and pulverized during blasting operations. The dust formed will contain particles that could result in the following hazards:

- Respiratory
- Fire
- Explosion

Wet blasting methods minimize dust exposure, but dispersed droplets, mists and dried residues may become airborne and create potential exposures

1. You must evaluate the potential health hazards from abrasive blasting operations by considering the composition and toxicity of the abrasive material and the surface being abraded.
2. You must keep dust concentrations below the permissible exposure limits found in Toxic and Hazardous Substances.

13.15 EXAMPLES OF THE TYPES OF ABRASIVES USED IN BLASTING OPERATIONS

Type of Abrasive	Examples of Abrasives	Other Information
Synthetic or natural mineral grains	Crystalline Silica Garnet	Silica sand is the most hazardous. Limit the use of silica sand wherever possible. For types of abrasive used in place of silica go to the Occupational Safety and Health Administration's (OSHA) homepage at: http://www.osha.gov/ Select 'S' for Silica
Slag abrasive	Copper slag Nickel slag Mixed metal slag	May contain heavy metals
Metallic shot or grit	Steel Chilled cast iron	The potential hazard is considered minimal
Organic	Ground corncobs Ground walnut shells	Readily combustible organic abrasives can form explosive mixtures with air. • Prohibit the use of combustible organic abrasives, except in automatic blast cleaning systems • Bond and ground the blast nozzle to prevent the buildup of static charges

13.16 EXAMPLES OF COATINGS REMOVED IN BLASTING OPERATIONS

Types of Coatings	Examples of Coatings	Other Information
Surface • Formed during the fabrication of a part	Those containing toxic metals: • Paints containing mercury • Cadmium plating • Lead paints on structural steel • Lead deposits on pistons of internal combustible engines	The type of coating should be known to evaluate potential hazards
Protective • Applied after fabrication	Protective • Applied after fabrication	

13.17 HOUSEKEEPING

Abrasive blasting operations can create conditions that result in injuries related to slip, trips and falls. Housekeeping procedures should include:

- Keeping aisles and walkways clear of steel shot or similar abrasives that may create a slipping hazard
- Prohibiting the accumulation of dust on the floors or ledges outside blasting enclosures
- Cleaning up dust spills promptly
- Use of high-efficiency particulate air filter (HEPA), vacuum cleaner when the plant isn't in operation and by a person wearing a respirator approved for the existing conditions

13.18 BLAST CLEANING ENCLOSURES

There two basic types of enclosures in abrasive blasting:

1. **Blasting Cabinet:** An enclosure where the operator stands outside, operating necessary controls or blasting nozzle from outside of the enclosure.
2. Blast Cleaning Room: A complete enclosure in which abrasive blasting is performed with the operator working inside the room.

Blast Cleaning Enclosures If you have	Then make sure
Air inlets and access openings	They are either baffled or arranged so the combination of inward airflow and baffles minimizes both of the following: • The escape of abrasive or dust particles into adjacent work areas. • Visible spurts of dust
Small access opening s where dust might escape	Slit resistant baffles are installed in multiple sets of all small access openings, and do both of the following: • Regularly inspect them • Replace them when needed
An observation window in enclosures where hard, deep cutting abrasives are used	The window is made of safety glass protected by screening Caution: • Hard, deep cutting abrasives may shatter normal glass • If the safety glass shatters, the protective screening will help contain the glass and protect employees from cuts and lacerations
Small operator access doors	They are flanged and tight when closed, and open from both inside and outside the enclosure Caution: If you have a small operator access door and a large work access door, the large work access door may open or close from the outside only.

13.19 BLAST CLEANING ENCLOSURES AND RECOMMENDED AIR VELOCITIES

Examples of Blast Cleaning Enclosures	Recommended Air Velocities in Feet per Minute (fpm)
Abrasive blasting cabinets	At least 500 fpm at the hand openings
Blast cleaning rooms	At least 300 fpm with well baffled air inlets
Rotary blast cleaning tables	200-250 fpm at the access opening
Abrasive separators	200-250 fpm at all openings
Bucket elevators	
Other accessory abrasive handling equipment including blast cleaning drums and barrels	

The exhaust systems should be constructed, installed, inspected, and maintained to meet both of the following:

- The American National Standards Institute (ANSI), Z9.2-2001 for – Fundamentals Governing the Design and Operation of Local Exhaust Systems
- The National Fire Protection Association (NFPA) 91-2004 for – Exhaust Systems for Air Conveying of Vapors, Gases and Noncombustible Particulate Solids.

Also refer to the ANSI Z9.4-1997 for information on – Exhaust Systems for Abrasive-blasting Operations, Ventilation, and Safe Practices for Fixed Location Enclosures.

If you have flammable or explosive dust mixtures that may be present:

- Make sure the construction of equipment, including the exhaust system and all electrical wiring, meets both of the following:
  1. The American National Standard Installation of Blower and Exhaust Systems for Dust, Stock, and Vapor Removal or Conveying, NFPA 91.2004
  2. The electrical requirements for Class II locations
- Make sure blast cleaning enclosures, the ducts and the dust collector are constructed with either loose panels or explosion venting areas that meet all of the following:

Provide pressure relief in case of an explosion

1. Provide pressure relief in case of an explosion
2. Are located away from occupied areas
3. The Guide for Deflagrations, NFPA 68.2002

13.20 SPECIFIC OPERATING REQUIREMENTS

13.21 BLASTING CABINETS

- Ventilation is required so that there is a continuous flow of air into all openings in the enclosure during blasting. The exhaust shall promptly clear the dust laden air within the cabinet after blasting.
- Inlets and access openings are to be baffled to minimize escape of abrasive or dust particles into adjacent work areas. No visible spurts of dust are to be observed. Slit, abrasive resistant baffles are needed at all small access openings where dust might escape. These are to be regularly inspected and replaced when needed.
- Before the cabinet is opened, the blast is to be closed off, and the exhaust system operated long enough to remove the dusty air within.
- Safety glass protected by screening is needed for observation windows where hard cutting abrasives are used.
- Doors are to be flanged and fit tight when closed.
- Dust leaks are to be promptly repaired.
- Static pressure drop at exhaust ducts is to be measured after installation and periodically thereafter to assure satisfactory operation.
- Exhaust ducts are to be cleaned whenever there is an indication of a partial blockage.
- An abrasive separator is to be used in installations where the abrasive is recirculated.
- Air exhaust from the cabinet is to be discharged through dust collecting equipment.
- Dust collectors are to be installed, so that accumulated dust can be emptied and removed without contaminating other work areas.

13.22 BLAST CLEANING ROOMS

Ventilation is needed so that there is a continuous flow of air into the room from all doorways and other openings.

- Doors on blast cleaning rooms are to be operable from both inside and outside. If there is a small operator access door, the large work access door may be closed or opened from the outside only.
- Static pressure drop at exhaust ducts is to be measured after installation and periodically thereafter to assure satisfactory operation.
- Exhaust ducts are to be cleaned whenever there is an indication of a partial blockage.
- An abrasive separator is to be used in installations where the abrasive is recirculated.
- Air exhaust from the room is to be discharged through dust collecting equipment.
- Dust collectors are to be installed so that accumulated dust can be emptied and removed without contaminating other work areas.

13.23 AIR BLASTING

Ventilation for open air blasting work is not needed. Provide and ensure use of personal protective equipment for the abrasive blaster.

13.24 BLAST CLEANING NOZZLES

Make sure nozzles are all the following:

1. Mounted on a support when not in use
2. Equipped with operating valves that are manually held open
3. Pressurized tanks used to supply abrasive should be connected to the manual control of the nozzle to prevent the buildup of static charges
4. The relief valve or opening should be located so that it can safely vent

13.25 INSPECTION AND MAINTENANCE

- Make sure the exhaust ventilation system is fully operational by checking the static pressure drop at the exhaust ducts leading from the equipment when an installation is completed and annually after installation.
- Repair or clean exhaust systems when dust leaks are found, or the pressure drop gauge indicates a change exceeding 20 percent.
- Use an abrasive separator to separate larger particles for reuse on installations where abrasive is recirculated.
- Set up dust collecting equipment to:
  1. Empty and remove accumulated dust without contaminating work areas
  2. Discharge the air used in blast cleaning equipment
- Dispose of fine dust from dry collectors by:
  1. Emptying and transporting the fine dust in enclosed containers
  2. Using a sluice with a wetting process to contain the dust

ABRASIVE BLASTING CHECKLIST

Location: _____ Lead Person at Jobsite: _____

Yes, No N/A

Worksite Environment

☐ ☐ ☐ Has a hazardous blasting zone been established at the job site that includes the blast area and areas where dust concentrations may exceed OSHA's permissible exposure limits?

☐ ☐ ☐ Has the composition of the materials to be blasted been investigated for lead, asbestos and other heavy metals and toxics?

☐ ☐ ☐ Have electrical lines and hoses in the blast area been identified and protected from blasting operations?

☐ ☐ ☐ Has the atmosphere in the work area been tested to ensure that it will be safe to breath?

☐ ☐ ☐ Have all the work surfaces been inspected, holes covered, water and other liquids removed, and ice, snow and other slippery surfaces controlled?

☐ ☐ ☐ Are air movers and vacuum/dust collectors being used to provide clear visibility for the blasters?

☐ ☐ ☐ Is hearing protection available for personnel exposed to greater than 80 dBA and double hearing protection available to those exposed to greater than 100 dBA?

Air Supply

☐ ☐ ☐ If an oil lubricated compressor is used for breathing air, is it equipped with a high temperature and carbon monoxide alarm?

☐ ☐ ☐ If an oil lubricated compressor is used for breathing air, has the air quality been tested within the last quarter to determine that it meets the CGA standard for "Grade D "breathing air?

☐ ☐ ☐ If an air compressor or pump is used for breathing air, is it positioned so that the air intake is positioned to prevent the ingestion of engine exhaust or other toxic gases, vapors or fumes?

☐ ☐ ☐ Is the compressor or air pump and air lines shutoff and depressurized prior to performing maintenance?

Yes, No N/A

Airlines

☐ ☐ ☐ Have the airlines and connections been inspected for wear and damage and been repaired, prior to use?

☐ ☐ ☐ Have the gaskets for each connection been inspected and replaced if worn, distorted or too soft?

☐ ☐ ☐ Are airlines laid out so that they will not obstruct workers?

☐ ☐ ☐ Are safety pins and whip checks installed on all connections?

Abrasives

☐ ☐ ☐ Are appropriate NIOSH approved respirators being used during blasting and cleanup?

☐ ☐ ☐ Are mechanical lifting devices used to assist in loading and handling abrasives?

☐ ☐ ☐ Does the abrasive contain less than 1% crystalline silica?

☐ ☐ ☐ Has the Material Safety Data Sheet (SDS) been reviewed for the blasting agent and hazardous compounds?

Blasting Machine

☐ ☐ ☐ Have all fittings and valves been checked for tightness and found to be in good operating condition?

☐ ☐ ☐ Have damaged gaskets and parts been replaced?

☐ ☐ ☐ Has the machine been inspected for dents and other damage?

Abrasive Metering Valve

☐ ☐ ☐ Does the valve handle move freely for accurate adjustment of abrasive flow?

Remote Controls

☐ ☐ ☐ Is the blast machine equipped with a remote-control system? OSHA 29 CFR 1910.244

☐ ☐ ☐ Is the remote-control handle allowed to be strapped, taped, wired, or otherwise secured in a position that will interfere with the movement of the lever?

Yes, No N/A

☐ ☐ ☐ Is the abrasive trap cleaned at least twice each shift to avoid restriction in the air exhaust?

Pressure Regulators

☐ ☐ ☐ Are pressure regulators specifically designed for nozzle air volumes and pressures per the manufacturer's recommendations?

Screens & Covers

☐ ☐ ☐ Is a screen used to keep debris out of the blast machine?

☐ ☐ ☐ Is a cover used to protect the entry of moisture when not in use?

Blast Hose & Couplings

☐ ☐ ☐ Are the couplings inspected daily for damage prior to use?

☐ ☐ ☐ Are hoses inspected daily for wear and soft spots?

☐ ☐ ☐ Are couplings wired together and whip checks installed to prevent disengagement and whipping?

☐ ☐ ☐ Is static dissipating hose used to prevent the buildup of static electricity?

☐ ☐ ☐ Is the size of the blast hose 3 to 4 times the size of the nozzle orifice to prevent premature hose wear?

☐ ☐ ☐ Are hoses laid out in long curves to reduce premature wear and blowouts?

Nozzles

☐ ☐ ☐ Is the nozzle washer inspected before each use and replaced if worn?

☐ ☐ ☐ Is the nozzle replaced if the orifice size increases to 1/16" larger than its original size?

Blaster' Safety Equipment

☐ ☐ ☐ Is the blaster wearing a NIOSH Type CE respirator?

☐ ☐ ☐ Are other personnel working in the same area wearing appropriate respiratory protection?

Yes, No N/A

☐ ☐ ☐ Are appropriate head, eye, face, and hearing protection being used by all personnel?

☐ ☐ ☐ Is the air supply at least CGA "Grade D?"

☐ ☐ ☐ Is the breathing air filtered to remove moisture, oil mists, and particulates?

☐ ☐ ☐ Is the helmet inspected for wear and damage before each use?

☐ ☐ ☐ Are lenses replaced frequently?

☐ ☐ ☐ After blasting is the dust removed from the helmet and clothing before they are removed?

☐ ☐ ☐ Is the helmet stored in a clean, dust free location away from the blasting operation?

☐ ☐ ☐ Has the carbon monoxide monitor and alarm system been calibrated?

Blaster

☐ ☐ ☐ Has the blaster been trained qualified to the equipment, functions, blasting techniques, abrasives, maintenance requirements and safety features?

☐ ☐ ☐ Has the operator participated in the pre-job safety meeting?

Scaffolding

☐ ☐ ☐ Has the scaffold been inspected and signed off for use?

☐ ☐ ☐ Is the scaffolding equipment equipped with the appropriate guard rails and work platforms?

☐ ☐ ☐ Is the staging surfaces level, smooth, and free of obstructions?

Inspection Completed by:

_____ _____ _____

Print Name Signature Date

_____

Location

14 AERIAL LIFT SAFETY

AERIAL LIFT SAFETY

14.1 INTRODUCTION

Various aerial lifts are used at the 3A Group, such as self-propelled elevating work platforms (e.g., scissor lifts), manually propelled elevating aerial lifts (e.g., uprights), extensible and articulating boom-supported elevating work platforms (e.g., aerial man-lifts), and vehicle-mounted elevating and rotating aerial devices and work platforms (e.g., bucket trucks).

Many different codes and standards govern the use of this equipment at 3A Group to ensure the safety of operators and other workers. This Environment, Safety and Health (ES&H) Manual document is based on codes and standards adopted in the Work Smart Standard (WSSs) for aerial lifts, along with manufacturers' recommendations and other standards that apply for 3A Group activities.

This document contains requirements for aerial lifts that lift workers and tools to elevated work sites. It does not contain requirements for the use of fire-fighting equipment, such as those covered in the American National Standards Institute/ Automotive Fire Apparatus (ANSI/NFPA) 1901-1996, or personal platforms attached to a crane boom or suspended by hooks. See Appendix A for definitions of terms used in this document.

All workers must comply with the requirements set forth in this document. Any deviation from these requirements will require approval by the appropriate management chain

- Aerial lifts may be "field modified" for uses other than those intended by the manufacturer provided the modification has been certified in writing by the manufacturer or by an equivalent entity.
- Lift controls shall be tested each day prior to use to determine that such controls are in safe working conditions. Tests shall be made at the beginning of each shift during which the equipment is to be used to determine that the brakes and operating systems are in proper working condition.
- Only authorized persons shall operate an aerial lift and boom and basket load limits specified by the manufacturer shall not be exceeded.
- Aerial lifts shall have a working back-up alarm audible above the surrounding noise level or the vehicle is backed up only when an observer (spotter) signals that it is safe to do so.
- The minimum clearance between electrical lines and any part of the equipment (i.e. crane or load) shall be 10 feet for lines rated 50 kV or below.
- Employees shall always stand firmly on the floor of the basket and shall not sit or climb on the edge of the basket or use planks, ladders, or other devices for a work position.
- An approved fall restraint system shall be worn when working from an aerial lift. The fall restraint system must be attached to the boom or basket. An approved fall restraint system shall be attached to the boom or basket when working from an aerial lift and it is not permitted to be attached to adjacent poles or structures.
- All employees who operate an aerial lift device shall be trained in the safe operation of the specific device they will operate. Training must conform to all OSHA requirements.

14.2 HAZARDS

The following conditions occurring during aerial lift operations can result in property damage, personal injury, or death:

- A fall from an elevated level.
- Falling objects or items falling out of lifts.

- Exceeding the load capacity of the lift, which may result in tip-over or structural failure.
- Electrical hazards (e.g., overhead power lines, extension cords, bridge crane bus bars).
- Entanglement hazards (situations that may cause the lift to be caught on or snagged against other objects).
- Contact with stationary objects (e.g., walls, buildings, other vehicles, ceilings, floors, piping) that may result in an entrapment or crushing hazard.
- Uneven terrain that may cause the vehicle to tip, topple over or eject the operator. Some examples may include slopes, holes, drop-offs, bumps, debris, and utility vault covers.
- High winds or inclement weather such as rain, hail, snow, or lightning.
- Operation of an internal combustion engine vehicle indoors, which can cause asphyxiation or toxic exhaust-gas exposure.
- Unapproved use of equipment in unusual environments or the use of inadequate controls for operations or maintenance activities, which can cause a fire or explosion.

14.3 GENERAL DISCUSSION

The following sections provide requirements and best management practices for the various types of aerial lifts used at 3A Group. When in doubt, default to the manufacturer's instructions for the particular make and model of the lift for more detailed guidance.
The information in this document shall be supplemented by good judgment, safety control, and caution in evaluating each situation. Since the operator is in direct control of the aerial lift, conformance with good safety practices is the responsibility of the operator. The operator shall make decisions on the use and operation of the aerial lift with due consideration for the fact that his or her own safety as well as the safety of others is dependent on those decisions. All operators shall be trained before operating aerial lifts.
Operators are qualified to use lifts to the rated capacity of the equipment for which they are trained and evaluated. All operations shall be done safely and in accordance with accepted work practices. Directorates or facility points of contact may impose additional restrictions on their operations as necessary.

This document does not apply to subcontractors.

14.4 MAINTENANCE

Frequent, annual and/or periodic (depending on activity, severity of service and environment) maintenance inspections shall be performed by the owner of the lift on a timely basis by qualified mechanics. Inspection items listed in the maintenance manuals shall be tested, evaluated and, if applicable, corrected by qualified personnel before the unit is returned to service. Lifts shall not be operated if they are out of compliance.
Replacement parts shall be identical or equivalent to the original parts or provide a greater level of safety. Markings on the aerial lift shall not be removed, defaced or altered. Missing or illegible markings shall be replaced promptly. Altering or disabling of safety devices, such as warning beepers, guards or interlocks is prohibited, and modifications shall be done only with the permission of the manufacturer.

14.5 OPERATIONS

This section discusses various phases of operation such as prestart inspections, workplace inspections, operating requirements, and post operation requirements.

An Integrated Work Sheet (IWS) is required for the use of aerial lifts. An IWS can be written specifically for the use of aerial lifts, or an IWS may list an aerial lift as one of the hazards for another operation.

Operators shall be trained before using any aerial lift. The training shall include familiarization with the specific group of lifts to be used and alerting the operators to their responsibilities with respect to the lifts. When an operator is directed to operate an unfamiliar aerial lift, the operator shall receive instructions regarding the location of the manufacturers' manuals, the purpose and function of all controls, and the safety devices and operating characteristics specific to the group of aerial lifts prior to operating. Operators shall also be afforded the opportunity to familiarize themselves with the operation of the lifts.

The safety team shall review and concur with all indoor work that involves lifts with internal combustion engines. Concurrence may be in the form of a specific IWS, Hazards Assessment Control Form (HAC), Pre-task Hazards Analysis (PHA), Safety Plan of Action (SPA), or other form of written communication, which will be attached to the paperwork completed for the specific job.

14.6 BEFORE OPERATION

Before operation, the operator shall:

- Perform a prestart inspection
- Practice with the aerial lift (if unfamiliar with the lift) until comfortable/proficient with its operation.
- Read and understand the manufacturers' manuals.
- Understand all labels, warnings and instructions on the lift.
- Ensure that all occupants of the platform wear appropriate personal safety equipment for the conditions under which the platform will be operated, per the applicable Integration Work Sheet/Safety Plan (IWS/SP) (e.g., fall protection, hard hats).
- Have been instructed by a qualified person in the intended purpose and function of each of the controls.
- Notify and communicate with the Facility Point of Contact (FPOC) at the site where the lift will be used.

14.7 WORKPLACE INSPECTIONS

Operators will inspect the workplace to mitigate hazards before and during aerial lift use. Areas will be inspected for hazards such as:

- Drop-offs, holes, or untamed earth fills.
- Slope(s), ditches, bumps, and floor obstructions.
- Debris.
- Overhead obstructions and high voltage hazards.
- Other hazardous locations and atmospheres.
- Inadequate support (The working surface that the lift is sitting on cannot support the weight of the machine, men, etc. for the operation).
- Wind and weather conditions.
- Presence of unauthorized persons or other hazardous conditions.

The safety team member shall, with the operator's supervisor, determine if there are any unusual hazards in areas where lifts will be used.

14.8 PRESTART INSPECTION

The aerial lift shall be inspected for defects prior to each shift's operation. The prestart inspection shall be performed and documented by the operator on each shift and will include items in accordance with manufacturer's recommendations for each specific aerial lift, such as:

- Operating and emergency controls.
- Safety devices.
- Personal protective devices.

- Hydraulic, air, pneumatic, fuel and electrical systems for wear, leakage, excessive dirt, moisture or any other condition which may impair the use of these systems.
- Fiberglass and other insulating components for visible damage or contamination.
- Missing or illegible placards, warnings, operational, instructional, and control markings.
- Visual inspection of all mechanical fastenings.
- Cables and wiring harnesses.
- Loose or missing parts.
- Wheels and tires.
- Operating manual(s), and their placement in weatherproof containers on the lift, or in the cab of the truck.
- Outriggers, stabilizers, and other structures.
- Guardrail systems.
- Other items specified by the manufacturer.

The aerial lift shall not be operated if the prestart inspection indicates that repair is necessary. See Appendices for sample inspection sheets.

14.9 OPERATION

The operator shall perform all prestart and workplace and operating. When operating the lift, the operator shall follow the Operator Warnings and Instructions as specified in Appendix F.
The lower controls of aerial lifts shall not be used for continuous operation with personnel in the platform.
Aerial lifts are not normally insulated for use near electrically energized circuits such as power lines or exposed bus bars. In general, scissors lifts are not electrically insulated and will not provide protection from contact with or proximity to electrical current. Any aerial lift intended for use around electrically energized circuits shall meet the electrical requirements of American National Safety Institute/Scaffold Industry Association (ANSI/SIA) A92.2-2001, “Vehicle-Mounted Elevating and Rotating Aerial Devices.” Refer to the manufacturer’s owner’s manual an d identification plate affixed to the machine for the category of insulating aerial device (if applicable). Operators shall maintain safe distances from electrical power lines and apparatus in accordance with governmental regulations and the Minimum Safe Approach Distance (MSAD) chart provided in Appendix G.
Aerial lifts are not normally designed for use in hazardous locations. Do not operate an aerial lift in hazardous locations or areas where potentially flammable or explosive gases or particles may be present. Refer to the manufacturer’s owner’s manual and identification plate affixed to the machine to determine whether it is permissible to operate the machine in hazardous locations (if applicable).

14.10 RESPONSIBILITIES

14.10.1 OPERATOR

Before operation, the operator shall:

- Ensure that their training is current.
- Read and understand the manufacturers’ manuals.
- Understand all labels, warnings and instructions on the lift.
- Ensure all occupants of the platform wear appropriate personal safety equipment for the conditions under which the platform will be operated (e.g., fall protection, hard hats)
- Have been instructed by a qualified person in the intended purpose and function of each of the controls.
- Notify and communicate with the supervisor at the site where the lift will be used.
- Ensure that manufacturers’ machine manuals, such as operations manuals, the maintenance manuals for each make and model of lift owned, and the manual of responsibilities (if it is a scissor lift) are in the weatherproof containers located on the lifts or in the mobile unit.

- Be retrained, if necessary, based on the owner's or user's observation and evaluation of the operator or every three years for aerial man-lifts or five years for scissor lifts or bucket trucks, whichever comes first.
- Perform written prestart inspections before use of the lift each day or shift and perform a visual and functional test. See Appendix B, C, D, or E for sample inspection sheets.
- Conduct workplace inspections before and during aerial lift use.
- Observe operator warnings and instructions to be used before and during each movement of the platform. See Appendix F for a list of these warnings and instructions.
- Shut down lift operations in case of any suspected malfunction, or if a hazard or potentially unsafe condition exists. Notify the work supervisor about any problems or malfunctions that affect the safety of operations. These problems or malfunctions shall be repaired prior to the use of the lift.
- Perform prestart activities 3 prior to performing work.

14.10.2 OWNER/USER

The Owner/User shall ensure that:

- Aerial lift safety programs are developed, documented and utilized as required.
- Manufacturers' manuals, such as the manual of responsibilities, operations, and maintenance manuals, are available and stored in the weatherproof containers on the lifts or in the mobile units.
- Frequent, annual and/or periodic maintenance inspections shall be performed on a timely basis (taking into account the severity of use and environment) by qualified mechanics trained for this purpose.
- Inspection items listed in the maintenance manuals shall be tested, evaluated and, if applicable, corrected by qualified personnel before the unit is returned to service.
- There is distribution of and compliance with all safety bulletins received from manufacturers.
- Assistance shall be rendered to operators who have questions concerning lifts.
- Modifications of the aerial lift equipment shall be made only by the manufacturer or with their prior written permission.
- If the location of the intended operation has the hazards listed in Section 3.3.2, the ES&H Team shall be consulted and safety measures discussed with, selected, and passed on to the operator before use of the lift.
- That operators comply with all requirements as specified in operator responsibilities.

14.11 WORK SUPERVISORS

- Work supervisors (e.g., Direct Work Supervisor, Job Site Supervisor) shall:
- Ensure that the aerial lift is used only for intended applications as defined in the operating manual, and that recognized safety practices are followed.
- Select operators based on their experience and physical qualifications.
- Ensure that operators' training is current.
- Monitor the performance of lift operators to ensure that they comply with safety rules.
- Ensure that unauthorized persons do not operate the lifts.
- Monitor daily written prestart inspections.
- Ensure that lifts are equipped with required safety equipment (e.g., overrides, back-up beepers, anchorage points for personal fall arrest systems.
- Ensure that lifts are maintained and that qualified personnel perform frequent, annual, and periodic inspections.
- Ensure that lifts are not operated if they are out of compliance with their applicable maintenance schedules.

14.12 HAZARDS CONTROL DEPARTMENT

The Hazards Control Department Team shall:

- Determine, in conjunction with the supervisor, the safety measures to be taken if the lift will be used in a location that has unusual hazards.
- Review and approve indoor work that involves lifts with internal combustion engines. For additional information on indoor use of internal combustion engines.
- Make recommendations for alternatively powered lifts.
- Stay current with regulations governing the operation of lifts and transmit changes to the appropriate parties. (The Aerial Lift Subject Matter Expert has this responsibility.)

14.13 DOCUMENTATION

Maintenance records shall be retained for five years (or longer if specified elsewhere) by the owner group, such as the Heavy Equipment Shop, and include written records of frequent, annual, and periodic inspections and repairs performed, including deficiencies found, corrective actions taken, and the person(s) performing the inspections/repairs.
Inspection sheets shall be kept for two years. If an inspection shows the need for maintenance or repair, the documentation shall be kept for at least five years.

14.14 TRAINING

Only those workers who have received instructions regarding the inspection, application, and operation of an aerial lift, including recognition and avoidance of hazards, shall operate that aerial lift.
The operator shall be retrained if management notes any performance deficiencies, or every three years for aerial man-lifts or five years for scissor lifts or bucket trucks, whichever comes first.
Records of operators' training shall be kept in Training Records or personnel file.

14.15 FACILITY POINTS OF CONTACT

The Facility Points of Contact shall:

Aerial lifts	Devices/equipment designed to lift workers and tools to an elevated worksite. Includes scissors lifts, aerial man-lifts, and bucket trucks.
Bare handwork	A technique of performing live-line maintenance on energized conductors and equipment whereby one or more authorized persons work directly on an energized part after having been raised and bonded to the energized conductors or equipment.
Category an Aerial Device	An aerial lift (usually a bucket truck) that has dielectric properties in order to resist electrical hazards. The dielectric components shall be certified annually to assure dielectric value.
Lower controls	Controls situated at ground level that can control the lift platform.
MSAD	Minimum Safe Approach Distance (to 'live' electrical lines, equipment and components.). See Appendix G. This does not apply to line trucks. See the manufacturer's manuals for more information.
Operators	Qualified persons who directly control the movement of the aerial lift. These persons are authorized, trained, and engaged in the lift operation. This could include any employee or subcontractor using a lift owned, rented, or leased by 3A Group.

Owners	Persons or entities who have possession of an aerial lift. 3A Group directorates and/or departments, such as Fleet Management, that own, lease, or rent the equipment can be considered owners. Owners do maintenance inspections.
Owner/User	Situations in which the owner is also the user of the lift. See the definitions for owners and users.
Upper controls	Controls situated in the platform, man-lift or bucket part of the aerial lift that also controls the movement of the lift.
Users	Persons or entities who have care, control and custody of the aerial lift. This person or entity may also be the employer of the operator, an owner, or lessee. At 3A Group, directorates or departments, such as Laboratory Services, Plant Engineering or UTEL could be considered users.

Work with personnel using aerial lifts to establish/ensure work zones are posted and obeyed.
Work with safety teams to review and approve indoor work with aerial lifts.

WORK STANDARDS

14.16 WORK SMART STANDARDS

10 CFR 851, “Worker Safety and Health Program.” A306
29 CFR 1910, Subpart F , “Powered Platforms, Manlifts, and Vehicle-Mounted Work Platforms,” (1910.66 to1910.68), (current version); specifically, Standard 1910.67, Vehicle-mounted elevating and rotating work platforms (Bucket trucks and Aerial lifts). A338
29 CFR 1926, Subpart L , “Scaffolds,” 1926.450 to 1926.454, January 1999; Standard 1926.453 addresses aerial lifts.

14.17 OTHER REQUIREMENTS

ANSI/SIA A92.2-2001, for Vehicle-Mounted Elevating and Rotating Aerial Devices (Bucket Trucks). After repair, insulating systems on units shall be dielectrically tested in accordance with Section 5.4.3 of ANSI/SIA A92.2-2001. Insulated replacement boom shall be tested to ensure conformance to Section 5.3.3. of ANSI/SIA A92.2-2001. For bucket trucks used in electrical work, see Part 4, ANSI C2-1997, NEC, as cited in ANSI-SIA A92.2-2001. Other rules and regulations may apply; see departments performing the work for more information.
ANSI/SIA A92.3-1990 , for Manually Propelled Elevating Aerial Platforms.
ANSI/SIA A92.5-1992 , for Boom-Supported Elevating Work Platforms (Aerial Platform Manlifts).
ANSI/SIA A92.6-1999 , for Self-Propelled Elevating Work Platforms (Scissor lifts), plus Manual of Responsibilities.

14.18 APPENDIX A

Equipment Number/Type of Vehicle	
Location of Use	
Operators Name (Please Print)	**Phone#**
Badge #	**Pager #**
Inspection Date/*Out*	**Inspection Date/*In***
Hour Meter/*Out*	**Hour Meter/*In***

14.19 APPENDIX B - PLATFORM LIFT EQUIPMENT INSPECTION CHECKLIST

To be completed by operator when checking out and checking in equipment.
Inspect equipment periodically.
Use only equipment which is in safe working condition.
DO NOT operate equipment if any items inspected need repair.
Notify equipment yard attendant of any needed repairs or, in his absence, the next supervisor

Check (Add if necessary)	**OUT O.K.**	**Repair Needed**	**IN O.K.**
Oil Level			
Fuel Level			
Coolant Level (DO NOT CHECK IF HOT)			
Tire Pressure			
Hydraulic Level			
Leaks			
CHECK OPERATIONS:			
Horn			
Gauges			
Brakes			
Lights			
Steering			
Attachments			
Accessories			
Backup Alarm			
Warning Lights			
Warning Buzzer			

RECORD MALFUNCTIONS, DAMAGE, OR PROBLEMS:

AREA	OUT O.K.	Repair Needed	IN O.K.
PLATFORM			
1. Controller			
2. Switches			
3. Placards and Decals			
4. Control Tags			
5. Handrails and Chains			
CHASSIS			
1. Batteries			
2. Battery Charger			
3. Hydraulic Pump/Motor			
4. Valves			
5. Hydraulic Hoses and Tubing			
6. Hydraulic Oil Tank			
7. Lift Cylinder			
8. Limit Switch			
9. Placards and Decals			
10. Wheel and Tires Assemblies			
11. Steer Cylinder			
12. Steer Components			
13. Scissor Arms			
14. Safety Prop			
15. Pivot Pins/Bolts			
16. Switches, Ground Control			
17. Control Tags			
18. Hose and Cable			
19. Tire Pressure/Condition (if applicable)			

PLATFORM LIFT EQUIPMENT INSPECTION

RECORD MALFUNCTIONS, DAMAGES, OR PROBLEMS:

14.20 APPENDIX C

AERIAL LIFT DAILY SAFETY INSPECTION CHECKLIST
To be completed prior to each use
Make: _____ ID Number: _____Week Ending_____

Inspector Initial/Time							
ITEM	SUN.	MON.	TUES.	WED.	THURS.	FRI.	SAT.
1. Check Load Charts							
2. Capacity							
3. Appearance							
4. Hazard Warning Signal							
5. Brakes							
6. Safety Chains							
7. Tire Condition							
8. Electrical							
9. Baskets							
10. Steering							
11. Safety Override							
12. Control Operation							

Superintendent (print) Signature

Date / Time

Comments

14.21 APPENDIX D

AERIAL LIFT EQUIPMENT INSPECTION CHECKLIST

To be completed by operator when checking out and checking in equipment.
Inspect equipment periodically.
Use only equipment which is in safe working condition.
DO NOT operate equipment if any items inspected need repair.
Notify equipment yard attendant of any needed repairs or in his absence, the next supervisor

Equipment Number/Type of Vehicle	
Location of Use	
Operators Name (Please Print)	**Phone #**
Badge #	**Pager #**
Inspection Date/*Out*	**Inspection Date/*In***
Hour Meter/*Out*	**Hour Meter/*In***

Check (Add if necessary)	**OUT O.K.**	**Repair Needed**	**IN O.K.**
Oil Level			
Fuel Level			
Coolant Level (DO NOT CHECK IF HOT)			
Tire Pressure/Condition			
Hydraulic Level			
Leaks			
CHECK OPERATIONS:			
Horn			
Gauges			
Brakes			
Lights			
Steering			
Attachments			
Accessories			
Backup Alarm			
Warning Lights			
Warning Buzzer			

RECORD MALFUNCTIONS, DAMAGE, OR PROBLEMS:

14.22 APPENDIX E

Up Right UL40 Man Lift Inspection Checklist

- Transportation of Lift: The lift's gross weight is 1,033 lbs; requires trailer capacity of 1,500 lbs. Lift to be in lowered stowed position and secured in trailer.
- Barricading work areas.
- Review procedures for raising lift from lowered stowed position to upright position.
- Installing outriggers and leveling procedures.
- Test all four outrigger sensors.
- Test emergency descent valve.
- Check hydraulic fluid level. Must show on dipstick.
- Check battery compartment for leaks.
- Operator's manual on lift.
- Lift gate latches.
- Condition assessment of lift.
- Test controls including emergency descent valve.
- Hazard assessment of work area.
- Controls in place for identified hazards.
- Ground man for emergency descent available and knowledgeable of descent valve.
- Complete job task.
- Lower lift to stowed position.
- Transport lift back to storage.
- Return key and daily lift inspection sheet to lift custodian.
- Report any problems with lift
- List any problems

_____

Signature of employee completing inspection

_____

Time of inspection Date of inspection

14.23 APPENDIX F - OPERATOR WARNINGS AND INSTRUCTIONS

- The aerial lift is used only for intended applications as defined in the equipment's operating manual. The following recognized safety practices shall be used:
- Operators shall not use the lift in an unauthorized manner.
- All platform occupants shall use fall protection (e.g., full body harness, shock-absorbing lanyard) connected to the anchorage point(s) provided at the platform position.
- A hard hat shall be worn at all times when operating aerial lifts.
- Other personal protective equipment, (e.g., eye, foot, hand, clothing) shall be worn as required.
- The slope and grade for which the platform is rated shall not be exceeded. Aerial lifts may be equipped with tilt or other motion/capacity warning alarms. These alarms shall be operational. The limit switch shall not be altered or disabled. Operators shall not depend upon the tilt alarm as a level indicator.
- The deployment of stability-enhancing means, such as outriggers, outrigger pads, stabilizers or extendible axles, shall be utilized.
- The guardrail system shall be used per manufacturer's specifications. Entry gates or chains shall be closed before operating the lift.
- Operators shall not overload an aerial lift. Occupants and equipment shall not exceed the maximum platform capacity (or the maximum capacity of the platform extension when so equipped).
- Safe distances, including overhead clearance, shall be maintained between the operator, the machine and other objects. Electrocution hazards shall be avoided. Operators shall maintain safe distances from electrical power lines, conductors or bus bars. They shall allow for boom or platform movement or electrical line sway or sag. Operators shall follow minimum safe approach distances (MSAD); see Appendix G.
- Operators shall not drive the mobile chassis close to an obstruction. The operator shall place his/her machine, then use the raise, swing, and boom functions to get in close. Operators shall use the slowest speed for such movements to avoid "bounce" of the platform.
- Only Category "A" aerial lifts shall be used for bare-hand electrical work. Check manufacturer's instructions for testing, locking, tagging, and grounding.
- Workers on the ground associated with the aerial lift operation shall wear appropriate head protection.
- Operators shall not sit, stand, or climb on the platform guardrails or edge of the bucket. They shall always maintain a firm footing on the platform floor.
- The use of railings, planks, ladders, scaffolds or any other device in or on the work platform for achieving additional working height or reach are prohibited.
- Areas around aerial-lift operations shall be barricaded to prevent injury to pedestrians and other workers. When other moving equipment is present, precautions, such as warnings, barriers, or flashing lights shall be used as appropriate.
- Observations shall be conducted on an ongoing basis to detect any deficiencies in equipment or method of use. Operator shall cease operation of the lift if any suspected malfunction occurs. Problems or malfunctions shall be reported to the supervisor as soon as possible. Any problems or malfunctions shall be repaired before using the platform.
- Potentially hazardous locations shall be reported to the supervisor as soon as possible.
- Aerial lifts with internal combustion engines operating inside a building, or other unusual operating support conditions, are prohibited unless specifically evaluated and permitted by the supervisor and the ES&H safety team member.
- Care shall be taken to avoid entanglement.
- Work area shall be kept clear of workers, equipment, and other obstructions before lowering the platform.
- The engine shall be shut down and equipment refueled in a well-ventilated area.

- Battery charging shall be conducted in a well-ventilated area.
- Operators shall not use batteries that weigh less than the original equipment. Operators shall always wear protective clothing and eyewear when working with batteries.
- The platform shall not be steadied by positioning it against another object.
- Operators shall not attempt to increase the stability of a lift by attaching it to an adjacent structure. Operators shall not tie or attach lifts to any adjacent structures.
- Operators shall not modify or alter an aerial lift. Mounting attachments for holding tools or other materials onto the bucket, platform, toe boards, or guardrail system can increase the weight in the bucket or platform.
- Operators shall not place or attach fixed or overhanging loads to any part of the machine.
- Operators shall not place loads outside the platform perimeter.
- The platform shall not be used as a crane or jack, unless the manufacturer has approved these operations.
- Operators shall not use the machine to push or pull another object.
- Operators shall never use the boom to push the aerial lift along the ground or attempt to free a machine by lifting the wheels off the ground with the boom.
- Operator shall limit travel speed according to conditions.
- Traveling 50 feet or more with an aerial lift shall be done with the platform in the lowered or stowed position. Extensible or articulating booms shall be retracted or folded.
- Elevated driving requirements and repositioning of the aerial lift while elevated shall include maintaining a clear view of the support surface and route of travel, ensuring the safety of workers in the area and maintaining safe distances from hazards and overhead obstacles that could present crushing hazards. Operators shall not drive over 0.5 mph with the platform elevated.
- Stunt driving is prohibited.
- When the aerial platform is unattended, it shall be secured to protect against unauthorized use.
- The altering of safety devices is prohibited.
- Personnel shall leave the lift before attempting to free a snagged platform.
- Entering or exiting the elevated platform shall be done per the manufacturer's instructions.
- Operators shall use the three (3) point contact method (3 out of 4 arms and legs in contact with the machine) when mounting and dismounting the platform or bucket. Never attempt to mount or dismount a moving machine or climb down the frame or boom from the platform or bucket when raised.
- When required to exit or climb out of an elevated aerial lift to a location not otherwise protected by guardrails, floors, or other continuous means of fall protection, operators shall use a second shock-absorbing lanyard to connect to the new location before disconnecting from the aerial lift. When entering an aerial lift from an unprotected location, operators shall connect a shock-absorbing lanyard to the anchorage point in the aerial lift before entering.
- Modifications will only be approved with or by the prior written permission of the manufacturer.
- Materials shall be carried on the platform as specified in the manufacturers' recommendations for load capacity.
- The rated horizontal force on the platform shall not be exceeded.
- Operators shall not exceed the manufacturers' limits when pushing on or pulling toward any object outside of the lift or platform.
- Steps shall be taken to avoid collision of the platform with any crane or overhead equipment, moving or not.
- Support requirements for the platform shall be adequate before work begins.
- The aerial platform shall be leveled using the manufacturers' outriggers and leveling devices and the brakes set.
- Operators shall not use lifts as a ground for welding.
- Operators shall not increase the surface area of a platform or the load. By increasing the area exposed to the

wind, the stability of the machine is decreased.

- Only one designated person should operate the controls. Operators shall never allow anyone to tamper with, service, or operate a machine from the lower control station while workers are in the bucket or platform except in an emergency.
- Operators shall not operate lifts during inclement weather, unless approved for this purpose

14.24 APPENDIX G

MSAD (Minimum Safe Approach Distance) to Energized (Exposed or Insulated) Power Lines

Voltage Range (Phase to Phase)	Minimum Safe Approach Distance (Feet) (Meters)	
O to 300V	AVOID CONTACT	
Over 300 to 50KV	10	3.05
Over 50KV to 200KV	15	4.60
Over 200KV to 350KV	20	6.10
Over 350KV to 500KV	25	7.62
Over 500KV to 750KV	35	10.67
Over 750KV to 1000KV	45	13.72

15 ARC FLASH PROTECTION POLICY

ARC FLASH PROTECTION POLICY

15.1 PROTECTING YOU AND YOUR WORKERS

OSHA requires the use of protective equipment when working where potential electrical hazards exist, although the agency does not specify how to select personal protective equipment. OSHA requires the employer to assess workplace hazards and the need for personal protective equipment, but it does not specify how to conduct hazard assessments.
Although OSHA doesn't directly state what to do about arc-flash hazards, OSHA 29 CFR 1910.132(d) (1) requires employers to evaluate the workplace for hazards. And based on these assessments, the employer must select and require the use of appropriate personal protective equipment (PPE) for its employees.

15.2 DEFINITIONS

- **Arc Fault Current:** For Arc Flash Hazard Analysis calculations, use the short circuit symmetrical amperes from a bolted 3-phase fault. Select the value at time of circuit interruption.
- **Arc Flash Hazard:** Danger due to Arc thermal energy from an electric arc fault.
- **Arc Flash Hazard Analysis:** Calculations to predict the Arc thermal energy from the source of an electric arc fault.
- **Arc Flash Hazard Assessment:** A process to determine if an Arc Flash Hazard exists.
- **Arc In A Box:** The estimated Arc Thermal Energy created in a six-sided metal enclosure. The Arc Flash Hazard is present due to one side open.
- **Arc Thermal Energy:** Radiant heat intensity in calories/cm2 emitted by an electrical arc.
- **Arc Thermal Performance Value (ATPV):** Amount of heat energy in cal/cm2 a fabric or garment is rated to protect the wearer from a second-degree burn. (Note: The onset of a second-degree bum to the skin is 1.2 calories/cm2.)
- **Close Proximity:** Close enough to reach, fall into, or otherwise accidentally contact an electrical source. Working in Close Proximity would be within the Electrical Arc Flash Hazard Boundary.
- **Electrical Arc Flash Hazard Boundary:** The distance from an arc flash hazard source where Arc Thermal Energy applied to the skin is equal to 1.2 calories/cm2 which are the onset of a second-degree burn to the skin. Additional PPE is required within this area for protection from arc thermal energy.
- **Energy of Break Open Threshold (EBT):** Amount of heat energy in calories/cm2 a fabric or garment is rated before the garment fabric breaks open. EBT is averaged from the highest five energy values.
- **Flame Resistant (FR):** Material treated with a chemical flame retardant to prevent clothing ignition, or natural materials that are inherently flame resistant (e.g. wool, PR 97, Nomex).
- **Live Line Tools:** Tools electrically rated for the voltage involved and used to touch or come in close proximity to exposed, energized conductors or equipment.

Personal Protective Equipment (PPE): Clothing and equipment that protects the wearer from injury.

15.3 PROTECTION AGAINST ARC FLASH

A. Policy: An arc flash is a "dangerous condition associated with the release of energy caused by an electric arc." An arc flash is an explosion causing severe burns, injuries and/or death depending on the severity. Most workers realize that electrical shock is potentially life threatening, but many do not understand that wearing clothing that is not flame resistant can result in severe harm or death if it is ignited in an electrical arc flash.

B. Purpose: While it is the policy of 3A Group to de-energize the power source before performing any work on the system, we understand that at times it is necessary to be exposed to the energy source (i.e. Investigative work). Before the point of exposure, we need to protect the worker from a potential arc flash that is always possible due to the presence of a power source. The means of proper PPE and levels of protection are simplified with the use of fire-resistant garments that meet the hazard risks.

Keep in mind that the use of these suits, are only needed when you are being exposed to energy, or you are attempting to tie-in or are contacting the power source. Once the potential for an arc flash is either removed or isolated, and the worker is protected, the protective suit is no longer needed (i.e. the panel cover is back on).

It is the policy of 3A Group that all employees use the following PPE to protect themselves against Arc Flash occurrences.

C. Exposure: to under 600 volts:

1. Nomex full body jump suit
2. Properly rated gloves
3. Dielectric hard hat
4. Full amber face shield
5. Dielectric booties to slip over work boots

D. Examples of work performed at this level: (examples not intended to be all inclusive of every type of work!)

1. Removing any panel covers or barriers of energized equipment to perform investigative functions or inspections.
2. Working in a panel with the line side energized and the panel cover removed.
3. Installing a breaker into an energized electrical panel.
4. Pulling cables or wiring into energized panels.
5. Pulling or installing fuses into energized parts.

E. Exposure to over 600 volts:

1. The level of protection for 600 volts and above will be a full body 40cal. High Voltage Suit complete with a full Head Hood, Dielectric booties, and properly ratted High Voltage gloves.

2. Examples: Work performed at this level: (examples not intended to be all inclusive of every type of work!)

    a. Removing any gear covers or barriers of energized equipment to perform investigative functions or inspections.
    b. Installing protective blankets or insulating devices on Buss work (i.e. rubbering up) in an active High Voltage Substation.
    c. Racking in a breaker into an energized electrical cabinet.
    d. Pulling cables or wiring into energized switchgear.
    e. Pulling or installing cut-outs on a utility pole.

3. Contact your Foreman or supervisor to obtain a 3A Group. Arc Flash Protection Kit which will have all the above-mentioned PPE. Check the kits before use to ensure that all the high voltage PPE has a current inspection certification. Do not use if it has expired!

F. Employees shall be trained in safety-related work practices and procedural requirements as necessary to provide protection from the electrical hazards associated with their respective jobs. Employees shall be trained to identify and understand the relationship between electrical hazards and possible injury. Documentation shall be made when the employee demonstrates proficiency, be maintained for the duration of the employee's employment, and contain each employee's name and date of training.

G. The contract employer shall advise the host employer of:

   a. Any unique hazards presented by the contract employer's work,
   b. Any unanticipated hazards found during the contract employer's work that the host employer did not mention, and
   c. The measures the contractor took to correct any hazards reported by the host employer to prevent such hazards from recurring in the future.

H. Unqualified persons shall not be permitted to enter spaces that are required to be accessible to qualified employees only, unless the electric conductors and equipment involved are in an electrically safe work condition

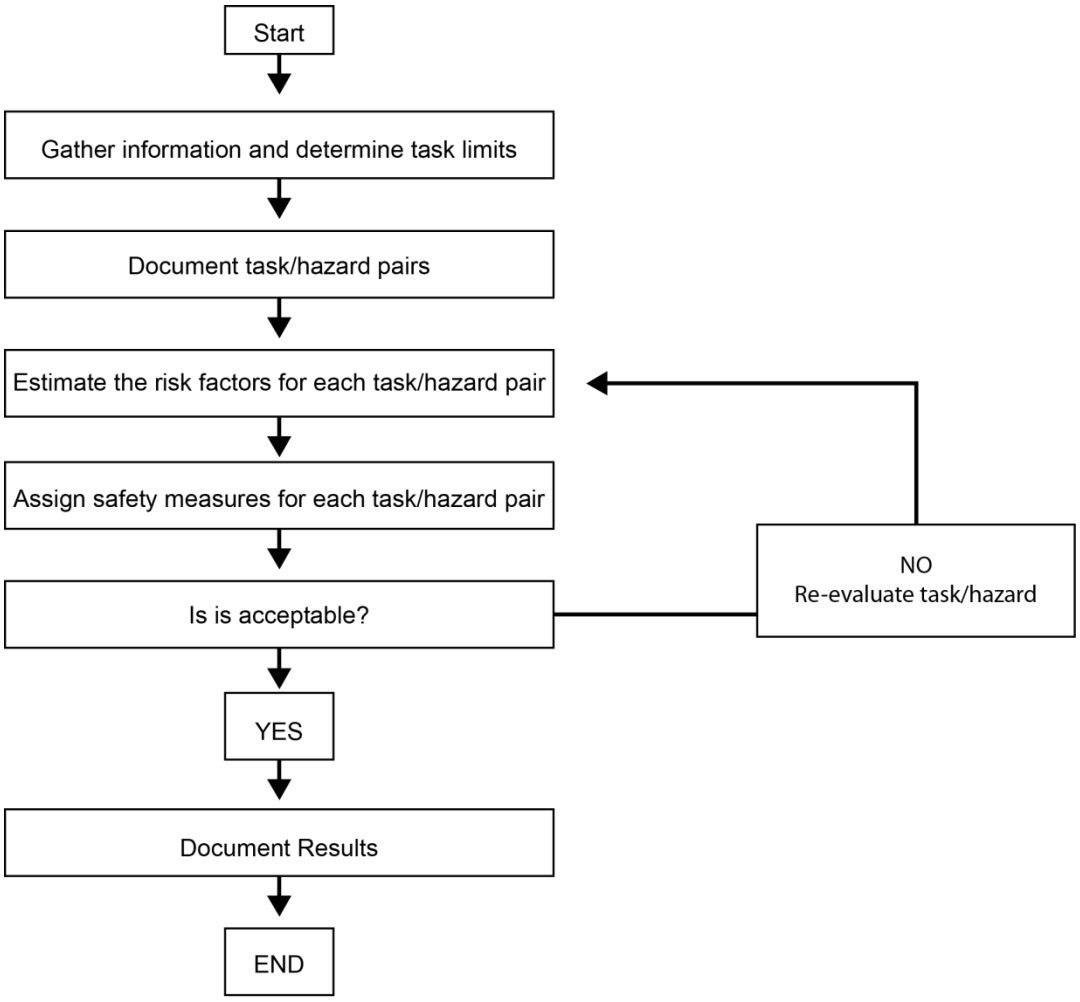
I. Qualified personnel permitted to work within the Limited Approach Boundary of exposed energized electrical conductors and circuit parts operating at 50 volts or more shall, at a minimum, be additionally trained in all the following:

   1. The skills and techniques necessary to distinguish exposed energized electrical conductors and circuit parts from other parts of electrical equipment.
   2. The skills and techniques necessary to determine the nominal voltage of exposed energized electrical conductors and circuit parts.
   3. The decision-making process necessary to determine the degree and extent of the hazard and the personal protective equipment and job planning necessary to perform the task safely.

J. 3A Group safety related work practices for working within the Limited Approach Boundary are the following:

   1. Conduct daily evaluations and safety inspections through the shifts.
   2. Anticipating unexpected events and conduct a job hazard analysis.
   3. All electrical parts are considered live until zero energy is verified.
   4. Work permits shall be utilized and posted on site (i.e. lockout/tagout & hot work).
   5. Electrical flash arc hazard analysis will be conducted, and the appropriate personal protective equipment identified.

K. Hazard Analysis should contain event severity, frequency, probability and avoidance to determine the level of safe practices employed. A hazard/risk evaluation shall be completed before work is started within the Limited Approach Boundary of energized electrical conductors and circuit parts operating at 50 volts or more or where an electrical hazard exists.



L. A job briefing should be held before starting each job and include all employees involved. The briefing should cover hazards associated with the job, work procedures involved, special precautions, energy source controls, and PPE requirements

M. Test instruments, equipment, and their accessories shall meet the requirements of ANSI/ISA-61010-1-Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use -Part 1 General Requirements, for rating and design requirements for voltage measurement and test instruments intended for use on electrical systems 1000 Volts and below. When test instruments are used for the testing for the absence of voltage on conductors or circuit parts operating at 50 volts or more, the operation of the test instrument shall be verified before and after an absence of voltage test is performed.

N. All insulating PPE must be inspected before each day's use and immediately following any incident that can reasonably be suspected of having caused damage. Insulating gloves shall be given an air test, along with the inspection.

O. Such tests include:

   a. Blankets-before first issue/every 12 months thereafter,
   b. Gloves-before first issue and every 6 months,
   c. Sleeves before first issue and every 12 months. Covers and Line hose shall be testing if insulating value is suspect.

P. Work on energized electrical conductors or circuit parts that are not placed in an electrically safe work condition, shall be considered energized electrical work and shall be performed by written permit only.

Q. Employees shall not enter spaces containing electrical hazards unless illumination is if enables the employees to perform the work safely. Where lack of illumination or an obstruction precludes observation of the work to be performed, employees shall not perform any task within the Limited Approach Boundary of energized electrical conductors or circuit parts operating at 50 volts or more or where an electrical hazard exists.

15.4 ARC FLASH HAZARD ASSESSMENT

Locations must perform an Arc Flash Hazard Assessment to determine if Arc Flash Hazards exist. The following are the steps necessary for performing an Arc Flash Hazard Assessment:

15.4.1 ASSESS TASKS

Location Management shall ensure the tasks listed in Table 4.3.1 are assessed. If there are no tasks involving an Arc Flash Hazard, the assessment is complete. If the task is operation of enclosed switchgear with doors closed, perform an Arc Flash Hazard Analysis per Section 4.4 or use the PPE Level described in Table 4.5 to complete the assessment.

15.4.2 TASKS ASSOCIATED WITH AN ARC FLASH HAZARD.

- Inspection or infrared testing in opened panels with exposed energized bus
- Voltage testing and phasing
- Racking circuit breakers (open or enclosed switch ear
- Switching
- Grounding
- Cleaning bushings and insulators
- Opening doors or compartments to exposed bus
- Using Live Line Tools/Voltage Rated Tools
- Electrical equipment operation with doors opened
- Operation of enclosed switch gear with doors closed
- Performing other activities that may initiate an Arc Flash Hazard

15.4.3 HAZARD CONTROL

Priority must be given to eliminating the Arc Flash Hazard. Determine if equipment design or work practices will control the Arc Flash Hazard. Arc Fault rated switchgear complete with viewing windows and integral-grounding (earthing) switches is an example of equipment designed to eliminate the Arc Flash Hazard.
Examples of work practices to control Arc Flash Hazards include remote operation of switches and circuit breakers, remote grounding of switches and circuit breakers, or use of rated electrical isolation blankets or

barriers. If the equipment design or work practice results in elimination of the Arc Flash Hazard, the assessment is complete.

15.5 DETERMINE ELECTRICAL ARC FLASH HAZARD BOUNDARY

When an Arc Flash Hazard is present, personnel must know the Electrical Arc Flash Hazard Boundary. The Electrical Arc Flash Hazard Boundary is the distance from the arc source at which the Arc Thermal Energy is equal to 1.2 calories/cm^2. If the task is performed outside the Electrical Arc Flash Hazard Boundary, further analysis is not required.

15.5.1 DERIVATION OF FORMULAS

The formulas for calculating boundaries for safe work zones, where there is the potential for an arc flash hazard and the formulas for calculating the amount of thermal energy present as a flash occurs, are derived from several sources. The formulas have some component numbers that are constant and others that are variable. Also, they are accepted as the rule by safety agencies and by recognized experts in industry.
These calculations occur in the AES (Your Company's Engineering Standard) Electrical Arc Flash Hazard Protection.1 and are integral elements of the AES High Voltage.1 for high voltage safe work practices and the soon to be mandated AES 32.69.1 for low voltage levels.
The primary resource for the research that went into deriving these calculations was based upon research performed by the NFPA (National Fire Protection Association) comprised of some of the industries' leading experts in the field of electrical safety. Other standards organizations such as the IEEE and Edison Electrical Institute had input. Many leading industries such as DuPont, Duke Energy, and Ontario Hydro have performed countless research activities and have developed computer software to facilitate and support end-user implementation of arc flash hazard protection measures.
The electrician must understand the basic concepts of arc hazard potential and the requirements for working safely in such identified areas. However, the electrician performing a task does not need to know the physics behind the calculations for either thermal energy released in an arc blast, or the associated safe work zone dimensional boundaries established.

15.5.2 FORMULA FOR CALCULATING ELECTRICAL ARC FLASH HAZARD BOUNDARIES

For calculating the Electrical Arc Flash Hazard Boundary, the formula below can be used. Or use a software package as referenced in this section to calculate the Electrical Arc Flash Hazard Boundary. Or use Table 1 in this section to establish the Electrical Arc Flash Hazard Boundary.

15.5.3 THE FORMULA

$D_c = [2.65 \times MVA_{BF} \times t\}^{1/2}$ This formula is used when Short Circuit Current (Isc) is known.
Variables:

- D_c represents the distance (in feet) of a person from an arc source for curable second-degree burns
- t equals the time (in seconds) of arc exposure.
- MVA_{BF} is the bolted fault MVA (megavolt-amperes) at the point involved.
- MVA equals the MVA rating of transformer (for transformers with MVA ratings below 0.75 MVA, multiply the transformer rating by 1.25). The MVA value is used only in simple, one-transformer calculations.

15.5.4 PERFORMING AN ELECTRICAL ARC FLASH HAZARD BOUNDARY CALCULATION

Given the following information, calculate the Arc Flash Hazard Boundary.

- 50 MVA transformer (base MVA of 50)
- Impedance (Z) of 6.75% on a 13,800-volt bus.
- Fault clearance time (t) of 6 cycles (0.1 seconds for 60Hz).
- ***Table 1.***

Step 1- Calculate the bolted fault MVA_{BF}	$MVA_{BF} = MVA_{BASE}/Z$	50/.0675 = 741
Step 2- Calculate the flash hazard boundary (D_c)	$Dc = [2.65 \times MVA_{BF} \times t]^{1/2}$	$[2.65 \times 741_F \times 0.1]^{1/2} = 14$
Calculate the Short Circuit Current	Isc = (MVA_{BF} / (√3 x bus voltage)) x 1,000,000	(741/(√3 x 13,800)) x 1,000,000 = 31,000

Variables:

- D_c represents the distance (in feet) of a person from an arc source for curable second-degree burns
- t equals the time (in seconds) of arc exposure.
- MVA_{BF} is the bolted fault MVA (megavolt-amperes) at the point involved.
- Z = Transformer Impedance
- Isc = Short Circuit Current
- ½ is the square root

15.5.5 ELECTRICAL ARC FLASH HAZARD BOUNDARY FOR ALL APPLICATIONS

When an Arc Flash Hazard is present, personnel must know the Electrical Arc Flash Hazard Boundary. If a person is within the Electrical Arc Flash Hazard Boundary, choose the PPE to protect to less than or equal to 1.2 calories/cm^2. Elimination of the Arc Flash Hazard ends the need for an Electrical Arc Flash Hazard Boundary. Required PPE for common tasks is discussed in the Personal Protective Equipment section of this learning guide.

If an arc flash hazard boundary calculation has not been performed, Table 2 must be used to determine the boundary. Be sure the voltage levels and MVA_{BF} are less than or equal to those listed below.

Table 2

Electrical System Voltage Phase to Phase	***Electric Arc Flash Hazard Boundary D_c***	
kV	**Feet**	**Meters**
.051 - .600	4.0	1.2
.601 - .999	6.0	2.0
1.0 - 15	14.0	4.3
15.1 - 36	16.0	5.0
36.1 - 46	20.0	6.0

For values above 46kV, calculate the Electric Arc Flash Hazard Boundary.

The calculations in the above table are based on the following bolted faults:

- **51 – 600 volts:** 50 bolted fault MVA and a fault clearing time of 6 cycles (0.1 seconds)
- **601 – 999 volts:** 100 bolted fault MVA and a fault clearing of 6 cycles (0.1 seconds)
- **1 kV – 15 kV:** 750bolted fault MVA and a fault clearing of 6 cycles (0.1 seconds)
- **15.1 kV – 36 kV:** 1000 bolted fault MVA and a fault clearing of 6 cycles (0.1 seconds)
- **36.1 kV – 46 kV:** 1500 bolted fault MVA and a fault clearing of 6 cycles (0.1 seconds)

15.5.6 CALCULATING ARC THERMAL ENERGIES

Calculated Arc Thermal Energies are used to determine the appropriate PPE required that will protect the worker from greater than second degree bums and must reduce Arc Flash Hazard exposure to less than 1.2 cal/cm^2.

When calculating Arc Thermal Energies, choose the distance from the arc source to the worker's torso. Choose distances of 18" or greater. Table 3, below, allows determination of potential Arc Thermal Energies, without calculation, if the Arc Fault Current is known.

Arc Flash incidents may occur in open air or in confined boxes (controllers). The resultant thermal energy associated with an arc flash is different based on the situation and therefore must be calculated differently. Below are the formulas used.

Formula for Calculating Arc Thermal Energy for 600 volts or less in Open Air

$E_{MA} = 5271 \times D_A^{-1.9593} \times t_A \times [0.0016F^2 - 0.0076F + 0.8938]$

where:

E_{MA} = maximum open Arc Thermal Energy in calories/cm^2

D_A= distance in inches from the arc source to the worker's torso. Valid for distance of 18" and greater.

T_A = arc duration in seconds

F = bolted fault short circuit current in kA (valid for 16 to 50 kA).

Formula for Calculating Arc Thermal Energy for 600 volts or less in a Box

$E_{MB} = 1038.7 \times D_B^{-1.4738} \times t_A \times [0\text{-}0093F^2 - 0.3453F + 5.9675]$

where:

E_{MB} = maximum 20-inch cubic box Arc Thermal Energy in calories/cm^2

D_B = distance in inches from the arc source to the worker's torso. Valid for distance of 18" and greater.

T_A = arc duration in seconds

F = bolted fault short circuit current in kA (valid for 16 to 50 kA).

Potential Arc Thermal Energies in Open Air for known Short Circuit Currents

For voltages in Open Air, use the table below or calculate Arc Thermal Energies using the appropriate software.

- ***Table 3***

Supply Voltage in kV	Short Circuit Currents in kA							Arc Gap		Distance from Arc to worker's location		Arc Duration
	10	20	30	40	60	80	100					
	Total Calories/cm2 to workers							Inches	cm	Inches	cm	Seconds
0.300	.60	1.72	3.36	5.56	11.7	20.2	31.1	1.25	3	18	46	0.1
0.480	.60	1.72	3.36	5.56	11.7	20.2	31.1	1.25	3	18	46	0.1
0.600	.60	1.72	3.36	5.56	11.7	20.2	31.1	1.25	3	18	46	0.1
0.750	0.87	2.37	4.47	7.21	14.6	24.7	37.5	2	5	18	46	0.1
1.0	0.70	1.77	3.17	4.93	9.48	15.4	22.8	4	10	26	66	0.1
2.4	0.92	2.24	3.92	5.96	11.1	17.7	25.8	6	15	26	66	0.1
4.16	1.08	2.58	4.45	6.69	12.3	19.3	27.8	8	20	26	66	0.1
13.2	1.56	3.55	5.76	8.25	13.9	20.4	27.3	12	30	26	66	0.1
13.8	1.56	3.55	5.76	8.25	13.9	20.4	27.3	12	30	26	66	0.1
15	1.56	3.55	5.76	8.25	13.9	20.4	27.3	12	30	26	66	0.1
22	1.62	3.70	5.99	8.57	14.5	21.2	28.4	18	46	31	79	0.1
34.5	1.78	4.07	6.60	9.44	15.9	23.3	31.3	20	50	31	79	0.1
46	1.50	3.41	5.53	7.91	13.3	19.6	26.2	20	50	34	86	0.1
Above Arc Thermal Energy calculations based on using ARCPRO software version 2.0. ARCPRO is a product of Ontario Hydro Technologies, Toronto, Ontario, Canada.												

Notes:
Arc energies computed by ARCPRO have been verified by comparison with measured results from high current laboratory tests involving controlled vertical arcs in air. ARCPRO results have shown good agreement with measured values from a series of tests covering the following ranges of parameters: currents from 3.5 kA 0 21.5 kA, arc durations from 4 cycles to 30 cycles, arc lengths from 1 inch to 12 inches, and distances of 8 inches to 24 inches from the arc.
ARCPRO assumes ac symmetrical currents with 60-Hz frequency free-burning vertical arcs in air. ARCPRO does not account for the following additional criteria: movement of the arc, electrode materials such as aluminum, hot particles being ejected from the arc, 3-phase arcs or arcs in enclosures. ARCPRO is most applicable to arcs longer Tan Z5 cm and arc currents above 200 A rms.
Duke Heat Flux Calculator Freeware provides reasonable estimates within the range of 1kA and 10 kA. Heat Flux limitations include program termination for values outside of modeled ranges for arc gap and voltage, and poor estimates for small arc gaps at higher currents and voltages.

Potential Arc Thermal Energies in a Cubic Box for known Short Circuit Currents

For voltages in a Cubic Box, use the table below or calculate Arc Thermal E using the "Formula for Calculating Arc Thermal Energy in a Box discussed earlier.

Supply Voltage in kV	Short Circuit Currents in kA				Arc Gap		Distance from Arc to worker's location		Arc Duration
	20	30	40	60					
	Total Calories/cm2 to workers				Inches	cm	Inches	cm	Seconds
0.300	1.72	3.36	5.56	11.7	1.25	3	18	46	0.1

15.5.7 DETERMINE THE ARC THERMAL ENERGY FOR THE TASK TO BE PERFORMED

To calculate the Arc Thermal Energy, refer to Arc Hazard Assessment lesson in this Learning Guide. If the voltage is 600 volts or greater, use software, or refer to Arc Hazard Assessment lesson in this Learning Guide. . If the task involves enclosed switchgear with doors open and the switchgear is rated greater than 600 volts, refer to Personal Protective Equipment lesson in this Learning Guide to complete the assessment.

15.5.8 DETERMINE PPE

Select PPE to protect from the Arc Thermal Energy at the worker location within the Electrical Arc Flash Hazard Boundary. Refer to Personal Protective Equipment.

15.5.9 ARC FLASH HAZARD ANALYSIS

The Electrical Arc Flash Hazard Boundary and the Arc Thermal Energy to which a worker could be exposed must be calculated. The calculations for these are covered in detail in the Arc Flash Hazard Analysis section of this learning guide.

15.6 CREATING A SAFE WORK ZONE

Personnel without appropriate PPE shall not cross an Electrical Arc Flash Hazard Boundary and enter a work area where an Arc Flash Hazard is present.
To establish a. Safe Work Zone where voltages are less than 1000 volts AC, establish appropriate safe work practices to protect personnel from hazards present in the work zone. To establish a Safe Work Zone where voltages are greater than 1000 Volts AC, follow the requirements in High Voltage.1, Section 8.0. This section refers to standard Tag-Lock-Try procedures and establishment of barriers around the designated work zone. The work zone is determined by the Arc Flash Hazard boundaries and minimum approach distances as defined in High Voltage.
Electrical personnel will normally control the boundary with equipment having signage to illustrate distances.

15.7 PERSONAL PROTECTIVE EQUIPMENT

If an Arc Flash Hazard Analysis is not performed, personnel must wear the PPE Level as described in the Personal Protective Equipment section of this learning guide.
Personnel must wear the appropriate PPE for the determined Arc Flash Hazard level. To protect personnel from injuries greater than second-degree bums, the PPE must reduce Arc Flash Hazard exposure to less than 1.2 cal/cm^2.

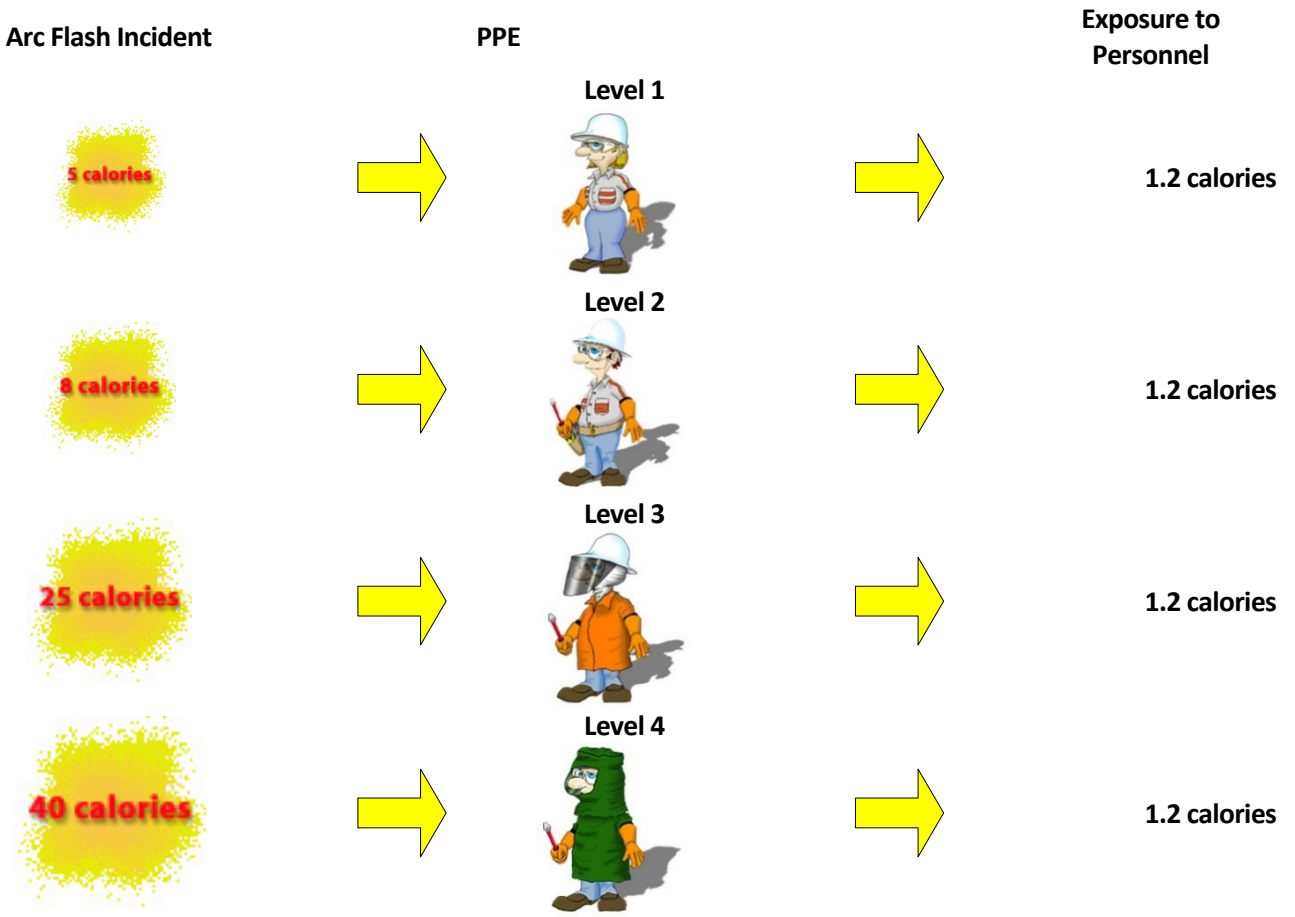
15.7.1 ARC THERMAL PERFORMANCE VALUE (ATPV)

Each piece of clothing worn by an employee will provide some level of protection from an arc flash. As layers of clothing, and air gaps, are applied they have a cumulative effect in protection. The level of PPE is the sum of the ATPV ratings for each layer.

15.7.2 DETERMINE PPE REQUIRED FOR A TASK

If an Arc Flash Hazard Analysis is not performed, personnel must wear the PPE Level listed in Table 4.
Personnel must wear the appropriate PPE for the determined Arc Flash Hazard level. In order to protect personnel from injuries greater than second degree bums, the PPE must reduce Arc Flash Hazard exposure to less than 1.2 cal/cm^2.
Personnel shall not wear articles containing conductive material such as rings, metal watch bands, metal-framed eyewear, and dangling metal jewelry when within the Electrical Arc Flash Hazard Boundary. Wearing of post type earrings shall be determined by location policy.
The clothing and PPE required for a task is dependent upon the potential hazard exposure and are categorized into five levels that provide adequate protection. Descriptions of these levels are found on the following pages.

For PPE Levels 1 to 4, clothing and equipment providing the same level of protection (calories/cm^2) may be used instead of the specific brands or fabric weights (oz/yd ^{2}). PPE selected should not increase other hazards. Natural fiber clothes and undergarments must be 100 percent cotton, 100 percent wool, or have equivalent ignition properties that will not increase the extent of bum injury. Undergarments may have elastic supports.



Arc hazard levels in Table 4 are based upon fault clearing times of less than or equal to six cycles (0.1 seconds), and fault currents not to exceed 40kA. If longer fault clearing times and/or fault currents greater than 40KA are exceeded, an Arc Flash Hazard Analysis SHALL be performed.

Table 4.5 – PPE Levels for Common Voltage Tasks Performed within an Electrical Arc Flash Hazard Boundary

Common Voltage Task	
Panels, switches or enclosed switchgear 51 V – 240 V, 10 kA or greater short circuit current.	
Switching or breaker operation with covers on with no exposed, energized parts, excluding wall mounted, covered toggle or similar switches typically used for lighting, etc.	0
Switching or breaker operation, testing, troubleshooting, doors opened. For less than 10 kA short circuit current available, the PPE Level required may be reduced by 1.	1
Panels, switches or enclosed switchgear 241 V – 999 V.	
Switching or breaker operation doors closed, no exposed, energized parts less than 600 amps. See Note 1.	0
Switching or breaker operation with doors closed, 600 amps or greater. See note 2.	1
Racking in or out Circuit Breakers, Cubicle doors open.	3
Removing bolted covers to exposed energized parts.	3
Switching or breaker operation, testing, troubleshooting with doors open. See Note 3.	2
Enclosed switchgear 1kV and above.	
Switching or breaker operation with doors closed. See Note 2.	2
Switching or breaker operation with doors open.	4
Voltage testing and applying safety grounds.	4
Work on control circuits near exposed, energized high voltage parts.	4
Opening panel doors or compartment covers to exposed, energized high voltage parts	4
Outdoor Equipment, open air, 1kV and above.	
Disconnect switch operation, gang operated from grade.	
Disconnect switch operation, live line tool (hot stick) operated.	
Work on energized parts, inducing voltage testing.	
Application of Safety Grounds after voltage testing.	

Note - Aluminum enclosures provide limited Arc Flash Hazard protection. If the fault level is above 25,000 Amps or the main over current device is 1200 Amps or greater, at a minimum, Level 1 clothing with hand and face protection is required.
Note 1- If there is increased danger of injury due to Arc Flash Hazard because of any openings in the door, panel or covers, including ventilation opening, hand protection and/or face protection may be required. Hand protection shall consist of a minimum weight of 2.75-ounce leather glove with gauntlet of sufficient length to provide wrist protection. Face Protection shall consist of a tinted, propionate, wrap around face shield over safety glasses or goggles.
Note 2 - PPE Level 0, if rated and tested Arc Fault Contained Switchgear.
Note 3 - Requires the use of Face Shield and Hearing Protection.

- **Level 0 PPE**
  Level 0 PPE consists of untreated cotton clothing including a minimum of long sleeves and, long pants and safety glasses with side shields. This level provides no appreciable protection from Arc Flash Hazard energy.
- **Level 1 PPE**
  Level 1 PPE must provide protection to 5 calories/cm^2 from potential Arc Flash Thermal Energy. Level 1 PPE total clothing weight usually is 4.5 oz/yd ^{2} to 8 oz/yd ^{2} and may consist of:

- FR long sleeve shirt and FR long pants, FR Coveralls or 50" FR smock.
- Safety glasses with side shields and electrically non-conductive frames.
- Polycarbonate or propionate goggles, if goggles are required.
- Electrically rated safety shoes.
- Electrically non-conductive hardhat; and
- Arc Flash Hazard rated gloves shall be worn to protect against the Arc Flash Hazard energy for this level of PPE. Voltage rated gloves are required if electrical contact hazard exists or their use is mandated by other codes or standards. Voltage rated gloves with leather protection may meet the requirements for both Arc Flash Hazard and electrical contact hazard.

- **Level 2 PPE**

  Level 2 PPE must provide protection to 8 calories/cm^2 from potential Arc Thermal Energy, Level 2 PPE total clothing weight of all layers usually is 9 oz/yd^2 to 12 oz/yd^2 and may consist of:



First Layer	• 100 % cotton underwear, including short sleeve shirt.
Second Layer	• FR long sleeve shirt and FR long pants, FR Coveralls or 50" smock.
Other PPE:	• Safety glasses with side shield and electronically non-conductive. • Electrically non-conductive hardhat. • Hearing protection • Arc Flash rated gloves shall be worn to protect against the Arc Flash Hazard energy for this level PPE. Voltage rated gloves are required if the electrical contact hazard exists or their use is mandated by other codes or standards. • Voltage rated gloves with leather protection may meet the requirements for both Arc Flash Hazard and electrical contact hazard.

- **Level 3 PPE**
  Level 3 PPE must provide protection to 25 calories/cm^2 from potential arc fault energy. Level 3 PPE total clothing weight of all layers usually is 16 oz/yd^2 to 20 oz/yd^2 and may consist of:



First Layer	• 100 % cotton underwear, including short sleeve shirt.
Second Layer	• FR long sleeve shirt and FR long pants, FR Coveralls or 50" smock.
Third Layer:	• Single layer Nomex 50" length smock or coveralls • Nomex hood or hood cape • Wrap around arc rated face shield
Other PPE:	• Safety glasses with side shields and electrically non-conductive • Polycarbonate or propionate goggles, if goggles are required • Electrically rated safety shoes • Electrically non-conductive hardhat • Hearing Protection • Arc Flash rated gloves shall be worn to protect against the Arc Flash Hazard energy for this level PPE. Voltage rated gloves are required if the electrical contact hazard exists or their use is mandated by other codes or standards. • Voltage rated gloves with leather protection may meet the requirements for both Arc Flash Hazard and electrical contact hazard.

- **Level 4 PPE**
  Level 4 PPE must provide protection to 40 calories/cm^2 from potential arc fault energy. Level 3 PPE total clothing weight of all layers usually is 24 oz/yd^2 to 30 oz/yd^2 and may consist of:



First Layer	• 100 % cotton underwear, including short sleeve shirt.
Second Layer	• FR long sleeve shirt and FR long pants, FR Coveralls or 50" smock.
Third Layer:	• Multi-ply Nomex III 50" length switcher's coat • Nomex switcher's hood with wrap around arc rated face shield
Other PPE:	• Safety glasses with side shields and electrically non-conductive • Polycarbonate or propionate goggles, if goggles are required • Electrically rated safety shoes • Electrically non-conductive hardhat • Hearing Protection • Arc Flash rated gloves shall be worn to protect against the Arc Flash Hazard energy for this level PPE. Voltage rated gloves are required if the electrical contact hazard exists or their use is mandated by other codes or standards. • Voltage rated gloves with leather protection may meet the requirements for both Arc Flash Hazard and electrical contact hazard.

15.8 CARE AND MAINTENANCE OF PPE

PPE shall be inspected, maintained, and cared for according to the manufacturer's specifications. PPE shall be inspected before each use per the manufacturer's recommendations. Any damaged PPE shall be removed from service. PPE soiled with grease or flammable liquids shall be removed from service and property cleaned. PPE damaged in an arc flash incident shall be removed from service.

Periodic Reviews

Annual self-assessments of the location's electrical safety program shall be conducted to ensure personnel are complying with the requirements of this document, and that personnel are wearing the proper PPE to eliminate Arc Flash Hazard injuries. Action plans shall be developed to close any identified gaps.

Modifications, Changes or Additions to Electrical Systems

If modifications, changes or additions to the electrical system occur, a reassessment shall be completed to verify the Arc Flash Hazard and PPE requirements. The reassessment documentation shall include modifications completed, modified Arc Flash Hazard or PPE required, date and assessor's name.

Design of Electrical Systems to Limit Arc Flash Hazards
An Arc Flash Hazard Assessment shall be conducted on any newly designed electrical systems. Priority must be given to eliminating the Arc Flash Hazard through the appropriate engineering and design. After January 1, 2004, new switchgear rated for 1000 volts and above must be arc fault rated with integral grounding switches and viewing windows.

15.9 OTHER HIGH VOLTAGE REQUIREMENTS

Periodic Reviews
Annual self-assessments of the location's electrical safety program shall be conducted to ensure personnel are complying with the requirements of this document, and that personnel are wearing the proper PPE to eliminate Arc Flash Hazard injuries. Action plans shall be developed to close any identified gaps.

Modifications, Changes or Additions to Electrical Systems
If modifications, changes or additions to the electrical system occur, a reassessment shall be completed to verify the Arc Flash Hazard and PPE requirements. The reassessment documentation shall include modifications completed, modified Arc Flash Hazard or PPE required, date and assessor's name.

Design of Electrical Systems to Limit Arc Flash Hazards
An Arc Flash Hazard Assessment shall be conducted on any newly designed electrical systems. Priority must be given to eliminating the Arc Flash Hazard through the appropriate engineering and design.
After January 1, 2004, new switchgear rated for 1000 volts and above must be arc fault rated with integral grounding switches and viewing windows. See document 32.25.4 titled "4.16 Thru 34.5 kV Switchgear Centers Enclosed" for additional switchgear specifications.

16 ASBESTOS

EXPOSURE TO ASBESTOS

16.1 POLICY

It is 3A Group policy to not work in areas that are suspect of containing asbestos. All efforts at remediation will be employed and a survey will be conducted after, that documents levels of asbestos are reduced to a level equal to or below the OSHA minimums.

16.2 DEFINITION

Asbestos is a silicate mineral, a fibrous, Naturally Occurring material of varying chemical compositions. Asbestos is used in well over 3,000 products including building materials and goods.

16.3 REACTIONS

Severe lung disease can be caused by asbestos through the inhalation of excess quantities of the fiber. It usually takes several years for symptoms of asbestos disease to become apparent.

The current allowable level of asbestos in the air established by OSHA is 5 fibers per cubic centimeter greater than 5 microns in length in an 8-hour time weighted average.

16.4 SAFETY PRECAUTIONS

When it is determined that a job will, or may, expose employees to asbestos fibers, the Safety Director will determine exposure probability and feasibility of control methods.

1. Where employees will be exposed to asbestos fibers, a program of monitoring shall be established to determine whether the employees' exposure to asbestos is below the limits prescribed by the OSHA standards. If limits are exceeded, an engineering compliance program will be undertaken immediately.
2. Sample procedures should include both personal monitoring and environmental monitoring. Personal monitoring should include a collection of sampling from within the breathing zone of employees. Environmental monitoring should include samples collected from areas of the work environment that are representative of the airborne concentrations of asbestos fibers, which may reach the breathing zone of employees.
3. After initial determination of asbestos concentrations has been made, additional sampling should be made at intervals not greater than a six-month period.
4. All work areas involving asbestos fibers should be enclosed, isolating them from any other activity on the project.
5. Exhaust ventilation and dust collection systems should be installed that remove asbestos dust accumulations immediately from the work area.
6. All hand operated and power operated tools engaged in work around asbestos contained material should be provided with local exhaust ventilation systems.
7. So far as is practical, asbestos should be handled, mixed, applied, removed, cut, scored, or otherwise worked in a wet state sufficient to prevent emission of airborne fibers.
8. Employees engaged in handling or working with asbestos material should be equipped with personal protective equipment such as respirators, and special clothing such as coveralls or similar whole-body covering.
9. Change rooms should be provided for employees exposed to asbestos fibers to prevent contamination of employee street clothing from his work clothes.

10. Work clothes that are asbestos contaminated will be laundered to prevent the release of airborne asbestos fibers in excess of the exposure limits outlined above.
11. Asbestos contaminated clothing should be transported in sealed impermeable bags or other closed impermeable containers and labeled accordingly.
12. Areas containing asbestos fibers in excess of specified limits will be properly identified with warning signs that would indicate there is asbestos in the area, that it is a dust hazard, advising employees to avoid breathing the dust, to wear protective equipment, not to remain in the area unless work requires it, and that breathing asbestos may be hazardous to health.
13. Any employee that is exposed to asbestos fibers in excess of the above specified limits will be notified in writing of the exposure as soon as practical but not later than 5 days of the finding.
14. Each employee exposed to airborne concentrations of asbestos fiber in excess of the limits specified above will be provided with medical examinations relative to this exposure. The initial medical examination will be given within 30 days of initial exposure that will include as a minimum a chest roentgenogram, a history to list symptomatology or respirator disease, the pulmonary function test to include forced vital capacity, forced expiratory volume at one second. These employees shall also be given annual medical evaluations thereafter while employed in environments, which subject them to exposure to asbestos fibers. When employment of such an employee is terminated, the company shall provide or make available within 30 days before or after termination, a comprehensive medical examination that shall include those tests specified for the initial examination.
15. Records shall be maintained of all medical examinations administered to employees. These records shall be maintained for at least 20 years.

17 ASSURED EQUIPMENT GROUNDING

ASSURED EQUIPMENT GROUNDING

17.1 PURPOSE

The purpose of this program is to provide procedures and guidelines to eliminate all injuries resulting from possible malfunctions, improper grounding and/or defective electrical tools. This program applies to all sites, employees and contractors and shall be used on owned premises.

17.2 DEFINITIONS

Competent Person - one who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them.

Ground Fault Circuit Interrupter - a device for the protection of personnel that functions to de-energize a circuit or portion thereof within an established period of time when a current to ground exceeds some predetermined value that is less than that required to operate the overcurrent protective device of the supply circuit.

17.3 RESPONSIBILITIES

Supervisors are designated as competent persons for the Assured Equipment Grounding Conductor Program and are responsible for program execution. One or more competent persons must be designated (as defined in 1926.32(f) to implement and execute the program.

Employees are responsible for following the requirements of this program, to perform visual inspections and to take defective equipment out of service.

17.4 PROCEDURES AND GUIDELINES TO ELIMINATE INJURIES

The following procedures and guidelines are designed to eliminate all injuries resulting from possible malfunctions, improper ground and/or defective tools.

17.4.1 ASSURED GROUNDING SITE PROGRAM REQUIREMENT

An assured grounding conductor program must be implemented on all 3A Group sites covering all cord sets, receptacles which are not part of the building or structure & equipment connected by cord and plug which are available for use or used by employees.

17.4.2 GROUND FAULT CIRCUIT INTERRUPTERS

All 120-volt, single-phase 15 and 20 ampere receptacle outlets on construction or maintenance sites, which are not part of the permanent wiring of the building or structure, and which are in use by employees, shall have approved ground fault circuit interrupters for personnel protection.

- All hand portable electric tools and extension cords shall use a GFCI.
- Additionally, approved GFCI's shall be used for 240-Volt circuits in the same service as described above.
- GFCI's must be used on all 120 volt, single-phase 15-amp and 20-amp receptacles within 6 feet of a sink, damp areas or on installed outdoor equipment.

- The GFCI must be the first device plugged into a permanent receptacle.
- The GFCI must be tested before each use.

17.4.3 ASSURED EQUIPMENT GROUNDING CONDUCTOR PROGRAM

The Assured Equipment Grounding Conductor Program (AEGCP) shall cover all cord sets, receptacles not a part of the permanent wiring of a structure and equipment connected by cord and plug on all construction and maintenance sites.

This written description of the program shall be kept at the jobsite for inspection and copying by OSHA and any affected employee.

17.4.4 REMOVING EQUIPMENT

Restrictions for the use of equipment that does not meet requirements or if is found to be defective shall be applied and enforced. Any equipment which has not met the requirements of this program shall not be available or permitted to be used by 3A Group. Damaged items shall not be used until repaired.

17.4.5 HOW OFTEN INSPECTION OF CORDS AND EQUIPMENT ARE TO BE MADE

Daily Visual inspections – The following shall be visually inspected before each day's use for external defects (such as deformed or missing pins or insulation damage) and for indication of possible internal damage:

- Cord sets.
- Attachment caps.
- Plug and receptacle of cord sets.
- Any equipment connected by cord and plug (with the exception of cord sets and receptacles which are fixed and not exposed to damage) such as deformed or missing plug, and
- Insulation damage
- Damaged items shall not be used until repaired or shall be discarded.

17.4.6 HOW AND WHEN TESTS ARE PERFORMED AND WHAT RECORDS ARE MAINTAINED

All equipment grounding conductors shall be tested for continuity and shall be electrically continuous.

Each receptacle and attachment cap or plug shall be tested for correct attachment of the equipment grounding conductors. The equipment grounding conductor shall be connected to its proper terminal.

When tests are performed:

- Before each use.
- Before equipment is returned to service following any repairs.
- Before equipment is used such as when a cord has been run over.
- At intervals not to exceed 3 months, except that cord sets and receptacles which are fixed and not exposed to damage shall be tested at intervals not exceeding 6 months.

Tests performed as required by this program shall be recorded as to the identity of each receptacle, cord set and cord and plug connected equipment that passed the test and shall indicate the last date tested or interval for which it was tested. This record shall be kept by means of logs, color coding or other effective

means and shall be maintained until replaced by a more current record. These records shall be made available at the job site for inspection by the Assistant Secretary and any affected employees.

All tested cord sets, and cord and plug-connected equipment shall be marked, one or both ends, with colored tape to denote the month that the tests were performed. The below color code chart that must be followed for marking.

Month #	Month	Color of Tape to Apply to Cords
1	Jan	Red
2	Feb	Yellow
3	Mar	Green
4	Apr	Blue
5	May	Brown
6	Jun	White
7	Jul	Start over with Red and repeat

18 BACKHOE AND LOADER SAFETY

BACKHOE AND LOADER SAFETY

18.1 SCOPE

3A Group employee shall operate a backhoe unless specifically trained and authorized by 3A Group. Backhoe operators are skilled professionals responsible for an expensive piece of equipment as well as the safety of those working on the project.

Backhoe loaders are complicated machines. Be sure to know your equipment's capabilities and limitations such as its load capacity, stability speed, braking and steering before operating the equipment. Check to make sure you have an operator's manual before you use the equipment.

18.2 BEFORE USING THE MACHINE

Read the owner's manual to learn the characteristics of the machine.

3A Group backhoe operators will use the proper personal protective equipment as stated in their training.

- Safety shoes
- Hardhat
- Safety glasses
- Heavy gloves
- Reflective clothing
- Hearing protection
- Respirator where necessary (dusty conditions)
- Sturdy pants and shirt

.

Check the loader/backhoe for the presence of the following safety devices in good working order:

- rollover protective structure (ROPS)
- seat belt (if ROPS equipped)
- guards
- shields
- back-up warning system
- lights
- mirrors.

18.3 PRE-OPERATIONS CHECKLIST

- Check engine, coolant, & hydraulic fluid levels
- Check for broken and/or dirty glass
- Check all functions for smooth operations
- Check transmission for smooth operation
- Check brakes
- Inspect hydraulic hoses
- Check that all safety devices & guards in place & functional
- Inspect bolts, welds, & pins for proper condition
- Inspect Rollover Protective Structure
- Inspect seat belt
- Check tires for condition, inflation, & missing valve caps

- Inspect all lights, gauges, horn & alarms
- Inspect engine compartment for leaks & trash build-up
- Fill the fuel tank while engine is off and cool. Never fill inside a building. Do not smoke, while fueling. Wipe up any spills immediately.
- Check the machine daily for broken, missing, or damaged parts. Make the necessary repairs or replacements.
- Keep the machine clean -- especially steps, handrails, pedals, grab irons, and floor of the cab. Slippery surfaces are very hazardous.
- Remove or secure loose items in the cab that could interfere with operating the controls.
- Check the work area for hidden holes, obstacles, drop-offs, etc. Clear children, pets, and bystanders from the area.
- Check overhead for utility lines, roofs, and other obstacles.
- Make sure to locate underground cables, gas lines, water, and sewer lines before digging. You need to request this service in advance.
- Always use the handrails, ladders, and steps provided when mounting the machine; never grab controls or the steering wheel.
- The cab was designed for one person -- allow no riders, especially children.

When a machine is used by several operators in the course of a shift, 3A Group will ensure each operator perform a pre-operation inspection before operating the machine during that shift.

18.4 INSPECTING THE LOADER

Check for the following:

- Damaged lift arms
- Bent or damaged hydraulic cylinders
- Worn hinge pins & bushings
- Damage & leaking hydraulic lines
- Smooth operation through all functions
- Damaged or loose teeth on bucket
- Bent or damaged bucket links
- All welds for cracks

The loader assembly attaches to the front of the tractor by two lift arms and hydraulic cylinders. The arm hinges need to be inspected for wear and proper lubrication. Each arm has a hydraulic lift cylinder used to raise and lower the bucket. Inspect the cylinders for fluid leaks and damage to the cylinder rods.

18.5 OPERATING THE LOADER

- Adjust the seat, fasten the seat belt, set the brake, and place transmission in park or neutral before starting the engine.
- If machine is in a garage be sure ventilation is adequate. CARBON MONOXIDE KILLS!
- Start the engine and check all controls for proper function. Check horn and backup alarm. Do not use if anything is faulty.
- If the backhoe is still attached, be sure to use chains and locks to prevent it from swinging.
- If the backhoe is removed, you may have to use counterweights. Check your owner's manual.
- Keep the working area as level and clean as possible. Use the bucket to grade the area frequently.
- Always carry the bucket low for good visibility and maximum stability.

- Use extreme caution when backfilling to avoid collapsing the wall of the trench.
- When undercutting high banks or material piles be alert for falling rocks and/or cave-ins.

18.6 OPERATING THE BACKHOE

- Keep the loader bucket on the ground.
- Level the machine for maximum stability.
- Operate the backhoe only from the seat.
- Never swing the bucket over a truck cab.
- Dump the bucket uphill if possible, when operating on a slope. If you must dump downhill swing slowly to avoid tipping the machine.
- If using the backhoe as a hoist, do so with the weight over the back of the machine -- NEVER THE SIDE -- to avoid tipping.
- Be sure the load you are lifting is balanced and move the boom slowly to avoid swaying the load.

18.7 SAFE STOPPING PROCEDURE

- Park the machine on level ground if possible and set the parking brake. Place transmission in park if so equipped.
- Lower the loader and backhoe buckets to the ground.
- Stop the engine and remove the key.
- Work the hydraulic controls to relieve pressure.
- Wait until all motion has stopped and then dismount carefully using steps and safety holds.
- Do not jump from the machine.

18.8 SKID LOADER SAFETY

Skid steer loaders are useful but dangerous pieces of equipment. The National Institute for Occupational Safety and Health (NIOSH) found a number of fatalities associated with skid steer loader use, most often attributable to:

- Working or standing under a raised loader bucket
- Leaning out of the operator's compartment into the path of the moving lift arms
- Improper entering or exiting
- Rollovers

To reduce the potential for the above types of accidents, the following safety features are critical: liftarm supports, interlocked controls, seat belts, rollover protective structures (ROPS), and side screens. Equipment that lacks the above operable safety features is not appropriate for use by 3A Group employees.

18.9 GENERAL SAFETY

- Operators should be trained by a knowledgeable person prior to operating a skid steer loader. This should include reading/understanding the owner's manual, operational safety, and demonstration of safe operation under anticipated conditions (e.g., terrain, load, etc.).
- Never by-pass or disable the safety devices.
- Before operating, clear the work area of by-standers and acquaint yourself with surrounding hazards (e.g., electrical lines, low clearance, uneven terrain, ramp edges, etc.).
- Consult 3A Group's safety supervisor to determine if hearing protective devices are warranted while operating the equipment.

18.10 ENTRY

- Do not operate if fatigued, injured, or while taking medications or other substances that may impede your ability to operate the equipment safely.
- Conduct a pre-operation safety check before entering to verify the integrity of safety devices, tires, structural components, and engine (e.g., no leaks, adequate fuel, etc.).
- Clear mud, ice, snow, and other debris from the controls, operator's compartment, and entry/exit footholds.
- Enter the equipment only when the bucket or other attachments are on the ground or are locked in place with lift arm supports.
- Face the seat and keep a three-point contact with the hand holds and steps.
- DO NOT use the operating controls for handholds or steps.
- Always wear the seatbelt when operating the equipment.

18.11 OPERATION

- Immediately after starting the engine, verify the working nature of the controls, brakes, horn, and alarms.
- Operate the loader from the operator compartment, never from the outside.
- Keep arms, legs, and head inside the cab when operating the loader.
- Avoid excessive speeds.
- Operate the equipment on stable surfaces. When possible, load, unload, and turn the equipment around on level ground.
- For maximum stability, travel and turn equipment when the bucket is in the lowest position possible.
- Never exceed the manufacturer's specified load limit. Take care to evenly distribute the load. In some cases, it may be necessary to secure the load to prevent falling or shifting.
- Avoid traveling across slopes and hills; if absolutely necessary, travel straight up or down with the heavy end of the machine pointed uphill.
- Always look in the direction of travel.
- Never allow passengers in the operator compartment or bucket of the skid steer loader.
- Never allow a person to position themselves under or near the bucket or frame while the skid steer loader is in operation.

18.12 EXIT

- Before leaving the operator's seat, set the bucket on the ground, set the parking brake, and turn off the engine.
- Never work around the equipment when the bucket or fork attachment is raised unless it is supported and the brakes are set, and the key is removed from the ignition. Use lift arm supports when they are present on the equipment. If no supports are present, contact the equipment dealer or manufacturer for help in determining proper support procedures.
- Chock the wheels, if necessary.

18.13 MAINTENANCE

- Maintain equipment in good operating condition with all safety devices functioning properly. Follow the manufacturer's recommendations for maintenance of the equipment.

- Do not service the equipment when the engine is running unless directed to do so by the operator's manual, and then only while observing stated safety precautions/procedures.
- Observe safe refueling procedures.

19 CHEMICAL DIP TANKS

CHEMICAL DIP TANKS

19.1 DIPPING AND COATING OPERATIONS

19.2 INTRODUCTION/OVERVIEW

A dip tank is a container that holds a liquid, other than plain water, in which objects are completely or partially immersed for dipping or coating. Objects may also be suspended in the vapor above the liquid inside the tank. The general term "dipping and coating" covers a wide variety of workplaces and operations.

19.3 USE OF DIP TANKS

Dip tanks are used in a wide variety of industries and workplace operations; however, their use can generally be put into one of four categories.

- **Cleaning objects.** For example, grease and oils might be cleaned off metal materials by dipping into solvent liquids, solvent vapors, sodium hydroxide solutions, and even water-based soap solutions.
- **Coating objects.** Paints, waxes, plastics, and other coatings can be applied by dipping an object into the tank.
- **Surface alteration.** Chemicals in dip tanks can also be used to alter the surface of an object. Acid tanks are often used to etch metal materials in order to make them thinner.
- **Changing the character of an object.** The character of metal materials can be changed in dip tanks through processes such as electroplating.

19.4 TYPICAL DIP TANK OPERATIONS

- **Paint dipping**—applying paint by dipping objects into a tank of paint
- **Electroplating**—a process in which an object is coated with metal
- **Pickling**—dipping foods into a brine solution or dipping metal parts into an acid solution
- **Quenching**—dipping hot materials into a tank for immediate cooling
- **Tanning**—a process used to convert hides or skin into leather
- **Degreasing**—cleaning oily and greasy metal parts by dipping them into solvent liquid or vapor
- **Stripping**—refers to a number of different processes such as dipping furniture into a chemical in order to strip old paint off the wood so it can be refinished with a new paint or other coating
- **Cleaning**—an operation found in many different industries that can include dip tanks of solvent, alkaline solutions, or even soap and water solutions
- **Dyeing**—dipping an object into a tank of dye to change its color
- **Roll, flow, or curtain coating**—different ways to coat objects with materials such as plastics, waxes, paints, etc.

  Discuss specific uses of dip tanks in your workplace.

19.5 OSHA REGULATIONS

The Occupational Safety and Health Administration has developed some general standards (29 CFR 1910.123-126) for the design of dip tanks, ventilation, and other engineered safety features. It is important for us to discuss these features, so we know what to look for when inspecting our dipping and coating operations.

19.6 IDENTIFYING HAZARDS

19.6.1 CHEMICAL HEALTH HAZARDS

You can find information about the health hazards of the chemicals and materials used in dip tanks by reviewing

the SDSs or the chemical labels.
Before working with any dip tank, be sure you understand the health hazards of the chemical, symptoms of overexposure, and what precautions you need to take to protect yourself.
Discuss the types of chemicals used in your dipping and coating operations.

19.7 ROUTES OF ENTRY

- **Inhalation**—Know the breathing hazards of the chemical in your dip tank. Solvent vapors could cause headaches, dizziness, etc., when an employee is overexposed. Fumes from acid tanks will cause damage to nose, mouth, and lungs.
- **Skin Contact**—Understand the hazards of skin contact with the chemical in your dip tank. Acid and alkaline solutions will burn your skin. Some solvents can penetrate your skin and enter your bloodstream. Other materials could cause skin rash.
- **Eye Contact**—Splashing your eyes with any material will cause irritation. Some materials will cause more severe damage to your eyes. Acids and alkalis can burn the eyes. Solvents can damage eyes and may even damage contact lenses.
- **Ingestion**—You are not likely to drink liquids from the dip tank intentionally. However, if you eat lunch or drink near dip tanks, the vapors can penetrate your food or beverage and then you will be ingesting the chemical with your food. Never eat or drink near the dip tanks. Never keep foods or beverages near dip tanks.

Discuss routes of entry and symptoms of overexposure for specific dipping and coating chemicals in your workplace.

19.8 PHYSICAL HAZARDS

Dip tanks also have a number of physical hazards depending on the process and the type of chemical.

- **Fire or Explosions**—Hazards associated with dip tanks containing solvents. Solvents with low flash points or solvents that are heated have a greater potential for ignition of the solvent vapors, thus resulting in a fire or explosion.
- **Heated Chemicals**—The temperature depends on the process. Chemicals that are heated above 150 degrees F can cause thermal burns or scalding if they are ever splashed onto an unprotected worker.
- **Electrical Shock**—This can occur if dip tanks are heated with electric heaters or if the liquid chemicals are exposed to other electrical sources. A short in the heater or other electrical equipment may result in an electric current in the chemical solution that might shock workers who hand dip objects into the solution. Workers can be shocked even when wearing chemical protective gloves.
- **Wet and Slippery Floors**—Liquids splashing out of the tank or liquids dripping off objects when they are pulled out of the tank will often result in wet and slippery floors. The dip tank chemical may also be inherently slippery and add to the slip hazard.
  Discuss specific physical hazards of dipping and coating operations in your workplace.

19.9 PROTECTION AGAINST HAZARDS

19.9.1 CONTROL VAPORS

Vapors and fumes are one of the primary hazards associated with working around open surface dip tanks. The vapors that come from the chemicals in the dip tank must be controlled in order to protect workers from breathing high concentrations of chemical vapors and fumes. OSHA has established safe working levels of chemical exposures, called permissible exposure limits (PEL), which can be found on most SDSs. Workers are considered safe as long as their exposure is below the PEL.

Control vapors through methods such as:

- **Keeping the tank lid closed** at all times except when dipping objects into the tank or removing objects from the tank.
- **Using mechanical ventilation** to remove fumes and vapors from the work area.
- **Using floating materials** to reduce the surface area of the chemical that is exposed to the air. This method reduces the amount of chemicals that change from a liquid to a vapor.
- **Using chiller systems** inside a vapor degreaser to cool the solvent vapors above the heated liquid surface and condense the vapors back into the liquid state. The condensed solvent then flows down the inside of the tank and returns to the pool of heated liquid solvent-only to be heated up again and returned to vapors in a continuing cycle of liquid to vapor to liquid to vapor.

Discuss specific vapor control methods used in your workplace.

19.10 MECHANICAL VENTILATION

Mechanical ventilation draws a flow of air into a hood or exhaust duct. The ventilation system should be made of noncorrosive materials. The ducts or hoods should be positioned so vapors are drawn away from workers. Each dip tank must have an independent exhaust system unless the combination of substances being removed will not cause a fire, explosion, or chemical reaction.
The ventilation provided for a vapor area must keep the airborne concentration of any substance below 25% of its lower flammable limit (LFL). The LFL is the lowest concentration of a material that will propagate a flame. It is usually expressed as a percent by volume of the material in the air. The SDS will usually list the LFL.

19.11 RECIRCULATING EXHAUST AIR

OSHA does not allow employers to recirculate exhaust air when any substance in that exhaust air poses a health hazard to employees or the exhaust air exceeds 25% of the chemical's LFL.
Any exhaust air that is recirculated from a dipping or coating operation using flammable or combustible liquid must be free of any solid particulate that poses a health or safety hazard for employees.
The exhaust air must be monitored by appropriate equipment for the chemical(s) in the dipping and coating tanks to make sure it does not exceed OSHA's PEL.
The exhaust system must be designed with alarms that will sound when the vapor concentration for any substance in the exhaust stream exceeds 25% of its LFL. Also, the dipping and coating operation and exhaust operation must automatically be shut down when any substance exceeds 25% of its LFL.

19.12 PERSONAL PROTECTIVE EQUIPMENT

One way to protect yourself from the chemical, health, and physical hazards of dip tanks is to wear appropriate PPE.

- **Safety glasses** should be required whenever working with chemicals in any type of process. Dip tanks have the potential hazard of splashing when objects are added or removed from the tank. To protect your eyes from splashing, wear tight-fitting chemical goggles. A face shield should be worn to protect your face from chemical splashes. Remember, a face shield should not be worn in place of chemical goggles. A face shield is worn over goggles for additional protection.
- **Gloves** should also be required when working with dip tanks-especially when hand dipping objects into the tank. The type of glove will depend on the chemical and the process. Neoprene or rubber gloves will protect against many acid or alkaline solutions as well as a number of solvents and water- based solutions. Also, if your dip tank is heated, the gloves will need to be insulated. Review the SDS and glove manufacturer's information to select the appropriate glove.
- **Respirators** must also be worn if the area near the dip tank contains vapors or fumes that exceed OSHA's PELs. Air monitoring may be required to determine the level of airborne chemical exposure. Select the

respirator according to the type of chemical and the concentration in the air. Air-supplied respirators are needed for high vapor concentrations. Use air-purifying respirators with cartridges that are appropriate for the type of chemical when concentrations are lower. Be sure to have a respiratory protection program in place.

- **Chemical-resistant boots** are required if working near the dip tank may cause the worker's feet to become splashed or wet. Wear boots that are impervious to the type of chemical used. Consult the manufacturer to select the proper type.
- **Protective clothing** such as an apron, jacket, and/or pants will be required if the worker is exposed to splashes from the dip tank. Make sure the apron extends below the top of the worker's boots, so liquid does not drip onto the worker's legs. Obviously, the protective clothing must be impervious to the chemical in the dip tank.
- *Discuss specific PPE required for dipping and coating operations in your workplace.*
- **Hygiene Facilities**
- Employers must provide some basic hygiene facilities for employees who work in dipping and coating operations with liquids that may burn, irritate, or otherwise harm their skin.
- **Locker space** or other storage space must be provided for employees to store their street clothes during work. This storage space must be separate from the storage area provided for work clothes in order to prevent contamination of the employee's street clothes.
- **Washing facilities** with a basin and hot water faucet for every 10 employees that work with such liquids must be provided so employees can wash up after removing their work clothes and before putting on their street clothes. Workplaces should also provide shower facilities if the employees are working with especially hazardous chemicals.
- The goal of hygiene facilities and hygiene practices is to prevent taking chemical contamination home to the worker's family on clothes or skin.

19.13 EMERGENCY PROCEDURES

19.13.1 FIRST AID

First-aid procedures are very similar for most chemicals; however, you should consult the SDS for specific first-aid procedures. Know the first-aid procedures for specific chemicals you are working with, so you do not waste valuable time consulting the SDS during an emergency.
First-aid supplies appropriate for the chemicals and the type of operation must be located near the dipping and coating operation.

- **Inhalation**—If you feel symptoms, like dizziness, that might be caused by breathing too many chemical fumes or vapors, leave the dip tank area and get fresh air.
- **Eyes**—If your eyes are splashed with a chemical, immediately rinse your eyes at an emergency eyewash station for at least 15 minutes while holding your eyelids open.
- **Skin**—If chemicals splash onto your skin, wash the area with soap and warm water. Before working with dip tanks, it is important for any small skin abrasions, cuts, rashes, or open sores to be treated by a properly trained person, such as a doctor.
- **Ingestion**—Get medical attention if you ingest chemicals. Consult the SDS because first aid for ingestion varies. Sometimes vomiting is called for; sometimes you need to drink milk; sometimes you need to drink water-the instructions can vary.

A physician's approval is required before any employee with a sore, burn, or other skin lesion that requires medical treatment can work in a vapor area. A vapor area means any space containing a dip tank, including its drainboards, associated drying or conveying equipment, and any surrounding area where the vapor concentration exceeds 25% of the LFL of the liquid in the tank.
Employees who work with chromic acid must undergo periodic medical examination of their exposed body

parts, especially the nostrils.

19.14 EMERGENCY PREPAREDNESS

Spill response equipment that is appropriate for the chemicals used in your dipping and coating operations must be located nearby.
Emergency shower and eyewash stations must be located near dipping and coating operations. If you are using chemicals that are especially harmful to the skin, an emergency shower and eyewash station must be in the area. These chemicals include acids, alkalis, and solvents.
Emergency equipment must be accessible at all times. The equipment will not be helpful in an emergency if access is blocked by production parts or stored equipment.
Inspect emergency equipment on a regular basis-at least weekly. Make sure all the spill equipment is still there. If any of it is used for a minor spill, be sure to purchase replacements immediately. Check the emergency shower and eyewash station to ensure it is still operable and the water is clear. If you work with especially hazardous chemicals, check the emergency shower and eyewash station at the start of your shift.
Discuss types of spill response equipment and location of emergency showers and eyewash stations in your workplace

.

19.15 SAFE WORK PRACTICES

19.15.1 INSPECTION AND MAINTENANCE

Visually check the dip tanks every day for any obvious signs of damage or deterioration before using them. At least quarterly, the following items should be thoroughly inspected by maintenance personnel:

- Hoods and the ductwork of the ventilation system for signs of corrosion or damage
- Ventilation system for appropriate air flow
- Tank for any signs of leaking or damage
- Tank covers to make sure they open and close properly and cover the tank adequately
- Drains and associated piping and valve systems for any signs of leaks
- Overflow piping to ensure there is no blockage to prevent it from functioning properly.
- Electrical systems, such as heaters or other electrical controls, to make sure they are protected from both liquid and vapor chemicals and that they are in good working order.
- Fire extinguishing systems to ensure they are in good working order. Sprinkler heads should not be covered or appear corroded. Fire extinguishers should be located nearby and accessible.

Review 3A Group's inspection form.

19.16 CLEANING A DIP TANK

Follow the requirements and the procedures of OSHA's Confined Spaces standard when entering a dip tank for cleaning.

- Drain or pump out the contents of the dip tank.
- Ventilate the dip tank and any nearby low points where hazardous vapors may have accumulated.
- Wear PPE that is appropriate for the cleaning task. This might include an air-supplied respirator if ventilation is not adequate.
- Properly dispose of any sludge and debris that is removed during the cleaning process. Remember, dip tank sludge and debris may be classified as hazardous waste.

Review 3A Group's specific dip tank cleaning procedures.

19.17 FLAMMABLE AND COMBUSTIBLE LIQUIDS

Dipping and coating operations that use flammable or combustible liquids must comply with additional design

and safe work practice requirements. A combustible liquid means a liquid having a flash point of 100 degrees F or above and a flammable liquid means a liquid having a flash point below 100 degrees F.
Even if the liquid has a flash point that is 200 degrees F or above you must comply with these regulations if heated objects are dipped into the liquid or the liquid itself is heated. Check the SDS to find flash point information.
When heating flammable or combustible liquids in dipping and coating operations, the maximum tank temperature must be below the liquid's boiling point. Also, the temperature must always be maintained at 100 degrees F below auto-ignition temperature.
Bottom drains are required on tanks with a capacity of 500 gallons or more. The bottom drain must be designed to empty the tank, during a nearby fire, within five minutes. The drain must discharge to a safe location and it must be capable of manual and automatic operation from a safe and accessible location.
Overflow piping is required for tanks with a capacity greater than 150 gallons, or with a liquid surface area greater than 10 square feet. The overflow piping must be at least three inches in diameter and have sufficient capacity to prevent the dip tank from overflowing. The piping connections must allow for ready access to the interior of the pipe for inspection and cleaning. The bottom of the overflow connection must be at least six inches below the top of the dip tank.
Conveyor systems used with a dip tank system must be capable of automatic shut-down if there is a fire or if the ventilation rate drops.

19.18 FIRE PROTECTION

Fire protection must be provided for any dip tank with a capacity of at least 150 gallons or a surface area of at least four-square feet. Any hardening or tempering tank with a capacity of at least 500 gallons or a liquid surface of 25 square feet must also have fire protection.

- Fire extinguishers that are suitable for flammable and combustible liquid fires must be located in the vapor area.
- Automatic fire extinguishing or fire suppression systems must also be installed in the area.
- Tank covers must automatically close when a fire is near. The lid must also be capable of manual closing.
- Keep the tank cover closed when the tank is not used.
  Discuss locations of fire extinguishers at 3A Group.

19.19 CONTROL IGNITION SOURCES

All electrical wiring and equipment in the area must conform to the applicable hazardous area requirements, depending on the chemical in the dip tank. Local fire codes may have additional requirements.

- No open flames are permitted in the vapor area.
- Never use spark-producing devices, including tools. Use brass tools, which are non-sparking. Use non-sparking tools, such as plastic shovels, when responding to spills in the area.
- No hot surfaces or overly hot equipment, such as motors, are permitted in the area
- Heating and drying operations associated with the dip tank must be properly ventilated and have automatic shutoffs in case the ventilation system fails.

19.20 OTHER SAFE PRACTICES

- When using portable containers to add liquid to the tank, the containers must be properly bonded and grounded to the dip tank to prevent static electricity from building up, sparking and igniting a fire.
- The vapor area must be free of combustible debris and as free as possible of combustible stock. Do not store paper, cardboard, wood pallets, or similar items in the area.
- Rags and other material contaminated with flammable or combustible liquids from dipping or coating operations must be placed in approved waste cans immediately after use. Dispose of waste can contents at

the end of each shift. Do not allow contaminated waste rags to accumulate.
- Prohibit smoking in vapor areas and post visible "No Smoking" signs near each dip tank.
Discuss other safe work practices specific to 3A Group.

19.21 SPECIFIC DIPPING AND COATING OPERATIONS

In addition to some of the general design requirements and hazards associated with most dipping and coating processes, some types of processes require additional design elements because of the specific hazards associated with those processes.

- **Hardening or tempering tanks** must be located far from furnaces on noncombustible flooring. Hoods and vents must be made of noncombustible materials. The processes must be equipped with an alarm that sounds if the tank temperature comes within 50 degrees F of the material's flash point. Conveyors must have limit switches. Never agitate the liquid with air.
- **Flow coating** operations should use low-pressure pumping systems. They should be designed with substantial piping systems. A heat-actuated device that shuts down pumps in case of fire must also be installed.
- **Roll coating, roll spreading, or roll impregnating** operations that use a flammable or combustible liquid with a flash point less than 140 degrees F require a number of precautions. When roll coating, it is important to prevent the sparking of static electricity. Bond and ground metal parts and install static collectors. Maintain a conductive atmosphere (for example, one with a high relative humidity) in the vapor area.
- **Cyanide tanks.** Install a dike or other spill containment around the cyanide tank to prevent it from mixing with an acid tank if it were to spill or leak.
- **Vapor degreasing** operators must keep the equipment maintained in order to reduce or eliminate the amount of vapors that are released. The vapor condenser must keep the vapor level 36 inches or half the tank width (whichever is less) below the top of the vapor degreasing tank. When using gas fuel to heat the tank, the combustion chamber must be airtight to prevent solvent vapors from entering the air-fuel mixture. The flue must extend outside and be made of corrosion-resistant material. Be sure to control the temperature of the heating element so it does not produce too many vapors or cause a solvent or mixture to decompose.
- **Liquid spraying operations** over an open-surface cleaning or degreasing tank must control the spraying to the extent feasible. Enclose the spraying operation if possible. Use mechanical ventilation to provide enough inward air velocity to prevent the spray from leaving the vapor area.
- **Electrostatic paint-deterring equipment** must have electrodes that are substantial, rigidly supported, permanently located, and effectively insulated from the ground by nonporous, noncombustible, clean, dry insulators. Maintain a minimum distance of twice the sparking distance between goods being electrostatically deterred and the electrodes or conductors of the electrostatic equipment. This minimum distance must be displayed on a sign located near the equipment.
- Electrostatic equipment must have automatic controls that disconnect the power supply to the high-voltage transformer and signal the operator if ventilation or conveyors fail, if a ground occurs anywhere in the system, or if products come within twice the sparking distance of the electrodes.
- Use fence, rails, or guards made of conducting material and adequately grounded to separate paint-deterring operations from storage areas and from personnel. Protect operations from fires with automatic sprinklers. Collect paint deposits with drip plates and screens and clean these plates and screens in a safe location.

Wrap-Up

In order to safely work around dipping and coating operations it is very important to understand the hazards of the chemicals you are working with. Read the labels and SDSs. Learn the symptoms of overexposure as well as

first-aid procedures. Once you know the hazards, you can take steps to protect yourself by inspecting the equipment each day, checking ventilation, and wearing the appropriate PPE.
Take extra precautions when working with flammable or combustible liquids. Keep ignition sources away from the area and do not allow combustible materials, such as rags, to accumulate in the area.

Sample Handout # 1 -- Hazards of Dipping and Coating

Hazards of Dipping and Coating

Chemical Health Hazards

Before working with any dip tank:

- Understand the health hazards of the chemical.
- Learn the symptoms of overexposure.
- Know what precautions you need to take to protect yourself.

You can find information about the health hazards of the chemicals and materials used in dip tanks by reading:

- Safety Data Sheets (SDS)
- Chemical labels

Routes of Entry

- Inhalation
- Skin contact
- Eye contact
- Ingestion

Physical Hazards

- Fire or explosions
- Heated chemicals and thermal burn
- Electrical shock
- Wet and slippery floors

Sample Handout # 2 -- Protection Against Hazards

Protection Against Hazards

Control Vapors

- Keep the tank lid closed
- Use mechanical ventilation to remove fumes and vapors.
- Use floating materials to reduce surface exposed to air.
- Use chiller systems to cool the vapors.

Mechanical Ventilation

- Draw a flow of air into a hood or exhaust duct so that vapors are drawn away from workers.
- Have an independent exhaust system for each tank.
- Keep the airborne concentration of any substance below 25% of the Lower Flammable Limit (LFL).

Personal Protective Equipment (PPE)

- Safety glasses, chemical goggles, face shield
- Gloves
- Respirators
- Chemical resistant boots
- Protective clothing

Hygiene Facilities

- Have locker space to keep work clothes and street clothes separated.
- Have washing facilities with a basin and hot water faucet.

Sample Handout # 3 -- Emergency Procedures

Emergency Procedures

First Aid

First-aid supplies that are appropriate for the chemicals and the type of operation must be located near the dipping and coating tanks.

- Inhalation-leave the dip tank area and get fresh air.
- Eyes-rinse your eyes in an emergency eyewash station for at least 15 minutes while using your hands to hold your eyelids open.
- Skin-wash with soap and warm water.
- Ingestion-get medical attention.

Emergency Preparedness

- Have spill response equipment available.
- Have emergency shower and eye wash stations.
- Keep emergency equipment accessible.
- Inspect emergency equipment frequently.

Sample Handout # 4 -- Flammable and Combustible Liquids

Flammable and Combustible Liquids

Dipping and coating operations that use flammable or combustible liquids must comply with additional design and safe work practice requirements.

- Bottom drains
- Overflow piping
- Automatic shutdown for conveyor systems

Fire Protection

- Fire extinguishers for flammable and combustible liquid fires
- Automatic fire extinguishing or fire suppression system
- Tank covers that automatically close when a fire is near
- Tank cover closed when not in use

Control Ignition Sources

- No open flames in the vapor area
- No spark-producing devices
- No hot surfaces or overly hot equipment
- Proper ventilation for heating and drying operations associated with the dip tank

Other Safe Practices

- Bonded and grounded containers used to fill dip tanks
- No storage of paper, cardboard, wood pallets, or other combustible debris or materials
- Proper disposal of rags contaminated with flammable or combustible liquids
- No smoking

20 COMBUSTIBLE DUST

COMBUSTIBLE DUST

Know the dust fire and explosion pentagon the following OSHA fire and explosion pentagon diagram shows combustible dust explosions include the three factors of the familiar fire triangle (fuel, heat, and oxygen) plus the factors of dispersion of dust particulates and the confinement of the dust cloud.

Avoid the secondary dust explosion A primary dust explosion (deflagration) occurs when dust is suspended within a confined area (e.g., container, room, ventilation system, or piece of equipment) ignites and explodes. Depending on the amount of settled dust in the area, a small primary explosion may cause powerful secondary dust explosions. A secondary dust explosion may also follow a primary non-dust explosion (e.g., natural gas, pressure, or vessel).

A secondary dust explosion is the result of dust accumulation inside an enclosed area being disturbed and lifted in the air then ignited by the primary explosion. The following OSHA illustration shows the difference between a primary and secondary explosion.

20.1 DEFINITION OF DUST

Solid particles generated by handling, crushing, grinding, rapid impact, detonation, and decrepitation of organic or inorganic materials, such as rock, ore, metal, coal, wood, and grain."

- These very small particles become airborne and settle on surfaces and in crevices throughout the manufacturing area.
- Lighting, pipes, dust collectors, other equipment

DEFINITION OF COMBUSTIBLE DUST (NEP)

A combustible particulate solid that presents a fire or deflagration hazard when suspended in air or some other oxidizing medium over a range of concentrations, regardless of particle size or shape.

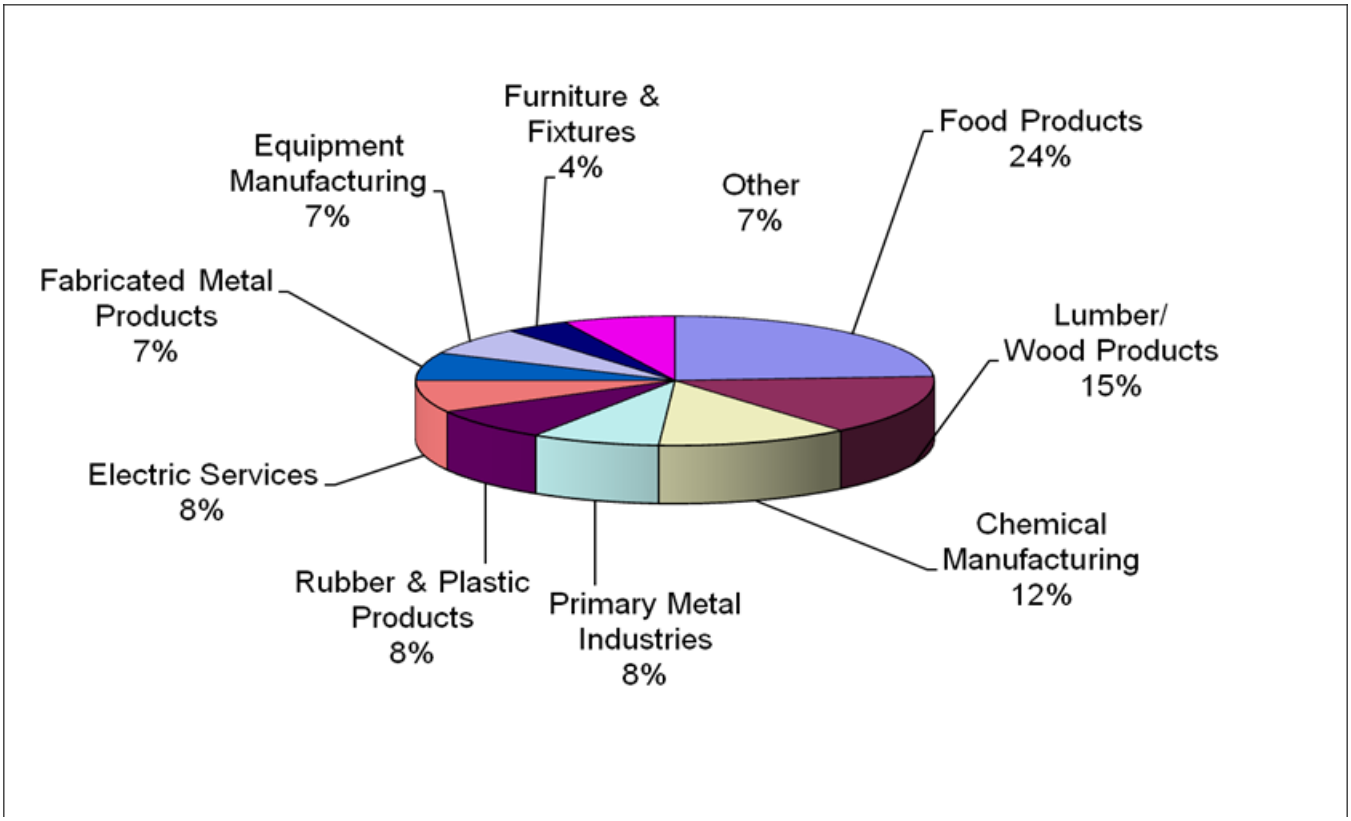
20.2 DEFINITION OF COMBUSTIBLE DUST (NFPA 654)

Any finely divided solid material that is 420 microns or smaller in diameter (material passing through a No. 40 Standard Sieve) and presents a fire or explosion hazard when dispersed and ignited in air.

20.3 DUST IDENTIFIED IN THE NEP

Dusts specifically identified in the NEP

- Metal dusts such as aluminum and magnesium
- Wood dust
- Coal and other carbon dust
- Plastic dust and additives
- Biosolids
- Other organic dust such as
- sugar, flour, paper, soap, and
- dried blood
- Certain textile materials



20.4 ASSEMBLE A REVIEW TEAM.

Work with knowledgeable employees from within the facility, including the Facility Safety Manager, Production Superintendent or Supervisor, Equipment Operators, Electrician or Electrical Engineer, and Maintenance Employees or Mechanical Engineer.

Each employee should provide knowledge into the processes and equipment throughout the facility. The production superintendent and supervisors should provide a detailed knowledge of the process from beginning to end. They should be able to identify raw materials, intermediate materials, and the final product. Equipment operators will be able to provide insight on how the equipment operates, its operating parameters, and sources of fugitive dust emissions. An electrician or electrical engineer should be able to provide information on Class II and Class III locations and if equipment and wiring meet the requirements for hazardous locations. Maintenance employees or a mechanical engineer should provide maintenance records and service logs for equipment. More importantly, these are the individuals that may be assigned to remedy fugitive dust emissions, implement preventative maintenance programs, or make modifications to material transfer points.

20.5 CONFIRM COMBUSTIBLE DUST HAZARD CONTROLS ARE IN PLACE.

20.6 MATERIALS USED AND PAST INCIDENTS

- Review Safety Data Sheets (SDSs) and related information for the chemicals and materials used or processed to determine the potential to create combustible dusts.
- If the facility as a history of fires and explosions involving combustible dusts, review the potential causes of these incidents and the preventive measures put in place following the incidents.

20.7 DUST CONTROL MEASURES

- Primary dust explosion occurs when dust suspension within container, room, or piece of equipment ignites and explodes
- Secondary dust explosion occurs when dust accumulated on floors or other surfaces is lifted into the air and ignites by primary explosion
    - Depending on the amount of dust in the area, a small deflagration or primary explosion may cause very powerful secondary dust explosions.
    - A secondary dust explosion may follow a primary non-dust explosion (e.g., natural gas or pressure vessel.)

20.8 MINIMIZE ESCAPE OF DUST FROM PROCESS EQUIPMENT OR VENTILATION SYSTEMS

- Use dust collection systems and filters
- Use surfaces that reduce dust accumulation
- Conduct regular inspections
- Clean dust residues at regular intervals
- Use cleaning methods that do not generate dust clouds
- Use vacuum cleaners approved for combustible dust collection
- Locate relief valves away from dust hazard areas
- Develop and implement written program for hazardous dust inspection, housekeeping and control
- Make sure settled dust layers on horizontal surfaces, including exposed rafters, do not exceed a depth of 1/32-inch, either on:

    - More than 5 percent of all horizontal surfaces for a building up to 20,000 square feet), or
    - Up to 1,000 square feet for buildings greater than 20,000 square feet.

Confirm the dust-containing systems (ducts and dust collectors) are designed in a way that do not expose employees to hazards nor allow fugitive dusts to accumulate in the work area. Examples include:

- No leaking of dust into work area.
- Collected air exhausted to the outside.
- Dust collectors not located inside buildings (some exceptions).
- Dust collector cleaning locations are away from the work area.
- Isolation devices to prevent deflagration propagation (spreading) between pieces of equipment connected by ductwork.
- The working surfaces are designed to minimize dust accumulation and facilitate cleaning.
- The facility has a housekeeping program with regular cleaning frequencies established for floors and horizontal surfaces (e.g., ducts, pipes, hoods, ledges, beams, cable trays, and on and around equipment) to minimize dust accumulations within operating areas of the facility.
- The cleaning methods used prevent combustible dusts from being suspended in the air. High-efficiency (HEPA) vacuum cleaning equipment or wet methods is recommended. Blowing off the settled dust with compressed air is discouraged.

20.9 IGNITION CONTROL MEASURES

Consider potential ignition sources including open sparks or flames from welding or abrasive cutting or grinding; embers; electrical equipment; static sparks; and hot surfaces (e.g., dryers, extruders, and heaters).

- Electric cleaning devices such as sweepers or vacuum cleaners, and electrical equipment are approved for the combustible dust locations.
- Spark detection and fire and explosion suppression systems are well designed and maintained.
- The facility has an ignition control program, such as grounding and bonding and other methods, for dissipating any electrostatic charge that may be generated while transporting the dust through the ductwork.
- The facility has separator devices to remove foreign materials capable of igniting combustible dusts (i.e., iron filings).
- The facility has a Hot Work Program including performing hot work in approved locations; written permitting procedures for hot work outside of designated areas; fire watcher training; and fire extinguisher user training.
- Combustible dust locations and other areas where smoking is prohibited are posted with “No Smoking” signs.
- Duct systems, dust collectors, and dust-producing machinery are constructed of non-combustible materials and are bonded and grounded to minimize accumulation of static electrical charge.
- The facility selects and uses powered industrial trucks (e.g., forklifts and loaders) that are approved for the combustible dust locations.

20.10 PREVENTION MEASURES

- Safety Data Sheets (SDSs) or other information for the chemicals and materials that could become combustible dusts are available to employees.
- Employees have had hazard awareness training on the fire and explosion hazards of combustible dusts and the control methods.
- Separator devices used to remove foreign materials capable of igniting combustible dusts

20.11 DAMAGE CONTROL MEASURES

- Separation of the hazard
- Segregation of the hazard
- Deflagration venting of a building, room or area
- Pressure relief venting for equipment
- Spark detection and extinguishing systems
- Explosion protection systems
- Sprinkler systems

20.12 PROTECTION MEASURES

The facility has an emergency action plan.

- Rooms, buildings, or other enclosures (dust collectors) have explosion relief venting distributed over the exterior wall of buildings and enclosures and directed away from work areas.
- Emergency exit routes are maintained properly to allow clear and visible exit routes.
- The personal protective equipment (PPE) has been selected for the job tasks involving combustible dusts, including:
    - The need for flash-resistant clothing has been determined for employees required to work in environments where combustible dust hazards exist.
    - Airborne concentrations of respirable dust have been evaluated to determine the need for respirators.
    - A written respiratory protection program that includes respirator selection, training, medical screening, and fit testing is in place where respirators are needed.

20.13 PROTECTION MEASURES—PHYSICAL

- Dust collectors not located inside buildings (exceptions)
- Rooms, buildings, or other enclosures (dust collectors) have explosion relief venting
- Explosion venting directed toward safe location away from employees
- Facility has isolation devices to prevent deflagration propagation between equipment connected by ductwork
- Spark detection and explosion/deflagration suppression systems in dust collector systems

21 CONCRETE SAFETY

CONCRETE SAFETY

Concrete workers are most susceptible to dermatitis when the do hand work. Wet cement is the #1 cause of occupational skin disease in the U.S. Concrete workers lose work at 7 times the national average. Concrete workers report 4 times more lost workdays than do all construction workers.

Concrete is easy to work with, versatile, durable, and economical. By taking a few basic precautions, it is also one of the safest building materials known. Relatively few people involved in mixing, handling, and finishing concrete have experienced injury.

Cement has many properties which are damaging to skin. Cement is alkaline, or caustic. The pH of wet cement ranges from 12 to 13. Wet cement is one billion times more alkaline than normal skin and one million times more alkaline than water. Cement is hygroscopic, pulling moisture from the skin. Cement is abrasive. Cement may contain sensitizing chemicals and metals.

21.1 POLICY AND SCOPE

All concrete construction and masonry work (including the placement of reinforcing steel and forms) shall meet the Safety Requirements of OSHA 29 CFR 1926.700 to 1926.706 Concrete and Masonry Construction.

21.2 PERSONAL PROTECTIVE EQUIPMENT

- 3A Group shall ensure that employees working with concrete wear shirts with minimum 4” sleeves, gloves and rubber boots for protection against the hazard of cement burns. Protective creams or lotions to reduce skin irritation and dermatitis may be provided to the workers.
- Concrete finishers shall be required to wear knee pads, and to use long-handled floats or powered equipment whenever possible. If powered finishing equipment is used, vibration damping devices should be a part of that equipment.
- Nozzle men applying cement, sand, air or water through pneumatic or pressurized hose systems should wear protective face shields and head protection.
- Safety glasses and face shields shall be used by employees when chipping, wire brushing or using powered hand tools (including impact and rotary tools).
- Hearing protection shall be required in areas with sound levels identified to have a potential for hearing impairment.

21.2.1 PROTECT YOUR HEAD AND EYES

Construction equipment and tools represent constant potential hazards to busy construction personnel. That's why hard hats are required on construction projects. 3A Group employees working with concrete will wear some sort of head protection, such as a hard hat or safety hat, when working any construction job, large or small.
Proper eye protection is essential when working with cement or concrete. Eyes are particularly vulnerable to blowing dust, splattering concrete, and other foreign objects. On some jobs it may be advisable to wear full-cover goggles or safety glasses with side shields. Sight is precious. Protect the head and eyes by using proper safety equipment and remaining alert.
Four types of skin problems happen most often among cement products workers:

Dry skin or irritation: irritant contact dermatitis; allergic contact dermatitis and caustic burns (alkaline burns) skin problems happen most often among cement products workers.

Best Protective Practices to work with wet cement.

1. Keep concrete from your skin
2. Wash with clean water & ph-neutral or mild acidic soap
3. Do not wear jewelry at when working with concrete.
4. Wear long sleeves
5. Use rubber boots with pants taped inside for concrete work.
6. Never let cement product remain on skin or clothing
7. Avoid barrier creams
8. Avoid skin products at work
9. Report any persistent skin problem to your supervisor & safety department

Take appropriate PPE protection when working with or around cements.

1. Don't work for prolonged periods in chemically saturated clothing
2. Exercise good daily hygiene

Report any chemical burns or cement related dermatitis to you Safety & Health Office

21.2.2 PROTECT YOUR BACK

All materials used to make concrete—Portland cement, coarse aggregate, sand, and water—are quite heavy even in small quantities. When lifting heavy materials, your back should be straight, legs bent, and the weight between your legs as close to the body as possible. Does not twist at the waist while lifting or carrying these items? Rather than straining your back with a heavy load, get help. Remember to use your head, not your back. Let mechanical equipment work to your advantage by placing concrete as close as possible to its final position. After the concrete is deposited in the desired area by chute, pump, or wheelbarrow, it should be pushed—not lifted—into final position with a shovel. A short-handled, square-end shovel is an effective tool for spreading concrete, but special concrete rakes or come-along also can be used. Excessive horizontal movement of the concrete not only requires extra effort but may also lead to segregation of the concrete ingredients.

21.2.3 PROTECT YOUR SKIN

When working with fresh concrete, care should be taken to avoid skin irritation or chemical burns. Prolonged contact between fresh concrete and skin surfaces, eyes, and clothing may result in burns that are quite severe, including third-degree burns. If irritation persists consult a physician. For deep burns or large affected skin areas, seek medical attention immediately.

21.2.4 FRESH CONCRETE'S EFFECT ON SKIN ARE:

Abrasive Sand contained in fresh concrete is abrasive to bare skin.
Basic & Portland cement is alkaline in nature, so wet Caustic concrete and other cement mixtures are strongly basic (pH of 12 to 13). Strong bases-like strong acids-are harmful, or caustic to skin.
Drying Portland cement is hygroscopic-it absorbs water. In fact, Portland cement needs water to harden. It will draw water away from any material it contacts-including skin.
Clothing worn as protection from fresh concrete should not be allowed to become saturated with moisture from fresh concrete because saturated clothing can transmit alkaline or hygroscopic effects to the skin.
Waterproof gloves, a long-sleeved shirt, and long pants should be worn. If you must stand in fresh concrete while it is being placed, screeded, or floated, wear rubber boots high enough to prevent concrete from getting into them.

The best way to avoid skin irritation is to wash frequently with pH neutral soap and clean water.

21.2.5 PLACING AND FINISHING

Waterproof pads should be used between fresh concrete surfaces and knees, elbows, hands, etc., to protect the body during finishing operations. Eyes and skin that come in contact with fresh concrete should be flushed thoroughly with clean water. Clothing that becomes saturated from contact with fresh concrete should be rinsed out promptly with clear water to prevent continued contact with skin surfaces. For persistent or severe discomfort, consult a physician.

21.3 GENERAL EQUIPMENT

Concrete pumping stations shall comply with the manufacturer's specifications and limitations applicable to the operation of concrete or similar systems. The limitations assigned to the equipment shall be based on the determination of a qualified engineer, competent in this field when manufacturer's specifications are not available. These determinations shall be documented and recorded.

Discharge pipes of concrete pumping systems shall be provided with pipe supports designed for 100% overload. Concrete pumping hoses shall be provided with positive fail-safe joint connectors to prevent separation of sections when pressurized.

Powered, rotating-type concrete trowel machines, manually guided, shall be equipped with an automatic shutoff (whenever operator removes his hands from the equipment handles).

The handles of concrete buggies shall not extend beyond the wheels on either side of the buggy.
Where the handles of bull floats have the potential to contact energized electrical conductors, the handles shall be constructed of nonconductive material or insulated with a nonconductive sheath to provide the equivalent protection of a handle constructed of a nonconductive material.

21.4 FORMS AND SHORING

Form work and shoring shall be designed, erected, supported, braced and maintained so that they will safely support all vertical and lateral loads that may be imposed during placement of concrete. Engineering drawings or plans of all form work and shoring showing the layout, working decks and scaffolding shall be available at the JOB SITE. When temporary storage of reinforcing rods, material or equipment is required on the top of any form work, these areas shall be designed to meet the additional loads of such material. No partially completed structure shall be exposed to any construction load unless such loading has been considered in the design and approved by the project engineer/architect.

Forms and shoring that have been stripped shall be stockpiled in such a manner to eliminate hazards of protruding wall nails, wire ties and other form accessories having the potential for injury.

Manufacturer's recommendations shall be followed for tubular steel frame shoring. These shall be in conformance with the Scaffolding and Shoring Institute's recommended procedures for compression testing scaffold and shores. Couplers (clamps) shall not be used if found to be deformed, broken or defective in any manner. They shall be constructed of structural type steel, malleable iron or structural grade aluminum. A thorough inspection shall be made of all steel frame shoring prior to erection to ensure the material is not deteriorated by rust or damaged or defective by dents or other damage.

21.5 PRE-STRESSED AND POST-STRESSED CONCRETE OPERATIONS

- When anchor fittings are utilized for tension strands, the recommendations and instruction of the supplier concerning installation, maintenance and replacement shall be followed.
- Tools and strand vises shall be kept clean and in good repair.
- During jacking operations of any tensioning element or group of tensioning elements, the anchors shall be kept turned up close to the anchor plate.
- No one shall be permitted to stand in line or directly over the jacking equipment during tensioning operations.
- No one shall be allowed to stand behind the jack during tensioning operations.
- All stressed concrete members shall be handled or lifted at the point specifically designated on the manufacturer's drawing, with the recommended lifting devices by the manufacturer or the engineer in charge.
- All stress members shall be stored on level base and adequately supported during storage and transportation to prevent tipping.

21.6 MASONRY WORK

The handling and storage of all masonry equipment or material shall be carried out in such a manner as to prevent sliding, falling or collapse of the tiers of stacked, racked or interlocked material.

In stacking bagged materials, such as cement and lime, stacks of over ten bags high shall be provided with restraining walls of sufficient strength to prevent tipping. All cement, lime and other materials stored in bags and used in masonry work shall be stacked so that the mouths or tops of the outside bags are facing towards the Center Operating of the stack.
To prevent a premature slacking action that may cause fires, lime must be stored in a dry place.

21.7 BRICKS AND MASONRY BLOCKS

Stacks of bricks and masonry blocks shall be kept level and the taper maintained during unstacking operations. Bricks and blocks shall never be stacked on uneven or soft surfaces. Stacks of bricks shall not exceed seven feet. Starting at a four-foot elevation, bricks shall be tapered back up to the seven-foot maximum height.

Brick, block or stone power saws should be equipped with a dust collection system. If a dust collection system is not used, all employees performing this task shall be provided with an approved respirator for protection from the dust hazard. Approved safety goggles and face shields shall be used when cutting brick, block or stone.

21.8 LADDERS AND SCAFFOLDING

All ladders and scaffolding used in concrete or masonry work shall conform to the section on ladders and scaffolding.

21.9 GENERAL REQUIREMENTS FOR CONCRETE & MASONRY OPERATIONS

- Re-bar caps must be used when personnel are working above any protruding reinforcing steel to eliminate the hazard of impalement.
- All employees must wear the necessary protective clothing to ensure that wet concrete never comes into contact with the employees' skin and eyes. When working in wet concrete, employees must wear rubber boots.

- Employees are not permitted to ride in concrete buckets or work under concrete buckets while the buckets are being elevated or lowered into position. Elevated concrete buckets are routed so that no employee or the fewest employees possible are exposed to the hazards associated with falling concrete buckets.
- Employees are not permitted to apply a cement, sand, and water mixture through a pneumatic hose unless they are wearing protective head and face equipment.
- Bulk storage bins, containers, or silos must have conical or tapered bottoms with mechanical or pneumatic means of starting the flow of material.
- Concrete mixers equipped with 1 yard or larger loading skips must be equipped with a mechanical device to clear the skip of material and have guardrails installed on each side of the skip.
- Handles on bull floats that are used where they may contact energized electrical conductors must be constructed of nonconductive material or insulated with a nonconductive sheath whose electrical and mechanical characteristics provide equivalent protection.
- Powered and rotating concrete troweling machines that are manually guided must be equipped with a control switch that automatically shuts off the power when the operator removes his/ her hands from the equipment handles.
- Concrete pumping systems using discharge pipes must be equipped with pipe supports designed for 100% overload.
- Concrete buckets equipped with hydraulic or pneumatically operated gates must have positive safety latches or similar safety devices installed to prevent premature or accidental dumping. The buckets must be designed to prevent material from accumulating on the top and sides of the bucket.
- Sections of concrete conveyances must be secured with wire rope (or equivalent material) in addition to the regular couplings or connections.

22 CONFINED SPACE

CONFINED SPACE ENTRY PROCEDURES

22.1 INTRODUCTION

Personnel are at times required to enter **enclosed spaces (hereafter called confined spaces)** to clean, inspect, repair, and perform other duties associated with a job.

22.2 PURPOSE

Entry into any **confined space** can be dangerous if the safety and integrity of the **confined space** is not known and properly controlled and maintained. It is important to understand and know what a **confined space** is, how to recognize the hazards associated with it, and how to eliminate or control any adverse exposure. It also is important to establish emergency procedures to assist in the removal of workers should the need arise.

22.3 DEFINITIONS

1. **CONFINED SPACE:** A space defined by the concurrent existence of the following conditions:

    a. Existing ventilation is insufficient to remove dangerous air contamination and/or oxygen deficiency, which may exist or **develop.**
    b. Ready access or egress for the removal of a suddenly disabled employee is difficult due to the location and/or size of the opening.

2. **DANGEROUS AIR CONTAMINATION:** An atmosphere presenting a threat of causing death, injury, acute illness, or disablement due to the presence of flammable and/or explosive, or toxic, or otherwise injurious or incapacitating substances.

    a. Dangerous air contamination due to the flammability of a gas of vapor at a concentration greater than 20% (percent) of its lower explosive (lower flammable) limit.
    b. Dangerous air contamination due to a combustible particulate is defined as a concentration greater than 20% (percent) of the minimum explosive concentration of the particulate.
    c. Dangerous air contamination due to the toxicity of a substance is defined as the atmospheric concentration immediately hazardous to life or health. This does not preclude the requirement to control harmful exposures to toxic substances at concentrations less than those immediately hazardous to life or health.

3. **OXYGEN DEFICIENCY:** An atmosphere containing oxygen at a concentration of less than 19.5% (percent) by volume.

22.4 SCOPE

Confined spaces that are potentially hazardous, can be found on some jobs, include but are not limited to:

1. Enclosures with limited access openings for personnel, such as in process or storage vessels;
2. Tanks, pits, tubs, vaults, vessels, or other confined areas and spaces where it is difficult to have a free exchange of clear air, or where hazardous ingredients had been processed prior to entering the area or space;
3. Confined spaces such as ventilation, process, or exhaust ductwork, sewers, underground utility tunnels, pipelines, or piping of any type

22.5 HAZARDS

The **hazards** commonly encountered in a **confined space** include:

1. **Toxic vapors** in unhealthy or fatal concentrations may result from residue of known or unknown material in a vessel, tank, or pit by gradual release from sludge or scale. The vapors may be **introduced to leakage** from interconnected systems, or be **introduced by use of cleaning solvents, welding, cutting, etc.**
2. **Flammable gases or dust** with the potential of fire or explosion.
3. **Lack of oxygen** causing asphyxiation may result from chemicals absorbing or replacing oxygen in the space, or from inert gases used to exclude oxygen from a specific area of work. Air in clean enclosures closed for an extended period may become deficient in oxygen because of oxidation of the metal of the tank. **Improper or inadequate ventilation** during work may also result in a lack of oxygen.
4. **Electrical shock** from portable lights, tools or associated electrical equipment.
5. **Injury from mechanical equipment** that may be defective or inadvertently or incorrectly operated.
6. **Injury from physical hazards** such as slipping, tripping or falling from elevated work areas, platforms, scaffolding, or ladders. Falling objects such as debris created during tearout or storage of tools and equipment that are not properly stored in elevated work areas.

22.6 GENERAL (PERSONAL GUIDELINES)

Supervision and all personnel who may be required to enter **confined spaces** shall review this instruction to ensure compliance with all applicable paragraphs.

1. Personnel with respiratory problems shall not be permitted in **confined spaces.** (All employees should have had an approved physical examination prior to using any respiratory equipment);
2. All personal protective apparel and respiratory equipment herein specified will be **NIOSH approved** and shall be worn when entering any hazardous enclosure as required;
3. Supervision over the area to be entered and supervision responsible for other work conducted in such area shall coordinate and regulate operations in their organizations in a manner that will reduce hazards to personnel entering such a **confined space.**
4. Job supervision should consult the Safety Coordinator prior to beginning work on any job should there be any question whether a particular area or job involves a **confined space.**

No deviations from the safety requirements specified in these instructions will be permitted without prior approval from the Safety Coordinator.

22.7 PROCEDURES FOR CONFINED SPACE ENTRY

The hazards inherent in **confined space** entry can be avoided or overcome if the following principles are applied properly each and every time a **confined space** is entered.

As such, the items below will have been completed prior to our starting work. In all cases, it will be the responsibility of the job supervisor to ensure that each of these requirements has been met.

22.8 RESPONSIBILITIES

22.8.1 MANAGERS/SUPERVISOR

- Shall ensure that all employees have been trained and fully understand the requirements of this program.
- Shall provide the necessary equipment to comply with these requirements and ensure that all employees are trained on its use.

- Shall ensure that all confined space assessments have been conducted and documented.
- Shall ensure that provisions and procedures are in place for the protection of employees from external hazards including but not limited to pedestrians, vehicles and other barriers and by use of the pre-entry checklist verifying that conditions in the permit space are acceptable for entry during its duration.
- Shall ensure that all Permit-Required Confined Spaces permits are posted.
- Shall ensure an annual review of the program including all entry permits issued that during that annual period.
- Shall ensure that confined spaces are identified properly as either a Non-Permit Confined Space or a Permit-Required Confined Space.
- Shall ensure that all confined spaces that have been identified as “no entry” have signs that state, “DANGER- DO NOT ENTER”.
- Shall ensure signs have been posted at all Permit-Required Confined Space areas that state, “DANGER – PERMIT ENTRY CONFINED SPACE” along with the proper warning word such as “ASPHYXIANT, FLAMMABILITY or TOXIC HAZARD”
- Shall file all permits at the area offices for review. Permits shall be kept on file for one year.

22.8.2 AFFECTED EMPLOYEE

- Shall attend Confined Space Entry training commensurate with their duties and when duties change as required.
- Shall comply with all aspects of this program.
- Authorized Entrants, Attendants and Entry Supervisors may be any 3A Group employee that is authorized by management to work in a confined space setting and that has been trained and is proficient in the understanding of program requirements.

22.8.3 AUTHORIZED ENTRY SUPERVISOR DUTIES

- Shall have a tailgate safety meeting, with all workers to be involved in the confined space entry and review the job to be performed and what safety concerns may be present.
- Shall confirm that all isolation, Lock/out and Tag/outs have been completed prior to entry into a confined space.
- Shall ensure that the requirements of this program are followed and maintained.
- Shall test all atmosphere conditions prior to entry and shall complete and maintain the confined space permit form and have it accessible for review on the job site at all times.
- Shall notify 3A Group supervisor of entry into a confined space and notify the supervisor of any changes that may occur, during an entry.
- If the confined space poses a hazard that cannot be eliminated, the Entry Supervisor must arrange for a rescue service.
- If the confined space poses no hazards to the Entrants, the Entry Supervisor can reclassify the confined space to a Non-Permit Confined Space.
- A stand-by rescue team is not required to be on site for Non-Permit Confined Space entries.

22.8.4 AUTHORIZED ATTENDANT DUTIES

- Knows the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of the exposure.
- Is aware of possible behavioral effects of hazard exposure in authorized Entrants.

- Continuously maintains communication and an accurate count of authorized Entrants in the confined space and ensures that the means used to identify authorized Entrants, and accurately identifies who is in the confined space.
- Remains outside the confined space during entry operations until relieved by another Attendant.
- 3A Group has procedures to be used by a single attendant monitoring several confined spaces during an emergency. If more than one confined space is to be monitored by a single attendant, the program must include the means and procedures that will be used in order to enable the attendant to respond to emergencies in one or more permit spaces that he/she is monitoring without distraction from all responsibilities. This will include radio communications with emergency responders or other methods of summoning aid, directing entrants to leave the confined spaces, etc. The procedures shall be on the confined space permit.
- Monitors activities inside and outside the confined space to determine if it is safe for Entrants to remain in the space and orders the authorized Entrants to evacuate the confined space immediately under any of the following conditions:
    - If the Attendant detects a prohibited condition;
    - If the Attendant detects the behavioral effects of hazard exposure in an authorized Entrant;
    - If the Attendant detects a situation outside the space that could endanger the authorized Entrants;
    - If the Attendant cannot effectively and safely perform all the duties required.
- Summon rescue and other emergency services as soon as the Attendant determines that authorized Entrants may need assistance to escape from confined space hazards.
- Takes the following actions when unauthorized persons approach or enter a confined space while entry is underway:
    - Warn the unauthorized persons that they must stay away from the confined space;
    - Advise the unauthorized persons to exit the confined space immediately, if they have entered the space;
    - Inform the authorized Entrants and the Entry Supervisor if unauthorized persons have entered the confined space.
- Performs no duties that might interfere with the Attendant's primary duty to monitor and protect the authorized Entrants.
- Authorized Attendants shall not monitor more than one confined space at a time.
- **Authorized Entrant Duties**
- Knows the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of the exposure;
- Uses appropriate personal protective equipment properly, e.g., face and eye protection, and other forms of barrier protection such as gloves aprons, coveralls, and breathing equipment;
- Is aware of possible behavioral effects of hazard exposure in authorized Entrants;
- Shall witness and verify calibrated air monitoring data and if approved, sign off, before entry is made.
- Is entitled to request additional monitoring at any time.
- Maintain communication with the Attendants to enable the Attendant to monitor the Entrants status as well as to alert the Entrant to evacuate if needed; and
  Exit from confined spaces as soon as possible when ordered by an Attendant or Entry Supervisor, when the Entrant recognizes the warning signs or symptoms of an exposure exists, or when a prohibited condition exists, or when an alarm is activated.

22.9 PRE-ENTRY

Prior to entry into any confined space, the following provisions should be reviewed, and conditions documented as part of the **ENTRY PERMIT:**

1. **CLEANING.** The **confined space** should be made clean and void of residue by hot or cold water flush, by steaming, by chemical neutralization or by air purge, with harmful vapors vented safely to the outdoors where practicable.
2. **VENTILATION.** The **confined space** should be thoroughly ventilated. After the space is cleaned and ventilated, a **mechanical exhaust system should be kept operating.** Should decontamination involve flammable liquids, vapors, gases, or dusts all sources of ignition must be eliminated. Should ventilation be necessary to be continued in the event that flammable vapors remain, all air moving equipment shall meet **Class I** requirements and compliance with the low voltage safety orders.

3. **ISOLATION.** The **confined space** should be completely isolated from all other systems and equipment. Positive and adequate measures must be taken to prevent harmful materials from entering the **confined space** while workers are inside.

   In all cases where lines have contained hazardous fluids of flammable or inert gas, or where they contain fluids at high pressures or temperatures, the lines should be physically disconnected by removal of valves, etc., and blank flanges placed in the lines as close to the work area as practical.

   Drains or overflow lines should be disconnected or blanked. Other lines to be disconnected or blanked should include steam connections, water, refrigerants, or air lines of any exterior jacket. Open ends of disconnected lines should be blanked or capped to prevent flow from disconnected ends entering an opening or falling on workmen. All blanks should be of sufficient thickness and tensile strength to withstand maximum pressures that may be imposed.

4. **LOCKOUT.** Line-disconnect switches supplying power to any mechanical mixers, agitators, pumps, and cover or door actuators should be tagged and locked in the ***"OFF***" position. It is not adequate to lock a push-button station, as it still may be possible to energize the circuit. The foreman in charge of the job should keep the keys to any locks and he alone shall be authorized to unlock any switches.

5. **TESTING OXYGEN (19.5%) AND GAS.** Before entry is made into any confined space (or tank), a test for oxygen and gas content shall be made. The Safety Coordinator or his designate, in the absence of the Safety Coordinator the supervisor is responsible for the testing, can then give the OK to issue an **ENTRY PERMIT.** Under no condition will entry be made until this procedure is carried out.

   If dangerous air contamination and/or oxygen deficiency does not exist within the space, as demonstrated by tests performed, entry into and work within the space may proceed subject to the following:

   a. Testing shall be conducted with sufficient frequency to ensure that the development of dangerous air contamination and/or oxygen deficiency does not occur during the performance of any work. Testing should be conducted at minimum; prior to the beginning of any work, and after any time period where the workers may be on break or lunch.
   b. If the development of dangerous air contamination and/or oxygen deficiency is shown by tests performed, existing ventilation shall be supplemented by appropriate means.
   c. When additional ventilation has been provided and dangerous air contamination and/or oxygen deficiency has been removed as demonstrated by conducting and recording additional testing, entry into and work within the space may proceed subject to the above periodic monitoring.
   d. If it is not possible to eliminate the air contamination or oxygen deficiency, then all workers, including the "safety watch", will be required to wear self-contained breathing apparatus (SCBA) or airline respirators.

22.10 ISSUANCE/REVIEWING OF PERMIT

Only when all pre-entry requirements are satisfied, the Entry Supervisor shall issue a completed and signed confined space permit. The confined space permit is valid for one shift.

In the event of any unauthorized entry, employee complaints, a hazard not covered by the permit, the occurrence of an injury or near miss the entry permit shall be cancelled and a review shall be conducted to provide employee protection and for revising the program prior to authorizing subsequent entries.

An annual review of this program, using the cancelled permits retained within 1 year after each entry shall be conducted by the HSE Manager to revise the program as necessary, to ensure that employees are protected. If no confined space entries were performed during a 12-month period, no review is necessary.

22.11 TERMINATION AND CLOSING OR CANCELLING OF PERMITS

The Entry Supervisor shall terminate the confined space permit, at the end of the job operation, at the end of the shift or when the Entry Supervisor or Attendant determine that conditions in or near the confined space have changed and is hazardous to the Entrants.

The Entry Supervisor shall, at the conclusion of entry operation, close out the permit and provide the safety department the original copy of the Confined Space Permit.

The Confined Space **ENTRY PERMIT** certifies and records approval for entry. It serves as a method of formalizing agreed-upon procedures and also a checklist to ensure that all existing hazards are considered, evaluated, and correct protective measures taken. No employee should enter any confined space without reporting to and securing approval from his immediate supervisor and the Safety Coordinator, when on the site.

Each supervisor who will send employees into a confined space work area must ascertain by personal investigation, immediately before entry and before signing the authorization, that the entry and incidental work will be safe. To ensure continuation of safe conditions, if a pause of appreciable duration (i.e., 8 hours) occurs during the work on a job, the site must be reinvestigated by the signers before the job can be allowed to resume. Entry permits are valid for one shift only.

22.12 PRECAUTIONS

The following precautions are an integral part of this **Confined Space Entry Procedure.** Each element should be reviewed in its entirety prior to beginning work in order to maintain compliance for safe operations.

1. **EQUIPMENT AND TOOLS.**

   a. Hand tools should be clean, in good condition, and should be selected carefully according to the use intended.
   b. Electrical tools and equipment, such as hand lamps and extension cords should be grounded, and when used in a **Class I** enclosure, of the explosion-proof type.
   c. Ground fault circuit interrupters must be connected in line and located outside the confined space for all power tool connections before use.
   d. In any **Class I or Class II** exposure, use air-operated power tools.
   e. Ladders used should be lashed at the top and, if possible, at the bottom.
   f. Employees performing welding in a confined space should be provided with and required to use airline/supplied respiratory protection.

g. Welding and cutting torches must not be taken into the space until ready to be used and must be removed from the confined space immediately after use.
h. Cylinders of oxygen or other gas shall never be taken into confined spaces and should be turned off at the cylinder valve when not in use.

CLASSIFICATION OF LOCATIONS:

a. **CLASS I** locations are those enclosed areas in which flammable, volatile liquids, gases, and vapors or mixtures are or may be present in quantities sufficient to produce explosive or ignitable mixtures.
b. **CLASS II** locations are those enclosed areas that are hazardous because of the presence of combustible dust.

3. **SIGNS.** Signs posted near the entrance to the confined space help keep unnecessary people away, assist in notification to others on the site that potentially harmful operations should not be started independently nearby without consultation, and help guide rescuers should they be necessary.
4. **BARRICADES.** Open pits and hazardous confined space operations require barricading with substantial railing 42" high with toe boards. Rope with streamers at the 42" level is recommended for closing adjacent work areas and aisles. Flashing lights on barricades area necessary when pits are open at night or in dimly lit areas inside.
5. **PROTECTIVE CLOTHING.** Special protective clothing may be required by the Safety Coordinator and job supervisor. It may range from specially designed, complete coverall suits for protection against highly toxic chemicals - harmful by adsorption through the skin, to the standard of chemical goggles, hard hats, gloves and sturdy work shoes normally worn to protect against routine hazards.

   Employees should never unduly expose the skin when working in a confined space especially when it involves exposure to acids, solvents, or caustics. Workers should wear a full coverage of clothing at all times. In most cases, coveralls will be furnished on the job. It will be the responsibility of the foreman to ensure that the proper clothing is being worn.

6. **RESPIRATORY PROTECTION.** Certified breathing air from self-contained units, or airline respirators should be supplied and worn if the integrity of the atmosphere cannot be guaranteed and if there is any possibility of air contamination of a harmful nature or of oxygen deficiency while employees are within a confined space.

   Such is the case when any electric arc or gas welding or cutting is done. **All welders** will be required to wear airline respirators or the equivalent due to the toxic nature of the welding rod and metals and their immediate exposure to these contaminants.

   Canister type respirator masks should be worn when any repairs are made **as long as there is an adequate exchange of air and oxygen** provided by forced ventilation fans or air movers in the space. Welders' helpers and other workers may also use canister type respirator masks when welding contaminants from the worker's breathing zone and out of the space.

   Canister type respirators, when used in a confined space, **do not always provide adequate protection** and should not be used in the following cases: 1) by welders unless air movement is adequate to keep the contaminated air from building up in the work area; 2) when there is a deficiency of fresh air or oxygen in the space; or 3) by rescue workers when condition #2 above exists.

8. **SAFETY WATCH. At least one safety watch** shall be assigned to stand by on the outside of any confined space opening ready to give assistance in case of emergency. In cases where the atmosphere within the confined space cannot be ensured to be free of dangerous air contamination and/or oxygen deficiency **at least one additional employee** who, may have other duties, shall be within sight or call of the safety watch.

   In case of emergency, the **safety watch** must never enter the confined space until he is relieved at this post. It is his job to summon aid immediately, to attempt to remove the victim by use of the lifeline, and to perform all other necessary rescue functions from outside. Upon arrival of help, he may enter the confined space for rescue work only when he is assured that adequate outside assistance is present.

   The **safety watch** should be well **trained in basic first-aid** principles such as rescue breathing techniques. Rescuers entering the confined space must be protected with the safety equipment required by the situation; i.e., lifeline and harness, and proper personal protective equipment.

   The **safety watch** shall be aware of the conditions of personnel within the space at all times. They shall not leave their position until the confined space is vacated, or they are relieved by other suitably attired personnel.

   For rescue purposes, at least one unit of self-contained breathing equipment or its equivalent should be located outside the confined space and convenient to the **safety watch** together with harness, rope, and such other emergency equipment as may be needed and indicated above (See Emergency and Rescue).

   The **safety watch** may pass tools, but he must have no other job which will take his attention away from the man in the confined space and/or which will interfere with his attempts to withdraw a victim by use of the lifeline, or which will require his leaving the vicinity of the confined space for any time whatever.

9. **FIRST AID & CPR.** At least one person trained in first aid and cardiopulmonary resuscitation (CPR) shall be immediately available whenever the use of respiratory protective equipment is required. The standards for CPR training shall follow the principles of the American Heart Association or the American Red Cross.
10. **COMMUNICATIONS.** An effective means of communication between employees inside a confined space and the **safety watch** must be provided and used whenever the sue use of respiratory protective equipment is required or whenever employees inside a confined space are out of sight of the safety watch and other standby employees. All affected employees must be trained in the use of such communication system. The system must be tested before each use to confirm it effective operation.
11. **EMERGENCY SIGNALS.** A clearly understood signal system shall be established prior to the start of the operation. The following example can be sued when it is necessary for the worker in the space to communicate quickly with the safety watch:

    a. One pull - allow more slack in the line
    b. Two pulls - lead line is inadequate
    c. Three pulls - emergency, pull man from space

    One additional safety line will be available for each person within the confined space. In the event a worker has fouled his lifeline on a structural member to such an extent that the clearing of the line to affect a rescue would be time consuming and dangerous, the lifeline to the man will be unsnapped. A new lifeline will be hooked on and a rescue effected.

22.13 MULTIPLE EMPLOYER PROCEDURE

In order not to endanger the employees of any other employer, the Entry Supervisor shall:

- Verify that all contractor employees have been trained in confined space and that all contractor employees fully understand the 3A Group procedures pertaining to Confined Space.
- Inform the contractor that the workplace contains permit spaces and that permit space entry is allowed only through compliance with a permit space program meeting the requirements of this section.
- Apprise the contractor of the elements, including the hazards identified and the employees experience with the space, that make the space in question a permit space.
- Inform the contractor of any precautions or procedures that 3A Group has implemented for the protection of employees in or near permit spaces where contractor personnel will be working.
- Coordinate entry operations with the contractor, when both 3A Group personnel and contractor personnel will be working in or near confined spaces.
- Debrief the contractor at the conclusion of the entry operations regarding the permit space program followed and regarding any hazards confronted or created in confined spaces during entry operations.
- In addition to complying with the confined space requirements that apply to all employees; each contractor, who is retained to perform permit space entry operations, shall:
    - Obtain any available information regarding confined space hazards and entry operations from the 3A Group Entry Supervisor.
    - Coordinate entry operations with the 3A Group Entry Supervisor, when both 3A Group personnel and contractor personnel will be working in or near permit spaces.
    - Inform 3A Group of the confined space program that the contractor will follow and of any hazards confronted or created in the confined space, either through a debriefing or during the entry operation.

22.14 EMERGENCY AND RESCUE.

Where potential exposure in the confined space is acute due to the lack of oxygen, air contamination, or exposure to flammable or explosive atmospheres, or where rescue may be difficult the worker(s) must be provided with a body harness with lifeline attached. Such safety harness and lifeline should be used when the shape, size and location of the confined space permits the safe emergency removal of workers by standby personnel without requiring entry into the confined space. The line shall be at least 1/2 inch in diameter and load tested at 2000 pounds.

When the shape, size, and location of the confined space does not meet this requirement, a specific procedure for the rescue of personnel must be developed in the pre-planning stage of the confined space entry work and made a specific part of the entry permit. In some cases, it is advisable to have a block and tackle positioned on a tripod or otherwise fastened above the manhole. For obvious reasons, manholes large enough to accommodate the man and his safety gear should be provided, such as 24" diameter for circular ones. Where existing manholes are smaller than 20" in the largest dimension, consult the Safety Coordinator for possible use of wrist harnesses. The free end of the lifeline should be secured to a fixed object and should be attended by a **"safety watch"** who will keep the man in the confined space always within his view.

Rescue service must be on-site for immediately dangerous to life and health (IDLH) conditions while work is being performed. Rescue services must be either:

- Provided by the host facility,
- Provided by an outside service which is given an opportunity to examine the entry site, practice rescue and decline as appropriate, or

- Provided by 3A Group by selecting a rescue team that is equipped and trained to perform the needed rescue services.
- The Attendant shall order the other Entrants not to move the injured nor allow untrained or unauthorized workers into the space that are not trained to handle a confined space rescue.
- Material Safety Data Sheet's for substances that an injured Entrant was exposed to must be provided to the medical facility treating the injured worker.

22.15 PERMIT-REQUIRED CONFINED SPACE RESCUE:

- When the Attendant becomes aware of the need for rescue, the Attendant shall immediately summon the onsite rescue team by the agreed upon communication method, verbally, radio or cell phone, without leaving the vicinity of the confined space.
- The Attendant shall prevent unauthorized personnel from attempting a rescue.
- After the rescue team has been notified, the Attendant shall alert the Entry Supervisor of the emergency via the same communication methods.
- The preferred means of providing rescue service is through the use of a qualified outside rescue service vendor (client host). The outside rescue service vendor must be:
    - Informed of the hazards that they may confront during a rescue;
    - Provided access to the Permit-Required Confined Space to examine the entry site, practice rescue, and decline as appropriate.
    - Access to the space allows the rescue service and local supervision to jointly develop appropriate rescue plans.
    - If the host operator is designated to provide rescue services for 3A Group, the agreement of services must be included in contract for the job.
- If 3A Group employees are to perform Permit-Required Confined Space rescues, they must be:
    - Provided and trained in the use of the proper personal protective equipment necessary to make the rescue;
    - Provided PPE at no cost
    - Trained to perform the assigned duties;
    - Required to practice making rescues at least once every 12 months;
    - Trained in basic first aid and CPR.
    - A minimum of one member of the rescue team must hold a current certification in first aid and CPR.

22.16 NON-ENTRY RESCUE

- To facilitate non-entry rescue, an Entrant must be attached to a retrieval system whenever he/she enters a Permit-Required Confined Space with a vertical depth of more than 5 feet.
- The retrieval equipment is not required if it will increase the overall risk of the entry, e.g., creating an entanglement hazard, or will not contribute to the rescue of the Entrant.
- Each Entrant shall use a full body harness equipped with a "D" ring located between the shoulders or above the head.
- Wristlets may be used instead of the full body harness, if the use of the full body harness is not feasible or creates a greater hazard *and* that using wristlets is the safest and most effective alternative.
- The retrieval line must be attached to the "D" ring and the other end of the retrieval line attached to a retrieval device or fixed point located outside the space so that rescue can begin as soon as the rescuer becomes aware that rescue is necessary.

22.17 TRAINING

Training shall be provided so that all employees whose work is regulated by this program acquire the understanding, knowledge, and skills necessary for the safe performance of the duties assigned to them.

Training shall be provided to each affected employee, before the employee is first assigned duties under this program, if a new hazard has been created or special deviations have occurred and before there is a change in assigned duties.

Training shall be documented

The employee shall be retrained:

- Whenever there is a change in confined space operations that presents a hazard about which an employee has not previously been trained.
- Whenever the supervisor has reason to believe either that there are deviations from the permit space entry procedures required by this section or that there are inadequacies in the employee's knowledge or use of these procedures.

The training shall establish employee proficiency in the duties required by this program and shall introduce new or revised procedures, as necessary.

The supervisor shall certify that the training required by this program has been accomplished.

- The certification shall contain each employee's name, the signatures or initials of the trainers, and the dates of training.
- The certification shall be available for inspection by employees, their authorized representatives, management, clients and the safety department.

22.18 SUMMARY

It will be the responsibility of the Safety Coordinator and the job supervisor to determine the environmental condition inside the confined space and prescribe the necessary precautions required for safe entry as outlined herein.

A minimum of workers will be permitted to work within any confined space at any one time. While personnel are inside the space, a qualified and certified **safety watch** shall be observing the operation from outside the confined space. The **safety watch** shall have safety equipment available.

The foreman and supervisor concerned must be alert before and during the job to detect and correct immediately new and different hazards, or to stop the work until the new hazards are corrected.

The Safety Coordinator should be notified before beginning any unusually hazardous confined space operation.

22.19 SAFETY WATCH INSTRUCTIONS

The Safety Watch duties are to observe other employees while they are performing their work and identify potentially unsafe conditions that may cause an accident. In addition, you are to act as a communication link for employees performing the work.

22.20 REQUIREMENTS OF THE SAFETY WATCH

1. The "Safety Watch" must understand how the job is to be performed and what the conditions or limitations are on the permit. Should their conditions change, or employees not follow instructions of the permit, the "Safety Watch" shall shut the job down and **report the change** in conditions or that the employees are not following instructions on the permit, **to the signer or counter signer of the permit.**
2. The "Safety Watch" must maintain a constant means of communication with the employees requiring the "Standby". Visual and voice contact will be kept when possible. A means of voice contact must be maintained whenever visual contact cannot be constant. The "Safety Watch" must be familiar with "sound powered" telephones or "walkie-talkies" if they are used.
3. The "Safety Watch" should discuss the job with the supervisor assigning the job and those employees performing the job in order to determine what action should be taken in the event of an accident or emergency.
4. The "Safety Watch" must stay at the work site until authorized to leave as directed by the supervisor assigning the job. If for any reason the "Safety Watch" should have to leave the job site, **STOP THE JOB** and notify those employees you are "standing by" for that you are leaving the job.
5. The "Safety Watch" must be familiar with the location, operation, and use of the fire and safety equipment in the work area. A fire extinguisher must be at the work site when burning or welding is in progress.
6. The "Safety Watch" shall immediately shut down the job if conditions change, presenting a hazard to workers or if directed to shut down the job by a responsible person.
7. The "Safety Watch" may be responsible for other duties not listed above, as directed by the supervisor assigning the job.
8. It may be a requirement that the "Safety Watch" be ready to wear a self-contained breathing apparatus. If this is required, you must be qualified to wear it. **NOTE:** Facial hair and spectacle bar (glasses) interfering with the seal area of respiratory equipment shall not be permitted.

NOTE: Should there be any doubt or misunderstanding about the above requirements, you are to contact your Supervisor immediately.

23 CRANE SAFETY

CRANES

23.1 PURPOSE

The purpose of this program is to outline the procedures for safe operations and the training requirements regarding crane and lifting devices, including all rigging is designed, constructed, installed, maintained and operated to perform safely.

23.2 SCOPE

This program is applicable to all employees who may utilize cranes and lifting equipment.

It applies to all 3A Group employees who operate overhead cranes, hoists, and rigging equipment in the scope of their job duties and assignments. When work is performed on a non-owned or operated site, the operator's program shall take precedence, however, this document covers 3A Group employees and shall be used on owned premises, or when an operator's program doesn't exist or is less stringent.

23.3 KEY RESPONSIBILITIES

23.3.1 MANAGERS AND SUPERVISORS

- For ensuring only trained personnel operate the equipment.
- Establish and maintain a daily, monthly and annual inspection program.
- Establish a recordkeeping log for safety checks, maintenance and repairs.
- Are responsible to ensure that employees and contractors are trained and qualified on the proper operations and have been trained in rigging safety by a competent person. Modifications or additions which affect the safe operation of the equipment may only be made with the manufacturer's written approval.
- Are responsible to see that all provisions of this program are followed and that rigging inspections are performed, and the equipment is in safe operating condition.

23.4 EMPLOYEES

- Personnel are responsible for visually checking the equipment they are using and reporting any observable wear, needed repairs or damage to their supervisor. They shall also report all equipment malfunctions immediately.
- Employees are responsible to follow the requirements of this program.

23.5 PROCEDURE

Operating controls shall be plainly marked to indicate the direction of travel.

All manufacturer procedures applicable to the operational function of equipment must be complied with. All manufacturer procedures applicable to the operational functions of equipment, including its use with attachments, must be complied with.

Procedures applicable to the operation of the equipment be readily available in the cab at all times. The operator shall have access to procedures applicable to the operation of the equipment. Procedures include rated capacities (load charts), recommended operating speeds, special hazard warnings, instructions and operator's manual.

23.6 OPERATOR QUALIFICATION

Operators must be determined to be qualified before they are permitted to operate any crane. Only those employees qualified by training or experience shall be allowed to operate equipment and machinery. Within 4 years of November 8th, 2010, employers must ensure operators be qualified/certified by one of the following methods:

- Certification by an accredited crane operator testing organization
- Qualification by an audited employer program
- Qualification by the U.S. military
- Licensing by a government entity

23.7 LOAD CHART

Each hoist shall have a legible load chart showing the rated capacity in all permitted working positions and configurations of use, manufactures name, model, serial number and year of manufacture or shipment date permanently marked or noted clearly, permanently posted on the equipment, weatherproofed and conspicuous on the equipment and shall be kept legible at all times. The load chart will be issued to the equipment operator, who must have it available at all times when operating the equipment.

23.8 MODIFYING EQUIPMENT

Modifications or additions that may affect the capacity or safe operation of the equipment must not be made without written approval from the manufacturer or approval from a registered professional engineer. The manufacturer must approve all modifications/additions in writing. A registered professional engineer must be qualified with respect to the equipment involved and must ensure the original safety factor of the equipment is not reduced.

23.9 PRIOR TO LIFTING

Cranes must not be used unless ground conditions are able to support the equipment and any supporting materials per the manufacturer's specifications. Equipment must not be assembled or used unless ground conditions are firm, drained, and graded to a sufficient extent so that, in conjunction (if necessary) with the use of supporting materials, the equipment manufacturer’s specifications for adequate support and degree of level of the equipment are met.

All loads shall be hooked or slung under the direction of a competent employee.

Prior to operating any equipment, the operator must be familiar with all recent entries in its logbook.

The operator must carry proof of training.

Before the start of each shift or use an operator uses a crane or hoist, the operator must inspect the crane or hoist was inspected for that work shift, and the control and safety devices were tested for that work shift to detect any defect, malfunction or hazardous condition. All safety devices must be in proper working order before operation begins. Safety devices are required to be on all equipment and must be in proper working order before operations begin. If any of the devices are not in proper working order the equipment must be taken out of service and operations must not resume until the device is working properly again. Examples of safety devices may include crane level indicator, boom stops, jib stops, foot pedal brake locks, horns, etc.

A fire extinguisher must be immediately available in the cab of each crane or other hoisting equipment.

The operator has the authority to stop and refuse to handle loads whenever there is a safety concern. Whenever there is a safety concern, the operator must have the authority to stop and refuse to handle loads until a qualified person has determined that safety has been assured.

When the operator of a crane or hoist does not have a clear and unobstructed view of the boom, jib, load line, load hook and load throughout the whole range of the hoisting operation, the operator must act only on the directions of a qualified, designated signaler who has a clear view of the things the operator cannot see. The operator of the crane or hoist must stop the operation of the equipment on receiving a stop signal from any person.

Operators of hoisting equipment shall disregard signals from anyone except designated signal persons but in an emergency other employee may give a stop signal.

Where the design of a crane is such that the boom may fall over backward, positive boom stops shall be installed in accordance with the manufacturer's instructions.

No employee shall ride or be permitted to ride on loads, hooks or similar equipment unless specifically authorized by his or her supervisor.

23.10 MARKING BOUNDARIES

3A Group must address safety measures to be used when the equipment has the potential to strike and injure an employee or pinch/crush an employee against any other object. 3A Group identifies hazard areas by marking the boundaries of the crane swing radius with warning lines, railings or similar barriers. Employees or other persons are not allowed within the barrier when operations are taking place. The crane will immediately be required to stop movement if someone enters the swing radius area.

23.11 OVERHEAD POWER LINES

A pre-operation hazard assessment will be performed to identify the work zone and determine if any part of the equipment could reach closer than 20 feet to a power line. The work zone shall be identified by demarcating boundaries such as flag and range limiting devices or defining the work zone as 360 degrees around the equipment up to the maximum working radius. The hazard assessment must determine if any part of the equipment could get closer than 20 feet to a power line.

3A Group will ensure measures must be taken if determined that any part of the equipment, load line or load could get closer than 20 feet to a power line. If it is determined that any part of the equipment, load line or load could get closer than 20 feet to a power line then at least one of the following measures must be taken:

- Ensure the power lines have been deenergized and visibly grounded.
- Ensure no part of the equipment, load line or load gets closer than 20 feet to the power line.
- Determine the line's voltage and minimum approach distance permitted in Table A below.

TABLE A—MINIMUM CLEARANCE DISTANCES

Voltage (nominal, kV, alternating current)	**Minimum Clearance Distance** (feet)
up to 50	10
over 50 to 200	15
over 200 to 350	20
over 350 to 500	25
over 500 to 750	35
over 750 to 1,000	45
over 1,000	(as established by the utility owner/operator or registered professional engineer who is a qualified person with respect to electrical power transmission and distribution).

Note: The value that follows "to" is up to and includes that value. For example, over 50 to 200 means up to and including 200kV.

23.12 ASSEMBLING/DISASSEMBLING EQUIPMENT

The manufacturer instructions and prohibitions must be followed when assembling and/or disassembling equipment. The manufacturer's procedures and prohibitions must be complied with when assembling and disassembling equipment.

A competent and qualified person must direct the assembly/disassembly of equipment. 3A Group will ensure the assembly/disassembly of equipment must be directed by a competent and qualified person.

23.13 HANDLING THE LOAD

23.14 SIZE OF LOAD

The rated capacity of a crane or hoist must not be exceeded, except for rated load test. The working load shall not be exceeded and shall be determined by the original manufacturer of the equipment, a registered professional engineer, or other persons whose qualifications are acceptable to local regulatory requirements.

23.15 ATTACHING THE LOAD

- The load shall be attached to the hook by means of slings or other suitable and effective means which shall be properly rigged to ensure the safe handling of the load.
- Chain and rope slings shall be free of kinks or twists before use.
- Baskets, tubs, skips or similar containers used for hoisting bulk materials shall be loaded so as not to exceed their safe carrying capacity.
- The hoist rope shall not be wrapped around the load.
- The load shall not be moved without checking the balance and the brakes. Brakes are checked by raising the load a few inches and applying the brakes.

23.16 LOAD LIFTING MANUAL

Safe lifting procedures can be found in the Lifting Handbook located in the operations office as designated for each work site by the Manager.

23.17 SAFE LIFTING

- If the operator of a lifting device has any doubts as to the safety of employees in the vicinity of the lift, the operator must not move any equipment or load until the operator is assured that the working conditions are safe. He or she shall report the circumstances to his or her supervisor who then shall be responsible for determining the action to be taken.
- Loads will be carried as close to the grade as possible and tag lines shall be rigged as necessary to control swinging of the load.
- Prior to moving a load ensure that the travel path of the load is free and clear of any undesirable obstructions.
- A suspended load shall not be left unattended by an employee.
- Ensure all employees who may be affected by the lift are aware of the hazards and are adequately protected.
- 3A Group must ensure that work is arranged, if it is reasonably practicable, so that a load does not pass over employees. An operator of a lifting device must not pass the load on the device over employees unless no other practical alternative exists in the circumstances and the employees are effectively warned of the danger by an audible alarm or other effective means. The operator of a lifting device that is travelling with a load must ensure that the load is positioned as close to the ground or grade as possible.
- A person working at a workplace must not stand or pass beneath a suspended load unless the employee has been effectively warned of the danger and the operator of the lifting device knows the employee is under the suspended load.
- Release the load only after the stability of the load has been verified and loads shall be safely landed and supported before unhooking.

If a hoist or crane is designed to be operated with outriggers or other stabilizing devices 3A Group shall ensure:

- The outriggers or other stabilizing devices are used in accordance with manufactures instructions.
- Are set on a solid footing or pad.
- Have their controls if any readily accessible to the operator and in a suitable position for safe operation.
- The area around the outriggers or other stabilizing devices is kept free of obstruction.
- There is a proper minimum clearance between any moving part of the crane and any obstacle near the base of the hoist or crane.
- Where there is a danger of an employee being trapped or crushed by any moving part of the crane when the crane swings, the area around the base of the crane is barricaded to restrict the entry of employees.

23.18 LOGBOOK PROCEDURE

The logbook will be readily available at all times to the operator and to another employee concerned with the maintenance and safe operation of the equipment. The operator shall be responsible for recording defects, operating difficulties, the need for maintenance and all maintenance and alteration work performed. If the operator requests, they shall be given a copy of the logbook.

The logbook for the equipment at a project shall include the greater of the immediately preceding twelve months or the period the crane or similar hoisting device is on the project.

When not being operated the logbook will be located in the operations office as designated for each work site by the Manager.

All logbook entries shall, on a regular basis, be signed by the person who performs the inspection, maintenance or calibration and review.

The logbook will include the following information:

- The date and time any work was performed on the hoist.
- Length of time in lifting service including hours of service.
- All defects and deficiencies and when they were detected.
- Details on all inspections, examinations, calibrations, checks and tests.
- Repairs or modifications performed or maintenance history.
- The record of certification.
- Details on any incident that may affect the safe operation of the equipment.

23.19 INSPECTIONS

Each crane and hoist must be inspected and maintained at a frequency and to the extent required to ensure that every component is capable of carrying out its original design function with an adequate margin of safety and is maintained in good working order. Inspections shall also be conducted at regular intervals as recommended by the manufacturer and by law.

Records of inspection and maintenance must be kept by the equipment operator and other persons inspecting and maintaining the equipment, for the following types of lifting equipment:

- A crane or hoist with a rated capacity of 900kg (2200 lbs.) or more
- A crane or hoist used to support an employee
- A tower cranes
- A mobile crane, boom truck or sign truck
- A side boom tractor or pipe layer
- A construction material hoist
- A chimney hoists

The following inspections shall occur at the indicated frequency:

23.20 NEW EQUIPMENT

Before being placed in service, new hoisting equipment, or hoisting equipment which has had modifications in the design or has undergone major repairs, shall be inspected and proof tested under the direction of a competent person who shall give the written warranty of the safe capacity of the equipment.

23.21 DAILY

A visual inspection of the equipment will be conducted by a competent person prior to each shift. A competent person must conduct a visual inspection of equipment prior to each shift. The inspection must consist of observation for apparent deficiencies. Some inspection items shall include control mechanisms, pressurized lines, hooks and latches, wire rope, electrical apparatus, tires (when used), and ground conditions. The manufacturer's guidelines shall be followed.

The following will be tested at the beginning of each shift by the competent operator:

- Limit switches
- Brakes
- Circuit breakers

- Other safety devices

Any defects found during inspection or use of a crane or hoist must be recorded in the inspection and maintenance record system and be reported immediately to the supervisor, who must determine the course of action to be taken. If a defect affects the safe operation of the crane or hoist, the equipment must not be used until the defect has been remedied.

23.22 MONTHLY

3A Group will ensure monthly inspections of equipment by a competent person are documented. Equipment must be inspected monthly by a competent person. The manufacturer's guidelines shall be followed. The inspection must be documented. Documentation must include the following:

- items checked,
- results of inspection,
- name and signature of the inspector.

Documentation must be retained for 3 months. (Documented monthly inspection is not required if the daily inspection is documented and records are retained for 3 months).

Any defects must be corrected before the crane is used. The report must be dated and signed by the person performing the inspection.

23.23 YEARLY

Once each year a more detailed inspection must be made of all hoisting equipment at each facility. After completing the annual inspection, a report must be completed and signed by the person performing the inspection and the report will be returned promptly to the Safety Manager.

23.24 RIGGING

All rigging work shall be assembled, used, maintained and dismantled under the direct supervision of a competent and qualified employees trained in safe rigging practices, in accordance with manufacturer's specifications and with the code of signals authorized by local regulatory guidelines for controlling hoisting operations.

23.25 RIGGING BREAKING STRENGTH AND LOAD RATING

The safe working-load on ropes, chains, slings and fittings shall not exceed the safe working-load recommended by the manufacturer.

Rigging fittings must be marked with the manufacturer's identification, product identifier and the working load limit (WLL) or sufficient information to readily determine the WLL. The WLL of existing fittings not identified must be determined by a qualified person, marked on the fitting and such fittings must be removed from service by January 1, 2001.

Rigging shall not be subjected to a load of more than 10 percent of the breaking strength of the weakest part of the rigging, if an employee is being raised or lowered 20 percent of the ultimate breaking strength of the weakest part of the rigging, and if the rigging is fatigue rated and an employee is not being raised or lowered the maximum load must not exceed 25 percent of the ultimate breaking strength.

3A Group may use a dedicated rigging assembly designed and certified for a particular lift or project by a professional engineer but the dedicated rigging assembly must be re-rated before it is used for another lift or project.

The maximum load rating of the rigging, as determined by the rigging manufacturer or a professional engineer must be legibly and conspicuously marked on the rigging. If it is not practicable to mark the rigging the maximum load rating of the rigging must be available to the employees at the work site.

23.26 RIGGING INSPECTION AND REJECTION CRITERIA

All 3A Group rigging and rigging equipment to be used during a work shift is to be inspected thoroughly prior to each period of continuous use during the shift to ensure the rigging is functional and safe by a competent person. All deteriorated or defective equipment will be immediately removed from service if it doesn't meet the below inspection requirements or rejection criteria.

23.27 SLINGS

- A wire rope sling with a swaged or poured socket or a pressed fitting must be permanently identified with its working load limit, the angle upon which the WLL is based and the name or mark of the sling manufacturer.
- An alloy steel chain sling must be permanently identified with the size, the manufacturer's grade and the WLL, the length and number of legs, and the name or mark of the sling manufacturer.
- Synthetic fiber web slings must be permanently identified with the manufacturer's name or mark, manufacturer's code or stock number, working load limits for the types of hitches permitted, and type of synthetic web material or be removed from service if any of these requirements are not met.
- A sling shall be permanently removed from service if it is damaged or worn.
- All slings are to be clearly labeled to indicate the slings maximum load or the slings maximum load is made readily available to employees.
- A sling must be stored to prevent damage when not in use.
- When a sling is applied to a sharp edge of a load, the edge or the sling must be protected to prevent damage to the sling

23.28 HOOKS

- A worn or damaged hook must be permanently removed from service and 3A Group shall not require or permit an employee to use a hook that is worn, damaged, deformed, cracked or otherwise defective or where the throat opening has been increased or the tip has been bent more than 10% out of plane from the hook body, or any dimension of the hook has been decreased by 10% or any damage exceeds any criteria specified by the manufacturer. **Note**: This is a higher standard than required is some locations.
- All hooks shall be clearly labeled with the maximum load of the hook in a location where an employee using the hook can easily see the rating or the hooks maximum load is made readily available to employees.
- A hook will have a safety latch, mousing, or shackle if the hook could cause injury if it is dislodged while in use.

All devices shall be visually inspected prior to use and removed from service for any of the following conditions:

- Nylon slings with:
  - Abnormal wear.
  - Torn stitching.
  - Broken or cut fibers.
  - Discoloration or deterioration.

- Wire rope slings with:
  - Kinking, crushing, bird caging, or other distortions.
  - Evidence of heat damage.
  - Cracks, deformation, or worn end attachments.
  - Hooks opened more than 10% at the throat.
  - Hooks twisted sideways more than 10 degrees from the plane of the unbent hook.
- Alloy steel chain slings with:
  - Cracked, bent, or elongated links or components.
  - Cracked hooks.
  - Shackles, eye bolts, turnbuckles, or other components that are damaged or deformed.

23.29 OPERATIONAL PROCEDURES

- Rigging shall not be subjected to loads more than outlined in legislative requirements. 3A Group will ensure the maximum load rating of the rigging is available to the employees at the work site.
- Wire rope, alloy steel chain, synthetic fiber rope, metal mesh slings, and synthetic fiber slings shall meet the requirements of ASME Standard B30.9-2006, Safety Standard for Cableways, Cranes, Derricks, Hoists, Hooks, Jacks and Slings (or current version). Below-the-hook lifting devices, other than slings shall meet the requirements of ASME Standard B30.20-2006, Below the Hook Lifting Devices (or current version).
- Loads to be unhooked by an employee must be safely landed and supported before the rigging is detached.
- The determination of the working load limit (WLL) of a sling assembly must ensure that the WLL of any individual component of the assembly is not exceeded.
- All slings used to hoist a load and the slings fittings and attachments must be in compliance with legislated standards and capable of supporting at least 10 times the load to which the slings fittings, and attachments may be subjected where they are used to support an employee, and at least five times the maximum load to which they may be subjected in any other case.
- No shackles shall be subjected to a load greater than the maximum load indicated on the shackle, and all shackle pins are installed to prevent accidental withdrawal, and a bolt is never used in the place of a properly fitted shackle pin.
- All hooks shall have a safety latch, mousing, or shackle if the hook could cause injury if it is dislodged while in use.
- Where an employee may be endangered by the rotation or motion of a load during hoisting one or more tag lines must be used to control the rotation or motion of the load and the tag lines will be of sufficient length to protect the employees from any overhead hazard and the tag lines are not removed from the load until the load is securely landed.

23.30 RIGGING A LOAD

- Determine the weight of the load - do not guess.
- Determine the proper size for slings and components.
- Do not use manila rope for rigging.
- Ensure that shackle pins and shouldered eyebolts are installed in accordance with the manufacturer's recommendations.
- Ensure that ordinary (shoulder less) eyebolts are threaded in at least 1.5 times the bolt diameter.
- Use safety hoist rings (swivel eyes) as a preferred substitute for eye bolts wherever possible.
- Pad sharp edges to protect slings.
- Remember that machinery foundations or angle-iron edges may not feel sharp to the touch but could cut into rigging when under several tons of load.

- Wood, tire rubber, or other pliable materials may be suitable for padding.
- Do not use slings, eyebolts, shackles, or hooks that have been cut, welded, or brazed.
- Install wire-rope clips with the base only on the live end and the U-bolt only on the dead end.
- Follow the manufacturer's recommendations for the spacing for each specific wire size.
- Determine the center of gravity and balance the load before moving it.
- Initially lift the load only a few inches to test the rigging and balance.

23.31 SIGNALING

A signal person must be provided if the operator's view is obstructed, if site specific safety concerns require it, or if the operator determines that it is necessary. A signal person must be provided for the following situations:

- The point of operation is not in full view of the operator,
- The view is obstructed when the equipment is traveling, or
- The operator or the person handling the load determines it is necessary due to site specific concerns.

Signals to the operator shall be in accordance with the standard hand. Specific requirements include:

- Each movement of equipment shall be proceeded by distinctive signals clearly discernible to all employees endangered by the movement and clearly distinguishable by the operator of the equipment controlled, and a signal which is not understood clearly by the operator of equipment shall be acted upon by him or her as though it were a stop signal.
- An employee shall not cause a signal to be given for the movement of equipment unless he or she has ensured that he or she and all employees within the area for which he or she is responsible are not endangered by the movement.
- Only a designated employee shall cause a signal to be given for the movement of equipment, but employees may cause a stop signal to be given and this signal shall be obeyed promptly and without question.
- An employee designated to direct the movement of equipment shall not be otherwise occupied while the equipment is in motion and he or she shall be prepared to signal to stop during the motion.
- A signaling device that functions unreliably or in a way that might constitute a hazard to an employee shall be removed from service immediately.
- Signals shall be discernible or audible at all times.
- Some special operations may require addition to or modification of the basic signals.
- For all such cases, these special signals shall be agreed upon and thoroughly understood by both the person giving the signals and the operator and shall not be in conflict with the standard signals.

23.32 TRAINING:

Training shall include:

- Documentation of employee, date of training and subject matter, including method used to test knowledge of material.
- No employee shall operate cranes or equipment covered by this program until training has been complete and management has approved and designated him or her as a qualified operator.

23.33 SLING INSPECTION FORM

Date of Inspection	Serial number of slings	Type of sling (2-legged, 3 legged, etc.)	Type of material (chain, wire rope, synthetic)	Date purchased	Date placed into service	Date of last inspection	Sling Condition (Excellent, Good, Bad) Note: a sling with a Bad rating must be removed from service.	Date repaired (if applicable)	Date removed from service	Inspected by:

24 CRYSTALLINE SILICA EXPOSURE CONTROL

CRYSTALLINE SILICA EXPOSURE CONTROL

24.1 INTRODUCTION

Silica is the second most common mineral on earth, found in the common form as “sand” and “rock”. Silica is the compound formed from the elements silicon (Si) and oxygen (O) and has a molecular form of SiO_2. The three main forms or ‘polymorphs’ of silica are alpha quartz, cristobalite and tridymite. The polymer most abundant and most hazardous to human health is alpha quartz and is commonly referred to as crystalline silica.

24.2 HEALTH HAZARDS ASSOCIATED WITH SILICA EXPOSURE

The health hazards of silica come from breathing in the dust. If crystalline silica becomes airborne through industrial activities, exposures to fine crystalline silica dust (specifically exposure to the size fraction that is considered to be respirable) can lead to a disabling, sometimes fatal disease called silicosis. The fine particles are deposited in the lungs, causing thickening and scarring of the lung tissue. The scar tissue restricts the lungs’ ability to extract oxygen from the air. This damage is permanent, but the symptoms of the diseases may not appear for many years. As noted in the following Figure, (respirable) silica dust is very small, and is not visible to the human eye.

A worker may develop any of three types of silicosis, depending on the concentration of silica dust and the duration of the exposure:

- Chronic Silicosis: Develops after 10 or more years of exposure to crystalline silica and relatively low concentrations.
- Accelerated Silicosis: Develops 5 to 10 years after initial exposure to crystalline silica at high concentrations.
- Acute Silicosis: Develops within weeks, or 4 to 5 years, after exposure to very high concentrations of crystalline silica.

Initially, workers with silicosis may have no symptoms; however, as the disease progresses, workers may experience:

- Shortness of Breath.
- Severe Cough.
- Weakness.

These symptoms can worsen over time and lead to death. Exposure to silica has also been linked to other diseases, including bronchitis, tuberculosis, and lung cancer.

24.3 SILICA EXPOSURES AT 3A GROUP

Many of the activities performed on 3A Group projects result in the creation/release of silica dust, thus exposing our employees. These activities include, but are not necessarily limited to:

- Sweeping
- Jackhammering
- Saw-cutting
- Drilling (of concrete)
- Excavating and Truck Loading activities

24.4 STATEMENT OF PURPOSE

3A Group is committed to providing a safe and healthy workplace to our employees, recognizing the right of workers to work in a safe and healthy work environment and ensuring that
3A Group's activities do not adversely affect the health and safety of any other persons.

This commitment includes ensuring every reasonable precaution is taken to protect our employees (and others) from the adverse health effects associated with exposure to silica.

24.5 RESPONSIBILITIES

Due to the risk posed by respirable silica, it is critical that all personnel involved in activities that could potentially create silica dust take specific actions to ensure that, as much as practicable, a hazard is not created. In recognition of this, the following (Silica related) responsibilities have been established and must be adhered to:

3A Group Top Management is responsible for:

- Regularly evaluating new equipment and technologies that become available, as able/appropriate, purchasing the "best available" equipment/technologies (within 3A Group's capabilities). Equipment/technologies with (silica) dust suppression and/or capture technologies will generally be given preference over equipment/technologies that lack such.
- Implementing a suitable respirable silica exposure monitoring program, or otherwise ensuring representative exposure monitoring results are available. The purpose of the program will ensure that (over time) 3A Group has quantifiable silica exposure data available for all regularly occurring, as well as reasonably foreseeable, work activities.
- Ensuring project and/or task specific Exposure Control Plans (ECPs) are developed communicated and effectively implemented as appropriate.
- Ensuring that all employees (i.e. Managers, Supervisors and Workers) receive the necessary education and training related to this Policy, as well as project/task specific ECPs.
- Maintaining applicable records (i.e. exposure sampling, inspections, respirator fit tests, training records, etc.) in accordance with 3A Group's record retention procedures/practices.
- (In conjunction with the 3A Group Health & Safety Committee Conducting a review of this Policy, as well as: (1) project/task specific ECP's, (2) available exposure monitoring data, (3) Industry/Regulatory information, and (4) new/emerging equipment/technologies on a regular (i.e. annual) basis.

24.5.1 SUPERVISORS ARE RESPONSIBLE FOR:

- Obtaining a copy of the project/task specific ECPs (and/or other similar such information) and ensuring such are made available at each work site.
- Ensuring that all the tools, equipment, PPE and materials (including water) necessary to implement the ECP is available (and in good working order) prior to allowing work activities to commence.
- Ensuring that all workers (under the supervisor's direction and control) have received the necessary education and training. As appropriate, each supervisor must ensure that workers are available to "demonstrate competency" for identified tasks.
- Ensuring that workers adhere to the project/task specific ECP, including PPE and personal hygiene (i.e. including be clean shaven where the respirator seals to the user's face) requirements.
- Coordinating work activities with the Owner/Prime Contractor as required, and/or otherwise implementing the controls necessary to protect others (i.e. erecting of barricades and signage) who could be adversely affected by 3A Group's acts (or omissions).

24.5.2 EMPLOYEES AND SUBCONTRACTED EMPLOYEES ARE RESPONSIBLE FOR:

- Knowing the hazards of silica dust exposure.
- Using the assigned protective equipment in an effective and safe manner.
- Working in accordance with the project/task specific ECP.
- Reporting (immediately) to their supervisor, any hazards (i.e. unsafe conditions, unsafe acts, improperly operating equipment, etc.).

24.6 EXPOSURE LIMITS

Exposure Limits/Considerations: The Occupational Health & Safety Regulation (OHSR) lists an occupational exposure limit (OEL) for respirable crystalline silica (including quartz) of 0.025 milligrams per cubic meters (mg/m^3). This is a concentration to which nearly all workers could be exposed for eight hours a day, five days a week, without adverse health effects. However, as a suspected carcinogen, crystalline silica is also an ALARA substance, and exposures must be reduced to levels **A**s **L**ow **A**s **R**easonably **A**chievable below the OEL.

24.7 RISK IDENTIFICATION

Risk Identification: Silica is contained on many of the products used/encountered on 3A Group's Projects Identifies the potential for between 50-77% Silica in aggregate), and (silica) dust can be readily released through the various tasks performed by 3A Group.

The health hazards of silica come from breathing in the dust. In addition to identifying the specific activities/areas where personnel could be exposed to silica dust, the "amount" of exposure and "duration" of exposure must also be considered. With consideration to these three factors, activities performed by 3A Group (or that are otherwise occurring in proximity to 3A Group's activities) that expose our employees (as well as members of the public and other workers) to the dust include, but are not necessarily limited to:

- Surface preparation activities such as: (1) the use of Blow-Packs, (2) the use of Bobcats with "sweeper" attachments, (3) the use of Sweeper trucks and (4) hand sweeping.
- Jackhammering (of both asphalt and concrete).
- Saw-cutting (of both asphalt and concrete).
- Drilling (of concrete).
- Granular Surface Preparation activities (i.e. grading and rolling), and
- Operation and use of milling equipment/machinery (i.e. milling and conveyance/discharge of milled materials on conveyor).

24.8 RISK ASSESSMENT

Risk Assessment: 3A Group will use a variety of methods to assist with the "assessment" of (possible and actual) silica exposures. These methods will include, but may not necessarily be limited to:

- Reviewing data/reports available in the public domain (i.e. Information available through regulatory agencies and industry associations.
- Regularly consulting with the Safety Committee's/Safety Managers from firms who perform similar work.
- Implementing a suitable respirable silica exposure monitoring program. This program will ensure that (over time) 3A Group has quantifiable silica exposure data available that is representative of all regularly occurring, as well as reasonably foreseeable work activities. Exposure monitoring will generally be

conducted “in-house”, although assistance (i.e. actual monitoring and/or interpretation of results) may be obtained through outside consultants.

24.9 RISK CONTROL

Control Methods: When determining measures to reduce or eliminate worker exposure to silica dust, 3A Group will generally select a combination of controls, listed in order of preference:

- Elimination and Substitution.
- Engineering.
- Administrative.
- Personnel Protection Equipment (PPE).

Substitution and Elimination: Whenever possible, 3A Group will substitute products containing silica with products that do not contain (or contain a lower percentage of) crystalline silica. While there have historically been few “substitutions” options available, 3A Group recognizes the importance of planning work in order to minimize the amount of silica dust generated. During the planning phases of a project, 3A Group will advocate for the use of methods that reduce the need for cutting, grinding, or drilling of concrete surfaces.

Engineering Controls: Engineering controls are those controls which aim to control or otherwise minimize the release of crystalline silica. Two “common” engineering control options are available to 3A Group in many circumstances. These include the Local Exhaust Ventilation (LEV) and Wet Dust Suppression (WDS) systems.

LEV Systems: Tools/appliance specific LEV systems are available on some tools/appliances. Such LEV systems are generally comprised of a shroud assembly, a hose attachment, and a vacuum system. Dust-laden air is collected within the shroud, drawn into the hose attachment, and conveyed to the vacuum, where it is filtered and discharged. “Large scale” LEV systems, such those available on some Vacuum Trucks and Mobile Sweepers, may also be employed (at times) on 3A Group projects.

When/if LEV systems are used, 3A Group will employ the following systems and safe work practices:

- Vacuum attachment systems that capture and control dust at its source whenever possible.
- Dust control systems will be maintained in optimal working condition.
- Grinding wheels will be operated at the manufacturer’s recommended RPM (operating in excess of this can generate significantly higher airborne dust levels).
- HEPA or good quality, multi-stage vacuum units (approved for use with silica dust) will be used in accordance with the manufacturer’s instructions.
- Whenever possible, concrete grinding will be completed when the concrete is wet (thus dust release will be significantly reduced).

WDS Systems: Unlike LEV systems, many tools/appliances at 3A Group are equipped with WDS systems (i.e. on the Milling equipment, sweeper equipped Bobcats, as well as attachments on various handheld/portable, abrasive/cutting equipment). When WDS Systems are not available, (as a standard or retrofitted part of a tool/appliance), similar effects can also be achieved by manually wetting the surface (i.e. with a mister or with a hose).

When WDS systems are used, 3A Group will employ the following systems and safe work practices:

- If water is not readily available on the specific 3A Group project, the project supervisor will arrange to have a water tank delivered to the site for use.
- Pneumatic or fuel (i.e. gasoline) powered equipment will generally be used instead of electrically powered equipment if water is the method of dust control, unless the electrical equipment is specifically designed to be used in such circumstances.
- Pressure and flow rate will be controlled in accordance with the tool manufacturer's specifications.
- When sawing concrete, tools that provide water directly to the blade will be used if possible.
- Wet slurry will be cleaned from work surfaces when the work is complete, if/when necessary.

Administrative Controls: Administrative controls are those that aim to control or otherwise minimize the release of silica through the use of work procedure and work methods, rather than by affecting the actual physical work. Common examples of administrative controls include, but are not limited to:

- Posting of warning signs.
- Rescheduling of work as to avoid the activities of others.
- Relocating unprotected workers away from dusty areas.

When administrative controls are used, 3A Group will employ the following systems and safe work practices:

- In conjunction with the Owner, suitable exposure control strategies (both within and outside 3A Group capabilities/responsibilities) will be discussed and determined. As necessary/appropriate, supplemental (to this policy/procedure) project and task specific Exposure Control Plans will be developed.
- Suitable housekeeping, restricted work area, hygiene practices, training and supervision procedures/standards will be determined and implemented on 3A Group projects.
- As appropriate, barriers will be erected around known silica dust generating activities, and/or warning signs will be posted.
- As able, work activities will be scheduled to minimize the silica related effect on, and from, others.

Personal Protective Equipment Controls: When used in conjunction with the other (i.e. Engineering and Administrative) controls elsewhere identified, personal protective equipment and clothing can help further reduce our employee's exposure to silica dust.

An air purifying respirator fitted with HEPA cartridges is the most common piece of PPE that would be used by 3A Group to minimize exposure to silica dust. Dependent on the effectiveness of the other (i.e. engineering) control measures employed, either a "full face piece" or "1/2 face piece" respirator would be used by personnel (In the majority of situations a ½ face respirator will be used. When working indoors or in other areas with poor ventilation, a full-face respirator may be required). Both of these respirators are "seal dependent", and thus the users must be "fit tested" and clean shaven where the respirator seals to the face.

In addition to respiratory PPE, protective clothing (i.e. disposable/washable coveralls) may be used and/or required to help prevent the contamination of the worker's personnel clothing.

24.10 EDUCATION AND TRAINING

Education and Training: Prior to performing activities or working on project sites where personnel could be exposed to silica dust, 3A Group will ensure that personnel receive suitable education and training. As necessary, personnel will be trained to a level of "demonstrated competency". While not necessarily an exhaustive list, education and training may include:

- The hazards and risks associated with exposure to silica dust
- The signs and symptoms of silica related diseases.
- General and specific silica exposure reduction methods/strategies (i.e. as detailed in the general/specific exposure control plans).
- The use of specific pieces of equipment and control systems (i.e. LEV and WDS systems).
- The use and care of respiratory (and other) personal protective equipment.
- How to seek first aid (i.e. for respiratory related concerns, including those that may be caused/associated with silica dust exposure), and
- How to report items of the concern (i.e. those related to silica dust).

The education and training detailed will be delivered to 3A Group employees through a variety of forums, including but not necessarily limited to:

- New Employee Orientations.
- Project/Site Orientations.
- Equipment/task-specific training (in accordance with 3A Group Policy, all personnel must be trained to a level of “demonstrated competency” prior to using required tools, equipment and appliances).
- Start of shift “toolbox talks”.
- Notifications and Bulletins (those developed in house and those acquired from other reputable sources).

24.11 SAFE WORK PROCEDURES

3A Group will ensure that suitable written procedures for controlling the risk of silica exposure are developed. This document/table summarizes the silica control options generally available on 3A Group sites/projects and will be complimented with project/tasks specific Exposure Control Plans as necessary. This document and any supplemental work procedures/ECPs will be made readily available for review by all affected workers.

3A GROUP SPECIFIC WRITTEN INSTRUCTIONS

Division/Task		Control Methods	Required PPE	Comments
Company Operations	**Stationary Masonry Saws**	Use saw equipped with integrated water delivery system that continuously delivers water to the blade. Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.	No specific PPE controls required	None.
Company Operations	**Handheld Power Saws**	Use saw equipped with integrated water delivery system that continuously delivers water to the blade. Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.	APF 10 respiratory protection equipment	None.
Company Operations	**Walk Behind Saws**	Use saw equipped with integrated water delivery system that continuously delivers water to the blade. Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.	APF 10 respiratory protection equipment when indoors or in an enclosed area. None when the task is performed outdoors.	None.
Company Operations	**Drivable Saws**	Use saw equipped with integrated water delivery system that continuously delivers water to the blade. Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.	APF 10 respiratory protection equipment	None.
Company Operations	**Core Saws or Drills**	Use tool equipped with integrated water delivery system that continuously delivers water to the blade. Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.	APF 10 respiratory protection equipment	None.
Company Operations	**Handheld or Stand-Mounted Drills**	Use drill equipped with commercially available shroud or cowling with dust collection system.	APF 10 respiratory protection equipment	None.

		Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions. Dust collector must provide the airflow recommended by the tool manufacturer, or greater, and have a filter with 99% or greater efficiency and a filter cleaning mechanism. Use a HEPA-filtered vacuum when cleaning holes.		
Company Operations	**Jackhammers and Handheld Powered Chipping Tools**	Use tool with water delivery system that supplies a continuous stream or spray of water at the point of impact and dust collection system. Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions. Dust collector must provide the airflow recommended by the tool manufacturer, or greater, and have a filter with 99% or greater efficiency and a filter cleaning mechanism.	APF 10 respiratory protection equipment	None.
Company Operations	**Handheld Grinders**	Use grinder equipped with commercially available shroud and dust collection system. Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions. Dust collector must provide 25 cubic feet per minute (cfm) or greater of airflow per inch of wheel diameter and have a filter with 99% or greater efficiency and a cyclonic pre-separator or filter-cleaning mechanism.	APF 25 respiratory protection equipment	None.
Company Operations	**Walk Behind Milling Machines and Floor Grinders**	Use machine equipped with integrated water delivery system that continuously delivers water to the cutting surface. Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.	None.	None.

24.12 DOCUMENTION

In accordance with Record/Statistics Procedures detailed in the latest revision of 3A Group's "Health & Safety Manual", records associated with Crystalline Silica Program will be maintained in accordance with the following:

Record Type	Location(s)	Retention Requirement
Silica Policy, Program and Procedure	Head Office, Shop and/or Project Office	Current Revision
Project/Task Specific Silica ECPs	Project Office	LOP
Exposure Monitoring Results	Head and Project Office	LOP + 3 years
Workplace Inspections	Head Office, Shop and/or Project Office	LOP + 1 year
First Aid Records/Reports of Exposure	Head Office, Shop and/or Project Office	LOP + 1 year
Incident Investigation Reports	Head Office	LOP + 3 years
Regulator Reports and Correspondence	Head Office, Shop and/or Project Office	LOS
Respirator Fit Tests	Head Office	LOE + 1 year
Equipment Maintenance and Repair Logs	Head Office, Shop and/or Project Office	LOS + 1 year
New Employee Orientation Records	Head Office	LOE + 1 year
Site/Project Orientation Records	Shop and/or Project Office	LOE + 1 year
Toolbox Talk Records	Shop and/or Project Office	LOP + 1 year
Crew Safety Meeting Records	Shop and/or Project Office	LOP + 1 year
Job/Task Specific Training Records	Shop and/or Project Office	LOE + 1 year

*LOP – Length of Project
*LOE – Length of Employment
*LOS – Length of Service

APPENDIX A
Project/Task Specific Exposure Control Plan
[Insert Project Control Plan]

25 DRUG AND ALCOHOL-FREE WORKPLACE

DRUG AND ALCOHOL-FREE WORKPLACE

25.1 PURPOSE

3A Group recognizes the problems which drug abuse have created in the construction industry and the need to develop drug abuse prevention programs. Accordingly, in order to enhance the safety of the workplace and to maintain a drug-free environment, 3A Group has amended its Drug and Alcohol Prevention Program to comply with Federal Regulations Part IV, Department of Transportation, Research and Special Programs administration, 49 CFR Part 199, "Control of Drug Use in Natural Gas, Liquefied Natural Gas, and Hazardous Liquid Pipeline Operations". 3A Group intends to abide by all future Federal Regulation and amendments, and specific requirements as determined by our customers.

25.2 SCOPE

This revised Drug and Alcohol Prevention Program is effective on January 1, 2020. The provisions of this Drug and Alcohol Prevention Program are **applicable to all employees of** 3A Group.

Implementation and continued enforcement of the Drug and Alcohol Prevention Program is subject to appropriate local, state, and federal laws as well as any collective bargaining agreements, and customer requirements.

Any special customer requirements not included in this policy will be adopted and enforced as required by that customer.

25.3 GENERAL PROVISIONS

It is the intent of 3A Group to provide a drug free working environment by maintaining a strong drug and alcohol prevention program as part of our safety program which ensures that all employees are healthy and fit for work, including job site, management, shop, and clerical personnel.

25.4 EMPLOYEE ASSISTANCE PROGRAM

The use, possession, transfer or sale of illegal drugs, narcotics, or other unlawful substances is absolutely prohibited and may be considered grounds for termination of employment. When discussed with management, employees experiencing problems prior to being identified through a positive drug test will be referred to an **EAP (Employee's Assistance Program)** for assistance. Refusal to enter treatment may result in termination.

25.5 PROGRAM REQUIREMENTS (MINIMUM)

The following elements form the basic minimum requirements for this program. Details of these and other requirements are outlined in the Procedures section of this policy.

25.6 PRE-EMPLOYMENT

Testing of potential new hires for the presence of drugs will be required.

25.7 REASONABLE SUSPICION

Employees who exhibit through identification of abnormal job performance or behaviors, which suggest that drug or alcohol abuse may be a factor, may be requested to test for the presence of alcohol of drug test.

25.8 RANDOM TESTING

All employees will undergo unannounced drug testing based on a computerized random selection process.

25.9 POST ACCIDENT TESTING

Will involve any employee in an accident or contributing to an accident as defined in this policy.

25.10 ABSTINENCE MONITORING

Of all employees who receive some form of rehabilitation may be required.

ON-THE-JOB USE, POSSESSION OR SALE OF DRUGS OR ALCOHOL

25.11 ALCOHOL

Being under the influence of alcohol by any employee while performing company business or **customer** location is prohibited to the extent that such use or influence may affect the safety of co-workers or members of the public, the employee's job performance, or the safe or efficient operation of the company facility.

Except as permitted by company facility management, consumption of alcohol on company property or job site is prohibited.

25.12 LEGAL DRUGS

Except as provided below, the use or being under the influence of any legally obtained drug by any employee while performing company business or while at a company or **customer** facility is prohibited to the extent such use or influence may affect the safety of co-workers or members of the public, the employee's job performance, or the safe or efficient operation of the company.

An employee may continue to work, even though under the influence of a **legal drug** if management has determined, after consulting with the Medical Department and Employee Relations, that the employee does not pose a threat to his or her own safety or the safety of their co-workers and that the employee's job performance is not significantly affected by the legal drug. Otherwise, the employee may be required to take a leave of absence or comply with other appropriate action determined by Management.

25.13 ILLEGAL DRUGS

The use, sale, purchase, transfer or possession of an illegal drug by an employee while at a company or **customer** facility or while performing company business is prohibited. The presence in detectable amount of any illegal drug in an employee while performing company business or while in a customer or company facility is prohibited.

25.14 DISCIPLINARY ACTION

Violation of the Policy can result in disciplinary action, up to and including termination, even for a first offense. An individual will not be hired if he/she fails the drug screening.

25.15 CUSTOMER OR OWNER REQUIREMENTS

It is understood that 3A Group's "customers" may, under the provisions of the contract, retain the right to search employees and their belongings for drugs, controlled substances, alcohol, or firearms while on the customer's property.

25.16 SEARCHES

25.17 SCOPE AND PROCESS

1. Searches of an employee and their personal property may be conducted when there is Reasonable Suspicion that the employee is impaired from performing his/her job or: in an "Unfit Condition"; and "Incident on duty"; "Post Accident", "Reasonable Suspicion", or when management believes the possession of alcohol or drugs may be occurring in violation of the company policy or **customer's policy**.
2. Searches and/or screening of employees and their personal property may otherwise be conducted who contributed to an accident or where there is Reasonable Suspicion to believe that the accident resulted from drug abuse.
3. The company may conduct unannounced searches for illegal drugs or alcohol in company **or customer** facilities or on job sites. Employees are expected to cooperate in the conducting of such searches.
4. An employee's consent to a search is required as a condition of employment and the employee's refusal to consent may result in disciplinary action, including termination, even for a first refusal.
5. Searches of company facilities and property can be conducted at any time and do not have to be based on Reasonable Suspicion.
6. Searches of clothing and personal effects will be conducted under the direct supervision of management accompanied by a witness. When **on a customer's property**, notify the customer representative prior to beginning the search so that their designated representative or Security personnel may observe.

25.18 PROCEDURES FOR HANDLING SEIZED PROPERTY

1. A receipt should be given for seized property.
2. If not already involved, the customer representative or security personnel should be notified in order to communicate, as appropriate, with local law enforcement authorities concerning identification of the material seized and possible prosecution.
3. Seized items should be retained in a locked cabinet under the exclusive control of a designated management employee.
4. If possession is transferred, a chain of custody should be established.
5. Seized property may turn out after the investigation to be property that properly was in the employee's possession. In such cases, the property should be returned, and a receipt obtained. If the property represents a violation of the Policy, the employee will be prohibited from working at the customer's facility in the future.

25.19 DISPOSITION OF UNCOOPERATIVE EMPLOYEES

Employees who refuse to cooperate with the search procedures will not be forced to comply but will be informed that failure to comply will be grounds for removal for the customer's premises. Those employees who refuse the search procedures will not be granted admittance to the customer's facilities in the future.

25.20 VOLUNTARY REHABILITATION

An employee who voluntarily seeks rehabilitation for a drug or alcohol abuse problem prior to a situation requiring testing based upon Reasonable Suspicion and who cooperates with the Company with regard to treatment, may not be subject to disciplinary action. Pursuant to State law, employees who seek voluntary rehabilitation are to be allowed a reasonable leave without pay.

The employee is responsible for arranging entrance into a recognized rehabilitation program. When arrangements have been made, a "Notice of Disability" signed by the attending physician must be given to the Safety Coordinator. The employee will then be granted a leave of absence in accordance with Company Policy and State regulations.

It should be fully understood, however, that continued or renewed drug or alcohol abuse after commencement of treatment may result in appropriate disciplinary action, up to and including discharge.

All information in connection with this voluntary program will be treated in as confidential a manner as possible.

25.21 CONTRACT PERSONNEL

The policy provisions stated in all sections above are applicable to contract personnel. Violation of these provisions or refusal to cooperate with implementation of the policy can result in the company's barring contract personnel from company facilities or participating in company operations.

25.22 EMPLOYEE'S REPORTING REQUIREMENTS - LEGAL DRUGS

For certain job positions, an employee's use of a legal drug can pose a significant risk to the safety of the employee or others. Employees who feel or have been informed that the use of a legal drug may present a safety risk are to report such drug use to the Personnel Department to determine job related consequences. Supervision who is aware of such a situation is to instruct the employee to report to the Personnel Department.

25.23 DEFINITIONS

"Under the influence" means, for the purposes of this policy, that the employee is affected by a drug or alcohol or the combination of a drug and alcohol in any detectable manner. The symptoms of influence are not confined to those consistent with misbehavior, nor to obvious impairment of physical or mental ability, such as slurred speech or difficulty in maintaining balance. A determination of influence can be established by a professional opinion, a scientifically valid test and, in some cases such as alcohol, by a layperson's opinion.

"Legal drug" means any drug; (a) which is not legally obtained, or (b) which is legally obtainable but has not been legally obtained. The term includes prescribed drugs not legally obtained and prescribed drugs not being used for prescribed purposes. It also includes marijuana.

25.24 PROCEDURES

25.25 EDUCATION AND TRAINING

1. **All employees** will be advised in writing of 3A Group's Drug and Alcohol Prevention Program. The information given will cover reasons for the program, the actual policy and procedure for implementation along with information on how to enroll in the Employee Assistance Program.
2. **All employees**, at the time of assignment to any customer facility, will be provided with a copy of the Program for review.
3. **All supervisory personnel** will be trained in the following areas:
   a. One session lasting 2 to 4 hours in length, of training on the specific, contemporaneous physical, behavioral, and performance indicators of possible drug use.
   b. Drug abuse recognition, signs, and symptoms.
   c. Company policy and procedure in response to implementation and the handling of employees who appear to be under the influence of prohibited drugs.
   d. Document observations and impressions of persons who may be under the influence of prohibited drugs.

25.26 NOTIFICATION

1. When an employee is observed in an "Unfit Condition" such as any of those specified in this policy that requires further investigation, testing, or searches, this "Condition" shall be immediately reported by the employee's supervisor to the supervisor's manager and the Safety Coordinator.
2. While at a **customer facility**, the designated company representative must also be notified.
3. Upon notification from the employee's supervisor to the supervisor's manager and/or the Safety Coordinator, appropriate action as outlined in this policy is to be taken, i.e., testing of the employee, implementing search procedures, etc.

25.27 TYPES OF DRUG TESTING

25.28 PRE-EMPLOYMENT TESTING

1. A pre-employment drug test will be conducted on all individuals who meet the criteria for employment.

   The company will maintain pre-employment screening practices designed to prevent hiring individuals who use illegal drugs or individuals whose use of legal drugs or alcohol indicates a potential for impaired or unsafe job performance.

   All applicants or newly hired employees will undergo a drug screen at a predetermined medical facility. 3A Group will pay each applicant or employee who takes and passes the drug screen test for all the time it takes to undergo the drug screen up to a maximum of two hours travel time plus lab time.

2. Applicants not passing the drug screen will not be placed on the 3A Group payroll or receive any compensation. Employees not passing the drug screen will be removed from the 3A Group payroll. 3A Group will pay the cost for administering the drug screen.

   All applicants will be informed of the 48 - 96 hours of delay prior to joining the work force to obtain the results of the drug test.

3. A sufficient amount of a sample shall be taken to allow for an initial test and a confirmation test. The initial test will be by Enzyme Multiplied Immunoassay Technique (EMIT). In the event a question or positive result arises from the initial test, a confirmation test must be utilized before action will be taken against an employee or applicant. The confirmation test will be by Gas Chromatography - Mass Spectrometry (GC/MS).

   Pre-employment job applicants who test positive do not have the option to have to be retested a second time at the expense of 3A Group.

   Testing standards for both the initial test and the confirmation test will be those established by the SAFETY Institute of Drug Abuse (NIDA). The testing laboratory will retain confirmed positive samples in secured long term frozen storage for a minimum of **one year**. Handling and transportation of each sample will be documented through strict chain of custody procedures.

3. 3A Group employees will be required to meet any special requirements imposed by the Customer's Substance Abuse policy prior to being assigned to that job.

25.29 UNFIT CONDITION

1. All supervisory personnel will be trained in the recognizing the specific, contemporaneous physical, behavioral, and performance indicators of possible drug or alcohol abuse.
2. The decision to test an employee for alcohol and drugs while on duty will be done by a meeting of the employee's supervisor and at least one other supervisor and the Safety Coordinator. While at a **customer facility**, the designated company representative must also be notified.
3. The search procedure shall be initiated as part of any observation as an integral part of the screening process. (SEE Search Procedures).
4. The employee shall be escorted to a designated "off-site" medical facility for actual screening.
5. The employee will be excluded from further work at the **customer's facility** pending the outcome of the test results.

25.30 INCIDENT ON DUTY

1. The decision to test an employee for alcohol and drugs while on duty will be done by a meeting of the employee's supervisor and at least one other supervisor and the Safety Coordinator. While at a **customer facility**, the decision to test must be made in conjunction with their designated representative.
2. Any employee refusing to submit to the alcohol and drug test will be immediately suspended from all work responsibilities without pay until all requested tests are completed; for a period not to exceed five (5) working days. If the employee chooses not to submit to the drug and alcohol screen during the five (5) day period, the employee may be considered to have voluntarily terminated employment.
3. The employee will be excluded from further work at the **customer's facility** pending the outcome of the test results.

25.31 REASONABLE SUSPICION TESTING

1. 3A Group will drug test an employee for drugs and alcohol when there is Reasonable Suspicion to believe the employee is using a prohibited drug or under the influence of alcohol.
2. A decision to test will be based on specific contemporaneous physical, behavioral, or performance indicators of probable drug use such as:

    a. Discovery of an employee in possession of drugs or alcohol while on duty;
    b. Sudden change in work performance;
    c. Sudden change in attitude;
    d. Minor, yet consistent avoidable accidents;
    e. Observations of extreme behaviors, i.e.;
        Slurred speech;
        Uneven gait;
        Mood swings;
        Violent outbursts of temper.
    f. Excessive Absenteeism;
    g. Pattern of consistent tardiness;
    h. Disappearing/missing from designated work site without the supervisor aware of whereabouts;
    i. Consistently in areas where employees should not be or has reason to be.

3. Before an employee is asked to test for Reasonable Suspicion, two of the company's supervisors will substantiate and concur in the decision to request a drug test. One of the two supervisors must have observed the behavior. The two supervisors may concur by telephone.
4. When a negative test result is received, the employee will be put back to work.
5. When a confirmed positive test result is received, the employee will be advised in writing of his/her termination of employment. The written notification will include the reason for the termination, the conditions under which rehire could be considered and specific recommendation to seek professional assistance.
6. Any employee refusing to submit to the alcohol and drug test will be suspended from all work responsibilities without pay until all requested tests are completed; for a period NOT to exceed **five (5)** working days. If the employee chooses not to submit to the drug and alcohol screen during the five (5) day period, the employee may be considered to have voluntarily terminated employment.
7. See specific requirements of Customer Substance Abuse policies, which will be distributed as appendices to this Drug and Alcohol Prevention Program.

25.32 RANDOM TESTING

1. Random testing; when required by Customer, State, or Federal mandate: applies to all employees including supervisors, as well as those who just supervise such performance by others.
2. 3A Group will random test fifty percent (50%) of all employees annually.
3. The tests will be conducted **once a month** in order to be evenly spaced throughout the year.
4. To assure that the selection process for random testing is indeed random, all employees will be place in a common selection pool
5. When a confirmed positive test result is received the employee will be advised in writing of his/her termination of employment.

The written notification will include the reason for the termination, the conditions under which rehire could be considered, and the specific recommendations to seek professional assistance.

6. See specific requirements of Customer Substance Abuse policies, which will be distributed as appendices to this Drug and Alcohol Prevention Program.

25.33 POST ACCIDENT TESTING

1. Employees whose performance either contributed to an accident or cannot be completely discounted as a contributing factor to the accident will be tested for drugs and alcohol. The employee will be tested as soon as possible, but no later than 32 hours after the accident or incident.
2. An accident on is defined as:
    a. An event that involves mechanical failure or damage to of our equipment or that of our customer, a death or personal injury, or vehicle accident.
    b. An event that is significant in the judgment of our customer, or 3A Group even if it does not meet the criteria of paragraph (a).
3. When a negative test result is received, the employee will be put back to work after an appropriate medical release to return to work.
4. When a confirmed positive test is received, the employee will be advised in writing of his/her termination of employment. The written notification will include the reason for the termination, the conditions under which rehire could be considered, and the specific recommendation to seek professional assistance.
5. See specific requirements of Customer Substance Abuse policies, which will be distributed as appendices to this Drug and Alcohol Prevention Program.

25.34 ABSTINENCE MONITORING

1. When an employee who has been identified as a user or has requested treatment, 3A Group may require monitoring of the employee's abstinence for at least one (1) year post treatment. The employee will be monitored weekly by the Employee Assistance Program.
2. When a negative test result is received, the employee will continue to work as usual.
3. When a confirmed positive test result is received, the employee will be advised in writing of his/her termination of employment. The written notification will include the reason for the termination, the conditions under which rehire could be considered and the specific recommendation to seek professional assistance.

25.35 ALCOHOL AND DRUG SCREENING FOR SAFETY SENSITIVE JOBS

Screening tests shall be conducted for the presence of alcohol and, at minimum, the five prohibited drugs listed below for all "Safety or Environmentally Sensitive Jobs."

These drugs are also listed under Part 199 of DOT.

"Safety or Environmentally Sensitive Jobs" is defined as "Those jobs where inattention to job duties or slow or inappropriate responses to operating conditions can create or aggravate emergency situations which could result in disabling injuries, loss of life, significant property damage, environmental damage or violation of environmental regulations."

25.36 PROHIBITED DRUGS

Testing under Part 199 is currently limited to the following drugs:

1. Cannabinoids (Marijuana, Hashish);

2. Benzoylecgonine (Cocaine);
3. Opiates (Heroin, Morphine, Codeine);
4. Amphetamines; and
5. Phencyclidine (PCP).

25.37 FEDERAL DRUG SCREEN LIMITS FOR ILLICIT DRUGS

CLASS SCREENED METHOD DRUG CONFIRMATION CUTOFF METHOD CUTOFF

AMPHETAMINES IA 1000 ng/ml Amphetamine GC/MS 500 ng/ml
(Amphetamine/Methamphetamine) Methamphetamine GC/MS 500 ng/ml

OPIATES IA 300 ng/ml Codeine GC/MS 300 ng/ml (morphine/Codeine) Morphine GC/MS 300 ng/ml

COCAINE IA 300 ng/ml Benzoylecogonine GC/MS 150 ng/ml (Cocaine Metabolites)

PHENCYCLIDINE IA 25 ng/ml Phencyclidine GC/MS 25 ng/ml (PCP)

CANNBINOIDS IA 10 ng/ml THC-COOH GC/MS 15 ng/ml

ALCOHOL* .080 BAC *

***Customer Policy if more stringent, i.e. UNOCAL .050% BAC (Blood Alcohol Concentration).**

The illicit Drug Screen includes confirmations.

Specimen requirements: 90 ml urine.

25.38 CUSTOMER REQUIREMENTS

(See applicable appendix when customer policy is more stringent).

25.39 POSITIVE TEST RESULTS OR REFUSAL TO TEST

1. If an employee refuses to test for drugs or tests positive, and the MRO determines that prohibited drug use was the cause, that employee will be terminated. 3A Group will not rehire that individual until he/she has:

   a. Successfully completed a rehabilitation program as deemed by the Employee Assistance Program.
   b. Has been recommended for return to duty by Medical Review Officer (MRO); and
   c. Has passed a drug test.

25.40 RE-EMPLOYMENT

An applicant who has previously worked for a "covered contractor" (a contractor who is required by a customer to comply with DOT Drug Testing) and was previously drug screened is required to re-test only if 45 or more days have elapsed since he/she last worked for the company, or another "covered contractor."

25.41 EMPLOYEE ASSISTANCE PROGRAM

1. 3A Group will contract for the provisions of Employee Assistance Program (EAP) services as part of the company's Drug and Alcohol Prevention Program. This program is to provide reasonable assistance to employees who demonstrate a desire to become drug free. The ultimate responsibility to be drug free rests with the individual employee at his/her expense.

I. See "Appendix A" for EAP listing.

25.42 THE TESTING FOR DRUGS

1. The collection of Employee's urine specimen will be conducted under the procedures required by the mandatory guidelines for Federal Workplace Drug Testing Programs. These procedures allow for individual privacy. The person at each collection site will take every precaution to ensure that each sample is not tampered with during the collection procedure. The specimen collection will follow strict chain of custody and security procedures.

   a. Photo identification (e.g., driver's license) must be presented at the collection site.
   b. Employees will be required to wash and dry their hands prior to providing specimens.
   c. Employees will be asked to remove unnecessary outer garments (e.g., coats or jackets). All personal belongings such as purses or briefcases will remain with the outer garments.
   d. The collection site person working with the employees will be of the same gender.
   e. The specimen will be provided in the privacy of a stall or otherwise partitioned area that allows for individual privacy.
   f. After handing the specimen bottle to the collector, the employee should make sure that his/her specimen is in full view until it is sealed and labeled. This protects the employee from wrong labeling or tampering with the specimens.
   g. If the collection site person has reason to believe that an employee may have altered or substituted the specimen, a higher-level supervisor will be notified. Should the employee actually tamper, adulterate, or in any other way attempt to dilute his/her specimen he/she will be terminated from employment.
   h. The employee will be asked to initial the identification label on the specimen bottle (identified by his/her name) for the purpose of certifying that it is that employee's.
   i. The employee will be asked to sign the permanent record book next to the information identifying his/her specimen, certifying that the specimen identified as having been collected from his/her is, in fact, the specimen he/she provided.
   j. If after laboratory analysis, the specimen is found to contain traces of a prohibited drug, the results will be disclosed only to the MRO. Prior to making a final decision, the MRO will verify a positive test result by giving the employee an opportunity to discuss the test results and submit medical documentation of legally prescribed medications.

25.43 DRUG TESTING LABORATORY

1. The drug testing laboratory will be NIDA certified and approved by the Department of Health and Human Services as required under the DOT procedures.

2. The drug-testing laboratory will permit unannounced inspections, including examinations or records at any time.

25.44 RECORDKEEPING

1. The following records shall be kept for specified length of time:
   a. Records that demonstrate the collection process will be kept for at least **three (3**) years.
   b. Records of employee drug test results that show a failed drug test, and the type of test failed (e.g., Post Accident, Random) and records which demonstrate rehabilitation, if any, will be kept for at least **five (5)** years. These records will include the following information:
      a) The functions performed by employees who failed a drug test.
      b) The prohibited drugs which were used by the employees who failed a drug test.
      c) The disposition of employees who failed a drug test (e.g., terminated).
      d) The age of each employee who failed a drug test.
   c. Records of negative drug test results will be kept for one (1) year.
   d. A record of the number of employees tested, by type of test (e.g., Random, Reasonable Suspicion) will be kept for at least **five (5)** years.
   e. Records confirming that supervisors and managers have been trained will be kept for at least **three (3**) years.
   f. Records must be maintained for the life of the equipment for employees tested under D.O.T. regulations.
   2. Records concerning collection and testing are covered under the Privacy Act, 5 U.S.C. 522 A. Employee records will be maintained and used with the highest regard for privacy.
      a. Amy employee, upon written request, has access to any records relating to his/her drug tests.
      b. The results of a drug test will not be disclosed without the employee's prior written consent, unless it is to:

         a) Employee's Medical Review Officer (MBO);
         b) The administrator of any Employee Assistance Program in which the employee is receiving counseling or treatment or is otherwise participating; or
         c) A management official having authority to **advise** personnel action against the employee.
   3. To maintain confidentiality, written records will be stored in locked containers. These records will not be a part of an employee's personnel records.
   4. 3A Group will not release the employee's rehabilitation or drug test records to a subsequent employer unless the employee gives his/her written consent.

25.45 RETENTION OF SAMPLES

Specimen samples, which yield positive test results on confirmation, will be retained by the laboratory in properly secured, long term, frozen storage for at **least one (1) year**. If within the one (1) year period the laboratory has not received a proper written request, the specimen sample may be discarded.

25.46 RETESTING

If the Medical Review Officer (MRO) determines there is no legitimate medical explanation for a confirmed positive test result other than the unauthorized use of a prohibited drug, the original sample may be retested if the employee makes a written request for retesting within **sixty (60**) days of the receipt of the final test result from the

MRO. The cost of shipment and re-analysis of the sample will be borne by the employee. The employee will be reimbursed for such expense if the retest is negative.

25.47 MEDICAL REVIEW OFFICER

1. 3A Group will contract for the provisions of MRO services as part of its Drug and Alcohol Prevention Program.
2. The MRO will be a licensed physician with knowledge of drug abuse disorders.
3. The MRO will be responsible for the following:
   a. Review the results of drug testing before they are reported to 3A Group.
   b. Review and interpret each confirmed positive test result to determine if there is an alternative medical explanation for the positive test result as follows:
      a) Conduct a medical interview with the employee whose test results were positive.
      b) Review the individual's medical history and any/all relevant biomedical factors.
      c) Review all medical records made available by the employee tested to determine if a confirmed positive test resulted from legally prescribed medication.
      d) When necessary, require that the original specimen be reanalyzed to determine the accuracy of the reported results.
      e) Verify that the laboratory report and assessments are correct.
   c. Determine a schedule of unannounced testing for an employee who has been rehired after completing a rehabilitation program.
   d. Ensure that an individual who tested positive and was terminated has been drug tested in accordance with the DOT procedures before he/she is rehired.
4. The following rules govern MRO determinations:
   a. If the MRO determines, after appropriate review, that there is a legitimate medical explanation for the confirmed positive test result other than the unauthorized use of a prohibited drug, the MRO is not required to take further action.

   b. If the MRO determines, after appropriate review, that there is no legitimate medical explanation for the confirmed positive test result other than the unauthorized use of a prohibited drug, the MRO shall report the findings to 3A Group Drug Abuse Representative.
   c. Based on a review of laboratory inspection reports, Quality Assurance and Quality Control Data, and other drug test results the MRO may conclude that a particular drug test result is scientifically insufficient for further action. Under these circumstances, the MRO should conclude that the test is negative for the presence of a prohibited drug metabolic in the employee's system.
   d. See "Appendix A" for MRO listing.

25.48 ACKNOWLEDGEMENT OF DRUG & ALCOHOL PREVENTION PROGRAM

I, the undersigned employee of 3A Group acknowledge that I have received, read, and understand the Company's Policy and Procedure for responding to drugs and alcohol in the workplace. I have had an opportunity to have any/all aspects of this Policy and Procedure explained to me. I understand that this Policy and Procedure are terms and conditions of my employment. Violation of this Policy or any aspect of the Procedures may result in my termination. I agree to abide by the contents herein described.

_____ _____

EMPLOYEE'S SIGNATURE DATE

_____ _____

WITNESS'S SIGNATURE DATE

26 ELECTRICAL SAFETY

ELECTRICAL SAFETY

26.1 PURPOSE

The purpose of the Electrical Safety program is to set forth procedures for the safe use of electrical equipment, tools, and appliances at 3A Group.

26.2 SCOPE

This program applies to all 3A Group employees, temporary employees, and contractors. When work is performed on a non-owned or operated site, the operator's program shall take precedence, however, this document covers 3A Group employees and contractors and shall be used on owned premises, or when an operator's program doesn't exist or is less stringent.

26.3 DEFINITIONS

- Affected Personnel - Personnel who normally use and work with electrical equipment, tools, and appliances, but who do not make repairs or perform lock out/tag out procedures.
- Appliances - Electrical devices not normally associated with commercial or industrial equipment such as air conditioners, computers, printers, copiers, coffee pots, microwave ovens, toasters, etc.
- Circuit Breaker - A device designed to open and close a circuit by non-automatic means and to open the circuit automatically on a predetermined over current without injury to itself when properly applied within its rating.
- Disconnecting Means - A device, or group of devices, or other means by which the conductors of a circuit can be disconnected from their source of supply.
- Disconnecting Switch - A mechanical switching device used for isolating a circuit or equipment from a source of power.
- Double Insulated Tool - Tools designed of non-conductive materials that do not require a grounded, three wire plugs.
- Ground - Connected to earth or some conducting body that serves in place of the earth.
- Grounded Conductor - A conductor used to connect equipment or the grounded circuit of a wiring system to a grounding electrode or electrodes.
- Ground Fault Circuit Interrupter (GFCI) - A device whose function is to interrupt the electric circuit to the load when a fault current to ground exceeds some predetermined value that is less than that required to operate the over current protective device of the supply circuit. *3A Group shall use GFCIs in lieu of an assured grounding program*.
- Insulated - A conductor encased within material of composition and thickness that is recognized as electrical insulation.
- Premises Wiring - That interior and exterior wiring, including power, lighting, control, and signal circuit wiring together with all of its associated hardware, fittings, and wiring devices, both permanently and temporarily installed, which extends from the load end of the service drop, or load end of the service lateral conductors to the outlet (s). Such wiring does not include wiring internal to appliances, fixtures, motors, controllers, motor control centers, and similar equipment.
- Qualified Person - One that has been trained in the repair, construction and operation of electrical equipment and the hazards involved.
- Strain Relief - A mechanical device that prevents force from being transmitted to the connections or terminals of a cable or extension cord.

- Class l Locations - Are those in which flammable gases or vapors are or may be present in the air in quantities sufficient to produce explosive or ignitable mixtures.
- Class 1 Division 1 - Is a location (a) in which hazardous concentrations of flammable gases or vapors may exist under normal operating conditions; or (b) in which hazardous concentrations of such gases or vapors may exist frequently because of repairs or maintenance operations or because of leakage; or (c) in which a breakdown or faulty operation or equipment or processes might release hazardous concentrations of flammable gases or vapors, and might also cause simultaneous failure of electrical equipment.
- Class 1 Division 2 - Is a location (a) in which volatile flammable liquids or flammable gases are handled, processed, or used, but in which the hazardous liquid, vapors, or gases will normally be confined within closed containers or closed systems from which they can escape only in case of accidental rupture or breakdown of such containers or systems, or in of abnormal operation of equipment or (b) in which hazardous concentrations of gases or vapors are normally prevented by positive mechanical ventilation, and which might become hazardous through failure or abnormal operations of the ventilating equipment; or (c) that is adjacent to a Class 1, Division 1 location, and to which hazardous concentrations of gases or vapors might occasionally be communicated unless such communication is prevented by adequate positive-pressure ventilation from a source of clean air, and effective safeguards against ventilation failure are provided.
- Class II locations - Class II locations are those that are hazardous because of the presence of combustible dust. Class II locations include the following:
- Class II, Division 1 - A Class II, Division 1 location is a location (a) in which combustible dust is or may be in suspension in the air under normal operating conditions, in quantities sufficient to produce explosive or ignitable mixtures; or (b) where mechanical failure or abnormal operation of machinery or equipment might cause such explosive or ignitable mixtures to be produced, and might also provide a source of ignition through simultaneous failure of electric equipment, operation of protection devices, or from other causes, or (c) in which combustible dusts of an electrically conductive nature may be present.

NOTE: This classification may include areas of, areas where metal dusts and powders are produced or processed, and other similar locations that contain dust producing machinery and equipment (except where the equipment is dust-tight or vented to the outside).

- These areas would have combustible dust in the air, under normal operating conditions, in quantities sufficient to produce explosive or ignitable mixtures.
- Combustible dusts that are electrically nonconductive include dusts produced in the handling and processing produce combustible dusts when processed or handled.
- Dusts containing magnesium or aluminum are particularly hazardous and the use of extreme caution is necessary to avoid ignition and explosion.
- Class II, Division 2 - A Class II, Division 2 location is a location in which: (a) combustible dust will not normally be in suspension in the air in quantities sufficient to produce explosive or ignitable mixtures, and dust accumulations are normally insufficient to interfere with the normal operation of electrical equipment or other apparatus; or (b) dust may be in suspension in the air as a result of infrequent malfunctioning of handling or processing equipment, and dust accumulations resulting there from may be ignitable by abnormal operation or failure of electrical equipment or other apparatus.

NOTE: This classification includes locations where dangerous concentrations of suspended dust would not be likely but where dust accumulations might form on or in the vicinity of electric equipment. These areas may contain equipment from which appreciable quantities of dust would escape under abnormal operating conditions or be adjacent to a Class II Division 1 location, as described above, into which an explosive or ignitable concentration of dust may be put into suspension under abnormal operating conditions.

26.4 RESPONSIBILITIES

26.4.1 MANAGERS/SUPERVISOR

The HSE Manager will develop electrical safety programs and procedures in accordance with OSHA requirements and/or as indicated by events and circumstances.

Operations Managers and Supervisors are responsible for ensuring that only qualified employees and or qualified contractors perform electrical repairs or installations.

Operations Managers are also responsible for ensuring all applicable electrical safety programs are implemented and maintained at their locations.

Employees are responsible to use electrical equipment, tools, and appliances according to this program, for attending required training sessions when directed to do so and to report unsafe conditions to their supervisor immediately.

Only qualified employees may work on electric circuit parts or equipment that has not been de-energized. Such employees shall be made familiar with the use of special precautionary techniques, PPE, insulating and shielding materials and insulated tools.

26.5 SAFE WORK PRACTICES

26.6 INSPECTIONS

- Electrical equipment, tools, and appliances must be inspected prior to each use.
- The use of a hard fixed GFCI or a portable GFCI adapter shall be used with all portable hand tools, electric extension cords, drop lights and all 110-volt equipment.
- Faulty equipment, tools, or appliances shall be removed from service immediately and tagged “Out of Service”, dated and signed by the employee applying the tag.

26.7 REPAIRS

- Only Qualified Personnel, who have been authorized by the department supervisor or manager, may make repairs to supply cords on electrical tools and to extension cords.
- The names of employees authorized to make repairs will be posted in the workplace.
- Only certified electricians shall be allowed to make repairs to electrical equipment and wiring systems.
- The supervisor obtaining the services of a certified electrician is responsible to verify the electrician’s credentials.
- Employees shall not enter spaces containing exposed energized parts unless qualified and proper illumination exists to enable employees to work safely.
- Employees shall not wear conductive apparel such as rings, watches, jewelry, etc. (unless they are rendered non-conductive by covering, wrapping, or other insulating means) while working on or near open energized equipment this includes batteries on trucks, forklifts, phone backup systems or other such equipment.
- If employees are subject to handle long dimensional conductor objects (ducts or pipes), steps for safe work practices shall be employed to ensure the safety of workers.

26.8 EXTENSION CORDS

- Use only three-wire, grounded, extension cords and cables that conform to a hard service rating of 14 amperes or higher, and grounding of the tools or equipment being supplied.
- Only commercial or industrial rated-grounded extension cords may be used in shops and outdoors.
- Cords for use other than indoor appliances must have a rating of at least 14 amps.
- Cords must have suitable strain relief provisions at both the plug the receptacle ends.
- Work lamps (drop light) used to power electrical tools must have a 3 wire, grounded outlet, unless powering insulated tools.
- Adapters that allow three wire, grounded prongs, connected to two wire non-grounded outlets are strictly prohibited.
- Cords must have a service rating for hard or extra-hard service and have S, AJ, ST, SO, SJO, SJT, STO, or SJTO printed on the cord.
- Cords may not be run through doorways, under mats or carpets, across walkways or aisles, concealed behind walls, ceilings or floors, or run through holes in walls, or anywhere where they can become a tripping hazard.
- High current equipment or appliances should be plugged directly into a wall outlet whenever possible.
    - All extension cords shall be plugged into one of the following:
    - A GFCI outlet;
    - A GFCI built into the cord;
    - A GFCI adapter used between the wall outlet and cord plug.
- All extension cords and or electrical cords shall be inspected daily or before each use, for breaks, plug condition and ground lugs, possible internal breaks, and any other damage. If damage is found, the extension cord or electrical cord shall be removed from service and repaired or replaced.
- Extension cords shall not be used on compressor skid to operated heat tapes or any other type of equipment on a temporary basis. Heat tapes or other equipment shall be hard wired per applicable electrical codes.

26.9 OUTLETS

- Outlets connected to circuits with different voltages must use a design such that the attachment plugs on the circuits are not interchangeable.

26.10 MULTIPLE OUTLET BOXES

- Multiple outlet boxes must be plugged into a wall receptacle.
- Multiple outlet boxes must not be used to provide power to microwave ovens, toasters, space heaters, hot plates, coffeepots, or other high-current loads.

26.11 DOUBLE INSULATED TOOLS

- Double insulated tools must have the factory label intact indicating the tool has been approved to be used without a three-wire grounded supply cord connection.
- Double insulated tools must not be altered in any way, which would negate the factory rating.

26.12 SWITCHES, CIRCUIT BREAKERS, AND DISCONNECTS

- All electrical equipment and tools must have an on and off switch and may not be turned on or off by plugging or unplugging the supply cord at the power outlet.
- Circuit breaker panel boxes and disconnects must be labeled with the voltage rating.
- Each breaker within a breaker panel must be labeled for the service it provides.
- Disconnect switches providing power for individual equipment must be labeled accordingly.

26.13 LADDERS & PORTABLE LADDERS

- Only approved, non-conductive ladders, may be used when working near or with electrical equipment, which includes changing light bulbs.
- Ladders must be either constructed of wood or fiberglass
- Portable ladders shall have non-conductive side rails.
- Wood ladders should not be painted, which can hide defects, except with clear lacquer.
- When using ladders, they shall be free from any moisture, oils, and greases.

26.14 ENERGIZED AND OVERHEAD HIGH VOLTAGE POWER LINES & EQUIPMENT

- When working under overhead lines clearance distance must be provided or lines shall be deenergized and grounded. The lines shall be deenergized and grounded or other protective measures shall be provided before work is started.
- A minimum clearance of 10 feet from high voltage lines must be maintained when operating vehicular and mechanical equipment such as forklifts, cranes, winch trucks, and other similar equipment.
- When possible, power lines shall be de-energized and grounded or other protective measures shall be provided before work is started.
- Minimum approach distance to energized high power voltages lines for unqualified employees is 10 feet.
- Minimum approach distance for qualified employees shall be followed per 29 CFR 1910.333(c)(3)(i) Qualified – Table S5 Selection and Use of Work Practices - Approach Distances for Qualified Employees – Alternating Current). Approach distances are 10’ for 50kV plus 4” for every additional 10kV.

26.15 CONFINED OR ENCLOSED WORKSPACES

- When an employee works in a confined or enclosed space that contains exposed energized parts, the employee shall isolate the energy source and turn off the source and lock and tag out the energy source (Only qualified electricians can work on an exposed energy source).
- Protective shields, protective barriers or insulating materials as necessary shall be provided.

26.16 ENCLOSURES, BREAKER PANELS, AND DISTRIBUTION ROOMS

- A clear working space must be maintained in the front, back and on each side of all electrical enclosures and around electrical equipment for a safe operation and to permit access for maintenance and alteration.
- A minimum two-foot working floor space in front of panels and enclosures shall be painted yellow.
- Employees may not enter spaces containing exposed energized parts unless illumination is provided that enables the employees to work safely.
- Housekeeping in distribution rooms must receive high priority to provide a safe working and walking area in front of panels and to keep combustible materials to the minimum required to perform maintenance operations.
- All enclosures and distribution rooms must have “Danger: High Voltage – Authorized Personnel Only” posted on the front panel and on entrance doors.

- Flammable materials are strictly prohibited inside distribution rooms (Boxes, rags, cleaning fluids, etc.)

26.17 LOCK OUT/TAG OUT

- No work shall be performed on (or near enough to them for employees to be exposed due to the dangers of tools or other equipment coming into contact with the live parts) live parts and the hazards they present.
- If any employee is exposed to contact with parts of fixed electric equipment or circuits which have been deenergized, the circuits energizing the parts shall be locked out or tagged or both.
- Conductors and parts of electrical equipment that have been de-energized but not been locked or tagged out shall be treated as live parts.
- Per 3A Group policy all electrical will be outsourced and performed only by qualified and licensed electrical contractors who are familiar with the use of special precautionary techniques, PPE, insulating and shielding materials and insulated tools. Any equipment being made ready for maintenance will be locked out using 3A Group's Control of Hazardous Energy – Lock Out/Tag Out Program. Lockouts are performed by the HSE Manager, Shop Foreman or Branch Manager. Designated employees in some branches may be trained by local management to lock out equipment. If live sources are to be worked, it will only be performed with the knowledge of local management. Only certified electricians may work on electric circuit parts or equipment.
- Only authorized personnel may perform lock out/tag out work on electrical equipment and will follow 3A Group's Control of Hazardous Energy – Lock out/Tag Out Program.
- Authorized personnel will be trained in lock out/tag out procedures.
- Affected personnel will be notified when lock out/tag out activities are being performed in their work area.

26.18 CONTRACTORS

- Only approved, certified, electrical contractors may perform construction and service work on 3A Group or client property.
- It is the Project Manager/Supervisors responsibility to verify the contractor's certification.

26.19 FIRE EXTINGUISHERS

- Approved fire extinguishers must be provided near electrical breaker panels and distribution centers.
- Water type extinguishers shall not be located closer than 50 feet from electrical equipment.

26.20 ELECTRIC SHOCK-CPR

- If someone is discovered that has received an electric shock and is unconscious, first check to see if their body is in contact with an electrical circuit. Do not touch a person until you are sure there is no contact with an electrical circuit.
- When it is safe to make contact with the victim, begin CPR if the person's heart has stopped or they are not breathing.
- Call for help immediately.

26.21 ELECTRIC WELDERS

- A disconnecting means shall be provided in the supply circuit for each motor-generator arc welder, and for each AC transformer and DC rectifier arc welder which is not equipped with a disconnect mounted as an integral part of the welder.

- A switch or circuit breaker shall be provided by which each resistance welder and its control equipment can be isolated from the supply circuit. The ampere rating of this disconnecting means may not be less than the supply conductor ampacity.

26.22 EQUIPMENT GROUNDING

- All gas compressors, air compressors, separators, vessels, etc. shall be grounded by means of using a lug and ground strap, nominal in size to a ½" bolt or larger, attached to a ground rod six feet or longer.
- Equipment bonding jumpers shall be of copper or another corrosion-resistance material.
- The transfer of hazardous or flammable material from a metal or plastic container with a flash point of 100 degrees F or less shall have a ground strap from the container and attached to the skid or a ground rod placed in the ground.

26.23 ASSURED GROUNDING

OSHA requires that employers shall use either ground fault circuit interrupters (GFCI) or an assured equipment grounding conductor program to protect personnel from electrical shock while working.

- 3A Group shall use GFCI's in lieu of an assured grounding program.

26.24 GROUND FAULT CIRCUIT INTERRUPTERS

All 120-volt, single-phase 15 and 20 ampere receptacle outlets on construction or maintenance sites, which are not part of the permanent wiring of the building or structure and which are in use by employees, shall have approved ground fault circuit interrupters for personnel protection.

- All hand portable electric tools and extension cords shall use a GFCI.
- Additionally, approved GFCI's shall be used for 240-Volt circuits in the same service as described above.
- GFCI's must be used on all 120 volt, single-phase 15 amp and 20-amp receptacles within 6 feet of a sink, damp areas or on installed outdoor equipment.
- The GFCI must be the first device plugged into a permanent receptacle.
- The GFCI must be tested before each use.

26.25 TRAINING

All regular full time and temporary employees will be trained in electrical safety utilizing the 3A Group Electrical Safety Training course or an approved equivalent.

Employees who face a risk of electric shock, but who are not qualified persons, shall be trained and familiar with electrically related safety practices.

Employee shall be trained in safety related work practices that pertain to their respective job assignments.

Employees shall be trained on clearance distances.

Safe work practices shall be employed to prevent electric shock or other injuries resulting for either direct or indirect electrical contacts when work is performed near or on equipment or circuits which are or may be energized.

Qualified employees must adhere to the approach distances in Table S5 of CFR 1910.333 (below). 3A Group only has unqualified employees.

Voltage Range (phase to phase) Minimum Approach Distance
Over 300V, not over 750V.....1 ft. 0 in. (30.5 cm)
Over 750V, not over 2kV.....1 ft. 6 in. (46 cm)
Over 2kV, not over 15kV.....2 ft. 0 in. (61 cm)
Over 15kV, not over 37kV.....3 ft. 0 in. (91 cm)
Over 37kV, not over 87.5kV.....3 ft. 6 in. (107 cm)
Over 87.5kV, not over 121kV.....4 ft. 0 in. (122 cm)
Over 121kV, not over 140kV.....4 ft. 6 in. (137 cm)

26.26 PERSONAL PROTECTIVE EQUIPMENT & SAFEGUARDS FOR PERSONNEL PROTECTION

- Employees working in areas where there are potential electrical hazards shall be provided with, and shall use, electrical protective equipment that is appropriate for the specific parts of the body to be protected and for the work to be performed.
- Equipment shall be maintained in a safe, reliable condition. Such protective equipment shall be periodically inspected and/or tested.
- If the insulating capability of protective equipment may be subject to damage during use, the insulating material shall be protected. (An example might be an outer covering of leather used for the protection of rubber insulating material.)
- Employees shall wear nonconductive head protection wherever there is a danger of head injury from electric shock or burns due to contact with exposed energized parts.
- Employees shall wear protective equipment for the eyes or face wherever there is danger of injury to the eyes or face from electric arcs or flashes or from flying objects resulting from electrical explosion.
- Each employee shall use insulated tools or handling equipment if they might make contact with conductors or parts. Program shall state that if the insulating capability of insulated tools or handling equipment is subject to damage, the insulating material shall be protected.
- Ropes and handlines used near exposed energized parts shall be nonconductive.
- Protective shields, protective barriers, or insulating materials shall be used to protect each employee from shock, burns, or other electrically related injuries while that employee is working near exposed energized parts. When normally enclosed live parts are exposed for maintenance or repair, they shall be guarded to protect unqualified persons from contact with the live parts.
- Alerting techniques used to warn and protect employees from hazards which could cause injury due to electric shock, burns or failure of electric equipment parts can take the form of safety signs and tags, barricades & attendants).

27 ERGONOMICS AND CUMULATIVE TRAUMA DISORDERS

ERGONOMICS & CUMULATIVE TRAUMA DISORDERS

27.1 INTENDED USE OF PROGRAM

This program is designed to protect employees of 3A Group who may be occupationally exposed to risk factors for musculoskeletal disorders (MSDs). MSDs include, but are not limited to, such conditions as:

- Cumulative trauma disorders (CTDs)
- Repetitive motion disorders
- Repetitive strain injuries
- Overuse syndrome
- Tendonitis
- Tenosynovitis
- Epicondylitis
- Trigger finger
- Carpal tunnel syndrome (CTS)
- Sprains
- Strains
- Inflammation
- Low back injuries
- Raynaud's Syndrome (White Finger)

27.2 POLICY

3A Group is firmly committed to providing employees with a safe and healthy work environment. It is a matter of company policy that all employees report symptoms relating to MSDs to their supervisor as soon as they are detected. 3A Group management and affected employees will work together in evaluating ergonomics hazards and implementing solutions.

An effective ergonomics program involves early reporting of MSDs symptoms and employee participation in evaluating risk factors and identifying controls to reduce these risk factors. When an employee reports possible symptom relating to MSDs, prompt action will be taken to evaluate and implement control measures.

27.3 RESPONSIBILITIES

27.3.1 ERGONOMICS COORDINATOR

The Ergonomics Coordinator will have overall responsibility for development, management and revision of the 3A Group ergonomics program. The Ergonomics Coordinator will have the authority to make necessary changes in the workplace in conjunction with management. Additional assistance will be provided by human resource, engineering, maintenance and other personnel as needed. The Ergonomics Coordinator will have the following responsibilities:

- Develop, implement and coordinate the ergonomics program
- Receive and respond to employee reports of signs or symptoms of MSDs
- Conduct assessments of jobs where employees report signs or symptoms of MSDs
- Take remedial actions to correct ergonomics risk factors
- Provide employee information and training pertaining to the company's ergonomics program

- Oversee the ergonomics safety committee
- Provide communications to employees and management concerning the company's ergonomics programs
- Evaluate and update the ergonomics program as needed
- Keep records pertaining to the program

27.3.2 SUPERVISORS

All supervisors will actively support this ergonomics safety program and assist the Ergonomics Coordinator in implementing this program. Responsibilities of all supervisors include:

- Immediately notifying the Ergonomics Coordinator whenever an employee reports signs or symptoms of MSDs
- Completing an accident/incident form within 24 hours whenever an employee reports signs or symptoms of MSDs
- Assist the Ergonomics Coordinator with identification and control of MSD risk factors
- Assist the Ergonomics Coordinator with identifying light duty jobs when employees have medical work restrictions due to MSDs
- Ensure employees working under restricted duty remain within work limitations

27.3.3 EMPLOYEES

Employee participation in the ergonomics program is critical. Employees have a unique perspective on the specific jobs they perform on a routine basis and have in depth knowledge of the specific job tasks that may involve MSD risk factors. An employee's involvement in identifying and correcting problem jobs will enhance the acceptance of change and increase job satisfaction. Employee responsibilities include:

- Following all company policies and procedures relating to health and safety including this ergonomics program
- Promptly report all signs and symptoms of MSDs to their immediate supervisor
- Assist the Ergonomics Coordinator, supervisor and any other staff in evaluating the job function in question and in the identification of possible control measures
- Participate in the development, implementation and evaluation of the ergonomics program through the safety and/or ergonomics safety committees

27.4 PROGRAM COMPONENTS

3A Group will provide necessary resources to ensure that the program is effective. The ergonomics program will be incorporated into the existing safety program and safety committee structure. A separate ergonomics safety committee may also be developed to specifically address ergonomics related safety issues.

27.5 MSD REPORTING PROCEDURES

Prompt action on MSDs at an early stage reduces the severity and cost of these injuries. All employees should promptly report any signs or symptoms of MSDs to their immediate supervisor. Reports may be written or verbal. Signs and symptoms of MSDs include:

- Painful joints
- Pain, tingling or numbness in the hands or feet
- Shooting or stabbing pains in the arms or legs
- Swelling or inflammation

- Burning sensations
- Stiffness
- Back or neck pain
- Fingers or toes turning white
- Pain in the knees, shoulders, forearms or wrist

All employees will be provided with information and training pertaining to MSDs identification and reporting procedures. New employees will be informed of the company ergonomics program and reporting procedures during the new employee orientation process.

27.6 HAZARD ANALYSIS

An evaluation of the job in question will be performed by the Ergonomics Coordinator, supervisors of the job in question, representative employees performing the job and any other employee who may have specialized knowledge or training that may be applicable to the situation. These could include engineering, medical, maintenance, or other staff. Job hazard evaluations could also be conducted by an outside professional such as an ergonomist.

The Ergonomics Coordinator will decide on the specific evaluation tool that will be used in a particular situation. When evaluating jobs, the following MSDs risk factors will be assessed:

- Awkward postures
- Forceful exertions
- Repetitive motions
- Duration of at-risk factors
- Contact stresses
- Vibration
- Heat/Cold

Evaluations will include observations, employee interviews and measurements such as forces, length, heights, frequency, duration, etc. Photographing and/or videotaping of the job may be conducted for documentation and further analysis.

27.7 HAZARD CONTROL

Control measures will be developed by the MSDs assessment team under direction of the Ergonomics Coordinator. Simple controls such as workstation adjustment will be implemented immediately. Controls requiring significant financial or manpower resources will be presented to management for approval. It is anticipated that significant resources may need to be allocated in certain situations and long-term planning will need to be implemented in these situations. Short-term solutions will be implemented until the final solutions can be put in place. Control measures will not only be implemented for the employee reporting an MSD but also for other employees performing the same job which have the same MSD risks. Control measures will be implemented so that the MSD risk factors are reduced to the extent feasible. Most controls will be initiated shortly after the MSDs is reported and evaluated.

If a MSD incident is reported in a job that has already had controls implemented, a further evaluation will be conducted. The evaluation will analyze whether controls are functioning and used properly and to see whether additional MSD hazards exist. The Ergonomics Coordinator will track the progress of control measures and consult with employees to ensure they are effective and do not create additional hazards.

27.8 ENGINEERING CONTROLS

When feasible, engineering controls will be used before other control methods or in conjunction with other control methods. Engineering controls are the preferred means of control because they eliminate the hazards. The Ergonomics Coordinator, supervisors, production manager, affected employees and other staff will determine to what extent engineering controls can be utilized to minimize exposure. Factors such as workplace constraints, implementation schedule, cost/benefit and production schedules will be taken into consideration when determining the most effective controls. Documentation of the effectiveness of engineering controls and cost/benefit analysis should be conducted when determining appropriate control measures. Some engineering controls include:

- Changes in workstation layout
- Changes/modifications of tools
- Modifications in the ways materials are transported or handled
- Changes in processes
- Changes in packaging
- Changes in the way tools/parts are manipulated

27.9 WORK PRACTICE CONTROLS

Work practice controls reduce MSDs risk factors through alteration of the manner in which work activities are performed. Work practice controls are based upon behavior of managers, supervisors and employees who follow proper work methods and are therefore less effective than engineering controls. Some work practice controls include:

- Development of proper work practices and procedures that are to be followed when performing a job or task
- Conditioning period for new employees
- Training in work practices that reduce MSDs risk factors

27.10 COMPUTER/TYPING COMFORT

Computer terminals are here to stay with more and more employees using them. You can prevent the minor muscle tension, stiffness, aches, fatigue and eyestrain that can result from sitting at your terminal for extended periods of time. Just follow this simple fitness and comfort program right at the terminal.

27.11 POSTURE AND POSITIONING

- Maintain good posture when working at the keyboard. Utilize a chair with back support.
  Keep your feet supported on the floor or on a footrest when you work to reduce pressure on your lower back
- Avoid twisting or bending your trunk or neck. Frequently used items should be positioned directly in front of you and angled upward on a copyholder when working.
  Keep your shoulders relaxed with your elbows close to your sides.
- Avoid resting your elbows on the hard surface or edge of your table. Pads can be used to protect your elbows if necessary.
- Elbows should be positioned at 100 to 110 degrees when working in order to keep a relaxed position at the keyboard. This could require a slight negative tilt (front of keyboard higher than back) when working in upright positions. If reclined in your chair, the keyboard could be at a positive angle to maintain this relaxed position.

- Your wrists should be in a neutral or straight position when keying or using a pointing device or calculator. Wrist rests can assist you in maintaining a neutral position when used properly during pauses. Float your arms above the keyboard and wrist rest when keying. Avoid planting your wrists on the table or wrist rest. This can result in bending the wrists either up and down or side to side.
- Take breaks. These breaks can be brief and should include stretches for optimal results. If possible, take a one or two-minute break every 15 to 20 minutes, or a five-minute break every hour. Every few hours, get up, move around, and do an alternative activity.

27.12 WORK ENVIRONMENT

- Avoid excessive reaching. Your keyboard, pointing device, files and telephone should be within easy reach.
- Use a keyboard tray to properly position your keyboard and pointing device.
- Use a copyholder positioned in line with your monitor and keyboard.
- When writing at the computer, avoid excessive reaching over the keyboard or work materials. A sturdy in-line copyholder can double as a writing surface if appropriately positioned.
- Position the monitor so that the viewed part of the screen allows you to keep your neck in a neutral or straight position. The monitor should be centered directly in front of you. The top of the computer screen should be slightly below the top of your head, so that you are looking at it with a slightly downward gaze.
- Position your monitor to eliminate excessive glare or reflections from windows and lighting.
- Customize your computer by using your software. The screen font, contrast, pointer size, speed, and color can all be adjusted to maximize your comfort and efficiency.

27.13 EYE CARE

Using your eyes doesn't harm them. But focusing on a computer screen for long periods can cause temporary eye discomfort. The muscles that move and focus your eyes become strained. Your eyes become dry and itchy. So take care of them: get regular eye exams to be sure your eyes are healthy and vision problems are corrected. And practice eye comfort tips to prevent everyday eyestrain.

- Take a break - Use the 20-20-20 rule: every 20 minutes, take a 20-second break and look at something 20 feet away.
- Blink frequently - Do not forget to blink periodically. Staring at computer screens can dry our eyes and cause redness and irritation.
- Consider computer glasses - Computer glasses are prescription eyewear that are specifically designed for computer work. They allow you to focus your eyes on the distance of a computer screen, which is generally farther away than reading material. Computer glasses optimize your eyesight when you're looking at digital screens and help to reduce glare.
- Keep your monitor bright - This reduces the flicker rate of the computer and reduces fatigue. Flickering can lead to eyestrain and headaches. Also, a bright monitor causes your pupil to constrict, which results in a greater range of focus. This reduces the need for your eye to accommodate and enables you to work longer and with more comfort.
- Use proper lighting - Use incandescent lighting and avoid high-intensity lamps, which cast shadows and create glare. Place a dim light on either side of your workstation to create equal brightness without dark, shadowed areas.
- Check your monitor’s position - The position of your computer monitor can add to your eyestrain. It is important that it be positioned at the proper distance away from your eyes. Optimally, your computer screen should be 15 to 20 degrees below eye level (about 4 or 5 inches) as measured from the center of the screen and 20 to 28 inches from the eyes.

- Adjust your screen resolution - Make sure your monitor has a high-resolution display. A higher resolution produces sharper type and crisper images, reducing eye strain.
- Minimize glare - Clean your monitor regularly to remove dust and consider installing an anti-glare screen. It also helps to keep shades drawn to prevent glare from outside sources.
- Try massage or eye cupping - Massaging the area around the eyes will help relax the muscles and can be very comforting. Rub your hands together to create friction and warmth, then gently cup your palms over your closed eyes and rest them.
- Take your vitamins - Getting the proper number of vitamins and minerals is important for overall eye health. Opt for vitamins that contain antioxidants and ingredients that help improve the health of the eye and reduce eyestrain, such as vitamins A, C and E with a B complex and Zinc.

27.14 ADMINISTRATIVE CONTROLS

Administrative controls are procedures and methods that reduce MSDs risk factors by altering the way work is performed. These controls include:

- Employee rotation
- Job enlargement
- Adjusting the work pace
- Redesigning work processes
- Rest break schedules

Personal Protective Equipment

In general, personal protective equipment such as back-belts and wrist/hand splints and braces provide little or no control of MSDs risk factors. Studies have shown that many of these devices provide no statistical reduction in the frequency or severity of MSDs injuries. Employees may not wear the devices properly or have a false sense of security while wearing these devices and actually increase their risk factors for a MSDs injury. It will be 3A Group company policy to allow these devices to be used only if an employee's physician or medical provider directs them to be used.

27.15 TRAINING

Training is essential to an effective health and safety program. The goal of ergonomics training is to enable managers, supervisors and employees to identify aspects of job tasks that may increase a worker's risk of developing MSDs. Ergonomics training will be provided to all 3A Group employees, so they understand risk factors for MSDs and how to reduce these factors. Employees will also be trained to identify signs and symptoms of MSDs and how to report these injuries. Training will be conducted at the time of hire and annually thereafter. Training will include:

- General ergonomics awareness
- Signs and symptoms of MSDs and importance of early reporting
- MSDs reporting procedures
- MSDs risk factors in the employee's jobs and control measures to reduce these factors
- The company's ergonomics program and the employee's role in the program
- Timetable for addressing MSD hazards

Training will primarily be conducted by in-house staff but outside experts may also be involved in the overall training program. The Ergonomics Coordinator and any other employees involved in managing the program will have specialized training as needed.

27.16 PROGRAM EVALUATION

The 3A Group ergonomics program will be evaluated annually or whenever deficiencies are noted. The program will be updated by the Ergonomics Coordinator. Measures such as reductions in frequency and severity of MSDs, reductions in the number of MSDs hazards, etc. will be used in evaluating the program.

27.17 RECORDKEEPING

Detailed records pertaining to the ergonomics program will be maintained by the Ergonomics Coordinator. Records will include:

- Employee reports of MSDs
- Responses to employees' reports
- Job hazard analyses
- Hazard control measures
- Ergonomics program evaluations
- Work restrictions, time off work and medical opinions
- Employee training records

Records will be kept for at least 3 years except for medical opinions, which will be kept for at least 3 years after the end of employment.

Glossary

- Carpal Tunnel Syndrome (CTS)- **Compression of the median nerve caused by swelling of the tendons in the carpal tunnel. CTS is characterized by numbness, pain and tingling in the fingers and clumsiness and loss of grip strength.**
- **Carpet Layers Knee-** Inflammation of the knee joint caused by prolonged kneeling on a hard surface.
- Cumulative Trauma Disorders (CTDs)- **See Musculoskeletal Disorders**
- **De Quatrain's Disease-** A musculoskeletal disorder characterized by inflammation of the tendons and their sheaths causing pain at the base of the thumb and inside wrist.
- Epicondylitis- **A musculoskeletal disorder characterized by swelling and pain in the tendons and muscles of the elbow. Also known as tennis elbow.**
- **Ergonomics-** The study of the interactions of humans with their work environment to achieve optimal work efficiency and wellbeing.
- **Hand-Arm Vibration Syndrome-** A condition contracted after prolonged exposure to hand-arm vibration. Symptoms include tingling, numbness and blanching (turning white) of the fingers caused by loss of blood circulation.
- **Herniated Disc-** A rupture of the cartilage disc between vertebrae.
- **Musculoskeletal Disorders (MSDs)-** A general term for soft tissue injuries caused by overuse. Disorders of the muscles, nerves, tendons, ligaments, joints, cartilage, blood vessels, or spinal discs. Symptoms range from numbness to tingling and pain. Conditions such as muscle strains and tears, ligament sprains, joint and tendon inflammation, pinched nerves and spinal disc degeneration are MSDs. Other medical conditions such as low back pain, tension neck syndrome, carpal tunnel syndrome, trigger finger, sciatica, epicondylitis, tendonitis, Raynaud's syndrome, hand–arm vibration syndrome and carpet layer's knee are all MSDs.
- **Raynaud's Syndrome-** A musculoskeletal disorder involving constriction of blood vessels of the fingers caused by persistent heavy vibration such as jackhammer use in cold environments.
- **Repetitive Motion Disorders-** See Musculoskeletal Disorders
- **Repetitive Strain Injuries-** See Musculoskeletal Disorders
- Rotator Cuff Syndrome- **Inflammation of the tendons of the muscles attached to the rotator cuff area of the shoulder.**
- **Sciatica-** Inflammation of the sciatic nerve in the back of the thigh.
- **Tendonitis-** Inflammation of a tendon.
- **Tenosynovitis-** The swelling of the outside sheath of a tendon.
- **Tension Neck Syndrome-** The inflammation of the nerves and muscles in the neck region, which results in pain and stiffness.
- **Trigger Finger-** A constriction of the tendon sheath that causes partial obstruction or extension of a finger. Once past the point of obstruction, movement is eased.

27.18 GUIDE TO OFFICE ERGONOMICS

Sore Body Part	P	Poss
1. Back of neck	Monitor screen too high or low	Lower monitor
2. Sides of neck	Keyboard is not aligned with monitor	Center keyboard
3. Sides of neck	Cradling telephone with shoulder	Hold phone with hand, use speaker phone if in an office
4. Right side of	Continual reaching for mouse on right side	Position mouse close to keyboard
5. Left side of	Continual reaching for mouse on left side	Position mouse close to keyboard
6. Right shoulder	Reaching for telephone/adding machine with rt.	Move telephone/adding machine closer
7. Right shoulder	Right arm of chair is too high	Lower arm of chair so shoulder is relaxed
8. Left shoulder	Reaching for telephone/adding machine with lt.	Move telephone/adding machine closer
9. Left shoulder	Left arm of chair is too high	Lower arm of chair so shoulder is relaxed
10. Thoracic area	Keyboard too high; mouse too high	Lower keyboard tray
11. Thoracic area	Keyboard too far away; mouse too far away	Move keyboard and mouse closer
12. Upper arms	Keyboard too high; mouse too high	Lower adjustable tray
13. Upper arms	Keyboard too high; mouse too high	Lower adjustable tray
14. Elbows	Keyboard too high; mouse too high	Lower adjustable tray
15. Forearms	Keyboard too high; mouse too high	Lower adjustable tray
16. Wrists	Keyboard too high or low; mouse too high or low	Adjust angle of tray; lower "feet" of keyboard
17. Wrists	No place to rest hands while not typing	Use wrist rests
18. Wrists	Resting wrists on sharp edge or hard surface	Use wrist rests
19. Hands	Improper alignment over keyboard	Use "natural" keyboard
20. Fingers	Improper alignment over keyboard	Sit directly in front of and facing keyboard
21. Eye strain	Monitor too close or too far away	Move monitor
22. Eye strain	Lighting too dim or too bright	Adjust lighting or monitor contrast
23. Back ache	Chair does not fit properly	Adjust chair
24. Leg ache	Seat pan either too deep or too shallow	Adjust chair
25. Leg ache	Seat does not tilt properly	Adjust chair
26. Legs go to sleep	Seat pan too deep	Adjust chair
27. Legs go to sleep	Chair does not lower enough, feet not flat	Use foot rest

28 EXCAVATION, TRENCHING AND SHORING

3A GROUP
EXCAVATION, TRENCHING AND SHORING

28.1 PURPOSE

The purpose of this training program is to protect employees from safety hazards that may be encountered during work in trenches and excavations.

28.2 SCOPE

3A Group is required to participate as a contract employer at client locations with trenching and excavation work; however, 3A Group does not initiate trenching operations.

When work is performed on a non-owned or operated site, the operator's program shall take precedence; however, this document covers 3A Group employees for basic awareness purposes that addresses all items and shall be used when an operator's program doesn't exist.

28.3 DEFINITIONS

- Accepted engineering practices means the standards of practice required by a registered professional engineer.
- Aluminum Hydraulic Shoring means a manufactured shoring system consisting of aluminum hydraulic cylinders (cross braces) used with vertical rails (uprights) or horizontal rails (wales).
- Bell-bottom pier hole means a type of shaft or footing excavation, the bottom of which is made larger than the cross section above to form a belled shape.
- Benching (Benching system) is a method of protecting employees from cave-ins by excavating the sides of an excavation to form one or more horizontal steps, usually with vertical or near-vertical surfaces between levels.
- Cave-in means the movement of soil or rock into an excavation, or the loss of soil from under a trench shield or support system, in amounts large enough to trap, bury, or injure and immobilize a person.
- Cross braces mean the horizontal members of a shoring system installed from side to side of the excavation. The cross braces bear against either uprights or Wales.
- Excavation means any man-made cut, cavity, trench, or depression in an earth surface formed by earth removal.
- Faces or sides mean the vertical or inclined earth surfaces formed as a result of excavation work.
- Failure means the movement or damage of a structural member or connection that makes it unable to support loads.
- Hazardous atmosphere means an atmosphere that is explosive, flammable, poisonous, corrosive, oxidizing, irritating, oxygen deficient, toxic, or otherwise harmful, which may cause death, illness, or injury.
- Health Safety Officer means the individual at 3A Group responsible for developing and implementing this program, conducting unannounced work site inspections, and ensuring that the departments comply with the program requirements.
- Kickout means the accidental movement or failure of a cross brace.
- Protective system means a method of protecting employees from cave-ins, from material that could fall or roll from an excavation face into an excavation, or from the collapse of adjacent structures. Protective systems include support systems, sloping and benching systems, shield systems, and other systems that provide the necessary protection.
- Ramp means an inclined walking or working surface that is used to gain access to one point from another. A ramp may be constructed from earth or from structural materials such as steel or wood.
- Sheeting means the members of a shoring system that retain the earth in position and in turn are supported by other members of the shoring system.
- Shield (Shield system) means a structure used in an excavation to withstand cave-ins and which will protect employees working within the shield system. Shields can be permanent structures or portable units moved along as work progresses. Shields used in trenches are usually referred to as "trench boxes" or "trench shields."
- Shoring (Shoring system) means a structure that is built or put in place to support the sides of an excavation to prevent cave-ins.
- Sides - See "Faces."

- Sloping (Sloping system) means sloping the sides of the excavation away from the excavation to protect employees from cave-ins. The required slope will vary with soil type, weather, and surface or near surface loads that may affect the soil in the area of the trench (such as adjacent buildings, vehicles near the edge of the trench and so forth).
- Stable rock means natural solid mineral material that can be excavated with vertical sides that will remain intact while exposed.
- Structural ramp means a ramp built of steel or wood, usually used for vehicle access. Ramps made of soil or rock are not considered structural ramps.
- Support system means a structure such as underpinning, bracing, or shoring, which provides support to an adjacent structure, underground installation, or the sides of an excavation.
- Tabulated data means tables and charts approved by a registered professional engineer and used to design and construct a protective system.
- Trench (Trench excavation) means a narrow excavation (in relation to its length) made below the surface of the ground.
- Trench box or shield - See "Shield".
- Uprights mean the vertical members of a trench shoring system placed in contact with the earth and usually positioned so that individual members do not contact each other. Uprights placed so that individual members are closely spaced, in contact with or interconnected to each other, are often called "sheeting."
- Wales are horizontal members of a shoring system placed in the direction of the excavation face whose sides bear against the vertical members of the shoring system or earth (the uprights or sheeting).

28.4 KEY RESPONSIBILITIES

Management shall determine if this program is required for regulatory compliance within his/her region. If this program is deemed necessary, then management shall determine which employees within his/her region is required to receive this training. Management shall select a training facility or use an in-house qualified trainer to supply the training.

Only trained personnel can be involved in working in trenches or excavations. 3A Group personnel DO NOT initiate trenching.

28.5 PROCEDURE

Competent Person Duties – The Safety Manager or their designee shall have the following duties:

28.5.1 PROTECTIVE SYSTEMS OR EQUIPMENT

- Monitoring water removal equipment and operations.
- Removal of workers if conditions dictate.
- Atmospheric testing.
- Inspecting excavations subject to runoff from heavy rains to determine need for diversion ditches, dikes, or other suitable protection.
- Determining cave-in potential to assess need for shoring or other protective system.
- Examining damaged material or equipment used for protective systems to determine its suitability for continued use.
- Classifying soil and rock deposits, by both visual analysis and by testing, to determine appropriate protection; re-classifying, if necessary, based on changing conditions.
- Determining the appropriate slope of an excavation to prevent collapse due to surcharge loads from stored material or equipment, operating equipment, adjacent structures, or traffic, and assuring that such slope is achieved.

28.5.2 INSPECTING TRENCH AND PROTECTIVE SYSTEMS

- Inspections prior to entry and authorizing immediate removal of employees from the hazardous area where evidence of possible cave-in, failure of protective systems, hazardous atmospheres, or other hazardous conditions exists.

28.5.3 UNSAFE ACCESS/EGRESS

- Designing structural ramps that are used solely by employees as a means of access or egress. Structural ramps used for access of equipment must be designed by a competent person qualified in structural design.

28.6 UTILITIES AND PRE-WORK SITE INSPECTION

The location of underground installations shall be determined before excavation.

When utility companies or owners cannot respond to a request to locate underground utility installations within 24 hours, or cannot establish exact location of these installations, 3A Group may proceed, provided it does so with caution and provided detection equipment or other acceptable means to locate utility installations are used.

Excavation shall be done in a manner that does not endanger the underground installations or the employees engaged in the work. Utilities left in place shall be protected by barricades, shoring, suspension or other means as necessary to protect employees.

28.7 PROTECTION OF THE PUBLIC

Barricades, walkways, lighting and posting shall be provided as necessary for the protection of the public prior to the start of excavation operations.

Guardrails, fences, or barricades shall be provided on excavations adjacent to walkways, driveways and other pedestrian or vehicle thoroughfares. Warning lights or other illumination shall be maintained as necessary for the safety of the public and employees from sunset to sunrise.

Wells, holes, pits, shafts and all similar hazardous excavations shall be effectively barricaded or covered and posted as necessary to prevent unauthorized access. All temporary excavations of this type shall be backfilled as soon as possible.

28.8 PROTECTION AGAINST FALLS

Walkways or crossings shall be protected by standard guardrails or railings shall be provided where employees and the general public are permitted to cross over excavations. Where workers in the excavation may pass under these walkways or bridges, a standard guardrail and toe board shall be used.

28.9 PROTECTION OF WORKERS IN EXCAVATIONS

- *Access and Means of Egress* - Stairs, ladders or ramps shall be provided where employees are required to enter trench excavations over 4 feet deep. The maximum distance of lateral travel (e.g., along the length of the trench) required to reach the means of egress shall not exceed 25 feet.
- *Structural Ramps* - Structural ramps used solely by employees as a means of access or egress from excavations shall be designed by a competent person. Structural ramps used for access or egress of equipment shall be designed by a person qualified in structural design and shall be constructed in accordance with the design.
- Ramps and runways constructed of two or more structural members shall have the structural members connected together to prevent movement or displacement.
- Structural members used for ramps and runways shall be of uniform thickness.
- Cleats or other appropriate means used to connect runway structural members shall be attached to the bottom of the runway or shall be attached in a manner to prevent tripping.
- Structural ramps used in place of steps shall be provided with cleats or other surface treatments on the top surface to prevent slipping.
- *Ladders* - When portable ladders are used, the ladder side rails shall extend a minimum of 3 feet above the upper surface of the excavation.
- Ladders shall have nonconductive side rails if work will be performed near exposed energized equipment or systems.
- Two or more ladders, or a double-cleated ladder, will be provided where 25 or more employees will be conducting work in an excavation where ladders serve as the primary means of egress, or where ladders serve two-way traffic.
- Ladders will be inspected prior to use for signs of damage or defects. Damaged ladders will be removed from service and marked with "Do Not Use" until repaired.

- Ladders shall be used only on stable and level surfaces unless secured. Ladders placed in any location where they can be displaced by workplace activities or traffic shall be secured, or barricades shall be used to keep these activities away from the ladder.
- Non-self-supporting ladders shall be positioned so that the foot of the ladder is one-quarter of the working length away from the support.
- Employees shall not be allowed to carry any object or load while on the ladder that could cause them to lose their balance and fall.
- *Exposure to Vehicular Traffic* - Employees exposed to vehicular traffic shall be provided with and shall wear vests or other suitable garments marked with or made of reflectorized or high-visibility material. Warning vests worn by flagmen shall be red or orange and shall be of reflectorized material if worn during night work.
- *Employee Exposure to Falling Loads* - No employee shall be permitted underneath loads (or where loads may fall) handled by lifting or digging equipment. Employees shall be required to stand away from any vehicle being loaded or unloaded to avoid being struck by any spillage or falling materials. Operators may remain in the cabs of vehicles being loaded or unloaded when the vehicles provide adequate protection for the operator during loading and unloading operations.
- *Warning System for Mobile Equipment* - A warning system shall be used when mobile equipment is operated adjacent to the edge of an excavation if the operator does not have a clear and direct view of the edge of the excavation. The warning system shall consist of barricades, hand or mechanical signals, or stop logs. If possible, the grade should be away from the excavation.
- *Hazardous Atmospheres* - The atmosphere shall be tested for air contaminants (oxygen, flammable gases, etc.) in excavations over 4 feet deep or if a hazardous atmosphere exists or could reasonably be expected to exist. A hazardous atmosphere could be expected, for example, in excavations in landfill areas, in excavations in areas where hazardous substances are stored nearby, or in excavations near or containing gas pipelines.
- Adequate precautions shall be taken to prevent employee exposure to atmospheres containing less than 19.5 percent oxygen and other hazardous atmospheres. These precautions include providing proper respiratory protection or forced ventilation of the workspace.
- Forced ventilation will be provided where necessary to ensure the atmosphere is safe.
- When controls are used that are intended to reduce the level of atmospheric contaminants to acceptable levels, continuous air monitoring will be performed. The device used for atmospheric monitoring shall be equipped with an audible and visual alarm.
- Atmospheric testing will be performed using a properly calibrated direct reading gas monitor. Direct reading gas detector tubes or other acceptable means may also be used to test potentially toxic atmospheres.

28.10 PERSONAL PROTECTIVE EQUIPMENT

- All employees working in trenches or excavations shall wear approved hard-hats and steel toed shoes or boots.
- Employees exposed to flying fragments, dust, or other materials produced by drilling, sawing, sanding, grinding and similar operations shall wear approved safety glasses with side shields.
- Employees exposed to hazards produced by, or performing, welding, cutting, or brazing operations shall wear approved spectacles or a welding face shield or helmet.
- Employees entering bell-bottom pier holes or other similar deep and confined footing excavations shall wear a harness with a lifeline securely attached to it. The lifeline shall be separate from any line used to handle materials and shall be individually attended at all times while the employee wearing the lifeline is in the excavation.
- Employees shall wear approved gloves or other suitable hand protection.
- Employees using, or working in the immediate vicinity of, hammer drills, masonry saws, jackhammers or similar high noise producing equipment shall wear suitable hearing protection.
- Each employee at the edge of an excavation 6 feet or deeper shall be protected from falling. Fall protection shall be provided by guardrail systems, fences or barricades.
- Emergency rescue equipment, such as breathing apparatus, a safety harness and line, and a basket stretcher shall be readily available where hazardous atmospheric conditions exist or may develop during work in an excavation. This equipment shall be attended when in use. Only personnel that have received approved training and have appropriate equipment shall attempt retrieval that would require entry into a hazardous atmosphere.

28.11 PROTECTION FROM HAZARDS ASSOCIATED WITH WATER ACCUMULATION

Employees shall not work in excavations that contain or are accumulating water unless precautions have been taken to protect employees against the hazards posed by water accumulation. The precautions taken must include inspection by a competent person before work begins, special support or shield systems to protect from cave-ins, water removal to control the level of accumulating water or use of safety harnesses and lifelines.

If water is controlled or prevented from accumulating by the use of water removal equipment, the water removal equipment and operation shall be monitored by a competent person trained in the use of the equipment.

If excavation work interrupts the natural drainage of surface water (such as streams), diversion ditches, dikes, or other suitable means shall be used to prevent surface water from entering the excavation. Precautions shall also be taken to provide adequate drainage of the area adjacent to the excavation.

The competent person shall inform workers of the precautions or procedures that are to be followed if water accumulates or is accumulating in an excavation.

28.12 STABILITY OF ADJACENT STRUCTURES

The competent person will determine if the excavation work could affect the stability of adjoining buildings, walls, sidewalks or other structures.

Support systems (such as shoring, bracing, or underpinning) shall be used to assure the stability of structures and the protection of employees where excavation operations could affect the stability of adjoining buildings, walls, or other structures.

Excavation below the level of the base or footing of any foundation or retaining wall that could be reasonably expected to pose a hazard to employees shall not be permitted.

1 Protection of Employees from Falling Objects and Loose Rocks or Soil

Adequate protection shall be provided to protect employees from loose rock or soil that could pose a hazard by falling or rolling from an excavation face. Such protection shall consist of:

- Scaling to remove loose material;
- Installation of protective barricades, such as wire mesh or timber, at appropriate intervals on the face of the slope to sto and contain falling material; or
- Benching sufficient to contain falling material.

Excavation personnel shall not be permitted to work above one another where the danger of falling rock or earth exists.

Employees shall be protected from excavated materials, equipment or other materials that could pose a hazard by falling or rolling into excavations.

Protection shall be provided by keeping such materials or equipment at least 2 feet from the edge of excavations, by the use of restraining devices that are sufficient to prevent materials or equipment from falling or rolling into excavations, or by a combination of both if necessary.

Materials and equipment may, as determined by the competent person, need to be stored further than 2 feet from the edge of the excavation if a hazardous loading condition is created on the face of the excavation.

Materials piled, grouped or stacked near the edge of an excavation must be stable and self-supporting.

Using the following categories, soil is classified into different types, which determine the kind of cave-in protection required. Only a competent and trained person can determine the soil type by using these classifications.

- Grain sizes are usually classified into four types: gravel, sand, silt, clay. Gravel is the least stable, and clay is the most stable.
- Saturation is the amount of water that the soil is currently holding. Complete saturation is much less stable than soil that is

only slightly damp. However, soil with no water content is unstable.

- Cohesiveness is a test that determines how well the soil sticks together. The more it sticks together, the more stable the trench walls will be. The field test usually consists of rolling the soil in your hand into the shape of a worm and observing how and when it separates.
- Unconfined compressive strength determines how much weight per square foot the soil can withstand. This will determine how easily the soil will shear and cave in

28.13 SOIL TYPES

Soil classifications must be determined by testing and protective systems designed according to soil classifications.

- The most stable type of soil is Type A. It is dense and heavy and consists primarily of clay.
- Type B has a medium level of stability and is made of soils such as silt, sandy loam, and medium clay.
- The least stable soil is Type C, which consists of gravel, loamy sand, and soft clay.

Timber shoring or aluminum hydraulic shoring must be determined according to the appendixes A & C of 29 CFR 1926 (Excavations).

The devices should be used while in good repair and maintenance. If damaged they must be inspected.

Employees should be protected from hazards of falling, rolling or sliding materials or equipment. Shields should not be subjected to excessive forces and will be installed to protect employees from lateral loads. Employees are restricted from being in the shield when installing or removing. The shield must be designed to resist calculated trench forces.

28.14 DAILY INSPECTION

The competent person shall conduct daily inspections of excavations, adjacent areas, and protective systems for evidence of a situation that could result in possible cave-ins, failure of protective systems, hazardous atmospheres or other hazardous conditions. An inspection shall be conducted by the competent person prior to the start of work and as needed throughout the shift. Inspections shall also be made after every rainstorm or other hazard increasing occurrence. These inspections are only required when the trench will be or is occupied by employees.

Where the competent person finds evidence of a situation that could result in a possible cave-in, failure of protective systems, hazardous atmosphere, or other hazardous conditions, exposed employees shall be immediately removed from the hazardous area until precautions have been taken to assure their safety.

There shall be a written log of all inspections conducted. This log shall include the date, work site location, results of the inspection, and a summary of any action taken to correct existing hazards.

28.15 TRAINING

All personnel involved in trenching or excavation work shall be trained in the requirements of this program and regulatory requirements.

Training shall be performed before the employee is assigned duties in excavations.

Retraining will be performed whenever work site inspections conducted by the competent person or Health Safety Officer indicate that an employee does not have the necessary knowledge or skills to safely work in or around excavations.

Training records shall include the date(s) of the training program, the instructor(s) of the training program, a copy of the written material presented, and the names of the employee(s) to whom the training was given.

29 FALL PROTECTION PLAN

FALL PROTECTION PLAN

29.1 PURPOSE

The purpose of this program is to provide fall protection procedures to prevent injury to employees while performing work assignments at elevated levels.

Qualifications of the Person or Position That Prepares Plans

Any changes to this Fall Protection Program must be approved by the Safety Manager, who is designated the Qualified Person to prepare plans for specified work sites. This is based on training received in fall protection planning and has demonstrated skills and knowledge in the preparation of fall programs, plans and the hazards involved.

29.2 SCOPE

Applies to all 3A Group employees who have work assignments at work levels that exceed 6 feet in height where guardrails or nets are not utilized. This includes work near and around excavations. Guardrails, safety nets, or personal fall arrest systems shall be used where feasible. When work is performed on a non-owned or operated site, the operator's program shall take precedence, however, this document covers 3A Group employees and shall be used on owned premises, or when an operator's program doesn't exist or is less stringent.

29.3 DEFINITIONS

"Anchorage" means a secure point of attachment for lifelines, lanyards or deceleration devices.

"Body belt (safety belt)" means a strap with means both for securing it about the waist and for attaching it to a lanyard, lifeline, or deceleration device.

"Body harness" means straps which may be secured about the employee in a manner that will distribute the fall arrest forces over at least the thighs, pelvis, waist, chest and shoulders with means for attaching it to other components of a personal fall arrest system.

"Buckle" means any device for holding the body belt or body harness closed around the employee's body.

"Carabineer" - see Snap hook

"Connector" means a device which is used to couple (connect) parts of the personal fall arrest system and positioning device systems together. It may be an independent component of the system, such as a carabineer, or it may be an integral component of part of the system (such as a buckle or D-ring sewn into a body belt or body harness, or a snap-hook spliced or sewn to a lanyard or self-retracting lanyard).

"Deceleration device" means any mechanism, such as a rope grab, rip-stitch lanyard, specially-woven lanyard, tearing or deforming lanyards, automatic self-retracting lifelines/lanyards, etc., which serves to dissipate a substantial amount of energy during a fall arrest, or otherwise limit the energy imposed on an employee during fall arrest.

"Deceleration distance" means the additional vertical distance a falling employee travels, excluding lifeline elongation and free fall distance, before stopping, from the point at which the deceleration device begins to operate. It is measured as the distance between the location of an employee's body belt or body harness attachment point at the moment of activation (at the onset of fall arrest forces) of the deceleration device during a fall, and the location of that attachment point after the employee comes to a full stop.

"Equivalent" means alternative designs, materials, or methods to protect against a hazard which the employer can demonstrate will provide an equal or greater degree of safety for employees than the methods, materials or designs specified in the standard.

"Failure" means load refusal, breakage, or separation of component parts. Load refusal is the point where the ultimate strength is exceeded.

"Free fall" means the act of falling before a personal fall arrest system begins to apply force to arrest the fall.

"Free fall distance" means the vertical displacement of the fall arrest attachment point on the employee's body belt or body harness between onset of the fall and just before the system begins to apply force to arrest the fall. This distance excludes deceleration distance, and lifeline/lanyard elongation, but includes any deceleration device slide distance or self-retracting lifeline/lanyard extension before they operate and fall arrest forces occur.

"Guardrail system" means a barrier erected to prevent employees from falling to lower levels.

"Infeasible" means that it is impossible to perform the inspection work using a conventional fall protection system (i.e., guardrail system, safety net system, or personal fall arrest system) or that it is technologically impossible to use any one of these systems to provide fall protection.

"Lanyard" means a flexible line of rope, wire rope, or strap which generally has a connector at each end for connecting the body belt or body harness to a deceleration device, lifeline, or anchorage.

"Leading edge" means the edge of a floor, roof, or formwork for a floor or other walking/working surface (such as the deck) which changes location as additional floor, roof, decking, or formwork sections are placed, formed, or constructed. A leading edge is considered to be an "unprotected side and edge" during periods when it is not actively and continuously under construction.

"Lifeline" means a component consisting of a flexible line for connection to an anchorage at one end to hang vertically (vertical lifeline), or for connection to anchorages at both ends to stretch horizontally (horizontal lifeline), and which serves as a means for connecting other components of a personal fall arrest system to the anchorage.

"Lower levels" means those areas or surfaces to which an employee can fall. Such areas or surfaces include, but are not limited to, ground levels, floors, platforms, ramps, runways, excavations, pits, tanks, material, water, equipment, structures, or portions thereof.

"Personal fall arrest system" means a system used to arrest an employee in a fall from a working level. It consists of an anchorage, connectors, a body belt or body harness and may include a lanyard, deceleration device, lifeline, or suitable combinations of these.

"Positioning device system" means a body belt or body harness system rigged to allow an employee to be supported on an elevated vertical surface, such as a wall, and work with both hands free while leaning.

"Rope grab" means a deceleration device which travels on a lifeline and automatically, by friction, engages the lifeline and locks so as to arrest the fall of an employee. A rope grab usually employs the principle of inertial locking, cam/level locking, or both.

"Safety Nets...Safety nets shall be provided when workplaces are higher than 25 feet above ground or water surfaces or other surfaces where the use of ladders, scaffolds, catch platforms, temporary floors, safety lines or safety belts are impractical.

> Nets shall extend 8 feet beyond the edge of the work surface where employees are exposed and shall be installed as close under the work surface as practical but in no case more than 25 feet below the work surface. Nets shall be positioned in a manner to prevent the user from coming into contact with below surfaces or structures. Proper clearance positioning of nets shall be determined by impact load testing. Work procedures shall not begin until nets are in place and have been properly tested.
>
> New nets shall meet accepted performance standards of 17,500-foot pounds minimum impact resistance as determined and certified by the manufacturers and shall bear a label of proof test. Edge ropes shall provide a minimum breaking strength of 5,000 pounds.

"Self-retracting lifeline/lanyard" means a deceleration device containing a drum-wound line which can be slowly extracted from, or retracted onto, the drum under slight tension during normal employee movement, and which, after onset of a fall, automatically locks the drum and arrests the fall.

"Snap hook" means a connector comprised of a hook-shaped member with a normally closed keeper, or similar arrangement, which may be opened to permit the hook to receive an object and, when released, automatically closes to retain the object. Snap hooks are generally one of two types: (1) The locking type with a self-closing, self-locking keeper which remains closed and locked until unlocked and pressed open for connection or disconnection; or (2) The non-locking type with a self-closing keeper which remains closed until pressed open for connection or disconnection. As of January 1, 1998, the use of a non-locking snap hook as part of personal fall arrest systems and positioning device systems is prohibited.

"Unprotected sides and edges" mean any side or edge (except at entrances to points of access) of a walking/working surface, e.g., floor, roof, ramp, or runway where there is no wall or guardrail system at least 39 inches (1.0 m) high.

"Walking/working surface" means any surface, whether horizontal or vertical on which an employee walks or works, including, but not limited to, floors, roofs, ramps, bridges, runways, formwork and concrete reinforcing steel but not including ladders, vehicles, or trailers, on which employees must be located in order to perform their job duties.

"Work area" means that portion of a walking/working surface where job duties are being performed.

Drawing of Components



Figure A

1. Tie-off Point
2. Lifeline
3. Rope Grab
4. Shock Absorbing Lanyard
5. Cross-Arm Strap
6. Retractable Lifeline
7. Full-Body Harness
8. Restraining Belt
9. Restraining

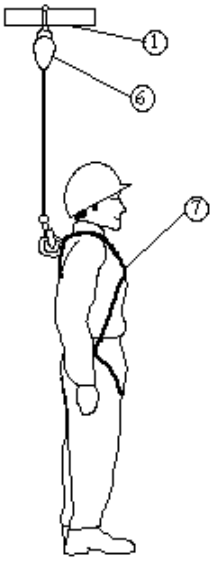


Figure B

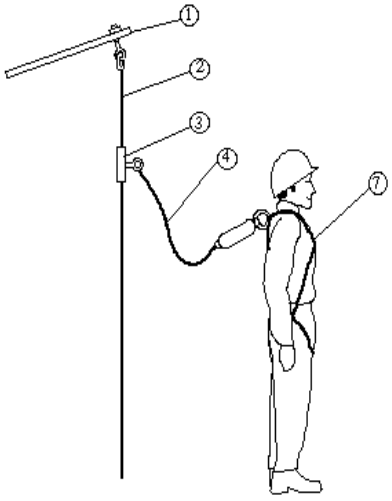


Figure C

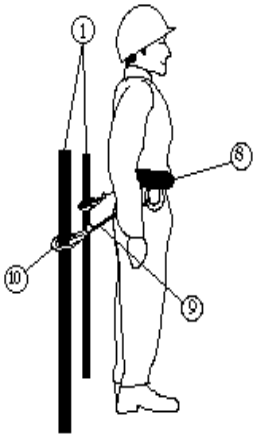


Figure D

29.4 RESPONSIBILITIES

Operations Manager

It is the responsibility of the local operations manager (designated competent person) to implement this Fall Protection Program. Continual observational safety checks of work operations and the enforcement of the safety policy and procedures shall be regularly enforced. All jobs shall be pre-planned prior to the start of work.

Supervisor

The Supervisor shall ensure that all persons assigned to work at elevated levels, exceeding 6 feet in height or more above lower level and where guardrails or nets are not utilized, be protected by personal fall protection equipment.

- Supervisors shall make exposure determinations and shall discuss with their employees the extent to which scaffolds, ladders or vehicle mounted work platforms can be used.
- Ensure that fall protection equipment is available and in safe working condition.
- Provide for emergency rescue in the event of a fall. Pre-plan the job to ensure that employees have been properly trained in the use, limitations, inspections and rescue procedures and that training records are on file.

Employees

Employees shall ensure they have and use the fall protection equipment as required by this program and:

- Understand the potential hazards of working at elevated levels as well as gaining access to and from the work location.
- Understand the use and limitations of such equipment.
- Pre-plan the job with his/her supervisor to agree that the job can be done safely.
- Inspect such equipment before each use and to report defective equipment immediately to their supervisor.

29.5 PROCEDURE

Fall protection is required whenever employees are potentially exposed to falls from heights of six feet or greater to lower levels. This includes work near and around excavations. Use of guard rails, safety net, or personal fall arrest systems should be used when the standard methods of protection are not feasible, or a greater hazard would be created.

Fall protection equipment will meet the requirements of applicable ANSI, ASTM or OSHA requirements. When purchasing equipment and raw materials for use in fall protection systems all applicable ANSI and ASTM requirements should be met.

29.6 MINIMUM STANDARDS

Fall protection must be provided to employees working at heights that exceed applicable regulatory thresholds.

Fall protection is required whenever employees are potentially exposed to falls from heights that exceed applicable regulatory thresholds. Guard rails, safety nets or personal or fall arrest systems should be used. Some applicable regulatory thresholds may include:

- General Industry 1910.23(b) - Protection for wall openings and holes. Every wall opening from which there is a drop of more than 4 feet shall be guarded.
- Construction Industry 1926.501(b)(1) - Unprotected sides and edges. Each employee on a walking/working surface (horizontal and vertical surface) with an unprotected side or edge which is 6 feet (1.8 m) or more above a lower level shall be protected from falling by the use of guardrail systems, safety net systems, or personal fall arrest systems.
- Marine Terminals 1917.112(b)(1) - Guardrails shall be provided at locations where employees are exposed to floor or wall openings or waterside edges, including bridges or gangway-like structures leading to pilings or vessel mooring or berthing installations, which present a hazard of falling more than 4 feet (1.22 m) or into the water.
- Shipyard Industry 1915.73(d) - When employees are exposed to unguarded edges of decks, platforms, flats, and similar flat surfaces, more than 5 feet above a solid surface, the edges shall be guarded by adequate guardrails.
- Steel Erection 1926.760(a)(1) - Each employee engaged in a steel erection activity who is on a walking/working surface with an unprotected side or edge more than 15 feet (4.6 m) above a lower level shall be protected from fall hazards by guardrail systems, safety net systems, personal fall arrest systems, positioning device systems or fall restraint systems.

The following are minimum standards for 3A Group employee personal fall protection systems:

- All D-rings must be a minimum of 2¼ inches (inside diameter).
- All snap hooks shall not allow pressure to be applied to the gate in the opening direction.
- No pelican hooks on lanyards should be used as a primary connection.
- Connectors shall be drop forged, pressed or formed steel, or made of equivalent materials.
- Connectors shall have a corrosion-resistant finish, and all surfaces and edges shall be smooth to prevent damage to interfacing parts of the system.
- D-rings and snap hooks shall have a minimum tensile strength of 5,000 pounds.
- D-rings and snap hooks shall be proof-tested to a minimum tensile load of 3,600 pounds without cracking, breaking, or taking permanent deformation.
- Snap hooks shall be sized to be compatible with the member to which they are connected to prevent unintentional disengagement of the snap hook. Only a locking type snap hook designed and used to prevent disengagement of the snap hook by the contact of the snap hook keeper by the connected member shall be used.
- Horizontal lifelines shall be designed, installed, and used, under the supervision of a qualified person, as part of a complete personal fall arrest system, which maintains a safety factor of at least two.
- Lanyards and vertical lifelines shall have a minimum breaking strength of 5,000 pounds. Where vertical lifelines are used, each employee shall be attached to a separate lifeline.
- Lifelines shall be protected against being cut or abraded.
- Self-retracting lifelines and lanyards which automatically limit free fall distance to 2 feet or less shall be capable of sustaining a minimum tensile load of 3,000 pounds applied to the device with the lifeline or lanyard in the fully extended position.

- Self-retracting lifelines and lanyards which do not limit free fall distance to 2 feet or less, rip stitch lanyards, and tearing and deforming lanyards shall be capable of sustaining a minimum tensile load of 5,000 pounds applied to the device with the lifeline or lanyard in the fully extended position.
- Anchorages used for attachment of personal fall arrest equipment shall be independent of any anchorage being used to support or suspend platforms and capable of supporting at least 5,000 pounds per employee attached, or shall be designed, installed, and used as part of a complete personal fall arrest system which maintains a safety factor of at least two and under the supervision of a qualified person.
- Systems used by an employee having a combined person and tool weight in excess of 310 pounds shall be modified to provide proper protection for such heavier loads.
- The attachment point of the body harness shall be located in the center of the wearer's back near shoulder level, or above the wearer's head, except when climbing.
- Body harnesses and components shall be used only for employee protection and not to hoist materials.
- Personal fall arrest systems and components subjected to impact loading shall be immediately removed from service and shall not be used again for employee protection until inspected and determined by a competent person to be undamaged and suitable for reuse.
- Provide for prompt rescue of employees in the event of a fall or assure that employees are able to rescue themselves.
- Personal fall arrest systems shall be inspected prior to each use for wear, damage and other deterioration, and defective components shall be removed from service.
- Personal fall arrest systems shall not be attached to guardrail systems, nor shall they be attached to hoists unless prior approval is obtained from a competent person.
- If and when a personal fall arrest system is used at hoist areas, it shall be rigged to allow the movement of the employee only as far as the edge of the walking/working surface.

29.7 STOPPING A FALL

The arresting force on an employee stopped by a fall shall be limited to a maximum arresting force of 1,800 pounds when wearing a body harness.

The fall arrest system shall be rigged such that an employee can neither free fall more than 6 feet, nor contact any lower level.

The fall arrest system shall bring an employee to a complete stop and limit maximum deceleration distance an employee travels to 3.5 feet.

The fall arrest system shall have sufficient strength to withstand twice the potential impact energy of an employee free falling a distance of 6 feet, or the free fall distance permitted by the system, whichever is less.

29.8 PROTECTION FROM FALLING OBJECTS

When employees are required to work in the near vicinity of others working with materials, tools, or equipment at elevated levels, Barricades around the immediate area of the overhead work shall be erected to prohibit employees from entering the barricaded area.

Employees performing work at elevated levels shall keep tools, materials, and equipment away from the edge to keep potential objects from falling over the side. Where practical, tools, etc. shall be secured with rope, wire, etc. to keep them from falling.

29.9 PORTABLE LADDERS

Three-point climbing is required while ascending/descending ladders. While on ladders, both hands and one foot, or both feet and one hand shall always be in contact with the ladder.

Tools required to perform a task shall be transported by a mechanical carrier such as a tag line, suspended bucket or tool belt.

- Tools shall not be carried by hand while climbing.
- Hands must be free to grip the ladder.
- Tools shall not be carried in clothing pockets.
- Tools shall be pulled up to the job site only after reaching the area of work.

When work is to be performed from straight/extension ladders, fall protection shall be utilized when heights exceed 6-feet.

Straight ladders shall be tied off at the top to prevent them from moving. A second person shall steady the ladder at the base while it is being tied off at the top by another employee. Do not tie off fall protection equipment to the ladder.

Storage
A dedicated storage area shall be provided for the storage of fall protection equipment and all components. The storage area shall keep the equipment clean, dry, and free from oils, chemicals, paints, and excessive heat.

Inspections
Fall protection equipment shall be inspected before each use for wear, damage, other deterioration, or other defects.

Elevated Personnel Platforms
Work performed, regardless of the nature of the work, from personnel platforms raised by forklifts, cranes, scissor lifts, etc., shall require the use of a full body harness and shall be connected to the platform.

Prompt Rescue of an Employee in the Event of a Fall
3A Group shall provide for prompt rescue of employees in the event of a fall or shall assure the employees are able to rescue themselves.

The pre-planning stage prior to the beginning of each elevated work assignment shall be evaluated by the supervisor to provide rescue of employees involved in a fall.

29.10 FALL PROTECTION PLAN

This option is available only to employees engaged in leading edge work who can demonstrate that it is infeasible, or it creates a greater hazard to use conventional fall protection equipment. The fall protection plan shall conform to the following provisions:

- The fall protection plan shall be prepared by a qualified supervisor and developed specifically for the site where the leading-edge work is being performed.
- The fall protection plan shall document the reasons why the use of conventional fall protection systems (guardrail systems, personal fall arrest systems, or safety net systems) are infeasible or why their use would create a greater hazard.
- The fall protection plan shall identify each location where conventional fall Protection methods cannot be used.
- These locations shall then be classified as controlled access zones.

29.11 CONTROLLED ACCESS ZONES

When used to control access to areas where leading edge or other operations are taking place the controlled access zone shall be defined by a control line or by any other means that restricts access.

When control lines are used, they shall be erected not less than 6 feet (1.8 m) nor more than 25 feet (7.7 m) from the unprotected or leading edge.

The control line shall extend along the entire length of the unprotected or leading edge and shall be approximately parallel to the unprotected or leading edge.

The control line shall be connected on each side to a guardrail system or wall.

- Control lines shall consist of ropes, wires, tapes, or equivalent materials.
- Each line shall be flagged or otherwise clearly marked at not more than 6-foot (1.8 m) intervals with high-visibility material.
- Each line shall be rigged and supported in such a way that its lowest point (including sag) is not less than 39 inches (1 m) from the walking/working surface and its highest point is not more than 45 inches (1.3 m).
- Each line shall have a minimum breaking strength of 200 pounds.

Only employees engaged in the related work shall be permitted in the controlled access zone.

29.12 SAFETY MONITORING SYSTEM

When the use of conventional fall protection equipment is deemed infeasible or the use of this equipment creates a greater hazard a Fall Protection Plan which includes a safety monitoring system shall be implemented by the supervisor.

Supervisors shall designate a competent person to monitor the safety of other employees. The competent person shall be assigned to:

- Recognize fall hazards;
- Warn employees if they are unaware of fall hazard or are acting in an unsafe manner;
- Be on the same working surface and in visual contact of working employees;
- Stay close enough for verbal communication; and
- Not have other assignments that would take his/her attention from the monitoring function.

29.13 INCIDENT INVESTIGATIONS

3A Group shall conduct accident investigations in the event of a fall, near miss or another serious incident.

Accident investigations shall be conducted to evaluate the fall protection plan for potential updates to practices, procedures or training in order to prevent reoccurrence.

Changes to the fall protection program shall be implemented if deemed appropriate from incident corrective actions.

29.14 TRAINING

Employees receive training pertaining to the recognition and elimination of fall hazards. A training program shall be provided for each employee who might be exposed to fall hazards. Training shall enable each employee to recognize the hazards of falling and shall train each employee in the procedures to follow to minimize these hazards.

The employee will be trained in the use and operation of fall arrest systems, inspections and maintenance procedures.

Retraining – Retraining shall be provided when the following are noted:

- Deficiencies in training,
- Workplace changes
- Fall protection systems or equipment changes that render previous training obsolete.

All training is documented. Written certification records must be maintained showing the following:

- Who was trained?
- When and dates of training
- Signature of person providing training
- Date 3A Group determined training was deemed adequate.

Training records shall be retained in the corporate office.

30 GAS CYLINDERS AND COMPRESSED GASES

GAS CYLINDERS AND COMPRESSED GASES

30.1 PURPOSE:

The purpose of this program is to prevent injury from failing or failure of compressed gas cylinders and to establish requirements for handling, lifting and storing compressed gas cylinders safely.

30.2 SCOPE

This program covers all employees and contractors who handle, transport and/or use compressed gas cylinders.

30.3 KEY RESPONSIBILITIES

30.3.1 MANAGERS/SUPERVISORS

Shall ensure that all employees are aware of the proper handling, storage and use requirements for compressed gas cylinders.
Shall ensure that initial training is conducted for all new employees and that retraining is conducted when employee behaviors suggest that retraining is warranted.

30.3.2 EMPLOYEES

Shall follow all requirements regarding the safe handling, storage and use of compressed gas cylinders.

30.4 PROCEDURE

Cylinders shall not be accepted, stored or used if evidence of denting, bulging, pitting, cuts, neck or valve damage is observed. If damage is observed:
The cylinder must be taken out of service.
The cylinder's owner shall be notified to remove the cylinder from the premises.
If owned, the cylinder shall be de-pressured and inspected as required by this program.

30.5 CYLINDER IDENTIFICATION

Gas identification shall be stenciled or stamped on the cylinder or a label used. No compressed gas cylinder shall be accepted for use that does not legibly identify its content by name.

30.6 HANDLING

- Valve caps must be secured onto each cylinder before moving or storage.
- Secure the cylinder in a blanket when being lifted by mechanical means. Slings, ropes or electromagnets are prohibited to be used for lifting compressed gas cylinders.
- The preferred means to move compressed gas cylinders is with a cart, carrier or with a helper.
- Compressed gas cylinders must not be allowed to strike each other.
- When a cylinder cap cannot be removed by hand the cylinder shall be tagged "Do Not Use" and returned to the designated storage area for return to vendor.

30.7 STORING

All cylinders must be secured upright in a safe, dry, well-ventilated area that limits corrosion and deterioration.

- Cylinders must be secured by means that will prevent the cylinder from falling.
- When securing the cylinder, the restraints shall not be attached to electrical conduit or process piping.

Empty and non-empty cylinders shall be stored separately. All stored cylinders shall be capped.

Oxygen cylinders must be stored a minimum of 20 feet from combustible gas cylinders or areas where there may be open flame or arcing. Cylinders may also be stored where the oxygen is separated from combustible gas cylinders by a 5 foot or higher wall with a fire resistance rating of 30 minutes.

Storage areas for full and empty cylinders must be designated and labeled. Cylinders should be stored in definitely assigned places away from elevators, stairs or gangways.

30.8 USE

- Cylinders must be equipped with the correct regulators. Regulators and cylinder valves should be inspected for grease, oil, dirt and solvents. Only tools provided by the supplier should be used to open and close cylinder valves.
- Never force or modify connections.
- Only regulators and gauges shall be used within their designated ratings.
- The use of a pressure-reducing regulator is required at the cylinder, unless the total system is designed for the maximum cylinder pressure.
- Valves must be closed when cylinders are not in use.
- Cylinders shall not be used as rollers or supports.
- Cylinders shall not be placed where they can come in contact with electrical circuits.
- Cylinders must be protected from sparks, slag or flame from welding, burning or cutting operations.
- Empty cylinders must be returned to designated storage areas as soon as possible after use.

30.9 INSPECTION OF COMPRESSED GAS CYLINDERS

3A Group shall determine that compressed gas cylinders under its control are in a safe condition to the extent that this can be determined by visual inspection. Visual and other inspections shall be conducted as prescribed in the Hazardous Materials Regulations of the Department of Transportation (49 CFR parts 171-179 and 14 CFR part 103). Where those regulations are not applicable, visual and other inspections shall be conducted in accordance with Compressed Gas Association Pamphlets C-6-1968 and C-8-1962. Some elements include, but are not limited to:
Hoses and connections should be inspected regularly for damage. Hoses should be stored in cool areas and protected from damage.
These owned cylinders shall be visually inspected prior to charging, before each use and at least annually.
All inspections and testing must be documented.

High Pressure Cylinders are those cylinders marked for service pressures of 900 psi and greater.
High pressure cylinders shall be taken out of service and submitted for re-qualification testing when any of the following conditions are identified by visual inspection.
Cuts, dings, gouges, dents bulges, pitting, neck damage or evidence of exposure to fire.
The cylinders shall be inspected and retested according to the requirements stated in 49 CFR 180.205 and .209.
Re-qualification of non-damaged cylinders shall be conducted per the schedule in 49 CFR 180.209.

Low Pressure Cylinders are those cylinders marked for service pressures of less than 900 psi.
Low pressure cylinders fall into two categories, those requiring requalification and those that do not require re-qualification.

Low pressure cylinders that do not require re-qualification shall be taken out of service and condemned when any of the following conditions are identified during inspection:
The tare weight of the cylinder is less than 90% of the stamped-on weight of the cylinder.
Observed pitting, dents, cuts, bulging, gouges or evidence of exposure to fire.
Low pressure cylinders subject to re-qualification shall be taken out of service, inspected and retested when visual inspection identifies any of the following conditions; dents, bulges, pitting or neck damage.
Re-qualification of non-damaged cylinders shall be conducted per the schedule in 49 CFR 180.209.

30.10 LEAKING CYLINDERS

Leaking cylinders should be moved promptly to an isolated, well-ventilated area, away from ignition sources. Soapy water should be used to detect leaks. If the leak is at the junction of the cylinder valve and cylinder, do not try to repair it. Contact the supplier and ask for response instructions.

30.11 TRANSPORTATION

Cylinders must be transported in a vertical secured position using a cylinder basket or cart and must not be rolled. Regulators should be removed, and cylinders capped before movement. Cylinders should not be dropped or permitted to strike violently, and protective caps are not used to lift cylinders.

30.12 EMPTY CYLINDER MARKING

Cylinders should be marked as "MT" and dated when empty. Never mix gases in a cylinder and only professionals should refill cylinders. Empty cylinders must be handled as carefully as when filled.

30.13 ENGINEERING CONTROLS

Engineering controls such as emergency shutoff switches, gas cabinets and flow restrictors should be used wherever possible to control hazards. Emergency eyewash facilities should be present where corrosive gases or materials are used.

30.14 SAFETY RULES

1. All portable cylinders used for the storage and shipment of compressed gases shall be constructed and maintained in accordance with DOT regulations.
2. Compressed gas cylinders shall be equipped with connections complying with ANSI B57.1-1965. "Compressed Gas Cylinder Valve Outlet and Inlet Connections".
3. All cylinders with a water weight capacity of over 30 pounds shall be equipped with means of connecting a valve protection device or with a collar or recess to protect the valve.
4. Compressed gas cylinders shall be legibly marked, for the purpose of identifying the gas content, with either the chemical or the trade name of the gas. Such markings shall be by means of stenciling, stamping, or labeling, and are not readily removable. Whenever practical, the markings will be located on the shoulder of the cylinder.
5. Compressed air or other compressed gases in excess of 10 pounds per square inch gauge will not be used to blow dirt, chips, or dust from clothing while it is being worn.
6. Compressed air or gases shall not be used to empty containers of liquids where the pressure can exceed the safe working pressure of the container.
7. The use of compressed air will be so controlled, and proper personal protective equipment or safeguards utilized, as to protect against the possibility of eye or body injury to the operator or other workers.

8. Abrasive blast cleaning nozzles shall be equipped with an operating valve that must be held open manually. A support will be provided on which the nozzle may be mounted when it is not in use.
9. Compressed gases shall not be used to elevate or otherwise transfer any hazardous substance from one container to another unless the containers are designed to withstand, with a factor of safety of at least four, the maximum possible pressure that may be applied.
10. Always identify the contents of a gas cylinder before using it. If a cylinder is not clearly labeled, return it to the Responsible Safety Officer.
11. Before using a cylinder, be sure it is properly supported with two metal chains or the equivalent to prevent it from failing. Contamination of compressed gas cylinders by feedback of process materials must always be prevented by installation of suitable traps or check valves.
12. Suitable pressure-regulating devices and relief devices must always be used when gas is admitted to systems having pressure limitations lower than the cylinder pressure.
13. Gas cylinder valves can be "cracked" (opened slightly) momentarily before regulators are attached to blow dirt off the valve seats, but the valve outlet should always be pointed away from people or equipment. (Cracking the valve is not recommended with hydrogen because it can be ignited by static charge or friction.)
14. After the regulator is securely attached to the cylinder valve, fully release (turn counterclockwise) the pressure-adjusting screw of the regulator before opening the cylinder valve.
15. Open gas cylinder high pressure valves slowly, this gives compression heat, time to dissipate and prevents “bumping” the gauges.
16. Never use a wrench on any cylinder-valve hand wheel.
17. Keep removable keys or handles on valve spindles or stems while cylinders are in service.
18. Never leave pressure in a system that is not being used.
19. To shut down a system, close the cylinder valve and vent the pressure from the entire system.
20. Equipment must not be disassembled while it is under pressure.
21. Be aware that any valved-off portion of the system may still be under pressure. Bleed the hose, line, or vessel before disassembly to ensure that there is not enough pressure energy stored in the trapped gas or in piping distortion to propel loose objects.
22. Connections to piping, regulators, and other appliances should always be kept tight to prevent leakage.
23. Where a hose is used, it should be kept in good condition.
24. Manifold pigtails should not be left disconnected for more than a few minutes. Certain insects are attracted to pure gases and will quickly clog these lines.
25. Never use compressed gas to dust off clothing. This may cause serious injury or create a fire hazard.
26. About 30 psi gauge pressure (0.2 MPa) must be left in "empty" cylinders to prevent air from entering the cylinder and contaminating it. Air contamination in a hydrogen cylinder is extremely dangerous.
27. Before a regulator is removed from a cylinder, close the cylinder valve and release all pressure from the regulator.
28. Before returning an empty cylinder, close the valve and replace the cylinder-valve protective cap and outlet cap or plug, if used.

30.15 COMPRESSED GAS CYLINDER MAINTENANCE FORM

Cylinder No. or Location	Problem Observed	Date	Corrective Action Required	Date Corrective Action Taken	Responsible Safety Officer

30.16 COMPRESSED GAS CYLINDER INSPECTION FORM

Cylinder no. or location						

31 HAND AND PORTABLE POWER TOOLS

3A GROUP
HAND AND PORTABLE POWER TOOLS

31.1 POLICY

The purpose of this program is to provide establish requirements for the safe operation of hand and power tools and other portable tools, including proper guarding. All hand and power tools shall be maintained in a safe condition.
3A Group shall ensure that all hand tools are used properly, safely and in accordance with all manufacturer's guidelines.

31.2 AUTHORITY AND RESPONSIBILITY

31.2.1 ENVIRONMENTAL HEALTH AND SAFETY IS RESPONSIBLE FOR:

1. Assisting supervisors in identifying hazardous conditions in regard to hand/power tools;
2. Inspecting areas to ensure that this policy is being adhered to; and
3. Providing safety awareness training, as needed.

31.2.2 DEPARTMENT SUPERVISORS ARE RESPONSIBLE FOR:

1. Anticipating all work hazards;
2. Ensuring that all safeguards are utilized;
3. Working with Environmental Health and Safety to initiate any necessary administrative action required to enforce safe work practices;
4. Replacing all damaged tools;
5. Ensuring that tools are being properly maintained by instituting an inspection program;
6. Ensuring employees are trained to use tools properly and in accordance with the manufacturer's instructions; and
7. Taking the appropriate corrective action in accordance with the 3A Group's Personnel Policy for employees not complying with this policy.

31.2.3 EMPLOYEES ARE RESPONSIBLE FOR:

1. Anticipating all work hazards;
2. Ensuring that all safeguards are utilized;
3. Conducting routine inspections to ensure that tools are properly maintained;
4. Reporting to their supervisor any tool that needs to be replaced;
5. Following all safety guidelines for the use of hand/power tools and according to manufacturer's instructions; and
6. Participating in training provided by the department.

31.3 GENERAL SAFETY PRECAUTIONS

Employees who use hand and power tools and who are exposed to the hazards of falling, flying, abrasive and splashing objects, or exposed to harmful dusts, fumes, mists, vapors, or gases must be provided with the appropriate equipment needed, including Personal Protective Equipment, to protect them from the hazard. Refer to the 3A Group's Personal Protective Equipment policy.

Any tool which is not in compliance with any applicable requirement of this plan is prohibited and shall either be identified as unsafe by tagging or locking the controls to render them inoperable or shall be physically removed from its place of operation.

All hazards involved in the use of power tools can be prevented by following some basic safety rules:

- Keep all tools in good condition with regular maintenance;
- Use the right tool for the job;
- Examine each tool for damage before use;
- Operate according to the manufacturer's instructions;
- Utilize the proper protective equipment. Refer to the 3A Group's **Personal Protective Equipment Policy**; and
- Participate in safety training.

Employees and employers have a responsibility to work together to establish safe working procedures. Refer to the **Hand and Portable Tool Information Sheet**. If a hazardous situation is encountered, it shall be brought to the attention of the Department Supervisor and/or Environmental Health and Safety for evaluation and corrective action. Additionally, only 3A Group employees shall use 3A Group hand/portable power tools.

31.4 HAND TOOLS

Hand tools are non-powered. They include anything from axes to wrenches. The greatest hazards posed by hand tools result from misuse and improper maintenance.

Some examples of misuse include the following:

- Using a screwdriver as a chisel may cause the tip of the screwdriver to break and fly, hitting the user or other employees;
- Using a tool with a wooden handle (e.g., hammer) if the handle is loose, splintered, or cracked, the head of the tool may fly off and strike the user or another worker;
- Using a wrench if its jaws are sprung, because it might slip; and
- Using impact tools (e.g., chisels, wedges) if they have mushroomed heads, the heads might shatter on impact, sending sharp fragments flying.

Hand tool precautions including the following:

- Employers shall caution employees that saw blades, knives or other tools be directed away from aisle areas and other employees working in close proximity. Knives and scissors shall be sharp. Dull tools can be more hazardous than sharp ones;
- Floors shall be kept as clean and dry as possible to prevent accidental slips with or around dangerous hand tools; and
- Around flammable substances, sparks produced by iron and steel hand tools can be a dangerous ignition source. Where this hazard exists, spark-resistant tools made from brass, plastic, aluminum or wood shall be used.

31.5 POWER TOOLS

Power tools can be hazardous when improperly used. There are several types of power tools, based on the power source they use: electric, pneumatic, liquid fuel, hydraulic, and powder-actuated.

The following general precautions shall be observed by power tool users:

- Never carry a tool by the cord or hose;
- Never remove prongs from any cords;
- Never stand in or near water when using tools;
- Always use a Ground Fault Circuit Interrupter (GFCI) with electrical tools if working in a wet environment;
- Never "yank" the cord or the hose to disconnect it from the receptacle;
- Keep cords and hoses away from heat, oil and sharp edges;
- Replace all frayed and/or damaged extension cords. Do not try to tape cords;

- Disconnect tools when not in use, before servicing and when changing accessories such as blades, bits and cutters;
- All observers shall be kept at a safe distance away from the work area;
- Secure work with clamps or a vise, freeing both hands to operate the tool;
- Avoid accidental starting. The worker shall not hold a finger on the switch button while carrying a plugged-in tool;
- Tools shall be maintained with care. They shall be kept sharp and clean for the best performance. Follow instructions in the user's manual for maintenance, lubricating and changing accessories;
- Maintain good footing and balance;
- Avoid loose fitting clothes, ties or jewelry such as bracelets, watches or rings, which can become caught in moving parts;
- Use tools that are either double-insulated or grounded (three-pronged);
- Keep work area well-lit when operating electric tools;
- Ensure that cords and hoses do not pose as a tripping hazard; and
- All portable electric tools that are damaged shall be removed from use and tagged "Do Not Use". This shall be done by supervisors and/or employees.

31.6 GUARDS

Guards shall be in place and operable at all times while the tool is in use. The guard may not be manipulated in such a way that will compromise its integrity or compromise the protection in which intended. Guarding shall meet the requirements set forth in ANSI B15.1.
Hazardous moving parts of a power tool need to be safeguarded. For example, belts, gears, shafts, pulleys, sprockets, spindles, drums, fly wheels, chains, or other reciprocating, rotating, or moving parts of equipment shall be guarded if such parts are exposed to contact by employees.
Guards, as necessary, shall be provided to protect the operator and others from the following: Point of operation;

- Nip points;
- Rotating parts;
- Flying chips; and
- Spark.

Safety guards shall never be removed when a tool is being used. For example, portable circular saws shall be equipped with guards. An upper guard shall cover the entire blade of the saw. A retractable lower guard shall cover the teeth of the saw, except when it makes contact with the work material. The lower guard shall automatically return to the covering position when the tool is withdrawn from the work. Refer to the 3A Group's Machine Guarding policy.

31.7 SAFETY SWITCHES

The following hand-held power tools shall be equipped with a momentary contact "on-off" control switch: drills, tappers, fastener drivers, horizontal, vertical and angle grinders with wheels larger than two inches in diameter, disc and belt sanders, reciprocating saws, saber saws and other similar tools. These tools also may be equipped with a lock-on control provided that turnoff can be accomplished by a single motion of the same finger or fingers that turn it on.
The following hand-held powered tools may be equipped with only a positive "on-off" control switch: platen sanders, disc sanders with discs two inches or less in diameter; grinders with wheels two inches or less in diameter; routers, planers, laminate trimmers, nibblers, shears, scroll saws and jigsaws with blade shanks quarter inch wide or less.

Other hand-held powered tools such as circular saws having a blade diameter greater than two inches, chain saws and percussion tools without positive accessory holding means shall be equipped with a constant pressure switch that will shut off the power when the pressure is released.

31.8 ELECTRIC TOOLS

Employees using electric tools shall be aware of several dangers with the most serious being the possibility of electrocution.
Among the chief hazards of electric-powered tools are burns and slight shocks which can lead to injuries or even heart failure.
To protect the user from shock, tools shall either have a three-wire cord with ground and be grounded, be double insulated, or be powered by a low-voltage isolation transformer. Anytime an adapter is used to accommodate a two-hole receptacle, the adapter wire shall be attached to a known ground. The third prong shall never be removed from the plug.
Tools shall be shut down before cleaning, repairing or oiling. Disconnect or use Lockout/Tagout Procedures. Refer to the 3A Group's Lockout/Tagout Program.
These general practices shall be followed when using electric tools:

- Electric tools shall be operated within their design limitations;
- Gloves, eye protection, and safety footwear are recommended during use of electric tools;
- When not in use, tools shall be stored in a dry place;
- Electric tools shall not be used in damp or wet locations; and
- Work areas shall be well lit, even if this means the operators has to augment the work surface illumination by other appropriate means

31.9 POWERED ABRASIVE WHEEL TOOLS

Powered abrasive grinding, cutting, polishing, and wire buffing wheels create special safety problems because they may throw off flying fragments or excessive dust.
Before an abrasive wheel is mounted, it shall be inspected closely and sound- or ring-tested to ensure that it is free from cracks or defects. To test, wheels shall be tapped gently with a light non-metallic instrument. If the wheel sounds cracked or dead, they could fly apart in operation and shall not be used. A sound and undamaged wheel will give a clear metallic tone or “ring.” To prevent the wheel from cracking, the user shall be sure it fits freely on the spindle. The spindle nut shall be tightened enough to hold the wheel in place, without distorting the flange. Follow the manufacturer’s recommendations. Care shall be taken to ensure that the spindle wheel does not exceed the abrasive wheel specifications.
Due to the possibility of a wheel disintegrating (exploding) during start-up, the employee shall never stand directly in front of the wheel as it accelerates to full operating speed.
Portable grinding tools need to be equipped with safety guards to protect workers not only from the moving wheel surface, but also from flying fragments in case of breakage.
In addition, when using a power grinder:

- Always use eye protection and a dust mask;
- Turn off the power when not in use; and
- Never clamp a hand-held grinder in a vise.

31.10 PNEUMATIC TOOLS

Pneumatic tools are powered by compressed air and include chippers, drills, hammers, and sanders.
There are several dangers encountered in the use of pneumatic tools. The main one is the danger of getting hit by one of the tool’s attachments or by some kind of fastener the worker is using with the tool.

Eye protection is required, and face protection is recommended for employees working with pneumatic tools. When sanders are used, dust masks shall also be worn.
Noise is another hazard. Working with noisy tools (e.g. jackhammers) requires proper, effective use of hearing protection. Refer to the 3A Group's Hearing Conservation program.
When using pneumatic tools, employees shall ensure they are fastened securely to the hose to prevent them from becoming disconnected. A short wire or positive locking device attaching the air hose to the tool will serve as an added safeguard.
A safety clip or retainer shall be installed to prevent attachments, such as chisels on a chipping hammer, from being unintentionally shot from the barrel.
Screens shall be set up to protect nearby workers from being struck by flying fragments around chippers, riveting guns, staplers or air drills.
Compressed air guns shall never be pointed toward anyone. Users shall never “dead-end” it against themselves or anyone else. It is recommended to use air guns equipped with safety tips that have relief ports to reduce pressure if blockage or dead ending occurs.

31.11 POWDER-ACTUATED TOOLS

Powder-actuated tools operate like a loaded gun and shall be treated with the same respect and precautions. The use of powder-actuated tools is prohibited until approved by Environmental Health and Safety.
Safety precautions to remember includes the following:

- These tools shall not be used in an explosive or flammable atmosphere;
- Before using the tool, the worker shall inspect it to determine that it is clean, all moving parts operate freely, and the barrel is free from obstructions;
- Employees shall not modify tools;
- The tool shall never be pointed at anybody;
- The tool shall not be loaded unless it is to be used immediately. A loaded tool shall not be left unattended, especially where it could be available to unauthorized persons;
- Hands shall be kept clear of the barrel end;
- To prevent the tool from firing accidentally, two separate motions are required for firing: one to bring the tool into position and another to pull the trigger;
- The tools shall not be able to operate until they are pressed against the work surface with a force of at least five pounds greater than the total weight of the tool;
- If a powder-actuated tool misfires, the employee shall wait at least 30 seconds, then try firing it again;
- If it still will not fire, the user shall wait another 30 seconds so that the faulty cartridge is less likely to explode then carefully remove the load. The bad cartridge shall be put in water;
- Suitable eye and face protection are essential when using a powder-actuated tool;
- The muzzle end of the tool shall have a protective shield or guard centered perpendicularly on the barrel to confine any flying fragments or particles that might otherwise create a hazard when the tool is fired. The tool shall be designed so that it will not fire unless it has this kind of safety device;
- All powder-actuated tools shall be designed for varying powder charges so that the user can select a powder level necessary to do the work without excessive force; and
- If the tool develops a defect during use, it shall be tagged and taken out of service immediately until it is properly repaired.

31.12 HYDRAULIC POWER TOOLS

The fluid used in hydraulic power tools shall be an approved fire-resistant fluid and shall retain its operating characteristics at the most extreme temperatures to which it will be exposed.
The manufacturer's recommended safe operating pressure for hoses, valves, pipes, filters and other fittings shall not be exceeded.

31.13 ERGONOMICS

The use of hand and portable power tools may be the source of certain ergonomic stressors, which may lead to the development of musculoskeletal disorders. Refer to the 3A Group's **Ergonomics** policy for more information.

31.14 HAND AND PORTABLE TOOL INFORMATION SHEET

Environmental Health and Safety General Safety Precautions

- Only 3A Group employees shall use 3A Group tools/portable powered tools.
- Every tool was designed to do a certain job. Use it for its intended purpose.
- Do not force tools beyond their capacity.
- Keep your tools in good condition: sharp, clean, oiled, dressed and not abused.
- Tools subject to impact (e.g., chisels, drills, punches) tend to "mushroom".
- Keep them sharpened to avoid flying chips. Use tool holders.
- Drill Bits shall be kept sharp, not dull, chipped, rounded or tapered.
- Worn tools are dangerous. For example, the teeth in a pipe wrench can slip if worn smooth, an adjustable wrench will slip if its jaws are sprung and hammer heads can fly off loose handles.
- Wrenches, if adjustable, shall work freely and adjust properly. Gripping teeth or smooth jaws shall not be worn. Always use the proper size wrench for the job. Never use a wrench as a hammer.
- Hammers shall not have broken claws or handles. Check for loose handles. Always use proper size and weight for the job.
- Screwdriver points shall not be badly worn, and handles shall be in good condition. Use the proper size and type of screwdriver for the job.
- Cutting tools shall be kept sharp to ensure good smooth cutting. Always use proper handles.

Before Use

- Is the tool sized right for the job?
- Is it in the proper working condition?
- Whenever possible, ground all power tools.
- Always wear the proper personal protective equipment required for the job. Protect your eyes, hands, ears and other body parts.
- Do not remove or make ineffective any safeguards unless authorized. Guards removed for repairs shall be replaced promptly.
- Cords shall not be frayed or damaged.
- Tools shall be inspected regularly to ensure cleanliness and proper operation.
- There shall be a power shut off switch within reach of the operator of each tool.
- Tools shall be equipped with an emergency stop button that is colored red.

31.15 PERSONAL PROTECTIVE EQUIPMENT

Employees using hand and power tools and exposed to the hazard of falling, flying, abrasive, and splashing objects, or exposed to harmful dust, fumes, mists, vapors or gases shall be provided with the particular PPE necessary to protect them from the hazard.

32 HAZARD COMMUNICATION / GHS

HAZARD COMMUNICATION

32.1 PURPOSE

The purpose of this program is to ensure the safe use of hazardous chemical substances and to comply with the requirements of OSHA HCS 2012.

32.2 INTRODUCTION

In 2012, OSHA revised the Hazard Communication Standard (HCS) to align with the Globally Harmonized System of Classification and Labeling of Chemicals (GHS). As a result, this Hazard Communication Program (HCP) has been revised to comply with the requirements of the OSHA HCS 2012.

It spells out how 3A Group will inventory chemicals stored and used, obtain and use Safety Data Sheets, maintain labels on chemical substances and train employees about the hazards of chemicals they are likely to encounter on the job.

Preparation of this program indicates our continuing commitment to safety among our employees in all of our locations.

- Each facility is expected to follow this program and maintain its work areas in accordance with these requirements.
- Employees, their designated representatives, and government officials must be provided copies of this program upon request.
- In addition to the program, other information required as part of our hazard communication effort is available to workers upon request.
- Asking to see this information is an employee's right.
- Using this information is part of our shared commitment to a safe, healthy workplace.

32.3 SCOPE

This program is applicable to all 3A Group employees who may be exposed to hazardous chemical substances. When work is performed on a non-owned or operated site, the operator’s program shall take precedence, however, this document covers 3A Group employees and contractors and shall be used on owned premises, or when an operator’s program doesn’t exist or is less stringent.

32.4 RESPONSIBILITIES

A written hazard communication program be developed, implemented and maintained at each workplace. A written hazard communication program shall be developed, implemented and maintained at each workplace that describes how labels and other forms of warning, Safety Data Sheets and employee information will be met.

32.4.1 SAFETY MANAGER OR DESIGNEE

The Safety Manager, or designee, is responsible for administering the hazard communication program. This person is also responsible for:

- Reviewing the potential hazards and safe use of chemicals.
- Maintaining a list of all hazardous chemicals and a master file of SDSs.
- Ensuring that all containers are labeled, tagged or marked properly.
- Providing new-hire and annual training for employees.

- Maintaining training records.
- Identifying hazardous chemicals used in nonroutine tasks and assessing their risks.
- Informing outside contractors who are performing work on 3A Group property about potential hazards.
- Reviewing the effectiveness of the hazard communication program and making sure that the program satisfies the requirements of all applicable federal, state or local hazard communication requirements.

32.4.2 EMPLOYEES

- Employees are responsible for following the requirements in the Hazard Communication Program.
- Any employee who transfers any material from one container to another is responsible for labeling the new container with all required information.
- All employees are responsible for learning the requirements of this section and for applying them to their daily work routine.
- Identifying hazards before starting a job.
- Reading container labels and SDSs.
- Notifying the supervisor of torn, damaged or illegible labels or of unlabeled containers.
- Using controls and/or personal protective equipment provided by the company to minimize exposure.
- Following company instructions and warnings pertaining to chemical handling and usage
- Properly caring for personal protective equipment, including proper use, routine care and cleaning, storage and replacement.
- Knowing and understanding the consequences associated with not following 3A Group policy concerning the safe handling and use of chemicals.
- Participating in 3A Group training.

32.5 PROCEDURE

32.5.1 LIST OF HAZARDOUS CHEMICALS

3A Group shall maintain a list of hazardous chemicals on the job site. A list of the hazardous chemicals known to be present using an identity that is referenced on the appropriate Safety Data Sheet shall be maintained.

The Hazardous Chemical List is updated as necessary and at least annually by the Safety Manager or their designee. The Hazardous Chemical List must be available for review upon request.

32.5.2 SAFETY DATA SHEETS (SDS)

SDSs must be obtained for each required chemical. Chemical manufacturers are responsible for developing SDSs. 3A Group shall have a SDS for each chemical used.

The purchasing of any potentially hazardous chemical products from any supplier that does not provide an appropriate Safety Data Sheet in a timely fashion is prohibited.

SDSs are to be maintained in a readily accessible location to employees. SDSs shall be maintained and readily accessible in each work area. SDSs can be maintained at the primary work site. However, they should be available in case of an emergency. SDS must be made available, upon request, to employees, their designated representatives, the Assistant Secretary & the Director.

The Safety Data Sheet must be kept in the SDS library for as long as the chemical is used by the facility.

Electronic access (telephone, fax, internet, etc.) may be used to acquire and maintain SDS libraries and archives.

The Manager is responsible for seeing that the Chemical Inventory List inventory is maintained, is current and is complete. He/she will review Chemical Inventory List at least annually. When a hazardous material has been permanently removed from the workplace, its SDS is to be removed from the Chemical Inventory List.

SDS' for hazardous materials to which 3A Group employees have been exposed must be maintained after the employee leaves the employment of 3A Group.

32.5.3 METHODS TO BE USED TO INFORM EMPLOYEES OF THE HAZARDS OF NON-ROUTINE TASKS

The methods that 3A Group will use to inform employees of the hazards of non-routine tasks (i.e., the cleaning of reactor vessels, etc.) and the hazards associated with chemicals contained in unlabeled pipes in their work areas include:

- Conducting a Job Hazard Assessment (JSA).
- Employees will be advised of methods and special precautions, PPE and the hazards associated with chemicals and the hazards associated with chemicals contained in unlabeled pipes in their work areas.
- In the unlikely event that such tasks are required, the supervisor, or designee, will provide a SDS for the involved chemical.

32.5.4 THE USE AND CARE OF LABELS AND OTHER FORMS OF WARNING

Container labels should contain the following information:

- Product identifier
- Signal word
- Hazard statement
- Pictogram(s)
- Precautionary statement(s), and
- Name, address and telephone number of the chemical manufacturer, importer or other responsible party.

The Manager will ensure that all hazardous chemicals used or stored in the facility are properly labeled.

Damaged labels or labels with incomplete information shall be reported immediately.

Workplace labels or other forms of warning will be legible, in English and prominently displayed on the container or readily available in the work area throughout each work shift.

If employees speak languages other than English, the information in the other language(s) may be added to the material presented as long as the information is presented in English as well.

3A Group will use the GHS labeling system for secondary containers.
Portable containers into which hazardous chemicals are transferred from labeled containers and that are intended for the immediate use of the employee who performs the transfer do not require a label.

If the portable container will be used by more than one employee or used over the course of more than one shift, the container must be labeled.

Received from vendors that are not properly labeled must be rejected.

32.6 PICTOGRAMS AND HAZARDS

Health Hazard	Flame	Exclamation Mark
		
• Carcinogen • Mutagenicity • Reproductive Toxicity • Respiratory Sensitizer • Target Organ Toxicity • Aspiration Toxicity	• Flammables • Pyrophorics • Self-Heating • Emits Flammable Gas • Self-Reactives • Organic Peroxides	• Irritant (skin and eye) • Skin Sensitizer • Acute Toxicity (harmful) • Narcotic Effects • Respiratory Tract Irritant • Hazardous to Ozone Layer (Non-Mandatory)
Gas Cylinder	**Corrosion**	**Exploding Bomb**
		
• Gases Under Pressure	• Skin Corrosion/ Burns • Eye Damage • Corrosive to Metals	• Explosives • Self-Reactives • Organic Peroxides
Flame Over Circle	**Environment** (Non-Mandatory)	**Skull and Crossbones**
		
• Oxidizers	• Aquatic Toxicity	• Acute Toxicity (fatal or toxic)

32.7 EXAMPLE LABEL

HS85
Batch number: 85L6543



Warning
Harmful if swallowed

Wash hands and face thoroughly after handling. Do not eat, drink or smoke when using this product. Dispose of contents/container in accordance with local, state and federal regulations.

First aid:
If swallowed: Call a doctor if you feel unwell. Rinse mouth.

GHS Example Company, 123 Global Circle, Anyville, NY 130XX Telephone (888) 888-8888

32.8 MULTI-EMPLOYER JOB SITES AND/OR MULTI WORK SITE

The following specific methods for providing other employer information concerning hazardous chemicals at job sites, methods of providing SDS sheets, methods of precautionary measures to be taken and methods of providing information on labeling systems:

32.8.1 MULTI-WORK SITES

Where employees must travel between workplaces during a work shift (multi job sites), the written program may be kept at a primary job site. If there is no primary, then the program should be sent with employees.

32.8.2 MULTI-EMPLOYER JOB SITES

A pre-job briefing shall be conducted with the contractor prior to the initiation of work on the site.

- During this pre-job briefing, contractors shall notify 3A Group and present current copies of Safety Data Sheets and label information for every hazardous chemical brought on-site.
- 3A Group shall notify and provide required SDS and label information for all hazardous chemicals the contractor may encounter on the job.
- The facilities labeling system and any precautionary measures to be taken by contractor during normal conditions and emergencies shall be addressed.
- By providing such information to other employers, 3A Group does not assume any obligations that other employers have for the safety of their employees.

32.9 TRAINING

Employees shall be provided with information and training. Employees shall be provided with effective information and training on hazardous chemicals in their work area at the time of their initial assignment and whenever a new physical or health hazard the employees have not previously been trained about is introduced into their work area. Information and training may be designed to cover categories of hazards (e.g., flammability, carcinogenicity) or specific chemicals. Chemical-specific information must always be available through labels and safety data sheets.

Additional training will be provided whenever a new chemical hazard is introduced into the work area. To reinforce the importance of handling chemicals properly when performing new or non-routine tasks supervisors will conduct supplementary training as needed.

Formal training will be conducted by facility employees or individuals who are knowledgeable in the Hazard Communication program.

The Hazard Communication Program documented training shall, as a minimum, include:

- Requirements of the OSHA Hazard Communication Standard 29 CFR 1910.1200 (General Industry) or 29 CFR 1926.59 (Construction Industry).
- Operations in the work area where hazardous chemicals are present.
- Location and availability of the hazard communication program, chemical inventory list and SDSs.
- Methods and observations used to detect the presence or release of a hazardous chemical in the work area, such as monitoring devices, visual appearance or odor of hazardous chemicals when being released.
- Explanation of the labels received on shipped containers.
- Explanation of the workplace labeling system.

- Explanation of the SDS, including order of information and how employees can obtain and use the appropriate hazard information.

The Manager shall ensure records of employee training are maintained.

32.10 IMPLEMENTATION REQUIREMENT

Per OSHA Requirements

Effective Completion Date	Requirement(s)	Who
December 1, 2013	Train employees on the new label elements and safety data sheet (SDS) format.	Employers
June 1, 2015* December 1, 2015	Compliance with all modified provisions of this final rule, except: The Distributor shall not ship containers labeled by the chemical manufacturer or importer unless it is a GHS label	Chemical manufacturers, importers, distributors and employers
June 1, 2016	Update alternative workplace labeling and hazard communication program as necessary, and provide additional employee training for newly identified physical or health hazards.	Employers
Transition Period to the effective completion dates noted above	May comply with either 29 CFR 1910.1200 (the final standard), or the current standard, or both	Chemical manufacturers, importers, distributors, and employers

33 HAZARDOUS WASTE MANAGEMENT

HAZARDOUS WASTE MANAGEMENT PROGRAM

33.1 TITLE AND PURPOSE

This document is 3A Group**'s** program for HAZARD WASTE MANAGEMENT. Its purpose is to set forth guidelines and procedures for the proper disposal of hazardous substances. Upon request, this document shall be made available to employees, their designated representative, and authorized State, or Federal safety officials.

33.2 SITE COORDINATOR

The Safety Coordinator will be the site coordinator for the Program. The Safety Coordinator will be responsible to coordinate and manage the Program in conjunction with the company's Hazard Communication Program.

It is the responsibility of Safety Coordinator to ensure that storage, handling, and disposal of hazardous substances takes place in accordance with the guidelines and procedures set forth in this document.

33.3 STORAGE OF HAZARDOUS SUBSTANCE

To the maximum extent possible, all poisons, acids, and flammable chemicals shall be stored separately from all other substances, preferably in designated storage areas or cabinets that are approved for the type of exposure anticipated. All flammable liquids must be stored in UL or FM approved flammable storage cabinets.

The Safety Coordinator shall schedule periodic inspections to ensure that all hazardous substances within the company are appropriately labeled and stored.

Chemicals and substances utilized in maintenance, and which are particularly vulnerable to incompatibility and possible adverse reaction or accident due to improper storage, should be minimized. To the maximum extent possible, for storage purposes, chemicals and substances should be separated into organic and inorganic groupings and further sorted into compatible families within the two major groupings.

33.4 HAZARDOUS WASTES DISPOSAL PROCEDURES AND REGULATIONS

Federal, state, and local environmental regulations require strict control of the handling, storage, and disposal of all materials identified as being hazardous or toxic to human health or the environment. Once such materials have been used within the operations, specific restrictions and procedures apply as to their disposal. The Safety Coordinator's office will maintain a monthly inventory based on information gathered during his survey and reporting by the department, accordingly, the following procedures shall be carried out for all departments that generate hazardous waste:

1. No hazardous waste may be dumped in drains, sewers, dumpsters, or onto the ground. The only exception is small quantities of some chemicals may be disposed of by drain or dumpster, in accordance with local Sanitation District rules or OSHA guidelines or the Safety Data Sheet (SDS).

2. The Safety Coordinator's office shall be the contact point for all information regarding storage and disposal of hazardous materials. It will arrange for periodic removal (a minimum of quarterly, or as required by law) of hazardous waste by a licensed hazardous waste hauler as needed.

3. Department of Transportation (DOT) storage drums are required for storage of waste oils, sludge, and solvents. Prior to removal, waste oils, sludge, and solvents shall be stored in Department of Transportation

(DOT) approved and labeled storage drums with lids. Labels shall clearly identify the material being stored for removal and the date it was placed in the drum. The average monthly quantity of each category and waste name shall be maintained and reported to the Safety Coordinator.

4. Hazardous wastes designated for disposal or treatment must be removed from the company **by a licensed hazardous waste hauler**. Arrangements for any hazardous materials disposal **MUST** be made through the Safety Coordinator's office with name, quantity, and location of hazardous materials. **Before choosing the hauler, his identification and record will be checked**.

5. When hazardous waste is designated for disposal or treatment from our site, a **"MANIFEST LIST"** must be prepared by the hauler. Each list must identify the name and amount of each material for disposal. A copy of the Environmental Protection Agency (EPA) manifest list and any related documents MUST be forwarded to the Safety Coordinator's office as soon as they are completed. The ORIGINAL shall be kept on file.

   After the waste has been deposited at an "approved dump site", another copy of the manifest will be returned to the Safety Coordinator's office to document proper disposal and site location.

6. The Safety Coordinator shall be responsible for keeping an on-going Hazardous Waste Disposal Manifest File, with copies of all information for the master file. As provided by law, the site Disposal Manifest File is subject to regular inspection by the local HEALTH DEPARTMENT. Appropriate fines may be levied for noncompliance.

33.5 DISCLOSURE PROCEDURE FOR EMERGENCY RESPONDERS AND EMERGENCY

33.6 RESPONSE PLAN FOR HAZARDOUS SPILLS

1. Compulsory Federal Law (SARA Title III) provides that counties adopt ordinances mandating that businesses or persons using, handling, or storing hazardous materials provide information regarding the location, type and health risks of such materials to emergency responders such as fire department and paramedics.

2. To comply with SARA Title III, 3A Group will provide the designated area the Hazardous Chemical Inventories and Emergency Response Plans. Currently the law applies only to businesses or persons using, storing or handling hazardous materials where:

   THERE IS AN ESTIMATED TOTAL YEARLY USE IN EXCESS OF 55 GALLONS OF LIQUIDS, 500 POUNDS OF SOLIDS, OR 200 CUBIC FEET OF GASEOUS SUBSTANCES.

   ONCE 3A GROUP HANDLES THIS AMOUNT OF PRODUCT, IT IS NECESSARY TO DETERMINE HOW MUCH WASTE IS THEN BEING GENERATED. IF IT IS NECESSARY TO RECYCLE OR DISPOSE OF WASTE THROUGH A LICENSED WASTE HAULER, RECYCLER, ETC., THEN 3A GROUP MUST THEN BECOME LICENSED AS A GENERATOR OF HAZARDOUS WASTES.

   Each department shall maintain an inventory of all hazardous chemicals, the quantities, and the Safety Data Sheets. The updated inventories shall be sent to the Safety Coordinator's office on a monthly basis. The Safety Coordinator's office shall assist in coordinating the program.

APPENDIX "A"

33.7 HAZARDOUS CHEMICAL (PRODUCT) INVENTORY

SITE LOCATION_____

SITE COORDINATOR_____

INVENTORY DATE_____

PRODUCT NAME **QUANTITY ON SITE**

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

APPENDIX "B"

33.8 LIST OF APPROVED VENDORS

VENDOR

HAZARDOUS WASTE EVACUATION PLAN

33.9 HAZARDOUS WASTE EVACUATION PLAN

33.10 SIGNAL TO BE USED

IN THE EVENT AN EVACUATION IS REQUIRED DUE TO A HAZARDOUS WASTE RELEASE:

The Emergency Coordinator is to signal for an evacuation of the facility by alerting all employees to evacuate immediately, using the following evacuation plan, which is posted in the facility, and of which all employees have been informed.

33.11 EVACUATION SHUTDOWN

The primary goal in the event of a release of hazardous waste or other emergency is the safety of all employees of the facility. Therefore, the following procedures should be followed only where doing so will not expose the employee to additional risk of bodily harm.

- All gas valves shall be turned to the off position.
- All equipment shall be stopped, and power locked out where possible.
- All combustibles materials shall be covered.
- All circuit breakers for electrical power not needed for emergency escape procedures shall be switched to the off position.

NOTE: Circuit breakers for lighting necessary for safe escape from the plant shall **NOT** be turn off.

33.12 EMPLOYEE ACCOUNTING

Each supervisor shall be responsible for the accounting of the employees in his department. The purpose of this is to notify the police or fire department of any employees who may still be in the facility.

No employee is to re-enter the facility for the purpose of rescuing another person. A rescue attempt made by an untrained, unequipped volunteer is more likely to result in harm to the person attempting the rescue than it is to result in a safe rescue.

33.13 RESCUE AND MEDICAL DUTIES

The facility's certified first aid attendants are the only employees authorized to administer first aid medical treatment to injured employees as authorized by the Emergency Coordinator. Employees trained in Cardiopulmonary Resuscitation techniques (CPR) are authorized to administer CPR as appropriate and necessary.

All other medical requirements are to be referred to the police, fire department or emergency medical personnel on the scene.

33.15 REPORTING RELEASES OF HAZARDOUS WASTE AND EMERGENCIES

All reports of releases of hazardous waste and other hazardous waste emergencies shall be reported immediately to the Emergency Coordinator. In his absence, the alternate Emergency Coordinator shall be contacted.

If the preceding procedure cannot be followed, the person identifying the emergency shall move immediately to a safe area and call the fire department.

34 HAZARDOUS SPILL PREVENTION & RESPONSE

SPILL PREVENTION AND RESPONSE

34.1 PURPOSE

The purpose of this plan is to document spill prevention and response requirements. Each 3A Group work site will develop a spill prevention and response plan based on the requirements and template provided.

34.2 SCOPE

This procedure applies to all 3A Group operations. When work is performed on a non-owned or operated site, the operator's program shall take precedence, however, this document covers 3A Group employees and contractors and shall be used on owned premises, or when an operator's program doesn't exist or is less stringent.

34.3 REQUIREMENTS

Each work site spill prevention and response plan shall contain the following requirements.

- Chemical substances should be stored in proper containers to minimize the potential for a spill. Whenever possible, chemicals should be kept in closed containers and stored so they are not exposed to storm water.
- The program must identify chemicals used that may be potentially spilled or released. This will include both liquid chemicals used at our facilities or brought on to owner client sites.
- Spill kits must be adequate for any anticipated spills. A proper spill kit must contain the appropriate supplies for materials that may be spilled. Supplies must be easily accessible when required, and considerations must be made for both the type and quantity of materials. The contents of spill response kits shall be periodically assessed to ensure the availability of adequate spill response supplies and adjust inventory as necessary.
- 3A Group shall ensure the availability of adequate spill response supplies by periodic inspection to assess their availability and adjust the inventory as necessary.
- Employees must be instructed on spill prevention and the proper response procedures for spilled materials. The training should include materials available for use, proper waste disposal and communication procedures.
- Areas where chemicals may be used or stored must be maintained using good housekeeping best management practices. This includes, but is not limited to clean and organized storage, labeling and secondary containment where necessary.
- Proper communication measures for employees to initiate in the event of a spill will be created on a site by site basis. Communication procedures will be based on type and quantity of materials spilled.
- Environmental spills shall be reported to environmental authorities when required. Reporting procedures will be based on type and quantity of materials spilled.

The following template shall be used for each work site.

Copies of this plan are located at the facility and are available to all employees.

Location(s) of plan(s): _____

Facility Information

Facility Name: _____

Mailing Address: _____

_____

Physical address if different: _____

_____

_____

Owner Name: _____

Owner Address: _____

_____

Primary Contact Name: _____

Work Phone Number: _____

Home Phone Number: _____

Mobile Phone Number: _____

Secondary Contact Name: _____

Work Phone Number: _____

Home Phone Number: _____

Mobile Phone Number: _____

Date of Initial Operation: _____

Site Assessment

Location - Describe where facility is located.

_____

_____

_____

_____

_____

_____

Copies of this plan are located at the facility and are available to all employees.

Location(s) of plan(s): _____

Facility Information

Facility Name: _____

Mailing Address: _____

_____

Physical address if different: _____

_____

_____

Owner Name: _____

Owner Address: _____

_____

Primary Contact Name: _____

Work Phone Number: _____

Home Phone Number: _____

Mobile Phone Number: _____

Secondary Contact Name: _____

Work Phone Number: _____

Home Phone Number: _____

Mobile Phone Number: _____

Date of Initial Operation: _____

Site Assessment

Location - Describe where facility is located.

_____

_____

_____

_____

_____

_____

Facility Description

Facilities and Equipment (*examples are shown but complete per site description*):

___ Garage for vehicle processing
___ Parts storage
___ Manufacturing Building
___ Spill kit/emergency equipment
___ Refrigerant (Freon) extractor
___ Parts washer

Please list: _____
_____
_____
_____
_____

Services:

___ Dismantler/Recycler
___ Equipment Repair
___ Moving Equipment
___ Painting/Sandblasting
___ Manufacturing

Please list: _____
_____
_____
_____

Fixed Storage - List capacity and contents of each storage container. For example, "One 6,000 gallon above ground tank containing diesel fuel." Be sure to include diesel, gasoline, waste oil, heating oil, kerosene, paint thinner and other solvents. Also describe the construction of the containers, secondary containment for each, liquid level indicators, alarms and method of corrosion protection for each container._____
_____
_____
_____
_____
_____
_____

Non-Fixed Storage - List capacity and contents of each storage container. For example, "One 55-gallon drum for recycled oil." Be sure to indicate what each container is used for; its condition and construction and how secondary containment is provided. _____
_____
_____
_____
_____
_____

Total quantity of stored materials: - The combined quantity of the materials listed above: _____ gallons

34.4 OIL SPILL HISTORY

Place an X on the appropriate line and proceed accordingly.

___ There has never been a significant spill at the above-named facility.

___ There have been one or more significant spills at the above-named facility. Details of such spill(s) are described below. For each spill that occurred, supply the following information:

- Type and amount of oil spilled
  - Location, date and time of spill(s)
  - Watercourse affected
- Description of physical damage
- Cost of damage
- Cost of clean-up
  - Cause of spill
  - Action taken to prevent recurrence

_____

_____

_____

_____

_____

_____

Potential Spill Volumes and Rates

Fill in all applicable blanks.

Potential Event	Volume Released	Spill Rate
Complete failure of a full tank*	___ gallons	instantaneous
Partial failure of a full tank*	1 to ___ gallons	gradual to instantaneous
Tank overflow**	1 to ___ gallons	up to ___ gallons per minute
Leaking during unloading***	up to ___ gallons	up to ___ gallons per minute
Pipe failure****	up to ___ gallons	up to ___ gallons per minute
Leaking pipe or valve****	several ounces to gallons	up to ___ gallons per minute
Fueling operations****	several ounces to gallons	up to ___ gallons per minute
Oil and grease	several ounces to quarts	spotting

* Volume of largest tank

** Calculate using the rate at which fuel is dispensed from the delivery truck into your tank(s).

*** Calculate using the rate at which petroleum would be withdrawn from the tank if it should have to be emptied (*e.g.,* if it was being taken out of service).

**** Calculate based on the specifications of your equipment.

Spill Prevention and Control

Spill Prevention - Provide specific descriptions of containment facilities and practices. Include description of items such as double-walled tanks, containment berms, emergency shut-offs, drip pans, fueling procedures and spill response kits. Also, describe how and when employees are trained in proper handling procedures and spill prevention and response procedures.

Spill discharge and flow - For each potential spill source; describe where petroleum would flow in the event of a spill. For example, "The 6,000-gallon diesel tank has a pre-manufactured secondary containment system capable of holding 110 percent of the total volume of the tank" and, "A spill from engine repair would be contained inside the shop building and quickly cleaned up with oil absorbents." Incorporate site map by reference (see instructions under *Appendices*).

Spill response - Identify what equipment would be deployed by whom and in what situation. Also, include phone numbers for response agencies, *e.g.,* U.S. Coast Guard, fire department, spill response contractors, etc. A copy of your spill response plan may be attached as an appendix to this plan in lieu of completing this section.

Security - Provide a description of how all containers are protected when the facility is not in operation or unattended. Include a description of fencing, access control, gates, locks, etc. that prevent access by unauthorized individuals.

34.5 FACILITY INSPECTIONS

Routine Inspections - Name facilities and the frequency with which they are inspected. For example, "The fuel pumps are inspected daily. The materials storage area is inspected monthly." Describe all facility containers, piping, etc. that is to be inspected. Name the person who has responsibility to implement preventative maintenance programs, oversee on-site inspections, coordinate employee training, maintain records, update the plan as necessary, and ensure that reports are submitted to the proper authorities.

Annual Inspections - Include a description of annual comprehensive inspections. For example, "A site inspection is also conducted annually by appropriate responsible personnel to verify that the description of potential pollutant sources are accurate, that the map reflects current site conditions, and that the controls to reduce the pollutants identified in this plan are being implemented and are adequate. This annual inspection will be conducted above and beyond the routine inspections done focusing on designated equipment and areas where potential sources are located."

Record Keeping

Describe record keeping procedures. For example, "Record keeping procedures consist of maintaining all records a minimum of three years. The following items will be kept on file: current plan, internal site reviews, training records, and documentation of any spills or maintenance conducted in regards to these sites." *Maintenance Inspection, Employee Training,* and *Record Keeping* logs are included in this template for your use.

34.6 MAINTENANCE INSPECTIONS

Maintenance Coordinator Name:

Maintenance Coordinator responsibilities include implementation of preventative maintenance programs and oversight of on-site inspections.

Use this table to record inspections:

Facility Inspected	Date of Inspection	Name of Inspector	Result Pass/Fail	Comments

34.7 EMPLOYEE TRAINING

Employee Training Coordinator Name: _____

Use this table to record spill prevention and response training.

Name of Employee	Date of Training	Type of Training/Topics Addressed

34.8 RECORD KEEPING OF INCIDENTAL SPILLS

Record Keeper Name:

Record Keeper responsibilities include maintaining records of incidents, updating the plan as necessary and ensuring reports are submitted to the proper authorities when necessary.

Incident No.	Type of Incident	Date of Occurrence	How it was Cleaned Up

34.9 APPENDICES

Site map - Attach a site map as Appendix A to this plan. You may attach an existing site map or create your own. If you use an existing map, be sure that the items listed below are included. If you need to create a site map, use a large enough piece of paper so all site plan elements may be seen and try to keep the map to a scale (e.g. 1" = 20' The following instructions should guide you step-by-step. Please use a straight edge (ruler) while creating the sketch.

- The sketch should be oriented as if you were in a plane looking down on your property (an aerial view), with North at the top (draw an arrow indicating north).
- Draw and label all roadways surrounding the work site.
- Draw and label all facilities within the work site as close proportionately as possible.
- Draw an arrow(s) pointing in the direction of downhill flow of water when it rains.
- Draw the location and general layout of all vehicles associated with the work site.
- Label any rivers or waterways surrounding the work site.
- Draw and label all methods of entry to the work site.
- Draw and label the location of all fuel containment facilities.
- Draw and label the location of all in-place spill prevention, control and countermeasure devices.

Other attachments - List any additional information to be attached as Appendix B, C, D, etc. Label and staple the attachments to the end of this plan.

Appendix A: Site Map
Appendix B: Emergency Response Posting Locations
Appendix C: _____
Appendix D: _____

Management Approval

I certify that I have personally examined and am familiar with the information submitted in this document and that, based on my inquiry of those individuals responsible for obtaining this information, the information submitted is true, accurate and complete.

_____	_____
Signature	Title
_____	_____
Printed Name	Date

35 HEARING CONSERVATION

HEARING CONSERVATION PROGRAM

35.1 PURPOSE

The purpose of this program is to provide a process to minimize employee-hearing loss caused by excessive occupational exposure to noise.

35.2 SCOPE

This program is applicable to all employees who may be exposed to noise in excess of 85 decibels (decibels). When work is performed on a non-owned or operated site, the operator's program shall take precedence, however, this document covers 3A Group employees and contractors and shall be used on owned premises, or when an operator's program doesn't exist or is less stringent.

35.3 DEFINITIONS

Audiometric testing - means detection by the person being tested of a series of pure tones. For each tone, the person indicates the lowest level of intensity that they are able to perceive.

Decibels – means the sound energy measured by a sound level meter using the "A" scale. The "A" scale is electronically weighted to simulate the response of the human ear to high and low frequency noise.

Slow Response – means the setting on the sound level meter that averages out impulses of brief duration that would cause wide fluctuation in the sound level meter reading.
Standard Threshold Shift – means a change in hearing threshold relative to the baseline audiogram of an average of 10 dB (corrected for age) at 2000, 3000 and 4000 Hz in either ear.

35.4 KEY RESPONSIBILITIES

35.4.1 MANAGERS AND SUPERVISORS

- Ensure requirements of this program are established and maintained.
- Ensure employees are trained and comply with the requirements of this program.

35.4.2 EMPLOYEES

- Wear hearing protection when required, attend the training, and cooperate with testing and sampling.

35.5 PROCEDURE

Occupational hearing loss is a cumulative result of repeated or continued absorption of sound energy by the ear; employee protection is based on reduction of the noise level at the ear or limiting the employee's exposure time. 3A Group shall offer hearing protection to all employees exposed to potential high noise levels in working areas and to those employees requesting hearing protection.

35.6 HEARING CONSERVATION PROGRAM

3A Group shall implement a hearing conservation program for employees exposed to sound levels 85dbA or greater. A continuing effective hearing conservation program shall be administered when employees are exposed to sound levels greater than 85 dbA on an 8-hour time-weighted average basis.

Employees will wear hearing protection in signed areas while on an owner client facility.

35.7 MONITORING PROCEDURES TO BE USED WHEN EXPOSURE LIMITS EXCEED THE ESTABLISHED LEVEL

When information indicates that employee exposure may equal/exceed the 8-hour time-weighted average of 85 decibels, a monitoring program shall be implemented to identify employees to be included in the hearing conservation program.

35.8 SURVEYS

Surveys will be conducted by a qualified employee or third party.

To evaluate noise exposure in terms of possible hearing damage, it is necessary to know the overall sound level ("A" scale measurement), the exposure time of the individual in hours per day and the length of time the individual has worked in the area being surveyed. This data shall be supplemented by the following:

- Name of area and location
- Date and time of survey
- Name of person conducting survey
- Description of instrument used, model and serial number
- Environmental conditions
- Description of people exposed

3A Group shall notify each employee of their monitoring results, or, if their job is exposed to noise 85 decibels or greater.

A plot of noise levels must be made for owned facilities. The plot must be filed or posted at the facility.

3A Group shall evaluate hearing protector attenuation for the specific noise environments in which the protector will be used. The adequacy of hearing PPE shall be reevaluated whenever noise exposures increase to the point that the PPE provided may no longer provide adequate protection. 3A Group shall then provide more effective PPE where necessary.

All sound measuring equipment must be calibrated before and after each survey. Records of sound measuring equipment calibration and noise level surveys shall be kept for 20 years.

Noise Surveys must be repeated whenever changes in the workplace may expose additional personnel to high noise or hearing protection being used by employees may not be adequate to reduce the noise exposure to a level below 85 decibels.

35.9 SOUND LEVEL SURVEYS

- All owned facilities that are suspected of having noise levels exceeding 85 decibels must be screened.

35.10 EXPOSURE SURVEYS:

- A representative sampling of employees shall be conducted to determine the exposure to noise over a period of time.
- Noise dosimeters must be capable of integrating all continuous, intermittent and impulsive sound levels from 80-dB to 130-dB and must be calibrated so a dose of 50% corresponds to a time weighted average of 85-dB.

35.11 SIGNAGE

Clearly worded signs shall be posted at entrances to, or on the periphery of, areas where employees may be exposed to noise levels in excess of 85 decibels. These signs shall describe the hazards involved and the required protective actions.

35.12 AUDIOMETRIC TESTING

3A Group must establish and maintain an audiometric testing program for all employees whose exposures equal or exceed the 8-hour time-weighted average of 85-dbA and making audiometric testing available to all employees whose exposures equal or exceed an 8-hour time-weighted average of 85 decibels.

35.13 BASELINE TESTING GUIDELINES

- 3A Group shall establish a baseline audiogram for each exposed employee within 6 months of their first exposure. Within 6 months of an employee's first exposure at or above the action level, a valid baseline audiogram shall be established against which future audiograms can be compared.
- When a mobile van is used the baseline shall be established within one year.
- A qualified third party shall perform all audiometric testing, evaluation, reporting and retesting.
- Prior to establishment of a baseline audiogram at least 14 hours without exposure to workplace noise is observed. Testing to establish a baseline audiogram shall be preceded by at least 14 hours without exposure to workplace noise. Hearing protection may be used to meet the requirement. Employees shall also be notified to avoid high levels of noise.

35.14 ANNUAL TESTING GUIDELINES

3A Group shall provide an annual audiogram and if a standard threshold shift has occurred the employee will be notified in writing within 21 days of determination. At least annually after obtaining the baseline audiogram, 3A Group shall obtain a new audiogram for each employee exposed at or above an 8-hour time-weighted average of 85 decibels. Each employee's annual audiogram shall be compared to that employee's baseline audiogram to determine if the audiogram is valid and if a standard threshold shift has occurred. If a comparison of the annual audiogram to the baseline audiogram indicates a standard threshold shift, the employee shall be informed of this fact in writing, within 21 days of the determination.

35.15 STEPS THAT ARE TAKEN WHEN STANDARD THRESHOLD SHIFT OCCURS

- Hearing protection shall be re-evaluated and/or refitted and,
- If necessary, a medical evaluation may be required and
- The employee shall be advised to wear hearing protection and if necessary, a reassignment of duties may be deemed appropriate.

35.16 REQUIRED RECORDKEEPING

3A Group shall maintain accurate records of all employee exposure measurements and all records are maintained as required by CFR 1910.95 (Occupational Noise Exposure).

Employee audiograms are considered medical/exposure records. These records must be kept for the length of employment plus 30 years.

35.17 HEARING PROTECTION DEVICES

- Hearing protectors are available to all employees exposed to an 8-hour time-weighted average of 85 decibels at no cost to the employee.
- Hearing protection shall be replaced as necessary.
- 3A Group shall ensure that hearing protectors are worn. Employees shall be properly trained in the use, care and fitting of protectors. This is done at no cost to employees.
- Employees shall be given the opportunity to select their hearing protectors from a variety of suitable hearing protectors provided by 3A Group.

35.18 TRAINING

Employees must be provided with training on at least an annual basis and shall be updated to be consistent with changes in the PPE and work processes.

A training program shall be provided for all employees who are exposed to action level noise.

The training shall be repeated annually for each employee. Training shall be updated consistent to changes in PPE and work processes. 3A Group shall make available to affected employees' copies of the noise exposure procedures and shall also post a copy in the workplace. 3A Group shall also allow the Assistant Secretary and the Director access to records.

All training must and shall be documented.

All staff shall have a copy of this program, noise exposure procedures and it shall be posted at the worksite and a copy made available to all employees and their representatives if applicable.

36 HEAT STRESS/ILLNESS PREVENTION PLAN

HEAT STRESS AND RELATED DISORDERS PREVENTION PLAN

36.1 PURPOSE

This program is designed to reduce the risk of work-related heat illnesses and to establish a standard system for the prevention, notification and of accidents involving occupational injury or illness, related to heat stress. This standard applies to all work done outdoors at 3A Group.

36.2 OBJECTIVES

1. Eliminate or control unsafe acts and conditions before they result in accidents or exposures that may produce injury and/or illness.
2. Stimulate regular employee hazard detection and control activity.
3. Provide a mechanism for employees to formally report hazards and to make safety recommendations.

36.3 DEFINITIONS

"**Acclimatization**" means temporary adaptation of the body to work in the heat that occurs gradually when a person is exposed to it. Acclimatization peaks in most people within four to fourteen days of regular work for at least two hours per day in the heat.
"**Heat Illness**" means a serious medical condition resulting from the body's inability to cope with a particular heat load, and includes heat cramps, heat exhaustion, heat syncope and heat stroke.
"Environmental risk factors for heat illness" means working conditions that create the possibility that heat illness could occur, including air temperature, relative humidity, radiant heat from the sun and other sources, conductive heat sources such as the ground, air movement, workload severity and duration, protective clothing and personal protective equipment worn by employees.
"Landscaping" means providing landscape care and maintenance services and/or installing trees, shrubs, plants, lawns, or gardens, or providing these services in conjunction with the design of landscape plans and/or the construction (i.e., installation) of walkways, retaining walls, decks, fences, ponds, and similar structures, except for employment by an employer who operates a fixed establishment where the work is to be performed and where drinking water is plumbed.
"Oil and gas extraction" means operating and/or developing oil and gas field properties, exploring for crude petroleum or natural gas, mining or extracting of oil or gas or recovering liquid hydrocarbons from oil or gas field gases.
"Personal risk factors for heat illness" means factors such as an individual's age, degree of acclimatization, health, water consumption, alcohol consumption, caffeine consumption, and use of prescription medications that affect the body's water retention or other physiological responses to heat.
"**Preventative recovery period**" means a period of time to recover from the heat in order to prevent heat illness.
"**Shade**" means blockage of direct sunlight. Canopies, umbrellas and other temporary structures or devices may be used to provide shade. One indicator that blockage is sufficient is when objects do not cast a shadow in the area of blocked sunlight. Shade is not adequate when heat in the area of shade defeats the purpose of shade, which is to allow the body to cool. For example, a car sitting in the sun does not provide acceptable shade to a person inside it, unless the car is running with air conditioning.
"Temperature" means the dry bulb temperature in degrees Fahrenheit obtainable by using a thermometer to measure the outdoor temperature in an area where there is no shade. While the temperature measurement must be taken in an area with full sunlight, the bulb or sensor of the thermometer should be shielded while taking the measurement, e.g., with the hand or some other object, from direct contact by sunlight.

36.4 REQUIREMENTS

All managers and supervisors are responsible for implementing and maintaining the Heat Illness Program in their work areas.

36.5 PROVISION OF WATER

Employees shall have access to potable drinking water. Employees shall have access to potable drinking water. Where it is not plumbed or otherwise continuously supplied, it shall be provided in sufficient quantity at the beginning of the work shift.

36.6 ACCESS TO SHADE

Employees will be provided with access to shade. Employees suffering from heat illness or believing a preventative recovery period is needed shall be provided access to an area with shade that is either open to the air or provided with ventilation or cooling. Such access to shade shall be permitted at all times. See definition of "Shade".

36.7 CONTROL MEASURES

Each work location involved in working in hot environments shall implement measures that must be in place to control the effects of environmental factors that can contribute to heat related illnesses. The most common environmental factors are air temperature, humidity, radiant heat sources and air circulation.

Physical factors that can contribute to heat related illness shall be taken into consideration before performing a task. The most common physical factors that can contribute to heat related illness are type of work, level of physical activity and duration, and clothing color, weight and breathability.

Supervisors must ensure personal factors that contribute to heat related illness are taken into consideration before assigning a task where there is the possibility of a heat-related illness occurring. The most common personal factors that can contribute to heat related illness are age, weight/fitness, drug/alcohol use, prior heat-related illness, etc.

Each work site shall develop site specific procedures but shall include the minimum:

- Bring at least 2 quarts per employee at the start of the shift and the supervisors/designated persons will monitor water containers every 30 minutes, and employees are encouraged to report to supervisor/designated person low levels or dirty water.
- Supervisors will provide frequent reminders to employees to drink frequently.
- Every morning there will be short tailgate meetings to remind workers about the importance of frequent consumption of water throughout the shift during hot weather.
- Place water containers as close as possible to the workers.
- When drinking water levels within a container drop below 50%, the water shall be replenished immediately or water levels should not fall below the point that will allow for adequate water during the time necessary to effect replenishment.
- Disposable/single use drinking cups will be provided to employees or provisions will be made to issue employees their own cups each day.
- Supervisors will set-up an adequate number of umbrellas, canopies or other portable devices at the start of the shift and will relocate them to be closer to the crew, as needed.
- Non-agricultural employers can use other cooling measures if they demonstrate that these methods are as effective as shade.

Working hours will be modified to work during the cooler hours of the day, when possible.
When a modified or shorter work-shift is not possible, more water and rest breaks will be provided.
Supervisors will continuously check all employees and stay alert to the presence of heat related symptoms.
Supervisors will carry cell phones or other means of communication, to ensure that emergency services can be called and check that these are functional at the worksite prior to each shift.
Every morning, workers will be reminded about address and directions to the worksite to inform medical responders and emergency procedures.
All newly hired workers will be assigned a buddy or experienced coworker to ensure that they understood the training and follow the company procedures.

36.8 TRAINING

Training in the following topics shall be provided to all supervisory and non-supervisory employees:

- The environmental and personal risk factors for heat illness;
- The importance of frequent consumption of small quantities of water, up to 4 cups per hour, when the work environment is hot, and employees are likely to be sweating more than usual in the performance of their duties;
- The importance of acclimatization;
- The different types of heat illness and the common signs and symptoms of heat illness;
- The importance to employees of immediately reporting to the employer, directly or through the employee's supervisor, symptoms or signs of heat illness in themselves, or in co-workers;
- 3A Group procedures for responding to symptoms of possible heat illness, including how emergency medical services will be provided should they become necessary;
- 3A Group procedures for contacting emergency medical services, and if necessary, for transporting employees to a point where they can be reached by an emergency medical service provider;
- 3A Group procedures for ensuring that, in the event of an emergency, clear and precise directions to the work site can and will be provided as needed to emergency responders.

Supervisors must receive training in the prevention of heat related illnesses prior to supervising employees working in heat. Supervisors will be trained in the 3A Group heat illness emergency response procedures to prevent heat illness and procedures to follow when an employee exhibits symptom consistent with possible heat illness, including emergency response procedures.

Communication for employees shall be in a form readily understandable by all affected employees.

3A Group shall ensure all contractors, subcontractors, staffing companies, etc. employees (including temporary) working outdoors have been trained in heat illness prevention.

36.9 OSHA QUICK CARD – PROTECT YOURSELF HEAT STRESS

OSHA QUICK CARD

Protect Yourself
Heat Stress

When the body is unable to cool itself by sweating, several heat-induced illnesses such as heat stress or heat exhaustion and the more severe heat stroke can occur and can result in death.

Factors Leading to Heat Stress

High temperature and humidity; direct sun or heat, limited air movement, physical exertion, poor physical condition, some medicines and inadequate tolerance for hot workplaces.

Symptoms of Heat Exhaustion

- Headaches, dizziness, lightheadedness or fainting.
- Weakness and moist skin.
- Mood changes such as irritability or confusion.
- Upset stomach or vomiting.

Symptoms of Heat Stroke

- Dry, hot skin with no sweating.
- Mental confusion or losing consciousness.
- Seizures or convulsions.
- Preventing Heat Stress

Know signs/symptoms of heat-related illnesses; monitor yourself and coworkers.

- Block out direct sun or other heat sources.
- Use cooling fans/air-conditioning; rest regularly.
- Drink lots of water; about 1 cup every 15 minutes.
- Wear lightweight, light colored, loose-fitting clothes.
- Avoid alcohol, caffeinated drinks, or heavy meals.

What to Do for Heat-Related Illness

- Call 911 (or local emergency number) at once.
- While waiting for help to arrive:
- Move the worker to a cool, shaded area.
- Loosen or remove heavy clothing.
- Provide cool drinking water.
- Fan and mist the person with water.

OSHA QUICK CARD™

Protéjase del
Estrés por calor

Cuando el cuerpo no puede bajar su temperatura mediante el sudor, pueden ocurrir varias enfermedades debido al calor, tales como estrés o agotamiento por calor e insolación o golpe de calor, las cuales pueden resultar en la muerte.

Factores que llevan al estrés por calor

Alta temperatura y humedad, calor o sol directo, movimiento limitado de aire, esfuerzo físico, pobre condición física, algunas medicinas y tolerancia inadecuada para lugares de trabajo calurosos.

Síntomas de agotamiento por calor

- Dolores de cabeza, mareos, vértigo o desmayo.
- Debilidad y piel húmeda.
- Cambios de humor como irritabilidad o confusión.
- Nauseas o vómitos.

Síntomas de insolación

- Piel seca y caliente sin sudor.
- Confusión mental o pérdida de conocimiento.
- Convulsiones o ataques.

Evita el estrés por calor

- Conozca las señales y los síntomas de las enfermedades relacionadas al calor; obsérvese a si mismo y a sus colegas.
- Bloquee el sol directo u otras fuentes de calor.
- Utilice ventiladores (abanicos) o aire acondicionado; descanse con regularidad.
- Beba mucha agua, como 1 taza cada 15 minutos.
- Vístase con ropa ligera, de colores claros y no ajustada.
- Evite el alcohol, bebidas con cafeína o comidas pesadas.

Qué hacer en caso de enfermedades relacionadas al calor

- Llame al 911 (u otro número local para emergencias) inmediatamente.

Mientras espera por ayuda:

- Mueva a la persona a un lugar fresco y sombreado.
- Suéltele o quitele la ropa pesada.
- Ofrézcale agua fresca para beber.
- Abanique y rocíe con agua a la persona.

37 HEAVY EQUIPMENT

HEAVY EQUIPMENT

37.1 PURPOSE

This program is written to be in compliance with local regulatory requirements and provide directives to managers, supervisors, and employees about their responsibilities in the operations and management of 3A Group vehicle safety.

37.2 KEY RESPONSIBILITIES

37.2.1 3A GROUP SAFETY MANAGER

- The designated Safety Manager is responsible for developing and maintaining the program and related procedures. These procedures are kept in the designated safety manager's office.

37.2.2 SITE MANAGER

- Responsible for the implementation and maintenance of the program for their site and ensuring all assets are made available for compliance with the plan.

37.2.3 EMPLOYEES

- All shall be familiar with this procedure and the local workplace vehicle safety program.
- Follow all requirements, report unsafe conditions, and follow all posted requirements.

37.3 PROCEDURE

37.3.1 OPERATOR QUALIFICATION

Only an authorized person(s) authorized by 3A Group shall operate machinery or electrical equipment.

Authorization to operate equipment will be issued to miners qualifying under appropriate training and proficiency testing. The person must also have in possession of an applicable operator's license.

A supervisor must not knowingly operate or permit a worker to operate equipment which is, or could, create an undue hazard to the health or safety of any person or is in violation of any local or federal regulations.

37.4 INSPECTION

Self-propelled mobile equipment shall be inspected by each equipment operator before being placed in operation on that shift.

A written record of the inspections, repairs and maintenance carried out on the equipment is kept at the workplace and made readily available to the operator of the equipment.

37.5 DEFECTIVE EQUIPMENT

Defective equipment shall be taken out of service, tagged or other effective methods of marking the defective equipment used to prohibit further use until the defects are corrected. When defects make continued operation hazardous to persons, the defective items including self-propelled mobile equipment shall be taken out of service and placed in a designated area posted for that purpose, or a tag or other effective method of marking the defective items shall be used to prohibit further use until the defects are corrected.

37.6 SAFE OPERATING REQUIREMENTS

Seat belts shall be worn by the equipment operator. Seat belts shall be worn by the equipment operator except when operating graders from a standing position the grader operator shall wear safety lines and a harness in place of a seat belt.

Machinery and equipment shall not be used beyond the design capacity intended by the manufacturer. Machinery and equipment shall not be used beyond the design capacity intended by the manufacturer where such use may create a hazard to persons.

Where the operator of a vehicle, mobile equipment, crane or similar material handling equipment does not have a full view of the intended path of travel of the vehicle, mobile equipment, crane or similar material handling equipment or its load, the vehicle, mobile equipment, crane or similar material handling equipment shall only be operated as directed by a signaler who is a competent person.

The signaler shall be stationed, in full view of the operator and with a full view of the intended path of travel of the vehicle, mobile equipment, crane or similar material handling equipment and its load; and clear of the intended path of travel of the vehicle, mobile equipment, crane or similar material handling equipment and its load.

The equipment operator must give audible warning before starting up machinery or equipment. Before starting crushers or moving self-propelled mobile equipment, equipment operators shall sound a warning that is audible above the surrounding noise level or use other effective means to warn all persons who could be exposed to a hazard from the equipment.

Audible warning devices provided on self-propelled mobile equipment shall be maintained in functional condition. Manually operated horns or other audible warning devices provided on self-propelled mobile equipment as a safety feature shall be maintained in functional condition.

Operators of self-propelled mobile equipment shall maintain control of the equipment while it is in motion.

Operating speeds shall be consistent with conditions of roadways, tracks, grades, clearance, visibility, traffic and the type of equipment used.

3A Group employees shall follow our parking procedures when leaving mobile equipment unattended. Mobile equipment shall not be left unattended unless the controls are placed in the park position and the parking brake, if provided, is set. When parked on a grade, the wheels or tracks of mobile equipment shall be either chocked or turned into a bank.

All braking systems installed on the equipment shall be maintained in functional condition.

Self-propelled mobile equipment shall be equipped with a service brake system capable of stopping and holding the equipment with its typical load on the maximum grade it travels.

Parking brakes shall be capable of holding the equipment with its typical load on the maximum grade it travels. If equipped on self-propelled mobile equipment, parking brakes shall be capable of holding the equipment with its typical load on the maximum grade it travels.

The operator shall use access provided to get on or off of equipment. Do not jump to the ground.

Moving machine parts shall be guarded to protect persons from contacting moving parts that can cause injury. Moving machine parts shall be guarded to protect persons from contacting gears, sprockets, chains, drive, head, tail, and take-up pulleys, flywheels, couplings, shafts, fan blades and similar moving parts that can cause injury.

The operator shall not use or attempt to use any vehicle in any manner or for any purpose other than for which it is designated.

The operator's manual for powered mobile equipment must be readily available to a worker who operates the equipment.

Adequate and approved fire suppression equipment shall be provided on mobile equipment.

Where a vehicle, crane or similar equipment is operated near a live power line carrying electricity at more than 750 volts, every part of the equipment shall be kept at least the minimum distance from the live power line for the particular voltage as required by local or federal law.

37.7 HEAVY EQUIPMENT GENERAL SAFE PRACTICES

The following are the minimum safety practices for the operation of heavy equipment

All motor vehicles must be equipped with the following:

- Adequate braking system
- Two headlights and taillights
- Brake lights
- Horn
- Seat Belts
- Good tires
- Windshields and powered wipers
- Defrosters
- Rear-view mirror
- Fuel cap

- Only trained and authorized operators are permitted to operate a forklift or heavy equipment.
- Prior to operating the forklift or equipment, the operator must test: the brakes, steering controls, warning light, clutch, horn, fluid levels, and other devices for safe and proper operation.
- Never check the engine while it is running.
- Document your inspection results and equipment defects using the attached Inspection Report Form. Report defects to your supervisor immediately. No defective equipment shall be used. Adjustments and repairs should be made by authorized personnel only.
- Wash the equipment whenever necessary. The equipment must be kept clean and free of oil and grease.

- Employees should operate the equipment/forklift with safe speed and within rated load capacity. Drive to the right. Do not exceed 10 miles per hour, or posted authorized speeds, on plant roads.
- Passengers are not permitted on forklifts or heavy equipment except for training purposes.
- Mobile equipment should never be left unattended without first shutting off power,
- neutralizing controls, setting brakes, and lowering forks or bucket. Do not park on an incline.
- All mobile equipment must have a functional fire extinguisher on board.
- Sound horn at exits, corners, cross aisles, intersections, and when approaching pedestrians. Do not use horn needlessly or at undue length.
- Always look in the direction equipment is traveling, looking backward when backing up, even for a short distance. Keep a clear view of the path. When forward vision is obstructed, drive in reverse.
- When traveling, with or without a load, keep forks or bucket as low as possible.
- Avoid following pedestrians or other vehicles too closely, especially when operating on inclines or in noisy areas.
- Ascend/descend all ramps and inclines slowly. Wait for passengers to exit the ramp before attempting to ascend/descend. When descending, always use low gear and the slowest speed control. Never ascend in reverse.
- A man cage must be used when elevating personnel with a forklift. Attach the cage prior to use. Do not travel with passengers in the man cage.
- Personal protective equipment should be used as instructed. Hard hats should be worn where danger of falling objects exists.
- If the machine is equipped with a seatbelt, the belt must be worn at all times.
- Only authorized, licensed drivers are permitted to operate vehicles or equipment.
- Accidents must be reported to the Safety Director immediately.
- Employees should not use motor vehicles or equipment that have an obstructed rear view unless:
- The vehicle has a backup alarm audible above the surrounding noise level;
- The vehicle is backed up only when an observer signals that it is safe to do so.
- No person should attempt to get on or off moving vehicles or equipment.
- Heavy machinery and equipment which is suspended by slings, hoists, or jacks must be blocked before employees are permitted to work under or between them.
- All hauling vehicles, where payload is loaded by crane, power shovel, loader, and similar equipment must have a cab shield and/or canopy to protect the operator from shifting or falling materials. The operator of any vehicle should leave the cab and stand clear of the equipment while it is being loaded.
- Engines must be shut off during all maintenance and fueling operations.
- Trip handles of dump truck and heavy equipment tailgates must be positioned so that the operator will be clear of any danger during dumping procedures.
- Employees are required to inspect their assigned vehicles at the beginning of each shift to assure that the vehicle is in safe operating condition and free of any apparent
- danger. Any defects must be immediately reported to the Safety Director.
- Employees are not permitted to ride with arms or legs outside the truck body.
- No heavy equipment is to be driven at speeds greater than 15 MPH.
- Only approved standard hand signals for crane, derrick, and boom equipment are to be used. These hand signals must be posted near the driver's seat of all equipment.
- All manufacturer specifications and limitations concerning the operation of cranes and other hoisting equipment are to be followed.
- Rated load capacities, operating speeds, and special hazard warnings must be posted near the driver's seat on all equipment.
- A certified agency must inspect all hoisting machinery on an annual basis. Records of dates and inspection results for all equipment must be readily available for review.

- Wire rope safety factors are to be in compliance with American National Standards Institute B30.5. The Safety Director shall maintain these standards.
- All exposed belts, gears, shafts, pulleys, sprockets, spindles, drums, flywheels, chains, and other moving parts must be guarded.
- The swing radius on the back of any crane must be barricaded so as to prevent people from being struck or crushed by the crane.
- Prior to any crane being moved, all swinging or hanging loads must be lowered and detached.
- A fire extinguisher must be available in all cabs of equipment and vehicles.
- Rollover protection (ROPS) as specified by OSHA is required for all applicable equipment operated on the project. Grandfather clauses are not acceptable.
- Employees are required to obey all state law, local, and company laws, rules and regulations while operating vehicles or equipment.
- Personal cars are not to be used for company business unless authorized by the appropriate supervisor. Passengers not employed by 3A Group are also prohibited.
- Any vehicle or piece of equipment with material extending four feet or more from the rear of the vehicle must have a red flag or cloth 12 inches square attached to the material.

37.8 ROCK CRUSHERS.

- Every rock crusher where an employee is required or permitted to be at, or near, an unguarded feed opening, shall be provided with adequate means whereby the power can be quickly disconnected in case of emergency. Such means of disconnecting the power shall be located at the crusher feed opening.
- A safe place shall be provided for employees at a crusher while cars or haulage vehicles are being unloaded.
- Adequate precautions shall be taken to prevent materials from being dumped into the crusher or crusher feeder while men are working therein.
- Employees working at a crusher shall be protected from falling into the crusher by one of the following means:
    - By adequately guarding the crusher mouth.
    - Use of a working platform located in such position that hung-up material in the crusher can be safely dislodged from the platform. The platform shall have a standard railing.
    - When it is not practical to adequately guard the crusher mouth, a safety belt and lifeline shall be worn by employees working over the feed opening of an operating crusher. This lifeline shall be tied sufficiently short to prevent the wearer from getting into the crusher.
    - By other equally safe means.
    - It is recommended that a wedge on a line, or hooks attached to an overhead hoist, be used to keep the crusher feed open.
- Before any repair work that may endanger the employee is started on a crusher, the prime mover shall be shut down, and where feasible rendered inoperable. A sign prohibiting starting shall be placed on the prime mover controls.

37.9 ROCK CRUSHERS PART II

- Every rock crusher where an employee is required or permitted to be at or near an unguarded feed opening shall be provided with adequate means whereby the power can be quickly disconnected in case of emergency. Such means of disconnecting the power shall be located at the crusher feed opening.
    - A safe place shall be provided for employees at a crusher while cars or haulage vehicles are being unloaded.
    - Adequate precautions shall be taken to prevent materials from being dumped into the crusher or crusher feeder while employees are working therein.

- Employees working at a crusher shall be protected from falling into the crusher by one of the following means:
  - By adequately guarding the crusher mouth.
  - Use of working platform located in such position that hung-up material in the crusher can be safely dislodged from the platform. The platform shall have a standard railing.
  - When it is not practical to guard the crusher mouth, a safety belt and lifeline shall be worn by employees working over the feed opening of an operating crusher. This lifeline shall be tied sufficiently short to prevent the wearer from getting into the crusher.

37.10 ROCK DRILLING OPERATIONS.

- When drilling holes in rock, or other dust-producing material, the dust shall be controlled within the maximum acceptable concentrations. Respiratory protection may be required.
- All power-controlled air drilling shall be performed by use of water or chemical solutions for controlling dust, or other equivalent means.
- The ends and each joint of air hoses 1 inch inside diameter or larger shall be chained or secured, as necessary, to prevent whipping in the event of a disconnected hose unless a suitable ball check device or equivalent is provided at the air source.
- Air pipelines shall be protected against accidental impact from vehicles and falling objects at points where breakage of lines would constitute a hazard to employees.
- Iron or steel hammers used for removing detachable bits shall be malleable or annealed, so that they will not readily chip or break while being used.
- Tugger and anchor lines shall be provided for securing drilling equipment on steep slopes.
- Workers shall be provided with, and required to use, personal fall protection for all scaling and drilling operations performed on steep slopes. A positive descent control device shall be used for all such applications. Backing Safety Solutions

37.10.1 SPOTTER

Spotters are a proven method of protecting employees on foot behind vehicles with an obstructed view, but spotters themselves can be at risk for injury or even death. 3A Group shall implement the following actions to help keep spotters safe:

- Ensure that spotters and drivers agree on hand signals before backing up.
- Instruct spotters to always maintain visual contact with the driver while the vehicle is backing.
- Instruct drivers to stop backing immediately if they lose sight of the spotter.
- Not give spotters additional duties while they are acting as spotters.
- Instruct spotters not to use personal mobile phones, personal headphones, or other items which could pose a distraction during spotting activities.
- Provide spotters with high-visibility clothing, especially during night operations.

37.10.2 CAMERAS

Most vehicles (and some types of mobile equipment) can accommodate a camera that provides operators with a view to the rear. Some vehicles come equipped with cameras or may be offered with them as optional equipment. Camera systems can also be purchased as after-market equipment for vehicles. Viewing screens may be dash-mounted but must not block the driver's view out the windshield. Harsh environments, such as some construction sites or mines, may require more rugged cameras. Determining where to mount a camera for maximum effectiveness may be difficult, especially on large vehicles. For example, dump trucks may require two or three cameras to monitor the blind spots on the front, rear, and side of the vehicle.

37.10.3 PROXIMITY DETECTION SYSTEMS

Radar and ultrasonic technology both are used in backing safety systems. A radar system transmits a signal, which is bounced off an object. The signal is then received by a receiver. These systems alert the driver with a visual and/or audio warning. These systems must be positioned so that they won't detect harmless objects, such as the concrete slab of a driveway, which can interfere with the detection of an object or person behind the vehicle or mobile equipment. Also, the composition of an object can affect detection, with some materials being virtually invisible to radar. Like cameras, this equipment can be mounted on most vehicles and may be an option from some manufacturers.

Ultrasonic systems, such as sonar, emit bursts of ultrasonic waves in a frequency above the hearing threshold of humans. When the waves strike an object, they generate echoes used to determine the distance to the object. These systems alert the driver with a visual and/or audio warning.

37.10.4 TAG-BASED SYSTEMS

Another type of proximity detection system is an electromagnetic field-based system, which is a type of tag-based system. This system consists of electromagnetic field generators and field detecting devices. One electromagnetic field-based system uses electromagnetic field generators installed on a vehicle and electronic sensing devices (a tag) worn by persons working near the vehicle. Another electromagnetic field-based system uses field generators worn by persons working near the vehicle, with the sensing devices installed on the vehicle. These electromagnetic field-based systems can be programmed to warn affected workers, stop the vehicle, or both, when workers get within the predefined danger zone of the vehicle.

37.10.5 INTERNAL TRAFFIC CONTROL PLANS

An internal traffic control plan (ITCP) is another method used to address back-over hazards. These are planning that project managers can use to coordinate the flow of moving equipment, workers, and vehicles at a worksite to minimize or eliminate vehicles and employees from crossing paths. These plans can significantly reduce, or possibly eliminate, the need for vehicles to back up on a site.

37.11 SAFETY PRECAUTIONS WHEN TRANSPORTING EMPLOYEES USING MACHINERY AND/OR EQUIPMENT

Persons shall not be transported:

- In or on dippers, forks, clamshells, or buckets except shaft buckets during shaft-sinking operations or during inspection, maintenance and repair of shafts;
- In beds of mobile equipment or railcars, unless provisions are made for secure travel and means are taken to prevent accidental unloading if the equipment is provided with unloading devices.
- On top of loads in mobile equipment;
- Outside cabs, equipment operators' stations, and beds of mobile equipment, except when necessary for maintenance, testing, or training purposes and provisions are made for secure travel.
- Between cars of trains, on the leading end of trains, on the leading end of a single railcar, or in other locations on trains that expose persons to hazards from train movement.
    - This paragraph does not apply to car droppers if they are secured with safety belts and lines which prevent them from falling off the work platform.
    - Brakemen and trainmen are prohibited from riding between cars of moving trains but may ride on the leading end of trains or other locations when necessary to perform their duties.
- To and from work areas in overcrowded mobile equipment;
- In mobile equipment with materials or equipment unless the items are secured or are small and can be carried safely by hand without creating a hazard to persons; or
- On conveyors unless the conveyors are designed to provide for their safe transportation.

37.12 MAINTENANCE

Mobile and stationary equipment shall be maintained in a safe operating condition.

Defects that affect safety shall be corrected in a timely manner. Defects on any equipment, machinery and tools that affect safety shall be corrected in a timely manner to prevent the creation of a hazard to persons.

37.12.1 REPAIRS OR MAINTENANCE OF MACHINERY

Defective equipment or equipment shall be only performed after the machinery or equipment is blocked against hazardous motion. Repairs or maintenance of machinery or equipment shall be performed only after the power is off, and the machinery or equipment blocked against hazardous motion. Machinery or equipment motion or activation is permitted to the extent that adjustments or testing cannot be performed without motion or activation, provided that persons are effectively protected from hazardous motion.

37.13 TRAINING

Training shall be provided and documented to ensure that each employee understands the functions and purpose of the energy control procedures and have received the knowledge and skills required for safe application, usage and removal of energy controls. Training requirements for this procedure will include:

- Each authorized employee shall receive training to spot and recognize hazardous energy sources, the types and magnitude of energy sources in the workplace, and the procedures necessary for isolating energy sources.
- Each employee that is working in the vicinity or is affected in any way by the lockout or tagout in process, but does not lockout or tagout the equipment, shall be instructed in the purpose of the energy control procedures.
- All employees that are working in the area where the energy control may be utilized shall be instructed about the procedure. The prohibition related to attempts to restart or re-energize machines or equipment which are locked out or tagged out.
- When tagout systems are used, employees will be trained to understand that the tagout system has limitations and does not provide a physical restraint of the energy being controlled that a lockout system provides.
- Employees will be informed that tags that are used as a means of isolating energy, must be legible to all affected employees in the energy-controlled area. Tags shall be securely attached with material that withstands the environmental conditions. Tags should be attached that they cannot be inadvertently or accidentally be removed. Tags must never be removed without authorization from the person who is responsible for the tag.
- The training shall include the understanding that tags should never be bypassed, ignored or overlooked. Tags are a warning devise and should never evoke a false sense of security.
- Employee shall receive retaining when new hazards have been identified, when the employee has been given a new job assignment, a new machine has been introduced to the workplace, or a piece of equipment has been altered that may create a new set of energy hazards. If the current energy control procedures are changed, the employees with be informed on what changes have been made to the policy.
- If any hazards have been revealed during periodic inspections, the employee will be informed of the hazards existing, or if it is felt that any employee does not have full knowledge or use or the energy control procedures.
- Certification of training including employees that were trained and the dates of the training will be maintained by 3A Group.

37.14 RECORDS

Maintenance records for any service, repair or modification which affects the safe performance of the equipment must be maintained and be reasonably available to the operator and maintenance personnel during work hours

Employees assigned to new work tasks as mobile equipment operators, drilling machine operators, haulage and conveyor systems operators, ground control machine operators, AMS operators and those in blasting operations shall not perform new work tasks in these categories until training has been completed.

37.15 DOCUMENTATION

Upon an employee’s completion of approved training program to operate machinery and equipment, record and certification shall be maintained to prove the employee has received the specific training.

A copy of the training certificate shall be given to the employee at the completion of the training. The training certificates for each employee shall be available at the site for inspection by OSHA and for examination by the employee, the employee's representative and state inspection agencies.

38 HIGH PRESSURE WATER JETTING SYSTEMS

HIGH PRESSURE WATER (HYDRO) JETTING SYSTEMS

38.1 SCOPE

This Guide Manual provides guidance for the operation and maintenance of water jetting equipment. It describes methods for eliminating or reducing hazards and risks associated with water jetting.

Water pressure of 10,000 psi is extremely powerful and dangerous. The main safety hazards associated with High-Pressure Water Jetting are injection and fatigue. Water jetting uses a pressurized stream of water with a velocity that is greater than 340 m/s (1,100 ft/s) when exiting the orifice. High-Pressure Water Jetting can cut skin and bones at close distances, i.e., the distance used to clean surfaces. Water jetting does not produce an etch or profile of the magnitude currently recognized by the coatings industry. Rather, it exposes the original abrasive blasted surface profile if one exists.

In summary, a water jet striking you from several centimeters can easily penetrate the skin. If this happens, you may not see the full extent of the injury. The entry wound may be quite small and may not bleed. But there is no telling how much water was injected into the body or if any internal damage was done. Micro-organisms can enter through the wound and spread inside the body.

It shall be 3A Group's responsibility to ensure all contractors employed for the purpose of high-pressure water jetting systems are made aware of these guidelines. It will be the responsibility of the contractors to ensure these procedures are strictly adhered to at all times.

38.2 PURPOSE

The objective of this Guide Manual is to provide users of water jetting systems with guidance concerning the risks and the safe operating practices to protect and safeguard equipment users and other persons who may be in the vicinity of water jetting operations.

38.3 RELATED DOCUMENTS

SSPC-SP 12/NACE 5, "Surface Preparation and Cleaning of Steel and Other Hard Materials by High- and Ultrahigh-Pressure Water Jetting Prior to Recoating"

38.4 DEFINITIONS

For the purpose of this Guide Manual, the definitions below apply.

- **Automatic unloader valve** — a device which automatically removes operating pressure on the pump by opening a free flow path for the pump output when it senses the line to the nozzle is closed. It automatically adjusts the amount of water sent to the nozzle line, dependent on the pressure set by the operator and the capacity of the pump.
- **Bursting disc** — a safety device designed to rupture and discharge the fluid so as to prevent a safe predetermined pressure being exceeded. (Needs to be replaced before operations can continue.)
- **Changeover valve** — an operator-controlled valve designed to properly direct high-pressure water flow from the pump to another item or items of equipment at the operator's choice.
- **Competent person** — a person who has acquired through training, qualification or experience, or a
- combination of these, the knowledge and skills enabling that person to perform the task required.
- **Dry shut-off valve** — an operator's control valve which has the capability to completely shut off flow to the nozzle. Typically seen as a handgun or foot valve shall only be used in conjunction with a regulator or automatic unloader valve.
- **Dump system** — an operator-controlled system that opens a free flow path for the water, thereby reducing the system pressure to a safe level without shutting off the flow to the nozzle.
- **Electrical control system** — a control system which uses various servomechanisms to control the engine speed and pressure loading of the pump system. Typically uses a 'hold to activate' switch (e.g. a foot pedal) to bring the system up to preset operating conditions. Enables operation without a shut-off or dump valve in the nozzle line.
- **Fan jet** — spreads the stream of water in one plane, giving a wide band coverage of the work piece. A typical application is for cleaning larger areas so allowing less energy to remove unwanted matter.
- **Flexible lance** — a flexible tube used to feed a nozzle through an enclosed space such as a pipeline. The flexible lance is most commonly used where a tube contains one or more bends.
- **Foot control valve** — the operator's control valve may be arranged for actuation by the operator's foot if desired, either in place of, or in addition to, hand-control.
- **High pressure water cleaning** — the use of high-pressure water, with or without the addition of other chemicals or abrasives to remove matter from various surfaces.
- **High pressure water cutting** — the use of high-pressure water, with or without the addition of additives to penetrate into the surface of a material for the purpose of cutting that material.
- **High pressure water jetting system** — a water delivery system consisting of an energy source (e.g. electric motor or IC engine), pump, control mechanism, hoses and pipes, nozzles and various other attachments and components necessary for the equipment to function as a system. The function of the system is to increase the velocity of the liquids at the point of application. Solid particles or additional chemicals may also be introduced, but the exit in all cases will be in a free stream.

- *Note: For the purpose of this Guide Manual the term 'jetting systems' is taken to mean high pressure water jetting, cleaning and cutting systems.*
- **Hose assembly** — a hose with couplings or end fittings attached in accordance with the hose manufacturer's recommendation.
- **Jetting gun** — a portable combination of operator's control valve, lance and nozzle, normally resembling a gun in arrangement.
- **Lancing** — an application whereby a lance and nozzle combination is inserted into, and retracted from, the interior of a pipe or tubular product. It may be self-propelled by its backward-directed jets, and may be manufactured in various shapes, sizes and combinations of rotating forward and backward-directed jets.

- **Flexible lancing** — an application of a lance made up of reinforced tube but flexible enough to bend. It is primarily used manually and in rare cases, it could be automated.
- **Rigid Lancing** — an application of a lance made of SS tubing and mounted on an automated feeder. It is usually for very high-pressure applications. Cleaning is affected by air driven lance inserted into and retracted from exchanger tubes. It is propelled by air driven motors.
- **Nozzle** — a device with one or more openings (orifices) where the fluid discharges from the system. The nozzle restricts the area of flow of the fluid, accelerating the water to the required velocity and shaping it to the required flow pattern and distribution for a particular application. Combinations of forward and backward nozzles are often used to balance the thrust. Such nozzles are commonly referred to as tips, jets or orifices.
- **Operator** — a person who has been trained and has demonstrated the competence necessary to perform an assigned water jetting related task without supervision.
- **Reaction force** — the force created by the movement of the water as it leaves the nozzle. The force acts in the opposite direction to the movement of the water.
- **Regulator valve** — automatically adjusts the amount of water sent to the nozzle line dependent on the pressure set by the operator and the capacity of the pump. Unlike the automatic unloader valve, it does not reduce the pump operating pressure at any time.
- **Refresher training** — training which reviews the required operations or principles. The person receiving refresher training either would not have performed the particular operations regularly or have reached the recommended time limits since training was last provided.
- **Relief valve** — a valve which automatically opens to discharge fluid to relieve pressure.
- **Retro gun** — a gun fitted with forward and backward facing jets which reduce the thrust experienced by the operator.
- **Safety observer** — a member of the work crew assigned the following tasks:
    - Observing the jetting operations and barricaded area.
    - Shutting down the system in the event of an emergency or malfunction.
    - Controlling (or communicating to the controlling operator) the system pressure as requested by the jet operator.
    - Controlling the access of personnel into the barricaded area.
- **Safety valve** — a valve which automatically, without the assistance of any energy other than the fluid consumed, discharges a certified quantity of the fluid so as to prevent a predetermined safe pressure from being exceeded. It is designed to close and prevent the further flow of fluid after normal pressure conditions of service have been restored.
- **Shot gunning** — an activity where a jetting gun is used to blast deposits out of the end of a pipe or tube. The gun is commonly fitted with a shrouded nozzle which is pushed firmly against the open end of the pipe or tube while the jet is operated in short bursts.
- **Shall** — indicates a direction.
- **Water jet**
- *Water jet*—a jet stream of water produced from the individual outlet orifice of a nozzle. The shape of the jet is determined by the form of the orifice while the speed at which it travels is determined by the orifice design, orifice area, and pressure.
- *Straight jet*—concentrates the stream of water over a small area of workpiece by minimizing the spread. A typical application includes cutting, or for general cleaning of matter with higher shear and/or bond strength.
- *Fan jet*—spreads the stream of water in one plane, so giving a wide band coverage of the work piece.

A typical application is for cleaning larger areas requiring less energy to remove unwanted matter.

38.5 GENERAL PRINCIPLES

The following principles shall be observed in the protection of persons against the harmful effects of hazards associated with water jetting:

Before commencing any water jetting operations steps shall be taken to ensure that all hazards likely to affect the safety of persons operating equipment or working in the vicinity of water jetting operations are minimized. These steps shall include:

- hazard identification;
- risk assessment; and
- risk control.

Every effort shall be made to prevent or control the release of injurious or harmful substances or material into the working environment. This may be achieved through the improved design of plant and equipment, buildings and work areas or by work procedures and controls which eliminate the need for persons to enter or remain within barricaded work areas when equipment is operating. If efforts to prevent or control hazards at the source are unsuccessful, appropriate personal protective equipment shall be provided and worn by equipment operators and any other persons who may be in the vicinity of the work areas.

Note: These principles shall extend to persons who are not directly concerned with the water jetting operations, e.g. persons who may be exposed to toxic substances carried away from the work area in the form of drifting mists.
Note: Where hazardous or toxic products are encountered appropriate measures shall be taken to ensure proper decontamination and disposal of these products.

38.6 PERSONAL PROTECTIVE CLOTHING

Appropriate personal protective equipment shall be worn where:

- hazards cannot be otherwise prevented or suitably controlled, e.g. by engineering or administration
- controls, total enclosure or substitution;
- complete protection is essential, e.g. in some occupational environments with uncertain levels of
- hazards; or
- legislation requires it.

The provision and use of personal protective equipment do not reduce or replace the need for proper Occupational Health and Safety prevention measures, such as engineering or administrative controls, to be undertaken. Recommendations of such preventive measures shall always be fully explored before considering issue of personal protective equipment. Where personal protective equipment is issued, instruction and training shall be provided regarding its correct use and maintenance.

38.7 HEAD PROTECTION

Where appropriate suitable head protection fit and rated for the high-pressure application.

38.8 EYE PROTECTION

Eye protection fit and rated for the high-pressure application (adequate for the purpose and of adequate fit on the person) shall be worn at all times when in the vicinity of jetting operations. Where liquids liable to cause eye damage are encountered, it may be necessary to use either a combination of visor and goggles or a full hood with shield.

38.9 BODY PROTECTION

All persons shall wear suitable waterproof clothing fit and rated for the high-pressure application as appropriate, having regard to the type of work being undertaken. Liquid- or chemical-resistant suits shall be worn where there is an assessed risk to health or of injury that can be prevented by such equipment.

38.10 HAND PROTECTION

Adequate hand protection fit and rated for the high-pressure application shall be worn when there is an assessed risk of injury that can be prevented by such equipment.

38.11 FOOT PROTECTION

All persons shall wear appropriate occupational protective footwear complying with OSHA requirements and rated for the high-pressure application. A metatarsal and lower leg guard shall be used by jetting operators where it is assessed that the risk of foot injury can be prevented by such equipment.

38.12 HEARING PROTECTION

Suitable hearing protection shall be worn at all times when the noise levels exceed limits set by regulatory authorities. All personnel and operators shall receive instruction in the correct use and maintenance of hearing protectors, so that noise exposure lies within the limits as recommended by the regulatory authority.

38.13 RESPIRATORY PROTECTION

Respiratory protection shall always be worn where there is an assessed risk of injury that can be prevented by such equipment. Respiratory protection shall only be worn by persons who have been trained in its correct use.

38.14 TRAINING

Only competent personnel shall supervise and operate water jetting systems. Operators shall be examined in accordance with the recommendation/s of an appropriate regulatory authority or other approved authority when such recommendation/s exists.

All employees required to operate high-pressure water jetting systems shall be conversant with the operation, risks and safety awareness.

Areas which shall be addressed include:

- The operation of the system shall be explained, pointing out potential dangers, problems and proper corrective actions to be taken in the event of failure or malfunction of the equipment.
- The personal protective equipment recommendation/s shall be explained. Instructions shall be given as to when and how specific items of clothing and other types of protective devices shall be worn, according to the location and the type of work to be performed. The possible effects on persons not directly associated with the jetting operations shall also be explained.
- It is also important that adequate care be taken in the selection, use and maintenance of personal protective equipment and that adequate resources be allocated for these functions. Advice on these matters shall be sought from the equipment manufacturers/suppliers, regulatory authorities and from the relevant Standards.

Note: It shall be recognized that protective equipment may not protect the operator from injury by direct high pressure water jet impact.

Note: Persons required to use PPE shall be instructed in its correct use and maintenance.

- The cutting action of a pressurized jet of water and the potential hazard it poses to the human body shall be demonstrated through the use of audiovisual aids or actual use of equipment (e.g. by cutting through a piece of suitable material).
- The operation of all relevant control devices shall be explained. The importance of not tampering with any control devices as well as the importance of keeping them in proper working order shall be stressed.
- It shall be explained that water jetting components such as valves and seating surfaces in pressure regulating devices experience high rates of wear during operations and the equipment requires frequent inspection, maintenance, or replacement in order to provide proper operation.
- The importance of ensuring that all component parts, fittings and hoses are compatible and are the correct size and rating for the particular pump unit shall be stressed to reduce the possibility of equipment failures.
- The proper method of connecting hoses, including laying out without kinks, protection from excessive wear, and proper tools to use on couplings and fittings shall be explained.
- The proper stance for a sound footing and correct use of various devices shall be demonstrated. The trainee, under close supervision, shall use the various devices while the unit is slowly (where this is possible) pressurized.

38.15 REFRESHER TRAINING

Refresher training shall be carried out to ensure the competency of operators.

Note: This shall be performed on a bi-annual basis or more frequently as appropriate.

38.16 OPERATIONAL PROCEDURE

38.17 PLANNING

Where possible, the item or component (work piece) to be jetted shall be removed from plant areas to a designated work area. Where this is impractical, water jetting operations may be carried out in situ or in an area adjacent to the installed position of the work piece. In such instances, jetting system operators shall ensure the necessary approvals and work permits have been obtained.

Repetitive tasks shall be carried out in accordance with a specific job plan. Personnel familiar with the equipment to be cleaned or the material to be cut and the work environment shall meet with personnel who will be carrying out the work, and outline potential hazards of the work area, environmental problems, safety standards and emergency procedures.

When work is carried out from scaffolding platforms, powered work platforms or other similar locations, or where there is an assessed risk of falling the operator or operators shall be appropriately safe guarded with a safety harness or belt and a line. The operators' platform shall also be secured to prevent movement caused by the reaction force of the jetting system.

All work in a confined space shall be carried out in accordance with Confined Space Manual.

Target and side shield shall, where practical, be suitably placed to safeguard personnel and equipment against water or grit, and solids removed by the jetting operation

Where there is a possibility of encountering corrosive or toxic material, the responsible officer is obliged to inform the person in charge of the water jetting operation of any precautions that may be necessary, including the collection and disposal or waste materials

38.18 CHECKLIST

A checklist shall be used to ensure that the proper procedures and proper equipment selection are followed.

38.19 SYSTEM CONTROL

All systems shall be 'fail safe' and incorporate at least two control mechanisms. Examples of control mechanisms include:

- dump valves;
- dry shut-off valves;
- electronic control systems; and
- trigger guns.

Note: A 'hold-to-operate' device is not required when the operator is remote from the work or the system is operated automatically.

38.20 WORK AREAS

Safe area limits appropriate for the planned jetting operations shall be clearly defined. The perimeter of the defined area shall be outside the effective range of the jetting equipment. Suitable barriers conforming to the general recommendation/s of the equipment manufacturer and safety guidelines of the company shall be erected to encompass the hazardous area. The perimeter of this area shall be outside the effective range of the jetting equipment.

The barriers may be of rope, safety tape or barricades. The actual form of the barriers is not important provided they are highly visible and give an effective warning. Hazzard signage shall also be posted to warn personnel they are approaching a hazardous area.

At all times, when high pressure water jetting equipment is in use, notices indicating DANGER: HIGH PRESSURE WATER JETTING EQUIPMENT IS IN USE shall be displayed so as to be clearly visible and legible to all persons who are in or near the restricted area where the equipment is being used.

38.21 HOOK-UP

38.22 HOSES

Only hose assemblies specifically designed for water jetting systems shall be used for this purpose.

Hoses shall be arranged to effectively minimize any tripping hazard.

Hose ends shall be suitably restrained with braided coverings or other suitable means to minimize any danger to personnel should a hose connection or end separate during jetting operations.

Support Hoses, pipes and fittings shall be supported to prevent excessive sway, or wear created by vibration or stress on the end connections. When hoses are drawn up the outside of a structure, support or 'tag' lines shall be used to support their weight. Measures shall also be taken to prevent hoses falling should a hose coupling fail.
When crushing or puncture is likely to occur to hoses laid on the ground or over sharp objects, hoses shall be suitably protected to prevent damage.

38.23 FITTINGS

All fittings shall be cleaned before installing in a system. Seals shall be replaced and lubricated as necessary. Care shall also be exercised to ensure all fittings, hoses and nozzles are suitable for the intended purpose.

38.24 NOZZLES

All orifices shall be checked in all nozzles for any obstruction, damage or imperfections.

38.25 PRE-FLUSHING

The system shall be completely flushed with sufficient water to remove any contaminants before installing the nozzle.

38.26 ELECTRICAL EQUIPMENT

Any electrical equipment in the immediate area of the operation that presents a potential hazard and is not required during the jetting operations, shall be de-energized, shielded, or otherwise made safe.

38.27 JETTING OPERATION

38.27.1 MULTI-PERSON OPERATIONS

In most water blasting operations, it is accepted practice to employ a minimum of two persons, but the number of operators used is generally based upon the demands of the equipment being used and the nature of the job.

The role of the second operator, also known as the “Safety Observer” or “Pump Operator” is to attend the pump unit, keep close watch on the first operator for signs of difficulty or fatigue (team members shall rotate their duties during any job to minimize fatigue to the operator holding the lance or gun), and watch the surrounding area for intrusion by other persons or unsafe situations.

Additional operators may be required:

- to assist the first operator with the handling of the lance if it is too long or heavy for one person
- to provide communication if the lance operator is out of sight of the pump unit operator.

All multi-person water blasting operations will be controlled by a team leader/supervisor who is trained and competent in all aspects of the blasting operation.

38.27.2 SINGLE-PERSON OPERATIONS

Are generally allowed where the method of operation does not place the operator at risk of jet impact e.g. drain or sewer cleaning.

The risks posed by the presence of other hazards must be considered and assessed when deciding on the advisability of single-person operation.

Single-person operation is also permitted when using mechanically operated or positioned appliances, where the operator is physically isolated from the pressurized water flow. Where such appliances are used, a set of written safe operating instructions will be prepared for each appliance and the appliance will be operated strictly in accordance with these instructions by a competent operator specifically trained in its use.

38.28 SYSTEM PRESSURIZATION

The pump shall not be started and brought up to pressure unless each team member is in his designated position, the nozzle is held in or directed at the work piece, and the lance or gun securely held.

Where possible the pressure will be increased slowly to allow the operator to experience the reaction force of the jet progressively and to identify any leaks or faulty components.

All leaks will be corrected; faulty components repaired or replaced before commencing operations. No attempt will be made to adjust any component, hose connection, fitting or similar, while the system is under pressure. The system will be depressurized or isolated before any repairs are carried out. If repairs are not possible equipment will be not used and tagged “out of service”.

The lowest pressure compatible with the work to be performed will be used. The pressure will not be adjusted without the operator’s awareness.

The system shall be de-pressurized when not in use, the defined work area is entered by an unauthorized person or any recommended practices are violated.

38.29 REACTION FORCE

Reaction forces will be taken into account when planning a particular job and allocating personnel to ensure the forces exerted by the gun and the hose on the water blasting operator are not excessive.

The reaction force along the axis of the gun barrel will be calculated in order for an average operator to retain control of the gun safely and comfortably. A maximum reaction force of 22.5kg is recommended for an eight-hour shift and this will not be exceeded for normal operations

Where a higher reaction force is required to achieve acceptable results, consideration will be given to mechanical control of the nozzle, and where such mechanical assistance is not possible; consideration will be given to the size and strength of the individuals assigned to the task and the time to be spent on the gun.

Higher reaction forces than those recommended may be controlled for short periods.

38.30 HANDGUN OPERATIONS

When using a lance or hand-held gun for water blasting operations operators will abide by the following principles:

- persons operating the lance or gun will have direct control of the water flow
- the system will never be left unattended when pressurized
- when more than one operation is being performed within the same area, a physical barrier will be installed or adequate spacing between operators will be maintained to prevent the possibility of injury from the water blasting operations
- objects to be cleaned will never be held manually
- where practicable the length of the gun barrel will be such that the nozzle strikes the ground before the operator can inadvertently direct it onto his feet or legs
- steel-braided or crush-resistant hoses will be used on air-operated fail-safe systems to keep the system from being activated by someone stepping on, running over or otherwise crushing the hose.

38.31 LANCING AND PIPE CLEANING

The operator inserting the nozzle will have direct control of the water flow to the nozzle except in cases where greater safety can be afforded by other control means.

When performing manual pipe cleaning or lancing operations, the entrance to a line or pipe ***will not*** be cleaned with a lance fitted with a retro (back) jets.

The clearance between the outside diameter of the hose, lance and nozzle assembly and the inside wall of the item being cleaned will be sufficient to allow adequate washout of water and debris.

Where the diameter of the nozzle and hose assembly exceed two-thirds of the inner diameter of the pipe or tube being cleaned, additional care will be exercised to minimize the risk of the nozzle and debris forming a hydraulic piston which may be forced out under pressure towards the operator.

During manual operation, the nozzle will be inserted into the tube prior to commencement of the actual jetting water flow. Conversely, the water flow will be interrupted before removal of the nozzle from the tube

Operators will ensure hoses are conspicuously marked at a distance of nominally 3-feet from the nozzle to indicate the location of the nozzle. In addition, tubes will be installed between the flexible lance and the connecting nozzle (usually a 12” to 24” rigid lancing tube) which will aid in sighting the nozzle coming out of the tube end.

Where there is a possibility of the operator being impacted by a returning or reversing nozzle the operator will ensure that a length of rigid assembly (starter bar) is of sufficient length to prevent reversal of the nozzle assembly during water blasting operations. Alternatively, a suitable safety shield will be provided to protect the operator from the nozzle turning through 180° and doubling back towards the operator. Where the operator is not in a position to be impacted by a returning nozzle e.g. when the nozzle is in a drain reached by an access-way, the nozzle assembly length recommendations may not be necessary.

38.32 WORK STOPPAGE

Jetting operations will cease:

- in the event that leaks become apparent on the high-pressure side of the pump or equipment damage becomes apparent
- if any person becomes aware of any change in conditions or any hazards being introduced or existing
- if the emergency evacuation alarm is sounded
- if any unauthorized person enters the cordoned or barricaded areas
- if any of the recommended relevant practices in this standard are not being followed.

Systems shall be depressurized when

- Not in use and left unattended
- Replacement of components or repairs are being made to the system

38.33 INCIDENTS AND ACCIDENTS

All accidents or injuries, whether resulting in 'lost time' or 'no lost time' injuries, shall be recorded in accordance with the recommendations of 3A Group's safety program.

Incidents that result in 'near misses' shall also be recorded as a means of providing a record of significant incidents that have the potential to result in serious injury at the workplace, so appropriate measures can be implemented to minimize or eliminate these potential hazards.

In the event that a person is injured by the impact of a water jet, the injury caused may appear insignificant and give little indication of the extent of the injury beneath the skin and the damage to deeper tissues. Although only a small hole may be present quantities of water may have penetrated the skin and entered the flesh and organs causing serious injury.

Any person struck on the skin by a high-pressure water jet shall be medically assessed immediately

All operators engaged in industrial water jetting operations shall carry an immediately accessible, waterproof medical alert card explaining treatment specific to water blasting-related injury.

Recommended information includes:

- typical post-accident infections that can be caused by high pressure water jetting
- first aid treatment
- contact details for medical experts
- worker identification and medical details.

38.34 COMMUNICATION

Before starting a blasting operation, the team members will agree on a code of signals or means of communication to be used during the operation of the equipment.

It is important to ensure all personnel working in the vicinity of water blasting operations are notified.

Pressurize System
The thumb pointing upwards, the rest of the hand closed. From the shoulder height the arm moves up and down.

Lower Pressure
Finger pointing down the rest of the hand is closed.
Move the hand in a circular motion and down.

Raise Pressure
First finger pointing up the rest of the hand closed

Depressurize System
Form a fist. Move the arm back and forth at shoulder height

38.35 INSPECTION CARE AND MAINTENANCE

38.36 GENERAL

All components of water jetting systems shall be inspected, serviced and generally maintained in accordance with the manufacturer's recommendations. Records shall be kept of service, repairs and maintenance. Operators shall report any defect in the water jetting system to their supervisor so that the defect may be investigated and rectified.

38.37 MAINTENANCE

38.38 PUMP UNIT

The pump unit shall be maintained in accordance with the manufacturer's instructions. This shall include daily pre-operational checks on the following items as applicable:

- Drive unit—lubricating oil, water, hydraulic fluid and fuel levels.
- Pump unit—lubricating oil and gearbox oil levels.
- Hydraulic hose reel—lubricating oil and fluid levels.
- Condition of guards, shields and safety interlocks.
- Electrical leads and connectors.

38.39 FILTERS AND STRAINERS

All water filters shall be checked at regular intervals, dependent upon the water supply conditions, and in accordance with pump manufacturer's recommendations.

****Extreme care shall be taken to ensure that the water is cleaned through filters which meet the pump manufacturer recommendation/s. failure to do so may cause destruction of the equipment and malfunction of the control mechanisms, possibly causing serious accidents.**

38.40 HOSE ASSEMBLIES

All hose assemblies shall be visually inspected prior to each use to ensure:

- The correct pressure rating and size is selected.

Note: Operators shall ensure the rating of the hose assembly is adequate for the intended application.

- There is no apparent structural damage, e.g. corroded or broken wires, bulging, kinking or cuts.

Note: Where the hose assembly shows evidence of damage, steps shall be taken to determine its serviceability before use. All testing of hose assemblies shall be carried out by competent persons.

- All end fittings and couplings are in good order and of the correct pressure rating for the unit operating pressure.
- Subject to Section 5 all those connections to equipment or other hoses shall be restrained with braided coverings or other suitable means to restrict their movement in the event of a hose end failure.

The effective service life of hose assembles is influenced by many factors such as:

- storage;
- pressure cycles;
- temperature;

- environment;
- chemical exposure; and
- longitudinal stress.

Note: The above listing is not exhaustive.

Attention to the following practices will assist in maximizing the service life of hose assemblies:

- Hose assemblies shall not be unnecessarily subjected to frequent and prolonged periods of high pressure.
- Exposure of hose assemblies to temperatures in excess of stated rating shall be avoided.
- Hose assemblies shall not unnecessarily be exposed to chemicals or corrosive substances. Where hose assemblies are exposed to such substance's steps shall be taken as soon as possible to neutralize their effect.
- Repetitive and prolonged use of hose assemblies in long-line drain cleaning functions and long vertical drops shall be avoided.
- Unnecessary exposure to sharp, protruding and abrasive surfaces shall be avoided. Where this is not possible steps shall be taken to minimize the damage to hose assemblies.
- Where practical, hose assemblies shall be stored in a cool dry area lying flat.
- Records shall be kept of all service repairs and maintenance to hose assemblies.

38.41 SERVICING

Major servicing operations and repairs requiring specialist knowledge shall only be undertaken by competent persons with thorough knowledge of the equipment. Such items include:

- Pressure relief valve.
- Bursting discs (if used).
- Pressure control devices.
- Pump control valve or dry shut-off control valve.
- Electrical controls and equipment.

38.42 REPAIRS

Operators of water jetting systems shall not carry out repairs other than simple adjustments to, or replacement of, parts which are specifically listed in the manufacturer's instructions for use and periodic service. All other repairs or maintenance shall be carried out by the manufacturer, his agent or other persons authorized by the manufacturer, his agent or other suitably qualified persons.

38.43 TOOLS

When maintaining or assembling jetting systems the correct size tools shall be used at all times. The use of tools which can damage equipment is not recommended e.g. using wrenches with serrated gripping jaws on hose connections particularly on the crimped portion of a hose fitting or lance.

38.44 COMPATIBILITY

When assembling equipment, all component parts and fittings shall be checked to ensure they are compatible and the correct size and rating for the pump unit. All electrical equipment shall meet the required levels of protection against the ingress of water, fumes or overspray.

38.45 MAINTENANCE RECORD

- Suitable maintenance records shall be kept for each major piece of equipment. After each inspection or service recommended by the manufacturer or equipment repair, the person carrying out the work shall record—
- the condition of the equipment and hoses;
- any repairs performed;
- any adjustments performed; and
- the date when the examination or work was carried out and the name of the person performing the task.

38.46 PERMANENT CLEANING AREAS

At locations where jetting operations are carried out on a regular basis consideration shall be given to the construction of permanent cleaning areas to minimize the disruption to surrounding areas.

These areas shall be suitably enclosed to contain overspray, debris, run-off and misdirected water jets. The enclosed area shall be large enough to allow a clear and safe working area around all sides of the largest object to be cleaned. Warning notices shall be displayed prominently at all access points and perimeters.

Access by unauthorized persons other than the jetting team shall be strictly prohibited whilst work is in progress. If any unauthorized entry occurs, all work shall cease immediately.

The working area shall be well lit at all times and be as free as is practicable from hazards likely to trip or otherwise endanger personnel in this area.

The working area shall contain a minimum of electrical equipment. All electrical equipment in the working area shall meet the required levels of protection provided in the operation guidelines of the equipment against the ingress of water fumes or over-spray.

The working area shall be provided with adequate drainage and means to collect and remove waste material produced during the jetting operations.

APPENDIX A

Typical Example of a Pre-Service and Operational Checklist for Pressurized Water Jet Cleaning

- Date:
- Location:
- Equipment being cleaned:
- Is the work area, including other end of unit being cleaned, clearly defined, and are proper warning signs posted?
- Have precautions been taken to protect all electrical equipment?
- Is there any hazard to personnel or possible damage to equipment such as release of corrosive chemicals, hot or flammable liquids, gases, drifting mist or other materials?
- Have all persons working in the vicinity been advised about the intention to carry out water jetting operations?
- Are all fittings of the correct pressure rating?
- Are all hoses of the correct pressure rating?
- Are all hoses in good operating condition?
- Are all fittings in good operating condition?
- Have suitable means been taken to protect hoses and lines from accidental damage?
- Are all nozzles free from plugging, and in good operating condition?
- Have precautions been taken to prevent inadvertent nozzle reversal?
- Is the filter on the pump water supply suction clean and in good operating condition?
- Is there an adequate water supply?
- Have all personnel been provided with the appropriate personal protective equipment for this job?
- Have all personnel received the proper training for this job?
- Are all personnel involved competent to perform this work?
- Has the complete hook-up been flushed, and air removed from the system?
- Has hook-up, including pipes, hoses and connections been pressure tested with water at the maximum operating pressure?
- Are all control systems operating correctly?
- Is the location of emergency medical aid known?
- Have the appropriate means of communications been established for the job?

39 LADDERS & STAIRWAYS

LADDERS & STAIRWAYS

39.1 GENERAL REQUIREMENTS

- A stairway or ladder must be provided at all worker points of access where there is a break in elevation of 19 inches (48 cm) or more and no ramp, runway, embankment, or personnel hoist is provided.
- When there is only one point of access between levels, it must be kept clear to permit free passage by workers. If' free passage becomes restricted, a second point of access must be provided and used.
- Where there are more than two points of access between levels, at least one point of access must be kept clear.
- All stairway and ladder fall protection systems required by these rules must be installed and all duties required by the stairway and ladder rules must be performed before employees begin work that requires them to use stairways or ladders and their respective fall protection systems.

39.2 KEY RESPONSIBILITIES

39.2.1 MANAGERS AND SUPERVISORS

- Managers and supervisors are responsible for ensuring that all employees, and/or contractors have been trained in the use and inspection of ladders in accordance to the manufacturer's guidelines.
- Managers and supervisors are responsible for ensuring that all employees and contractors are aware that if an inspection discovers a defect, the ladder shall not be used and taken out of service.

39.2.2 EMPLOYEES

- Employees shall inspect ladders prior, during and at the completion of each use to ensure the condition of the ladder and the safety of its occupants.
- Employees are responsible for following this program and reporting any damage or repairs that may be needed to their supervisor.

39.3 PROCEDURE

Inspection, Care and Safe Work Practices of Ladders

39.4 INSPECTION

Ladders shall be inspected by a competent person for visible defects on a periodic basis and after any occurrence that could affect their safe use.

- Ladder rungs must be uniformly spaced or meet OSHA/ANSI specifications. Ladder rungs, cleats, and steps shall be parallel, level, and uniformly spaced, when the ladder is in position for use.
- Portable and fixed ladders with structural defects, such as, but not limited to, broken or missing rungs, cleats, or steps, broken or split rails, corroded components, or other faulty or defective components, shall either be immediately marked in a manner that readily identifies them as defective, or be tagged with "Do Not Use" or similar language, and shall be withdrawn from service until repaired
- If a ladder is tipped over, it shall be inspected by a competent person for side rail dents or bends, or excessively dented rungs; check all rung to side rail connections; check hardware connections; check rivets for shears.
- Ladders with broken or missing steps, rungs, or cleats, broken side rails, or other faulty equipment shall not be used; improvised repairs shall not be made.
- All wood parts shall be free from sharp edges and splinters; sound and not painted.

39.5 CARE

- Ladders shall be maintained in good condition at all times, the joint between the steps and side rails shall be tight, all hardware and fittings securely attached, and the movable parts shall operate freely without binding or undue play.
- Metal bearings of locks, wheels, pulleys, etc., shall be frequently lubricated.
- Frayed or badly worn rope shall be replaced. Safety feet and other auxiliary equipment shall be kept in good condition to ensure proper performance.
- Rungs shall be kept free of grease and oil.
- Ladders shall be stored in a well-ventilated area in a manner to prevent sagging and warping.

39.6 LADDER SAFE WORK PRACTICES

- Ladders shall be used only for the intended purpose for which they were designed.
- The ladder shall be secured at the top or held by another person at the base.
- The footing of the ladder shall be placed on a stable and level surface.
- Extension ladders shall be placed at a 4:1 ratio. Ladders shall be used at an angle such that the horizontal distance from the top support to the foot of the ladder is approximately one-quarter of the working length of the ladder (the distance along the ladder between the foot and the top support.
- When ladders are not able to be extended then the ladder shall be secured at its top to a rigid support that will not deflect.
- Ladders shall not be placed on boxes, barrels, or other unstable bases to obtain additional height.
- Ladders shall not be used in a horizontal position as platforms, runways, or scaffolds.
- Ladders shall not be used by more than one man at a time.
- Ladders shall not be placed in front of doors opening toward the ladder unless the door is blocked open, locked, or guarded.
- If a ladder is used in a high traffic area, barricades shall be placed to avoid accidental displacement due to collisions.
- Do not stand on the top two rungs or top of step ladders.

On two-section extension ladders the minimum overlap for the two sections in use shall be as follows:

Size of Ladder (feet)	Overlap (feet)
Up to and including 36’	3
Over 36 up to and including 48’	4
Over 48 up to and including 60’	5

- Ladders shall extend a minimum of 3 feet above top of upper landing surface. The ladder side rails shall extend at least 3 feet (.9m) above the upper landing surface. When ladders are not able to be extended then the ladder shall be secured at its top to a rigid support that will not deflect.
- The employee shall maintain a three (3)-point grip on the ladder at all times and carry tools/equipment on a belt or hoist up. Do not carry anything in the hands that could cause injury in case of fall.
- The employee shall face the ladder while ascending or descending.
- The bracing on the back legs of stepladders is designed solely for increasing stability and not for climbing.
- The ladder shall not be moved while occupied.

39.7 STAIRWAYS

The following general requirements apply to all stairways used during the process of construction, as indicated:

- Stairways that will not be a permanent part of the structure on which construction work is performed must have landings at least 30 inches deep and 22 inches wide (76 x 56 cm) at every 12 feet (3.7 m) or less of vertical rise.
- Stairways must be installed at least 30 degrees–and no more than 50 degrees–from the horizontal.
- Variations in riser height or stair tread depth must not exceed 1/4 inch in any stairway system, including any foundation structure used as one or more treads of the stairs.
- Where doors or gates open directly onto a stairway, a platform must be provided that extends at least 20 inches (51 cm) beyond the swing of the door.
- Metal pan landings and metal pan treads must be secured in place before filling.
- All stairway parts must be free of dangerous projections such as protruding nails.
- Slippery conditions on stairways must be corrected.
- Workers may not use spiral stairways that will not be a permanent part of the structure.

The following requirements apply to stairs in temporary service during construction:

- Except during construction of the actual stairway, stairways with metal pan landings and treads must not be used where the treads and/or landings have not been filled in with concrete or other materials, unless the pans of the stairs and/or landings are temporarily filled in with wood or other materials. All treads and landings must be replaced when worn below the top edge of the pan.
- Except during construction of the actual stairway, skeleton metal frame structures and steps must not be used (where treads and/or landings will be installed later) unless the stairs are fitted with secured temporary treads and landings.
- Temporary treads must be made of wood or other solid material and installed the full width and depth of the stair.

39.8 STAIRRAILS AND HANDRAILS

The following general requirements apply to all stair rails and handrails:

- Stairways having four or more risers or rising more than 30 inches (76 cm) in height–whichever is less–must have at least one handrail. A stair rail also must be installed along each unprotected side or edge. When the top edge of a stair rail system also serves as a handrail, the height of the top edge must be no more than 37 inches (94 cm) nor less than 36 inches (9 1.5 cm) from the upper surface of the stair rail to the surface of the tread.
- Winding or spiral stairways must have a handrail to prevent using areas where the tread width is less than 6 inches (15 cm).M
- Stair rails installed after Mach 15.1991, must be not less than 36 inches (91.5 cm) in height.
- Midrails, screens, mesh, intermediate vertical members, or equivalent intermediate structural members must be provided between the top rail and stairway steps to the stair rail system.
- Midrails, when used, must be located midway between the top of the stair rail system and the stairway steps.
- Screens or mesh, when used, must extend from the top rail to the stairway step and along the opening between top rail supports.
- Intermediate vertical members, such as balusters, when used, must not be more than 19 inches (48 cm) apart.

- Other intermediate structural members, when used, must be installed so that there are no openings of more than 19 inches (48 cm) wide.
- Handrails and the top rails of the stair rail systems must be able to withstand, without failure, at least 200 pounds (890 n) of weight applied within 2 inches (5 cm) of the top edge in any downward or outward direction, at any point along the top edge.
- The height of handrails must not be more than 37 inches (94 cm) nor less than 30 inches (76 cm) from the upper surface of the handrail to the surface of the tread.
- Stair rail systems and handrails must be surfaced to prevent injuries such as punctures or lacerations and to keep clothing from snagging.
- Handrails must provide an adequate handhold for employees to grasp to prevent falls.
- The ends of stair rail systems and handrails must be built to prevent dangerous projections, such as rails protruding beyond the end posts of the system.
- Temporary handrails must have a minimum clearance of 3 inches (8 cm) between the handrail and walls, stair rail systems, and other objects.
- Unprotected sides and edges of stairway landings must be provided with standard 42-inch (1.1 m) guardrail systems.

39.9 LADDERS

The following general requirements apply to all ladders, including job-made ladders:

- A double-cleated ladder or two or more ladders must be provided when ladders are the only way to enter or exit a work area having 25 or more employees, or when a ladder serves simultaneous two-way traffic.
- Ladder rungs, cleats, and steps must be parallel, level, and uniformly spaced when the ladder is in position for use.
- Rungs, cleats, and steps of portable and fixed ladders (except as provided below) must not be spaced less than 10 inches (25 cm) apart, nor more than 14 inches (36 cm) apart, along the ladder's side rails.
- Rungs, cleats, and steps of step stools must not be less than 8 inches (20 cm) apart, nor more than 12 inches (31 cm) apart, between center lines of the rungs, cleats, and steps.
- Rungs, cleats, and steps at the base section of extension trestle ladders must not be less than 8 inches (20 cm) nor more than 18 inches (46 cm) apart, between center lines of the rungs, cleats, and steps. The rung spacing on the extension section must not be less than 6 inches (15 cm) nor more than 12 inches (31 cm).
- Ladders must not be tied or fastened together to create longer sections unless they are specifically designed for such use.
- A metal spreader or locking device must be provided on each stepladder to hold the front and back sections in an open position when the ladder is being used.
- Two or more separate ladders used to reach an elevated work area must be offset with a platform or landing between the ladders, except when portable ladders are used to gain access to fixed ladders.
- Ladder components must be surfaced to prevent injury from punctures or lacerations. and prevent snagging of clothing.
- Wood ladders must not be coated with any opaque covering, except for identification or warning labels which may be placed only on one face of a side rail.

39.10 PORTABLE LADDERS

- Non-self-supporting and self-supporting portable ladders must support at least four times the maximum intended load; extra heavy-duty type 1A metal or plastic ladders must sustain 3.3 times the maximum intended load. The ability of a self-supporting ladder to sustain loads must be determined by applying the load to the ladder in a downward vertical direction. The ability of a non-self-supporting ladder to sustain loads must be determined by applying the load in a downward vertical direction when the ladder is placed at a horizontal angle of 75.5 degrees.
- The minimum clear distance between side rails for all portable ladders must be 11.5 inches (29 cm).
- The rungs and steps of portable metal ladders must be corrugated, knurled, dimpled, coated with skid-resistant material, or treated to minimize slipping.

39.11 FIXED LADDERS

- A fixed ladder must be able to support at least two loads of 250 pounds (114 kg) each, concentrated between any two consecutive attachments. Fixed ladders also must support added anticipated loads caused by ice buildup, winds, rigging, and impact loads resulting from using ladder safety devices.
- Individual rung/step ladders must extend at least 42 inches (1.1 m) above an access level or landing platform either by the continuation of the rung spacings as horizontal grab bars or by providing vertical grab bars that must have the same lateral spacing as the vertical legs of the ladder rails.
- Each step or rung of a fixed ladder must be able to support a load of at least 250 pounds (114 kg) applied in the middle of the step or rung.
- The minimum clear distance between the sides of individual rung/step ladders and between the side rails of other fixed ladders must be 16 inches (41 cm).
- The rungs of individual rung/step ladders must be shaped to prevent slipping off the end of the rungs.
- The rungs and steps of fixed metal ladders manufactured after March 15, 1991, must be corrugated, knurled, dimpled, coated with skid-resistant material, or treated to minimize slipping.
- The minimum perpendicular clearance between fixed ladder rungs, cleats, and steps and any obstruction behind the ladder must be 7 inches (18 cm), except that the clearance for an elevator pit ladder must be 4.5 inches (11 cm).
- The minimum perpendicular clearance between the centerline of fixed ladder rungs, cleats, and steps, and any obstruction on the climbing side of the ladder must be 30 inches (76 cm). If obstructions are unavoidable, clearance may be reduced to 24 inches (61 cm), provided a deflection device is installed to guide workers around the obstruction.
- The step-across distance between the center of the steps or rungs of fixed ladders and the nearest edge of a landing area must be no less than 7 inches (18 cm) and no more than 12 inches (30 cm). A landing platform must be provided if the step-across distance exceeds 12 inches (30 cm).
- Fixed ladders without cages or wells must have at least a 15-inch (38 cm) clear width to the nearest permanent object on each side of the centerline of the ladder.
- Fixed ladders must be provided with cages, wells, ladder safety devices, or self-retracting lifelines where the length of climb is less than 24 feet (7.3 m) but the top of the ladder is at a distance greater than 24 feet (7.3 m) above lower levels.
- If the total length of the climb on a fixed ladder equals or exceeds 24 feet (7.3 m), the following requirements must be met: fixed ladders must be equipped with either (a) ladder safety devices; (b) self-retracting lifelines and rest platforms at intervals not to exceed 150 feet (45.7 m); or (c) a cage or well, and multiple ladder sections, each ladder section not to exceed 50 feet (15.2 m) in length. These ladder sections must be offset from adjacent sections, and landing platforms must be provided at maximum intervals of 50 feet (15.2 m).

- The side rails of through or side-step fixed ladders must extend 42 inches (1.1 m) above the top level or landing platform served by the ladder. Parapet ladders must have an access level at the roof if the parapet is cut to permit passage through it; if the parapet is continuous, the access level is the top of the parapet.
- Steps or rungs for through-fixed-ladder extensions must be omitted from the extension; and the extension of side rails must be flared to provide between 24 inches (61 cm) and 30 inches (76 cm) clearance between side rails.
- When safety devices are provided, the maximum clearance distance between side rail extensions must not exceed 36 inches (91 cm).

39.12 CAGES FOR FIXED LADDERS

- Horizontal bands must be fastened to the side rails of rail ladders or directly to the structure, building, or equipment for individual-rung ladders.
- Vertical bars must be on the inside of the horizontal bands and must be fastened to them.
- Cages must not extend less than 27 inches (68 cm), or more than 30 inches (76 cm) from the centerline of the step or rung and must not be less than 27 inches (68 cm) wide.
- The inside of the cage must be clear of projections.
- Horizontal bands must be spaced at intervals not more than 4 feet (1.2 m) apart measured from centerline to centerline.
- Vertical bars must be spaced at intervals not more than 9.5 inches (24 cm), measured centerline to centerline.
- The bottom of the cage must be between 7 feet (2.1 m) and 8 feet (2.4 m) above the point of access to the bottom of the ladder, the bottom of the cage must be flared not less than 4 inches (10 cm) between the bottom horizontal band and the next higher band.
- The top of the cage must be a minimum of 42 inches (1.1 m) above the top of the platform or the point of access at the top of the ladder. Provisions must be made for access to the platform or other point of access.

39.13 WELLS FOR FIXED LADDERS

- Wells must completely encircle the ladder.
- Wells must be free of projections.
- The inside face of the well on the climbing side of the ladder must extend between 27 inches (68 cm) and 30 inches (76 cm) from the centerline of the step or rung.
- The inside width of the well must be at least 30 inches (76 cm).
- The bottom of the well above the point of access to the bottom of the ladder must be between 7 feet (2.1 m) and 8 feet (2.4 m).

39.14 SAFETY DEVICES AND RELATED SUPPORT SYSTEMS FOR FIXED LADDERS

- All safety devices must be able to withstand, without failure, a drop test consisting of a 500-pound weight (226 kg) dropping 18 inches (41 cm).
- All safety devices must permit the worker to ascend or descend without continually having to hold, push, or pull any part of the device, leaving both hands free for climbing.
- All safety devices must be activated within 2 feet (.61 m) after a fall occurs and limit the descending velocity of an employee to 7 feet/second (2.1 m/sec) or less.
- The connection between the carrier or lifeline and the point of attachment to the body belt or harness must not exceed 9 inches (23 cm) in length.

39.15 MOUNTING LADDER SAFETY DEVICES FOR FIXED LADDERS

- Mountings for rigid carriers must be attached at each end of the carrier, with intermediate mountings, spaced along the entire length of the carrier, to provide the necessary strength to stop workers' falls.
- Mountings for flexible carriers must be attached at each end of the carrier. Cable guides for flexible carriers must be installed with a spacing between 25 feet (7.6 m) and 40 feet (12.2 m) along the entire length of the carrier, to prevent wind damage to the system.
- The design and installation of mountings and cable guides must not reduce the strength of the ladder.
- Side rails and steps or rungs for side-step fixed ladders must be continuous in extension.

39.16 USE OF ALL LADDERS

When portable ladders are used for access to an upper landing surface, the side rails must extend at least 3 feet (.9 m) above the upper landing surface. When such an extension is not possible, the ladder must be secured, and a grasping device such as a grab rail must be provided to assist workers in mounting and dismounting the ladder. A ladder extension must not deflect under a load that would cause the ladder to slip off its supports.

- Ladders must be maintained free of oil, grease, and other slipping hazards.
- Ladders must not be loaded beyond the maximum intended load for which they were built nor beyond their manufacturer's rated capacity.
- Ladders must be used only for the purpose for which they were designed.
- Non-self-supporting ladders must be used at an angle where the horizontal distance from the top support to the foot of the ladder is approximately one-quarter of the working length of the ladder. Wood job-made ladders with spliced side rails must be used at an angle where the horizontal distance is one-eighth the working length of the ladder.
- Fixed ladders must be used at a pitch no greater than 90 degrees from the horizontal, measured from the back side of the ladder.
- Ladders must be used only on stable and level surfaces unless secured to prevent accidental movement.
- Ladders must not be used on slippery surfaces unless secured or provided with slip-resistant feet to prevent accidental movement. Slip-resistant feet must not be used as a substitute for the care in placing, lashing, or holding a ladder upon slippery surfaces.
- Ladders placed in areas such as passageways, doorways, or driveways, or where they can be displaced by workplace activities or traffic must be secured to prevent accidental movement or a barricade must be used to keep traffic or activities away from the ladder.
- The area around the top and bottom of the ladders must be kept clear.
- The top of a non-self-supporting ladder must be placed with two rails supported equally unless it is equipped with a single support attachment.
- Ladders must not be moved, shifted, or extended while in use.
- Ladders must have nonconductive side rails if they are used where the worker or the ladder could contact exposed energized electrical equipment.
- The top or top step of a stepladder must not be used as a step.
- Cross bracing on the rear section of stepladders must not be used for climbing unless the ladders are designed and provided with steps for climbing on both front and rear sections.
- Ladders must be inspected by a competent person for visible defects on a periodic basis and after any incident that could affect their safe use.
- Single-rail ladders must not be used.

- When ascending or descending a ladder, the worker must face the ladder.
- Each worker must use at least one hand to grasp the ladder when climbing.
- A worker on a ladder must not carry any object or load that could cause him/her to lose balance and fall.

39.17 STRUCTURAL DEFECTS

- Portable ladders with structural defects–such as broken or missing rungs, cleats, or steps, broken or split rails, corroded components, or other faulty or defective components–must immediately be marked defective, or tagged with "Do Not Use" or similar language and withdrawn from service until repaired.
- Fixed ladders with structural defects–such as broken or missing rungs, cleats, or steps, broken or split rails, or corroded components–must be withdrawn from service until repaired.
- Defective fixed ladders are considered withdrawn from use when they are (a) immediately tagged with "Do Not Use" or similar language; (b) marked in a manner that identifies them as defective; or (c) blocked-such as with a plywood attachment that spans several rungs.
- Ladder repairs must restore the ladder to a condition meeting its original design criteria before the ladder is returned to use.

39.18 GLOSSARY

- **Cleat** – A ladder crosspiece of rectangular cross section placed on edge upon which a person may step while ascending or descending a ladder.
- **Double-Cleat Ladder** – A ladder with a center rail to allow simultaneous two-way traffic for employees ascending or descending.
- **Failure** – Load refusal, breakage, or separation of components.
- **Fixed Ladder** – A ladder that cannot be readily moved or carried because it is an integral part of a building or structure.
- **Handrail** – A rail used to provide employees with a handhold for support.
- **Job-Made Ladder** – A ladder that is fabricated by employees, typically at the construction site; non-commercially manufactured.
- **Load Refusal** – The point where the structural members lose their ability to carry the load.
- **Point of Access** – All areas used by employees for work-related passage from one area or level to another.
- **Portable Ladder** – A ladder that can be readily moved or carried.
- **Riser Height** – The vertical distance from the top of a tread or platform/landing to the top of the next higher tread or platform/landing.
- **Rolling Ladders** – A rolling ladder may only 2 ½ times the least (shortest) base in height
- **Side-Step Fixed Ladder** – A fixed ladder that requires a person to get off at the top to step to the side of the ladder side rails to reach the landing.
- **Single-Cleat Ladder** – A ladder consisting of a pair of side rails connected together by cleats, rungs, or steps.
- **Stair rail System** – A vertical barrier erected along the unprotected sides and edges of a stairway to prevent employees from falling to lower levels.
- T**emporary Service Stairway** – A stairway where permanent treads and/or landings are to be filled in at a later date.
- **Through Fixed Ladder** – A fixed ladder that requires a person getting off at the top to step between the side rails of the ladder to reach the landing.
- **Tread Depth** – The horizontal distance from front to back of a tread, excluding nosing, if any.

40 LANDSCAPING / GARDENING SAFETY

LANDSCAPING / GARDENING SAFETY

40.1 MATERIAL HANDLING AND BACK SAFETY

1. Know the approximate weight of your load and make certain any material handling equipment you may operate to move materials is rated to handle the weight of the load. (Never exceed the manufacturer's recommended safe working load for any material handling equipment. Doing so increases the probability of equipment failure, dumping of the load, personal injuries and/or damage to materials, the facility, etc.).
2. Lift heavy objects as instructed, with the leg muscles and not with the back. On average, do not manually lift over 50 pounds.
3. Call for assistance as needed for handling heavy or bulky objects or materials.
4. Use an appropriate, approved lifting device (i.e. special trucks, racks, hoists, and other devices) for lifting very heavy, bulky, large or unyielding objects.
5. All ropes, chains, cables, slings, etc., and other hoisting equipment must be inspected prior to each use.
6. A load should never be lifted and left unattended.
7. Wear safety gloves when handling materials that pose cutting exposures.
8. Properly stack and secure all materials prior to lifting or moving to prevent sliding, falling, or collapse.
9. Avoid moving or lifting loads by hand whenever possible.

40.1.1 TIPS FOR MANUAL LIFTING:

1. Get a good footing.
2. Place feet about shoulder width apart.
3. Bend at the knees to grasp the weight.
4. Keep back as straight as possible.
5. Get a firm hold.
6. Lift gradually by straightening the legs.
7. Don't twist your back to turn. Move your feet.
8. When the weight is too heavy or bulky for you to comfortably lift – GET HELP.
9. When putting the load down, reverse the above steps.

Note: If lifting stacked materials, materials should be carefully piled and stable. Piles should not be stacked as to impair your vision or unbalance the load. Materials should not be stacked on any object (i.e. floor, shelving units, ladders, scaffolds, etc.) until the strength of the supporting members has been checked.

40.2 WOODCHIPPER AND SHREDDER SAFETY

1. Before operating the equipment, read, understand, and follow the manufacturer's operating manual and safety decals on the equipment.
2. Set up the machine on level, stable, dry ground.
3. Chock/block wheels to ensure the machine will not move during operation.
4. Before start-up, inspect machine to confirm there is no debris in the feed chute and that the machine is good operating condition. Check sharpness of cutting edges, tightness of bolts, condition and tension of belts.
5. Barricade area around equipment to help reduce the probability that others working in the area near the machine will be hit with flying chips or debris.
6. Wear appropriate PPE (Personal Protective Equipment) when operating machines. This should include, but not be limited to: eye, face, hearing, and head protection.

7. Inspect all materials to be inserted into the chipper or shredder to confirm they do not include any debris such as wire, stones, glass bottles, etc. Do not feed raked-up material into the chipper or shredder machine. Raked materials may contain stones or debris that could damage the equipment or result in injuries to the worker.
8. Feed material trunk or larger end first.
9. Do not feed short pieces by hand; place shorter pieces on top of longer pieces when feeding the machine.
10. Recheck the sharpness of the knives and anvil if it becomes more difficult to feed the machine.
11. Do not force material into the feeder – injuries could occur if a worker slipped and fell toward the feeder.
12. Shut down equipment and wait for all moving parts to come to a complete stop before removing clogged materials or making adjustments. To prevent accidental start-up or operation develop Lockout/Tagout program for machine. This program should include but not be limited to:
    a. Remove key (if key ignition on machine)
    b. Lock out controls
    c. Disengage clutch

40.3 HEDGE TRIMMER SAFETY

1. Select a hedge trimmer appropriate for the work to be performed. Prior to purchasing a trimmer consider:
    - The size and height of shrubs and hedges being trimmed
    - Cutter bar length
    - Single – or double-sided blades
    - Weight and balance of the equipment
    - Availability of electrical power in area where equipment will be use
2. Before operating the equipment read, understand, and follow the manufacturer's operating manual and safety decals on the equipment.
3. Do not use electrical tools in the rain, or on wet grass or shrubs.
4. When using gasoline powered trimmers, inspect air filter and muffler screens to confirm they are clean and in good condition prior to use. For 2-cycle equipment follow equipment manufacturer recommended grade of fuel and gasoline/oil mixture. Maintain the blades sharp and ensure the cutter bar bolts are torqued correctly.
5. Wear appropriate PPE (i.e. eye protection, hearing protection).
6. Keep fingers and hands away from the blades.
7. Check hedges for any foreign objects (e.g., metal posts, wires) before trimming.
8. Keep the power cord of the electric hedge trimmer behind you to avoid snipping it or tripping. Leave enough slack in electrical cord to permit normal work motions.
9. Use both hands to hold and guide the tool.
10. Avoid overreaching during trimming operations.
11. Do not stand on unstable supports (e.g., chairs or boards on saw horses) or on ladders to gain access to tall hedges when using this equipment.
12. Use long-reach or telescoping trimmers for tall hedges and shrubs.
13. Do not force tools to cut something they are not designed to cut.
14. Turn off the power and wait for the blades to stop before cleaning out twigs or grass. To prevent injuries, use a brush or other device to remove material from the knives.
15. Develop a Lockout/Tagout Program for each piece of equipment to help reduce the probability of employee injuries during repair/maintenance operations.

40.4 POSTHOLE DIGGER SAFETY

1. Contact “one call” system to identify the location of all potential underground utilities prior to digging.
2. Select equipment that is suitable for the tasks required – consider the type of soil (full of rocks and roots?), the depth and diameter of the holes, accessibility to the site, etc.

3. Before operating the equipment, read, understand and follow the manufacturer's operating manual and safety decals on the equipment.
4. Check that you are using the correct shear bolt (for hardness and length) that is specified by the equipment manufacturer to ensure that the shear bolt breaks when required and to prevent clothing from getting entangled with a shear bolt that is too long.
5. Ensure that the auger point and cutting edges are in good condition and the equipment is in good working order.

40.5 HAND-HELD POSTHOLE DIGGER SAFETY

1. If you are using a one – or two-person hand-held unit, position yourself so that you do not get struck by the machine handle if the auger stops abruptly.
2. Operate the auger at slow speeds.
3. Dig the hole in several steps by clearing the soil frequently. Removing the soil reduces the load on the digger and allows for better control. clear.
4. Do not wear loose fitting clothing, boots with long laces, jewelry etc. which may get caught.
5. Turn off the power before cleaning out twigs or grass.
6. Do not lock the drive control in an "on" position.
7. Develop a lockout/tagout program for this machine to prevent potential injury during maintenance/equipment servicing operations.

40.6 TRACTOR-MOUNTED POSTHOLE DIGGER SAFETY

1. If you are using a post hole digger mounted on the back of a tractor, operate it while sitting in the tractor seat.
2. Ensure that no one is in contact with or near the post hole digger, auger or PTO (power take off) drive train before operating the equipment.
3. Ensure that all machine guarding, and shields are in place before digging.

40.7 SAFE OPERATING PROCEDURES FOR GARDEN TRACTORS

1. Read, understand, and follow instructions in the manufacturer's operating manual.
2. Know how to operate the equipment and use the attachments safely. Be familiar with the location and function of all the controls.
3. Check the oil level and refuel the engine before starting work while the engine is cool. If refueling is required before the job is completed, wait for the engine to cool if there is a likelihood that fuel can spill or splash on the hot engine.
4. Replace or tighten all loose or damaged parts or guards. Keep the tractor in good working condition.
5. Wear close-fitting clothing; long pants; sturdy, non-slip footwear; and hearing and head protection suitable for the hazards that you may encounter.
6. Do not ride on tractor hood or draw bar.
7. Do not allow other people to ride on the tractor.
8. Avoid sharp, fast turns. Avoid operating machine near unprotected holes, ditches, embankments, etc. that may cause equipment to overturn.
9. If not equipped with ROPS (i.e. Roll-over Protection System) or seat belts, consider installing both of these safety devices to reduce the probability of injury or a fatality should the equipment become involved in a rollover accident.
10. Do not park tractors where they can endanger the public.
11. Do not tamper with or remove safety attachments, machine guards, or safety labels. Use attachments that are designed specifically for the machine you are using and for the tasks you are performing.
12. Do not leave a tractor unattended unless the power is off, and the ignition key is removed.

13. Do not drive with PTO running if it is not being used.
14. Secure all equipment left overnight at jobsites so as to prevent tampering with the machine(s) by children or young adults in the area.

40.8 GARDEN TRACTORS WITH ROTARY MOWER ATTACHMENT

1. Read, understand, and follow instructions in the manufacturer's operating manual.
2. Replace or tighten all loose or damaged parts, especially the blade. Keep the tractor in good working condition.
3. If the blade appears to be nicked or damaged it should sharpen and balanced.
4. Before mowing, check the area and remove any debris, trash, fallen branches, etc. that could interfere with the operation of the mower or cause harm if hazardous objects are ejected at high speeds from the mower
5. (over 200 mph depending on the rpm speed of the mower and length of the blade).
6. Ensure that bystanders do not remain in the area while you are mowing.
7. Turn off machine, disconnect spark plug wire, if accessible (or remove the ignition key), shifting to neutral gear, set the brakes or take other precautions to prevent the equipment from moving, and wait for all moving or rotating parts to stop before unclogging the equipment, emptying grass-catching attachments (if used), or doing any other work on the machine.
8. Stop the equipment and inspect for damage if the mower blade or other attachment hits a hard object. If damaged, it should be repaired (and blades balanced, if necessary) or replaced before starting the equipment again.
9. Use caution when working in the vicinity of schools or parks where children may be at play.
10. In an effort to reduce the probability of employee injuries during service/maintenance operations on the equipment, a Lockout/Tagout Program should be developed for this equipment.

40.9 FRONT-END LOADER SAFETY

1. Read, understand, and follow instructions in the manufacturer's operating manual. Determine the amount of rear wheel weights the equipment manufacturer recommends being added when using a front-end loader.
2. Know how to operate the equipment and use the attachments safety. Be familiar with the location and function of all the controls.
3. Ensure that the hydraulic fluid is maintained at the proper level.
4. When checking for leaks in the hydraulic system, use a piece of paper or cardboard – never use your hands since oil from a pin-hole leak under high pressure can penetrate the skin. If this does happen, get immediate medical attention.
5. Mark out turning areas when loading vehicles.
6. Travel with the bucket low to ground to maintain equipment stability and give the operator an unobstructed view.
7. When operating equipment, pay special attention to ground surface condition. Watch out for holes, rocks or obstructions which, if ran over, may lead to the machine becoming unstable, the operator losing control of the equipment, and a possible machine rollover resulting.
8. Maintain the front of the tractor/front-end loader pointing uphill – back down slopes slowly. Avoid driving forward when going downhill with a loaded bucket.
9. Operate controls from the driver's seat, not standing beside the tractor.
10. Load the bucket evenly and do not load beyond the limits or rated capacity of the equipment. An uneven load on the bucket or loading in excess of rated capacity can result in machine instability or loss of steering control.
11. Lower the bucket to the ground when not using the loader.
12. Do not use the loader as a lift for people or for any other purpose for which the machine was not designed.
13. Repairs on front end loaders should be carried out by trained personnel only.

14. Prior to performing any repair work or preventative maintenance on the machine, develop a Lockout/Tagout procedure for the machine to help reduce injuries to repair/equipment service personnel.
15. Block or mechanically secure the bucket and lift and pivot arms of the front-end loader and chock wheels of the tractor before any repair or service work begins.

40.10 ROTARY TILLER SAFETY

1. As with all other machinery and equipment, read, understand, and follow operating and safety instructions in the manufacturer's operating manual. Know where all the controls are, what they do, and how to stop the equipment quickly.
2. Keep safety shields in place and maintain them in good condition, especially the PTO shaft guard, if the rotary tiller is a rear-mounted unit.
3. If a walk-behind rotary tiller (either gasoline or electric), follow the usual safety precautions for using such equipment.
4. Check the area for obstructions, such as wires, cables, and solid objects, near ground level. They can quickly entangle rotating tines and cause extensive damage.
5. Remove roots, stones, and other underground or aboveground debris that the tiller blades could catch on or send flying through the air.
6. If operating a walk-behind tiller, do not operate close to ditches, fences, or patios. The tines can catch and throw debris or result in the machine operator losing his balance.
7. Develop lockout/tagout procedures for this machine prior to performing repair or preventive maintenance on the equipment.
8. Disengage power to the tiller and shut off the motor before checking for damage if the tines hit some hard object or before trying to clear any obstruction.
9. Keep others clear of the area while the rotary tiller is being operated.

40.11 GRASS TRIMMER AND BRUSH CUTTER SAFETY PROCEDURES

1. Make sure you are trained in the proper use of this equipment. Rotating cutting tools can throw objects or cut the operator.
2. Read, understand, and follow instructions in the manufacturer's operating manual.
3. Hold the equipment firmly with both hands.
4. Ensure that the cutting blades are adjusted properly and that all bolts and securing hardware are tight.
5. Replace bent, warped, damaged or dull cutting apparatus.
6. Check that the throttle springs back to idle position when the trigger on the machine is released.
7. Select equipment with anti-vibration components.
8. Keep people clear of the area from starting and operating areas.
9. Check area for stones, glass, metal and debris.
10. Refuel the engine before starting work while the engine is cool. If refueling is required before the job is completed, wait for the engine to cool if there is a likelihood that fuel can spill or splash on the hot engine.
11. Make sure that shields, guards, and other safety devices are in place and working properly.
12. Replace or tighten all loose or damaged parts or guards.
13. Make sure muffler is in good condition. In dry weather, use a fire-safe muffler.
14. Start the unit on firm ground or other solid surfaces in an open area.
15. Maintain good balance and secure footing when operating.
16. Adjust harness and hand grip so as to improve comfort and safety of machine operator.
17. Use unit at ground level only.
18. Shut off engine before cleaning out clogged or stuck cutter.
19. Stop the engine before putting cutter down.

20. Disconnect the spark plug when the equipment is left unattended.
21. Secure cutter to prevent fuel spillage and damage during transport.
22. DO NOT leave running tool unattended.
23. DO NOT wear short pants or short sleeves.
24. DO NOT use rigid blades in stony areas.
25. DO NOT overreach. Keep proper footing and balance at all times.
26. DO NOT repair damaged attachments – discard them.

40.12 LANDSCAPING/LAWN MAINTENANCE WORK

1. Train all employees on recognizing hazards associated with the tools/equipment they are operating and the work they are performing. Provide instruction and safety equipment, where applicable, to employees on methods to avoid injury to themselves or others resulting from the identified hazardous conditions.
2. Identify and destroy harmful or noxious plants such as poison ivy.
3. Protect against insects with insect repellants or protective clothing when needed.
4. Rest periodically during strenuous jobs such as digging or sawing. Work-rest schedules vary according to temperature conditions, how strenuous the work is, and how acclimated the employee is to the work conditions.
5. Make sure emergency telephone numbers are clearly posted at each worksite near landline phones or if not available, within each toolbox, each work vehicle, and each self-propelled piece of equipment.
6. Know the location of the first aid kit and how to use the contents.
7. Do not touch stray or dead animals. Contact an animal control agency for removal.
8. Footwear should be construction boot type or steel toe boot. Boots should have a non-slip sole.
9. Wear approved hardhats or bump caps when overhead hazard exists or when working under low branches.
10. Wear a brimmed hat and comfortable clothing which provides sun protection.
11. Wear sturdy, well-fitting gloves with grip.
12. Use vibration-absorbing gloves while operating vibrating equipment.
13. Wear suitable chemical-resistant rubber or plastic gloves when handling fertilizers and pesticides.
14. Wear proper sunglasses when in direct sunlight for extended periods.
15. Use appropriate eye protection with side shields when operating mowers, weed trimmers or edgers, power tilling, breaking up rocks or concrete, using strong cleaning agents, spraying or dusting.
16. Wear hearing protection (e.g., earmuffs, ear plugs) that provides appropriate protection from noise produced by equipment being used.
17. Do not wear loose-fitting or torn clothing.
18. Use tools only in the manner for which the tool was designed and intended. Don’t use a screwdriver as a pry bar or a pipe wrench as a hammer.
19. Make sure that tools are in good repair.
20. Ensure that handles are tight and fastened securely.
21. Repair or replace worn or damaged handles. Confirm that the handle surfaces are smooth and sliver-free.
22. Keep cutting tools and equipment sharp.
23. Protect the cutting edges of the tools and equipment. Store tools and equipment, especially if they are transported regularly from job to job, in a way that prevents the cutting edges from being dulled or damaged.
24. Prior to placing tools in toolboxes, on hanging racks designed for tool/equipment storage, etc., remove all dirt and ensuring they are dry prior to placing them in storage as this will help prevent tools from rusting.
25. Store tools and equipment in a safe, organized manner so that workers can access them easily and without injury. If stored in a truck, van, etc., they should be stored securely so they do not fall or shift position during transport.

26. While tools are not in use, keep them within toolboxes, on storage racks, or within shelving units designed for such purposes. Do not leave tools on the floor within walk ways where they may create a potential trip/fall hazard.

40.13 OPERATING RIDING LAWN MOWERS

1. Read, understand, and follow the instructions in the manufacturer's operating manual.
2. Ensure your supervisor has fully trained you on how to operate the mower. Your supervisor should demonstrate how to use the mower, and observe you working with it until satisfied that you can operate it safely.
3. Be aware of the mower's safety features, including how to stop the mower quickly in case of an emergency.
4. Test ride the machine and become familiar with it before engaging the mower blade.
5. Clear the work area of debris, sticks, stones, toys, etc. that might be thrown by the blades. Ensure grass is dry.
6. Maintain mower and attachments in good operating condition. An annual inspection by an experienced technician is recommended.
7. Keep safety devices and guards in place. The operator-presence switch should stop the mower immediately when you release the control.
8. Inspect the mower prior to starting. Make certain that the blade is sharp and secure.
9. Check that the PTO, mower input driveline, drive belts, chains, and gears are all properly guarded. Repair or replace if necessary.
10. Set mower at the highest cutting point when operating on rough ground before starting the mower.
11. Running the engine at the lowest speed that will do the job reduces the force of thrown objects.
12. Check the blade-mounting bolts frequently for tightness.
13. Check grass catcher bags for wear. Replace worn bags.
14. Add gasoline when the mower is turned off and the engine is cool. Do not smoke when refueling!
15. Restart engine at least 25 feet from where you refueled to avoid igniting vapors.
16. Store gasoline safely – outside and away from any heat source.
17. Disengage all attachment clutches and shift mower into neutral before attempting to start the engine.
18. Only start the mower when seated in the driver's seat.
19. Look behind mower when backing up for children, pets or obstructions. Back up only minimal distances.
20. Mow straight up and down slopes rather than sideways for greater stability (unless mower is counterbalanced).
21. Reduce speed on slopes and when making sharp turns to prevent tipping or loss of control.
22. Watch for rocks, holes and other hazards, including tree limbs or shrubs at eye level.
23. w. Mow very tall grass twice at 90-degree angles if possible.
24. Stop and inspect the blades and shaft if the mower runs into a rock or stump. Damaged blades can cause vibration and vibration can loosen the blades.
25. Keep the discharge chute pointed away from buildings, people, and animals.
26. Keep hands and feet away from all moving parts.

40.14 PULLING LOADS SAFELY

1. Use approved hitch points.
2. Limit load weight and size to what is recommended by the manufacturer.
3. Do not turn sharply.
4. Use counterweights as recommended by manufacturer.

40.15 TRIMMING TREES SAFELY

1. Obtain training on tree cutting and trimming prior to starting such work.

2. If an aerial bucket truck or other boomed vehicle is used, ensure that the operators are trained in the safe operation of these vehicles and that employees are wearing a full body harness and lanyard tied-off to the bucket or personnel lifting equipment.
3. Before trimming a tree, inspect the area to identify possible hazards (e.g., presence of power lines, broken or cracked limbs after a severe storm) and take appropriate actions to prevent injuries or accidents.
4. Assume any power lines are energized or "live". Avoid any direct or indirect contact with the power line.
5. Mark off area around tree, barricade off the work area around the equipment and the tree which is to be trimmed. Prevent bystander access to the barricaded area. Always work with another person who stays on the ground.
6. Learn to recognize trees weakened by disease and types of trees prone to cracking.
7. Inspect tree limbs for strength before climbing. Check for cavities in the tree, rotten or dead branches, splits and cracks in the trunk or where branches are attached, broken branches hanging in the tree, etc.
8. Inspect the fall protection equipment and lines prior to starting the job. Tag and remove any damaged or defective equipment from service until it can be repaired or replaced and disposed of properly, according the manufacturer's recommendations.
9. If a ladder is used, tie it off on a secure branch.
10. Break small dead branches off by hand as you climb. Remove larger branches with proper tools.
11. Place hands and feet on separate limbs and move only one hand or foot at a time.
12. Raise or lower tools by attaching hand lines to the end of tools. Tools attached at the center might catch on branches. Smaller tools may be raised and lowered in a bucket attached to a hand line.
13. Use non-conductive tools and personal protective equipment if working near electrical power lines.
14. Be sure that you can see the cut you are making so you do not cut hand lines, safety ropes, etc. unintentionally.
15. Attach a fiber or leather guard on saws that are held by a ring on worker's belt.
16. Do not use dead branches for support.
17. Do not climb trees during wet or icy weather or under high wind conditions.
18. Do not leave partially sawn limbs on trees.
19. Do not carry saws, pruners, and other tools while climbing.
20. Do not use axes or hatchets.

41 LASER SAFETY

LASER SAFETY

41.1 INTRODUCTION

The Laser Safety Manual describes 3A Group's laser safety program and provides guidance for the safe use of lasers and laser systems. 3A Group has adopted the elements of this program to assist researchers in conducting work with lasers as safely as possible while also meeting reasonable and legally defensible standards of precaution in the use of lasers. The program is intended to minimize record keeping, follow accepted good practices, and provide useful resource materials for laser users. Comments on the program and manual content are always welcome and may be addressed to either the Laser Safety Officer or the Laser Safety Committee. The information contained in this manual is based on the American National Standard for the Safe Use of Lasers, ANSI Z136.1-2000. Although the Z136.1 standard is frequently cited in this manual, for more thorough guidance the complete standard should be reviewed.

41.2 MANUAL ORGANIZATION

Laser users are strongly encouraged to purchase a copy of the ANSI Z136.1 standard (suppliers of the standard are listed in Appendix B).

This Manual is divided into four sections (1) Laser Safety Program, (2) Classification and Control, (3) Non-Beam Hazards and (4) Appendices.

- Section One, Laser Safety Program, describes the program roles and responsibilities of the individual laser users, principal investigators, Laser Safety Committee, and Site Administration.
- Section Two, Classification and Control, addresses laser safety based on the classification scheme and required control measures of the Z136.1 standard.
- Section Three, Non-Beam Hazards, identifies the typical non-beam or ancillary hazards of laser systems.
- The Appendices contains selected references, a list of suppliers of laser safety services and equipment, Laser Fundamentals and Bio effects, and a glossary. Laser Fundamentals and Bio effects presents a basic review of the characteristics of laser light, the lasing process, and describes major types of lasers. Also included is information on the biological effects of laser beam interaction with tissue, with emphasis on the eye and skin.

A list of safety precautions for the use of Class 3 and 4 lasers is found on the next page.
Following the safety precautions list is a flowchart, presenting an overview of the work-site laser safety program, and a laser inventory form. The inventory form is used by the Laser
Safety Committee to track the quantity and type of lasers at the work-site, and allows the Laser
Safety Officer to review and assist principal investigators in classifying lasers and determining the controls required for their operation. Each principal investigator who possesses or acquires a laser must complete and return an inventory form to EH&S.

41.3 SAFETY PRECAUTIONS FOR CLASS 3 AND 4 LASERS

41.4 CLASS 3 (EYE AND SPECULAR REFLECTION HAZARD)

- Never aim the laser at a person’s eye or stare at the laser from within the beam.
- Keep the beam path above or below eye level for one seated or standing.
- Laser safety eyewear may be needed if MPE (Maximum Permissible Exposure) is exceeded.

- Don't view beam directly with optical instruments unless a protective filter is used.
- Only experienced and authorized individuals are permitted to operate the laser.
- Secure the laser from operation by unauthorized personnel. A key switch should be used if unauthorized personnel may gain access to the laser.
- Always strive to enclose as much of the beam path as practical and to operate the laser in a controlled access area.
- During alignment, avoid placing one's eye near the axis of the beam path, where specular reflections are most likely to occur. Alignment eyewear should be considered.
- Unnecessary specular (i.e., mirror-like) reflecting objects should be removed from the beam path.
- Mount the laser on a firm support to ensure the beam travels along its intended path.
- Post laser hazard warning signs at entrances to laser use areas.

41.5 CLASS 4 (FIRE, EYE AND SKIN HAZARD, DIFFUSE REFLECTION HAZARD)

- Review your laser safety procedure prior to laser operation.
- Strive to enclose as much of the beam as possible.
- A controlled access area is required. Entryway controls (e.g., warning lights, interlocks, protective eyewear, etc.) are required.
- Assure that protective laser eyewear is available and worn by all personnel within the laser-controlled area. If the beam is a serious fire and skin hazard, appropriate shielding should be used between the beam area and any personnel.
- Keep the beam path above or below eye level for one seated or standing.
- Use remote firing of the laser, video monitoring or remote viewing through a laser safety shield whenever feasible.
- If full laser power is not required, laser output filters and shutters which reduce the laser beam output to less than hazardous levels should be used.
- Assure that the laser has a key switch master control and that only authorized, properly trained individuals operate the laser.
- Mount the laser on a firm support to assure the beam travels along its intended path.
- Install appropriate laser warning signs at entrances to the laser-controlled area.
- Keep in mind that optical pump systems may be hazardous to view and should be shielded.
- Optical pump systems for pulsed lasers can be spontaneously discharged, causing the laser to unexpectedly fire.
- Beam backstops should be diffusely reflecting and composed of fire-resistant material.

41.6 LASER INVENTORY FORM

Principal Investigator_____ Office Ph. #_____
Department _____ Date _____

Please complete for each laser (excluding laser printers, pointers, bar code readers). Use additional sheets, if necessary.

Laser Manufacturer	Mode	Serial Number

Wavelength(s): _____ oµm onm Max. Beam Power/Energy:_____omW omJ
Wavelength(s): _____ oµm onm Max. Beam Power/Energy:_____omW omJ
Wavelength(s): _____ oµm onm Max. Beam Power/Energy:_____omW omJ
Wavelength(s): _____ oµm onm Max. Beam Power/Energy:_____omW omJ
Wavelength(s): _____ oµm onm Max. Beam Power/Energy:_____omW omJ
Wavelength(s): _____ oµm onm Max. Beam Power/Energy:_____omW omJ

Hazard class of laser as indicated by manufacturer: o1 o2a o2 o3a oUnknown

Has laser been modified and the hazard class changed? oYes oNo oDon't Know o4

Laser Location-Bldg: Room #: Lab. Ph.#:

Laser Manufacturer	Model	Serial Number

Wavelength(s): _____ oµm onm Max. Beam Power/Energy:_____omW omJ
Wavelength(s): _____ oµm onm Max. Beam Power/Energy:_____omW omJ
Wavelength(s): _____ oµm onm Max. Beam Power/Energy:_____omW omJ
Wavelength(s): _____ oµm onm Max. Beam Power/Energy:_____omW omJ
Wavelength(s): _____ oµm onm Max. Beam Power/Energy:_____omW omJ
Wavelength(s): _____ oµm onm Max. Beam Power/Energy:_____omW omJ

Hazard class of laser as indicated by manufacturer: o1 o2a o2 o3a oUnknown

Has laser been modified and the hazard class changed? oYes oNo oDon't Know o4

Laser Location-Bldg: Room #: Lab. Ph.#:

Manufacturer	Model	Serial Number

Wavelength(s): _____ oµm onm Max. Beam Power/Energy:_____omW omJ
Wavelength(s): _____ oµm onm Max. Beam Power/Energy:_____omW omJ
Wavelength(s): _____ oµm onm Max. Beam Power/Energy:_____omW omJ
Wavelength(s): _____ oµm onm Max. Beam Power/Energy:_____omW omJ
Wavelength(s): _____ oµm onm Max. Beam Power/Energy:_____omW omJ
Wavelength(s): _____ oµm onm Max. Beam Power/Energy:_____omW omJ

Hazard class of laser as indicated by manufacturer: o1 o2a o2 o3a oUnknown

Has laser been modified and the hazard class changed? oYes oNo oDon't Know o4

Laser Location-Bldg: Room #: Lab. Ph.#:

41.7 SECTION 1: LASER SAFETY PROGRAM

41.8 INDIVIDUAL LASER USERS

Individual laser users must be aware of and responsible for:

- Attending laser safety training sessions as determined by the hazard classification of the laser they intend to operate (see “Training,” in Section 2, page 27).
- Reviewing, understanding and complying with the laser safety procedures prior to operating their laser system.
- Wearing required protective equipment, such as approved eyewear and protective clothing.
- Maintaining engineering controls (e.g., interlocks not defeated) on the laser system as designed, specified and approved by the laser manufacturer, or the principal investigator, in consultation with the LSO. Assuring that safety features which are not functioning properly are reported to the principal investigator.
- Promptly reporting the details of any accident involving a laser to the principal investigator.

41.9 PRINCIPAL INVESTIGATORS

- Principal investigators are responsible for assuring that the use of lasers under their supervision complies with Laser Safety Committee policy, as described in this manual.
- Specific responsibilities include:
- Notifying the Laser Safety Officer whenever the principal investigator acquires, fabricates, transfers a laser to a different laboratory, or changes the hazard classification of a laser system. Notification can be accomplished by submitting a completed laser inventory form to EH&S.
- Developing written laser safety procedures for Class 4 lasers and ensuring that laser operations are carried out in accordance with those procedures. Laser safety procedures must be posted near the laser system or made readily available for review.
- Ensuring that laser operators, prior to actually using lasers, are properly instructed and trained in laser safety and are familiar with the laser safety procedure for their laser system. Training must be documented for all employees. Visitors to areas or laboratories in which lasers are used must also be informed of the hazards and control measures associated with these systems.
- Ensuring that laser maintenance and repair work are performed by qualified, trained individuals and conducted in a safe manner.
- Promptly notifying the Laser Safety Officer and discontinuing operation of a laser when an accident related to laser use has occurred.

41.10 LASER SAFETY COMMITTEE (LSC)

The Laser Safety Committee (LSC) consists of faculty, staff and student members who function as a peer review committee and are selected from departments where lasers are used. The LSC is appointed by the Vice Chancellor, Administrative Services, and is responsible for establishing and enforcing work-site policies relating to laser safety. The Laser Safety Committee serves as an advisor to the work-site Administration on matters relevant to laser safety and is the ultimate reviewing and authorizing agent for the use of lasers on site.

41.11 LASER SAFETY OFFICER (LSO)

The Laser Safety Officer is a member of the Laser Safety Committee, carries out the directives of the Committee and advises on the overall status of the laser safety program.
Major responsibilities and duties of the Laser Safety Officer are:

- Providing knowledgeable consultation and evaluation of laser hazards, reviewing and approving the written laser safety plan for a particular laser system.
- Ensuring that the work-site use of lasers is in conformance with Laser Safety Committee policy.
- Maintaining records related to the work-site laser safety program. Typical records include the laser inventory, accident investigations, hazard analysis and laser safety training.
- Inspecting and auditing laser systems and operations.
- Classifying or verifying the classification of laser systems.
- Suspending, restricting or terminating the operation of a laser system if the LSO considers the laser's hazard controls inadequate.
- Investigating any real or suspected accident resulting from a laser operation and initiating appropriate corrective action.

41.12 ENVIRONMENTAL HEALTH AND SAFETY (EH&S)

Environmental Health and Safety is responsible for: surveillance of laser operations through the staffing of a work-site Laser Safety Officer (LSO); providing consultation and laser safety services in conformance with the policies set forth in this manual, governmental regulations, and national laser safety standards. EH&S is authorized to inspect all areas of work-site operations and activities.

41.13 PURCHASING

Purchasing will notify the Laser Safety Officer, EH&S, of all laser purchase requests, excluding laser printers, bar code readers, laser pointers.

41.14 MEDICAL SURVEILLANCE

Medical surveillance needs of personnel working in a laser environment are the same as for other potential health hazards. Medical surveillance examinations may include assessment of physical fitness to safely perform assigned duties, biological monitoring of exposure to a specific agent, and early detection of biologic damage or effect.

Medical surveillance is strongly recommended for laser operators of Class 3b, and Class 4 laser systems. Laser operators should have, at a minimum, a baseline examination of the following, as specified in ANSI Z136.1:

- Ocular history
- Visual acuity
- Macular function
- Color Vision
- Ocular Fundus with an Ophthalmoscope
- Skin

Any individual with a known or suspected eye injury should be immediately referred to an ophthalmologist. Individuals with skin injuries should be promptly seen by a physician.

41.15 SECTION 2: CLASSIFICATION AND CONTROL

41.16 HAZARD CLASSIFICATION

The American National Standards Institute's Z136.1 standard establishes a classification for lasers according to their relative hazard and defines control measures for each class. Laser hazard classes are based on the ability of the primary laser beam to cause biological damage to the eye or skin during intended use. The classes are not based on the non-beam hazards associated with a laser system, although they can be significant. “Ancillary” or non-beam hazards are addressed in Section 3. In assessing the overall hazard related to laser operation, personnel and environmental related factors must be considered, such as level of safety training, and existence of non-laser operators in same laboratory.

The Food and Drug Administration requires that manufacturers classify their laser products.
An instrument label is affixed to the laser by the manufacturer which indicates the hazard class. Once a laser or laser system is properly classified, there should be no need to perform measurements or calculations of the laser beam power or beam characteristics. When the laser hazard class is unknown, or when the laser has been modified and the hazard class has changed, the Laser Safety Officer must be contacted to evaluate and classify the laser system.

41.17 THE FOUR LASER HAZARD CLASSES, ALONG WITH THEIR SUBDIVISIONS, ARE:

41.17.1 CLASS 1

Class 1 lasers are considered safe based on current medical knowledge. This class includes lasers which cannot emit levels of optical radiation in excess of the exposure limit for the eye (i.e. Maximum Permissible Exposure) under any exposure condition inherent in the design and intended use of the laser. A Class 1 laser system may contain a more hazardous laser embedded in the enclosure, but no harmful levels of the laser radiation can escape the system enclosure. For Class 1 lasers containing an embedded higher class of laser, the enclosure must be interlocked.

41.17.2 CLASS 2

All Class 2 lasers operate in the visible wavelength region (400-700 nm), are sub-divided into Classes 2a and 2, and are considered low-power lasers operating at less than 1 milliwatt. Class 2a lasers are not intended for prolonged viewing of the beam, but under normal operating conditions would not be hazardous if viewed directly (i.e. intrabeam viewing) for periods not exceeding 1,000 seconds. Class 2 lasers are not considered hazardous for momentary viewing of the direct beam for up to 0.25 seconds (i.e., aversion response time). The aversion response, blinking of eye and turning away, will afford ample protection from the beam of all Class 2 lasers. However, a Class 2 laser beam could be hazardous if one were to intentionally overcome the aversion response and stare directly into the beam for longer than 0.25 seconds. As a comparison, conventional bright light sources are also considered hazardous if one were to overcome the natural aversion response and directly stare into the light for an extended period.

41.17.3 CLASS 3

A Class 3 laser system can emit any wavelength but cannot produce a hazardous diffuse reflection unless viewed for extended periods at close range or with collecting optics. Class 3 is subdivided into Class 3a and Class 3b. Class 3a lasers would normally not present a hazard if viewed directly for momentary periods with the unaided eye (i.e., without collecting optics) and operate at 1 to 5 milliwatts for those emitting a continuous wave beam. Class 3b lasers operate at 5 to 500 milliwatts for continuous wave. The beam from all Class 3 lasers are not considered a fire, skin, or a diffuse reflection hazard.

41.17.4 CLASS 4

Class 4 laser systems can emit any wavelength, exceed 500 milliwatts, and are considered a fire, skin, and a diffuse reflection hazard. The most stringent control measures have been established for these lasers.

41.18 LASER HAZARD CLASSES

Applies to Wavelength Ranges*					Type of Hazard			
Class	UV	Visible	Near IR	Fair IR	Direct Ocular	Diffuse Ocular	Fire	Skin
1	Yes	Yes	Yes	Yes	No	No	No	No
2a	No	Yes	No	No	Only After	No	No	No
2	No	Yes	No	No	Only After	No	No	No
3a	Yes	Yes	Yes	Yes	Only After	No	No	No
3b	Yes	Yes	Yes	Yes	Yes	Only when laser	No	No
4	Yes	Yes	Yes	Yes	Output near 3b limit of 0.5 Watt Yes	Yes	Yes	Yes

*****Various ranges, in nanometers, are:

Ultraviolet (100-400)
Visible (400-700)
Near Infrared (700-1400)
Far Infrared (1400-106).

41.19 MAXIMUM PERMISSIBLE EXPOSURE

Maximum Permissible Exposure (MPE) levels have been established by ANSI Z136.1 for various laser wavelengths and exposure durations. The MPE is the level of laser radiation to which a person may be exposed without hazardous effect or adverse biological changes in the eye or skin. **In most cases it is unnecessary to make use of the MPE directly, if the laser hazard class is known and appropriate controls for that hazard class are implemented.** Since the determination of the MPE for various wavelengths and exposure situations can be quite complicated, the complete ANSI Z136.1 standard or the Laser Safety Officer should be consulted for further information.

It is good practice to maintain exposure levels as far below the MPE values as possible. One reason is that exposure to levels at the MPE values may be uncomfortable to view or feel upon the skin. MPEs for the eye and skin, along with correction factors for certain wavelengths, are listed on Tables 5 (a,b), 6 and 7 of this manual.

The exposure duration basis for the MPEs listed in the Z136.1 table are as follows: **0.25 second**: The human aversion time (i.e., blinking, turning away) for a bright light stimulus, which only applies to visible wavelengths (400-700 nm). The aversion response becomes the first line of defense for unexpected exposure to Class 2 lasers.

10 seconds: The time period chosen by the ANSI Z136.1 committee that represents the “worst case” time period for ocular exposure to an infrared (principally near infrared) laser beam. Eye movements provide a natural exposure limitation, eliminating the need for calculations greater than 10 seconds, except for unusual viewing conditions.

600 seconds: The time period chosen by the ANSI Z136.1 committee that represents the typical "worst case" time period for viewing visible diffuse reflections during tasks such as alignment.

30,000 seconds: The time period that represents a full one-day (8 hour) occupational exposure. This results from computing the number of seconds in 8 hours (28,800 seconds) and rounding it off to 30,000.

For single pulsed lasers, the exposure duration used in determining the MPE is equal to the pulse duration, as defined at the half-power point. The MPE for repetitively pulsed lasers requires a determination of the total exposure duration (Tmax) of a train of pulses. For repeated exposures to wavelengths in the 180 to 400 nm range, the exposure dose is additive over 24 hours, regardless of the repetition rate. Within the wavelength range of 280 to 400 nm, the MPE for any 24-hour period is reduced by a factor of 2.5 times relative to the single pulse MPE, if exposures on succeeding days are expected to approach the MPE.

41.20 NOMINAL HAZARD ZONE (NHZ)

The nominal hazard zone (NHZ) is a term used in ANSI Z136.1 to describe the space within which the level of direct, scattered or reflected laser light emitted during laser operation exceeds the MPE. Outside of the nominal hazard zone, the level of laser radiation is less than the applicable MPE.

The NHZ allows one to eliminate more restrictive Class 4 laser control measures if an area falls outside the NHZ. For instance, if the NHZ does not extend to the doorway in a laser laboratory, the door need not be safety interlocked or have a safety latch. This would eliminate the inconvenience of disrupting laser operation when frequent passage through the doorway is required. The NHZ boundary would, however, need to be visibly identified with tape or other suitable means. At the entryway to the NHZ, a warning sign is required which indicates the laser hazard, with special precautions and instructions written on the sign. The NHZ is derived from information supplied by the manufacturer or from measurements or calculations

41.21 LASER HAZARD CONTROL MEASURES

Control measures are established in the Z136.1 standard as a means of reducing the possibility of skin and eye exposure to laser radiation, during normal operation and maintenance, above their respective MPE values. Hazard control measures can be grouped into three general categories:

- Engineering (e.g., enclosures, interlocks, beam stops)
- Administrative (e.g., policies, laser safety procedures, training)
- Personnel Protective Equipment (e.g., eyewear, clothing)

41.22 CONTROL MEASURES FOR THE LASER HAZARD CLASSES

(ANSI Z136.1)

Engineering Controls	1	2a	2	3a	3b	4
Protective Housing	X	X	X	X	X	X
Interlocks on Protective Housing	?	?	??	X	X	
Service Access Panel	?	?	?	?	X	X
Key Control					•	X
Protective Viewing Portals			MPE	MPE	MPE	MPE
Collecting Optics	MPE	MPE	MPE	MPE	MPE	MPE
Totally Open Beam Path					X	X
Limited Open Beam Path					X	X
Remote Interlock Connector					•	X
Beam Stop or Attenuator					•	X
Activation Warning System					•	X
Emission Delay						X
Protective Windows					MPE	MPE
Administrative Controls						
Written Laser Safety Procedures					•	X
Education and Training			•	•	X	X
Authorized Operating Personnel					X	X
Alignment Procedures			X	X	X	X
Control of Spectators					•	X
Service Personnel Training	?	?	?	?	X	X
Indoor Laser Controlled Area					X	X
Class 3b Laser Controlled Area					X	
Class 4 Laser Controlled Area						X
Temporary Laser Controlled Area	?	?	?	?	X	X
Warning Labels (on laser housing)					X	X
Warning Sign Posting				•	X	X
Protective Equipment						
Eye Protection					MPE	X
Skin Protection					MPE	MPE

X= Required
•= Recommended
?= Required if contains an embedded Class 3b or 4 laser
MPE= Required if the Maximum Permissible Exposure is exceeded

Maximum emphasis should be placed on engineering control measures. However, if engineering controls are impractical or inadequate, warning devices, personnel protective equipment or administrative controls must be used. During the development of written laser safety procedures, one must consider the limitations of control measures (e.g., failure modes of enclosure, eye protection damage thresholds, inability of some personnel to understand written warnings). For all uses of lasers and laser systems, it is recommended that the minimum laser beam energy or power be used for the application and the beam location maintained at a height other than eye

level for one seated or standing. If it is not feasible to locate the beam at a height other than eye level, the beam should be enclosed.

41.23 ENGINEERING CONTROLS

41.23.1 PROTECTIVE HOUSING:

Required on all classes of lasers. In certain instances, operation of a laser or laser system without a protective housing may be necessary. In these instances, the Laser Safety Officer will conduct a hazard analysis and assure that alternative controls are used. Alternate controls may include, but are not limited to:

- access restrictions
- eye protection
- area controls
- barriers, shrouds, beams stop, or other suitable measures.
- additional training and administrative controls.

41.23.2 INTERLOCKS ON PROTECTIVE HOUSING

Class 3b and Class 4 lasers require an interlocked protective housing, which is activated when the protective housing is opened during operation and maintenance. The interlock is designed to prevent access to the beam above the applicable MPE. The interlock can be, for instance, mechanically or electrically interfaced with a shutter.

41.23.3 SERVICE ACCESS PANEL

Panels of the protective housing which are intended to be removed only by service personnel, thereby permitting access to a Class 3b or Class 4 beam, must either be interlocked or require a special tool for removal. A label must be affixed to the panel which reads: “Caution-Laser Radiation Inside. Avoid Exposure.”

41.23.4 KEY CONTROL

A master switch operated by a key, or by coded access (e.g., computer code). The appropriate supervisor is vested with the authority to enable the master switch. The master switch is disabled when the laser is not intended to be used.

41.23.5 VIEWING PORTALS

Viewing portals and display screens shall incorporate a suitable method (e.g., interlocks, filters, attenuators) to assure that personnel are not exposed to laser radiation greater than the applicable MPE during conditions of operation and maintenance.

41.23.6 COLLECTING OPTICS

Suitable methods shall be used (e.g., interlocks, filters, attenuators) to ensure that personnel using collecting optics (e.g., lenses, telescopes, microscopes, endoscopes, etc.) are not exposed to laser radiation levels greater than the applicable MPE.

41.23.7 TOTALLY OPEN AND LIMITED OPEN BEAM PATH

In those instances where the laser beam from a Class 3b or 4 lasers is either completely unenclosed or partially open, the Laser Safety Officer will perform a hazard analysis and determine the area, or "nominal hazard zone," surrounding the laser beam wherein the MPE is exceeded. Controls will then be required to assure personnel are not exposed to levels greater than the MPE.

High-power lasers require more rigid control measures not only because of the obvious risk of injury from the direct beam or specular reflections, but because there is a greater risk of injury from hazardous diffuse reflections. The entire beam path capable of producing hazardous diffuse reflections must be controlled.

41.23.8 REMOTE INTERLOCK CONNECTORS

A remote interlock connector allows connection to an emergency master disconnect interlock, or to a room, entryway, floor or area interlock. Safety latches or interlocks are used to deactivate the laser in the event of an unexpected entry into laser-controlled areas. The design of interlocks must allow both rapid egress and admittance by laser personnel in emergency situations. The person in charge of the laser-controlled area is permitted to momentarily override the room access interlocks when continuous laser operation is necessary, but specification for the momentary override must have the approval of the Laser Safety Officer. Interlocks will not allow automatic re-energizing of the power supply but must be designed so that the power supply or shutter must be reset manually. A control-disconnect switch ("panic button") shall be available for deactivating the laser.

41.23.9 BEAM STOP OR ATTENUATOR

A beam stops or attenuator provides a means of preventing access to laser radiation in excess of the MPE, when the laser beam output is not required. In some cases, such as during beam alignment, a beam attenuator can reduce the output of a laser beam to a level at or less than the MPE, thereby allowing one to operate the laser without the need for protective eyewear.
Consideration must be given to the material composition of the beam stop to reduce the risk of fire or burn-through of the material.

41.23.10 ACTIVATION WARNING SYSTEM

Activation warning systems consist of audible sounds (e.g., chimes, bells), warning lights, or a verbal “countdown” which notifies personnel that the laser is being activated.

41.23.11 EMISSION DELAY

The laser activation warning system is activated a sufficient time prior to actual laser emission, allowing one to initiate action to control exposure to the beam.

41.23.12 PROTECTIVE WINDOWS

Protective windows include absorbing filters, screens, and barriers that cover facility windows located in the nominal hazard zone of Class 3b and Class 4 lasers. The filters and barriers are intended to prevent transmission through the window of laser radiation greater than the applicable MPE.

41.24 ADMINISTRATIVE CONTROLS

41.24.1 LASER SAFETY PROCEDURES

A written laser safety procedure is required for Class 4 laser systems and is recommended for Class 3b systems. The procedure addresses both beam and non-beam hazards and is usually in the form of a checklist or a list of instructions. Laser operators must be thoroughly familiar with the laser safety procedure of their system prior to laser operation. A copy of the procedure must be either posted near the laser or made readily available for review.

41.25 DEVELOPMENTAL GUIDELINES FOR A LASER SAFETY PROCEDURE

General

- Review the laser operations/maintenance manual of the manufacturer, the 3A Group laser safety manual, and be aware of the laser hazards and controls prior to operating the laser. Only properly qualified and trained individuals must be allowed to operate lasers (see “Training,” in Section 2, page 27).
- Enclose as much of the beam as possible (e.g., appropriately colored Plexiglas, Lexan or metals). If beam is exposed and laboratory is shared by other researchers, specify use of curtains, barriers around the experimental set-up.
- Whenever feasible, remote firing, video monitoring or remote viewing through a laser safety shield should be used.
- If full beam power is not required, specify use of filters, attenuators to reduce laser beam irradiance to less than hazardous (i.e., MPE) levels. All non-essential reflective materials (e.g., jewelry, watches, belt buckles) must be eliminated from the beam area.
- Indicate that appropriate (i.e., specify optical density, wavelength) laser safety eyewear is required when operating a class 4 laser. Consideration must also be given in the procedure to those lasers which operate at multiple wavelengths and thus require different protective eyewear filters. Specify in the procedure that eyewear is worn prior to turning on the beam. Include provisions for inspecting the eyewear for cracking, bleaching, integrity, etc., before wearing.
- Beams shall be terminated with beam stops that are constructed of a material that will minimize reflection and, for Class 4 lasers, is of fire-resistant material.
- Specify that standard laser warning signs are posted, and that the laser use area cleared of non-essential personnel prior to laser operation.
- Assure that beam location is not at eye level to one in a sitting or standing position.
- Specify that the optical set-up and beam stops are secured with strong mechanical mounts. The optical set-up should not be disturbed by other members of the research group by moving or borrowing components.
- For Class 4 lasers, start countdown prior to actually firing the laser and assure that warning lights are on and personnel in the area are warned of imminent laser emission.
- Indicate that the key-switch master control permits only authorize individuals to operate the laser. Keys shall be removed from the laser when not in use. Specify who is authorized to maintain custody of the key. Doors to the laser lab should be locked when laser is on and unattended. Specify that when laser transmission is not actually required, the laser is turned off or beam shutters/caps shall be used.
- Incorporate emergency contacts and telephone numbers in the laser safety procedures.
- Indicate reporting of any accident of suspected or known injury to principal investigator and/or the Work-site Laser Safety Officer.
- All required safety features/interlocks shall be used. A listing or description of the required safety features/interlocks should be included in the laser safety procedure.

41.26 BEAM ALIGNMENT

- Alignment procedures are required by the ANSI-Z136.1 standard for Class 2, 3a, 3b and
- 4 lasers, although a laser safety procedure is required only for Class 4 laser systems.
- Whenever feasible, specify in your plan the use of remote or electronic means to guide the beam during alignment.
- Specify that the beam output shall be kept as low as possible during alignment. Output filters and attenuators are recommended.

- Consider using “alignment eyewear” for alignment tasks. Alignment eyewear allows a safe level of laser light to be transmitted through the filter. This allows the diffuse reflections of the beam to be viewed (the direct beam should never be viewed).

41.27 NON-BEAM HAZARD CONSIDERATIONS

- If a dye laser is used, specify appropriate gloves and handling techniques used when handling dyes.
- Assure that operators of laser equipment are familiar with electrical safety procedures, and that at least one person is certified in CPR. The general electrical safety guidelines listed on page 42 of this manual should be copied and incorporated into the laser safety procedures.
- For class 4 lasers, inspect research area to ensure that combustible materials are not located near the laser beam path and that fire-resistant beam stops, curtains, shrouds, etc., are used. Note location of fire extinguishers.
- If using an optically pumped laser, enclose the flash lamp and assure that the enclosure can withstand the explosive pressure of lamp explosion.
- When using excimer or other lasers operating in ultraviolet wavelengths, face shields, lab coats, sunscreens, etc., may be necessary to protect the skin from scattered ultraviolet radiation. Any of these required or recommended personnel protective measures must be specified in the laser safety procedures.

41.28 TRAINING

The type of laser safety training provided is commensurate with the laser hazard classification and duties of the individual (e.g., laser operator, visitors, other lab personnel). Training will be offered by EH&S and is mandatory for those who operate a Class 3b or Class 4 laser. The following topics are included in the laser safety training provided by EH&S:

- Fundamentals of laser operation (physical principles, components of a laser)
- Biological effects of laser radiation on the eye and skin
- Specular and diffuse reflections
- Non-beam hazards
- Laser hazard classification and control measures
- Overview of ANSI Z136.1 standard
- Elements of 3A Group’s laser safety program

Additionally, principal investigators must provide supplemental training specific to their laser system for those under their supervision who operate Class 3 or Class 4 lasers. The following topics should be included in the supplemental training provided by principal investigators:

- Laser safety and alignment procedures
- Description of control measures specific to the laser (e.g., eyewear, warning signs, interlocks, access restrictions)
- Non-beam hazards associated with the laser system (e.g., fire, electrical, chemical)
- Emergency procedures and telephone numbers of people to contact in the event of
- an emergency

Updated training is also useful when certain tasks, such as beam alignment, are a frequent work requirement. Every few years, laser operators of Class 3b and Class 4 laser systems should attend the EH&S laser safety class as a refresher. Principal investigators should also provide periodic refresher training to operators of their laser systems.

41.29 AUTHORIZED OPERATING PERSONNEL LIST

For Class 3b and Class 4 lasers, a list of operating personnel must be maintained. Training of operating personnel must be maintained in accordance with the training requirements indicated in this section.

- **ALIGNMENT PROCEDURES:**

Alignment of a Class 2, 3a, 3b or Class 4 laser optical systems shall be performed in such a manner that the primary beam or specular reflection of a primary beam does not expose the eye to levels of laser radiation above the MPE.

- **CONTROL OF SPECTATORS:**
  - Spectators or visitors must not be permitted into a Class 4 laser-controlled area unless:
  - Approval from the laser supervisor has been obtained.
  - The degree of hazard and avoidance procedures have been explained.
  - Appropriate protective measures are implemented.

41.30 SERVICE PERSONNEL TRAINING

Service personnel requiring access to Class 3b or Class 4 lasers or laser systems enclosed within a protective housing or enclosure must comply with the control measures of the embedded laser. The principal investigator must assure that service personnel are properly qualified and aware of beam and non-beam hazards associated with the laser system being serviced.

41.31 INDOOR LASER CONTROLLED AREA

An indoor laser-controlled area is an area or room which requires initiation of appropriate engineering and procedural controls and determination of the nominal hazard zone when laser radiation exceeds the MPE. In some cases, the nominal hazard zone (envelope around the laser beam where the MPE is exceeded) may be the entire room or area.
Visitors shall not be permitted into the laser-controlled area unless approval of the principal investigator has been obtained and protective measures taken. Visitors must be informed by laboratory personnel of laser safety precautions and required control measures (e.g., wearing laser protective eyewear) before entry into a laser-controlled area.

41.32 WARNING SIGNS AND LABELS

Lasers shall have warning labels with the appropriate cautionary or danger statement affixed to a conspicuous place on the laser housing, usually near the aperture of the laser beam.
Contact the Laser Safety Officer, EH&S, for door or entry-way warning signs.
Laser warning signs must meet the standards of ANSI Z136.1. All signs and labels must be conspicuously displayed in locations which serve to warn personnel. Normally, warning signs are posted on doors, or at entryways into laser-controlled areas.

Adequate space shall be left on all signs and labels to allow the inclusion of pertinent information. Such information may be included during the printing of the sign or label or may be handwritten in a legible manner, and shall include the following, as referenced to the figures on the proceeding page:

1. At position 1 above the sunburst, special precautionary instructions or protective actions required of the reader such as:
   a. For Class 2 laser systems “Laser Radiation—Do Not Stare into Beam”

b. For Class 3a laser systems where the accessible irradiance does not exceed the appropriate MPE based upon a 0.25 second exposure for wavelengths between 0.4 and 0.7 µm "Laser Radiation—Do Not Stare into Beam or View with Optical Instruments."
c. For all other Class 3a laser systems, "Laser Radiation—Avoid Direct Eye Exposure."
d. For all Class 3b laser systems, "Laser Radiation—Avoid Direct Exposure to Beam."
e. For Class 4 laser systems, "Laser Radiation—Avoid Eye or Skin Exposure to Direct or Scattered Radiation."

At position 1 additional special precautionary instructions may include: Invisible Laser Radiation; Knock Before Entering; Do Not Enter When Light is On; Restricted Area; etc.

2. At position 2 below the tail of the sunburst, type of laser (Ruby, Helium-Neon), or the emitted wavelength, pulse duration (if appropriate), and maximum output.
3. At position 3, the class of the laser or laser system.

A "Notice" sign is posted whenever a temporary laser-controlled area is established during servicing and repair of a laser. When a temporary laser-controlled area is created, the area outside the temporary area remains Class 1, with the "Notice" sign posted at the entryway. The area within a temporary laser-controlled area is either Class 3b or Class 4 and the appropriate danger warning sign is posted within this area.

41.33 PERSONAL PROTECTIVE EQUIPMENT

41.33.1 EYE PROTECTION

Lasers can produce serious injury to the eyes if adequate protection is not worn. A laser eye protection device can be defined as a filter which is designed to reduce light transmission of a specific wavelength, or range of wavelengths, to a safe level while maintaining adequate light transmission at all other wavelengths. Eye-protection devices which are specifically designed for protection against the emitted wavelength of the laser should be used when engineering and procedural controls are inadequate.

All laser protective eyewear shall be clearly labeled with the optical density values and wavelengths at which the particular eyewear affords protection. The optical density of laser protective eyewear at a specific wavelength is given as:

$$OD = \text{Log}_{10}\left(\frac{H0}{MPE}\right)$$

where H0 is the anticipated worst-case exposure (in mW/cm2 or J/cm2) to the eye. The MPE is expressed in the same units as the those of H0. Adequate optical density at the laser wavelength of interest must be weighed with the need for adequate transmission of visible light. Periodic inspections must be made of protective eyewear to ensure that pitting, cracking or bleaching will not endanger the wearer. The frame of the protective eyewear should also be inspected for mechanical integrity and light leaks.

Important factors to consider in determining appropriate eyewear are:

- Wavelength of laser output
- Potential for multi-wavelength operation

- Maximum permissible exposure (MPE)
- Optical density
- Visible light transmission
- Peripheral vision
- Radiant exposure (J/cm2) or irradiance (W/cm2) and the corresponding time factors at which laser-protective eyewear damage (penetration) occurs, including transient bleaching
- Need for prescription glasses
- Comfort and fit
- Degradation of absorbing media, such as photobleaching
- Strength of materials (resistance to shock)
- Capability of the front surface to produce specular reflection

The lenses of protective eyewear are either reflectors or absorbers. Both can be made of glass or plastic. Reflective glass filters rely on a thin surface coating to reflect laser beam exposure.
Glass filters are generally able to withstand a higher degree of heat and energy load than most polymeric materials. However, a scratch in the glass could allow radiation to penetrate, causing possible injury to the eye.

Absorptive filters molecularly convert, rather than reflect, the incoming laser energy to heat which is harmlessly diffused across the lens. Absorptive filters offer many important advantages over the reflective types and are not affected by surface scratches. The absorptive filters do not create hazardous reflections throughout the laser use area and the protection is not dependent upon the angle at which the beam hits the lens.

Polymeric filters -- such as those of polycarbonates -- have some advantages over the absorptive glass lenses. The plastic filters are noticeably more lightweight than the glass and have greater impact resistance. The polymeric filters boast a high heat-deflection temperature, which enables them to withstand high energy densities, although usually not as high as glass filters.
Equal consideration should be given to weight and comfort of eyewear frame as to filter type.
This is especially true for those who need to wear laser safety eyewear for extended periods.
The Laser Safety Officer, along with many optical companies (see Appendix B), can advise on the selection of protective eyewear.

41.33.2 SKIN PROTECTION

Skin protection may be required if one is likely to be chronically exposed to scattered ultraviolet light, such as during excimer laser applications, or acutely exposed to levels greater than the MPE for the skin. If exposure of the body to a concentrated, high-power laser beam is likely, such as greater than 100 watts in a 1 cm diameter beam, then one must consider skin as well as eye protection. One should always strive, if the laser application permits, to enclose as much of the beam as possible, or to use protective barriers. Skin protection is required when personnel are exposed to laser radiation greater than the MPE for the skin.
Where personnel are subject to chronic skin exposure from UV radiation, even at levels less than the MPE for the skin (e.g., certain excimer laser applications), skin covers and/or " sunscreen" creams are recommended.

Leather gloves, leather aprons and jackets are generally considered the most desirable in protection against UV exposure. Woven fabrics vary greatly in their attenuation properties.
Loosely woven fabrics, through which one can readily see light when held up to a light source, have a UV-B diffuse transmission ranging from 5% to 30%. Rayon and rayon blends transmit somewhat less (10 to 15%), and heavy wool and flannel materials may transmit 1% or less. Poplin is reported to have very low transmittance. Nylon is very ineffective with a transmission of 20% to 40%. This is important to note since many lab coats are nylon based.

Attenuation of laser light can also be greatly enhanced by the use of layered clothing.

For Class 4 lasers, consideration must be given to the use of skin-protective material which is fire resistant. The laser operator should also consider the operator's own skin UV sensitivity, as heightened by certain photosensitizing agents.

41.34 FACTORS COMMON TO LASER ACCIDENTS

When evaluating a particular laser system and developing a laser safety procedure, it is useful to review some of the common factors involved in previous laser accidents. The following circumstances are most often reported by laser manufacturers to the Food and Drug
Administration as the cause of personnel injuries from both the laser beam and other nonbeam hazards.

- Unanticipated eye exposure during alignment
- Misaligned optics
- Available eye protection not used
- Equipment malfunction
- Improper methods of handling high voltage
- Intentional exposure of unprotected personnel
- Operators unfamiliar with laser equipment
- Lack of protection for ancillary (non-beam) hazards
- Improper restoration of equipment following service

41.35 SECTION 3: NON-BEAM HAZARDS

Non-beam hazards of laser systems may include electrical, fire, explosion, other optical radiation hazards, compressed gases, cryogenic, toxic and carcinogenic materials, noise, ionizing radiation and toxic air contaminants from beam interaction with a target material.
These hazards must be evaluated separately by each principal investigator for their specific laser system and appropriate control measures for these hazards incorporated in the laser safety procedure. Additional information on specific guidelines and evaluation of non-beam hazards may be obtained by contacting EH&S or reviewing the 3A Group Laboratory Safety Operation Manual.

41.36 ELECTRICAL

The most lethal hazard associated with lasers is the electrical hazard. Electrocution burns and severe shock have occurred to a number of individuals troubleshooting or servicing laser equipment. To prevent electrical injuries, all personnel should be adequately trained and the “buddy system” used whenever working around high voltage laser power supplies. Training in Cardiopulmonary Resuscitation (CPR) is recommended for all laser service personnel, research personnel, and their assistants. Periodic refresher courses are also recommended.
Call the EH&S Training Coordinator for a list of CPR classes.
The following potential problems have frequently been identified during laser facility audits:

- Uncovered or improperly insulated electrical terminals
- Hidden “power-up” warning lights
- Lack of personnel trained in CPR, or lack of refresher training
- “Buddy system” not being practiced during maintenance and service
- Non earth-grounded or improperly grounded laser equipment
- Nonadherence to the OSHA lock-out standard (29 CFR 1910.147)

- Excessive wires and cables on floor that create a fall or slip hazard

Laboratory researchers have been killed or burned by the hot gas plasma formed from arcing 480-volt systems powering a laser, by a simple thing as a metal pen falling out of one's pocket, or by setting an inexpensive multimeter to "ohms" (incorrect) and trying to measure 480 volts at unlimited current. Facilities Management's Electrical Shop (x2997) can provide assistance in fuse-changing, or anything involving 480/277-volt work. For new 480-volt equipment installations contact the Senior Electrical Power Engineer (x4315).

Laboratory lasers at 3A Group are required to be supplied with the following wall-type connections for operator safety:

- A fully fused, enclosed and rated disconnecting means at the wall for ampacities over 30 amperes, at 208 or 480 volts. This provides a means for operator turn-off at the laser when working on the laser.
- High-powered 480-volt lasers must be equipped with a full 600 V AC disconnect switch and fusing means (locked), as well as a sign warning operator of the extremely hazardous voltage and current available at the source of laser power.

All laser systems shall be installed in accordance with manufacturer specifications and/or as required by the National Electrical Code. Additional measures to eliminate electrical shock, grounding, and electrical fire/explosion hazards are outlined in the Z136.1 standard.

41.37 GENERAL GUIDELINES ON ELECTRICAL SAFETY

- Consider live parts of circuits and components with peak open circuit potentials over 42.5 volts as hazardous, unless limited to less than 0.5 mA. Such circuits require positive protection against contact.
- Wear thick rubber-soled shoes (such as tennis shoes) and avoid leather-soled shoes, rings, metallic watchbands.
- Use a portable voltmeter to assure capacitors are discharged before touching terminals. Where feasible, wait 24 hours before attempting any work on circuits involving high energy capacitors.
- Whenever possible, use only one hand when working on circuits or control devices. To avoid "freezing" to the conductor in case shock occurs, use the back of the hand when touching electrical equipment, if possible.
- Never handle electrical equipment when hands, feet or body are wet, or when standing on a wet floor.
- With high voltages, regard floors as conductive and grounded, unless covered with a well-maintained dry rubber matting.
- Use a solid metal grounding rod to assure discharge of high voltage capacitors. The rod should be firmly attached to the ground prior to contact with the potentially live point. A resistor grounding rod (e.g., large wattage ceramic resistor) may be used prior to the application of the metallic rod to protect circuit components from overly rapid discharge, but never as a replacement for the solid metal conductor rod.
- Ground the frames, enclosures and other accessible noncurrent-carrying metallic parts of laser equipment and encourage the use of shock-prevention shields, power supply enclosures, shielded leads.
- Learn rescue procedures for helping victims of apparent electrocution as enumerated below:
  1. Kill the circuit.
  2. Remove the victim with a nonconductor if victim is still in contact with an energized circuit.
  3. Initiate Cardiopulmonary Resuscitation, if you are trained and comfortable doing so.
  4. 4. Have someone call for emergency aid.

41.38 CAPACITORS

Power capacitors are both an electrical and an explosion hazard and should be enclosed in cabinets of suitable construction with interlocking access panels. High energy capacitors should be in cabinets with walls of one-eighth inch steel. When not in use the high voltage terminal should be kept at ground potential by appropriate grounding measures.

41.39 EXPLOSION

High-pressure arc lamps and filament lamps in laser equipment shall be enclosed in housings which can withstand the maximum explosive pressures resulting from lamp disintegration.
The laser target and elements of the optical train, which may shatter during laser operation, should also be enclosed or equivalently protected to prevent injury to operators and observers.

41.40 FIRE

Enclosures and beam stop of Class 4 lasers can result in potential fire hazards if they are likely to be exposed to irradiances exceeding 10 W/cm2 or to beam powers greater than 0.5 watts. In these instances, the use of flame-resistant materials should be encouraged. Operators should also be aware of unprotected wire insulation and plastic tubing catching fire from intense reflected or scattered beams of Class 4 lasers, especially those operating at invisible wavelengths.
Solvents used in dye lasers can be extremely flammable. There have been cases where fires were started by a high-voltage pulse through an alcohol solvent and from ignition of the solvent from a hot xenon arc lamp tube. One should use non-volatile solvents, if possible, and the power output of flash lamps limited to the average power level recommended by the manufacturer.

41.41 OPTICAL RADIATION (OTHER THAN LASER BEAM)

Ultraviolet radiation emitted from laser discharge tubes and pumping lamps (i.e., not part of the primary laser beam) must be suitably shielded so that personnel exposures do not exceed the threshold limit values (TLV) specified by the American Conference of Governmental Industrial Hygienists. Optical flash tubes may emit hazardous levels of ultraviolet radiation if quartz tubing is used. The ultraviolet radiation can be readily attenuated by certain plastics and heat-resistant glasses.

Plasma emissions created during a laser-welding process may have sufficient ultraviolet and/or blue light content (0.2 to 0.55 µm) to be of concern to operators; especially those who are not adequately protected and are viewing the laser-welding process on a long-term basis.

41.42 IONIZING RADIATION

High voltage vacuum tubes greater than 15 kV and laser-metal induced plasmas may generate X-rays. The source, quality, and intensity of X-rays emanating from laser power supplies and related components should be investigated and controlled in accordance with policies established by the 3A Group Safety Office.

41.43 GAS SAFETY

Gases associated with laser systems may be simple asphyxiates, oxidizers, corrosive, toxic or flammable, and present a unique hazard due to the potentially large area affected during an accidental release. The type of engineering and procedural controls required depend on the gas, as does the need for protective equipment. Typical controls include the use of gas cabinets, sufficient exhaust ventilation, emergency gas shut-off valves, monitors, sensors, and alarms. Additionally, elements of the gas system design should also be considered, such as gas cylinder location, tubing path and construction and the regulator and purge system.
Excimer laser systems use both Ar, Kr, or Xe and F (or HCl) gases, as well as He, N and Ne.
Fluorine, chlorine or HCl gas should always be supplied in low-concentration pre-mix cylinders and should not be used in a concentrated form. Although the use of lower concentration premix cylinders will reduce the potential hazard of a gas release, the hazard is not completely eliminated.

Increased recognition of the hazards associated with gas transportation, operation, and storage have prompted new state and local regulations governing gas usage at the worksite. The 3A Group Gas Safety Program describes the administrative and engineering controls appropriate for documentation, storage, use and handling of gases. Contact EH&S for additional information on the Gas Safety Program.

41.44 DYES AND SOLUTIONS

Dye lasers normally use a lasing medium composed of a complex fluorescent organic dye dissolved in an organic solvent. Animal experimentation has shown these dyes to vary greatly in toxicity and potential carcinogenicity; consequently, all dyes should be treated as hazardous chemicals. A few, especially DCM (4-dicyanomethal-2-methyl-6-pdiethylaminostyryl-
4-H-pyran) have been found to be very strong mutagens. In many instances, the solvent in which the dye is dissolved plays a major role in the solution's hazards. Practically all solvents suitable for dye solutions are flammable and toxic by inhalation or skin absorption. Some dye solutions come premixed form the manufacturer, in which case efforts must be made to determine which dye and solvent were used for the preparation. It is important to read the Material Safety Data Sheet (SDS) on each of the dyes and solvents used in the laboratory.

Control measures must consider the mixing and use of dyes and solvents. These measures normally include the methods of solvent transfer, adequate ventilation, use of personal protective equipment, process isolation, secondary containment, labeling and personnel training requirements.

1.1.1.1 Laser Dye/Solvent Control Classes

Material / Synonym	Control Class[a]	Comments[b]
BBQ	M	Nonmutagenic, unknown toxicity
Benzyl alcohol	L	Moderate toxicity, low vapor pressure
Carbazine 720	M	Nonmutagenic, unknown toxicity
Coumarin 1/460	M	Nonmutagenic, moderately toxicity
Coumarin 2/45	M	Nonmutagenic, unknown toxicity
Coumarin 30/515	S	Mutagenic, unknown toxicity
Coumarin 102/480	S	Strong mutagen, unknown toxicity
Coumarin 120/440	M	Nonmutagenic, unknown toxicity
Coumarin 314/504	M	Nonmutagenic, unknown toxicity
Coumarin 420	M	Nonmutagenic, unknown toxicity
Coumarin 481	M	Nonmutagenic, unknown toxicity

Coumarin 498	M	Unknown mutagenicity, unknown toxicity
Coumarin 500	S	Mutagenic, unknown toxicity
Coumarin 540A	M	Nonmutagenic, unknown toxicity
Cresyl violet 670	S	Very strong mutagen,unknown toxicity
1,3,5,7, -Cyclooctatetrene (COT)	M	Unknown mutagenicity, unknown toxicity
DCM	S	Very strong mutagen,unknown toxicity
p,p'-diaminoquaterphenyl	S	Mutagenic, unknown toxicity
p,p'-diaminoterphenyl	S	Mutagenic, unknown toxicity
Dioxane	M	Moderate toxicity
DMSO	M	Moderate toxicity
DODCI	M	Unknown mutagenicity, unknown toxicity
DQOCI	M	Unknown mutagenicity, unknown toxicity
DPS	M	Doubtful bacterial mutagen, unknown toxicity
Ethylene dichloride (1,2,-dichloroethane)	M	Suspected carcinogen-avoid inhalation of vapors (see industrial hygienist, EH&S)
Ethyl alcohol	L	Low toxicity
Ethylene glycol	M	Moderate toxicity, low vapor pressure
Fluorescein 548	M	Unknown mutagenicity, unknown toxicity
IR-26	M	Unknown mutagenicity, unknown toxicity
IR-125	M	Unknown mutagenicity, unknown toxicity
IR-132	M	Unknown mutagenicity, unknown toxicity
IR-140	M	Unknown mutagenicity, unknown toxicity
IR-144	M	Unknown mutagenicity, unknown toxicity
Kiton Red 620	L	Nonmutagenic, practically non-toxic
Kodax Q-Switch #2	M	Unknown mutagenicity, unknown toxicity
Kodax Q-Switch #5	M	Unknown mutagenicity, unknown toxicity
LD-390	M	Unknown mutagenicity, unknown toxicity
LD-490	S	Mutagenic, unknown toxicity
LD-688	S	Mutagenic, unknown toxicity
LD-700	M	Nonmutagenic, unknown toxicity
LDS-698	S	Mutagenic, unknown toxicity
LDS-722	S	Strong mutagen, unknown toxicity
LDS-750	M	Unknown mutagenicity, unknown toxicity
LDS-751	M	Unknown mutagenicity, unknown toxicity
LDS-820	M	mutagenicity, unknown toxicity
LDS-867	M	Unknown mutagenicity, unknown toxicity
9-Methylanthracene	S	Mutagenic, unknown toxicity
Methyl alcohol	L	Moderate toxicity
Bis-MSB	M	Nonmutagenic, unknown toxicity
Nile Blue 690	S	Commerical grade is strongly mutagenic, purified dye is not. Unknown toxicity.
Oxazine 720	M	Nonmutagenic, unknown toxicity
Rhodamine 4	M	Nonmutagenic, eye irritant, slightly toxic
Rhodamine 6	M	Nonmutagenic, eye irritant, slightly toxic
Rhodamine 6G/590	M	[c]Special case
Rhodamine 110/560	S	Weak mutagen, unknown toxicity
Rhodamine 610/B	M	Nonmutagenic, moderately toxic
Rhodamine 640	M	Nonmutagenic, unknown toxicity
Sulforhodamine 640	M	Unknown mutagenicity, unknown toxicity

Stilbene 420/3	L	Nonmutagenic, practically non-toxic
2,2,2-Trifluorethanol	M	Dangerous, volatile, highly toxic, and extreme eye irritant (see industrial hygienist, EH&S).
N,N,N',N'-tetraethyl-diaminoquaterphenyl	M	Nonmutagenic, unknown toxicity
N,N,N',N'-tetraethyl-diaminoterphenyl	S	Strong mutagen, unknown toxicity

a L= Limited control class
M=Moderate control class
S=Strict control class

Dye/solvent mixtures with less than 1% dye shall be handled as appropriate for the solvent, with the exception that for those involving Strict classed dyes, in which Strict class requirements for container and equipment labeling, as well as spill cleanup, shall be followed. Dye/solvent mixtures with greater than 1% dye shall be handled as appropriate for the component having the strictest control class.

[b]The approximate mutagen potency of the dye in the standard Ames/Salmonella assay is: "weak mutagen = <100 revertants/mg; "mutagenic" = 100-1000 revertants/mg; "strong mutagens" = 1000-10,000 revertants/mg; "very strong mutagens" >10,000 revertants/mg. The Ames test is a reliable predictor of whether a compound is a carcinogen in mammels, but it does not measure the potency of the carcinogen. Thus, a weak Ames mutagen could be a strong carcinogen and a strong Ames mutagen could be a weak carcinogen. Ames test data are used because animal testing is more costly and has not been done for most dyes.

[c]Follow moderate control class precautions, but also conclude spill cleanups by wiping the area with chlorine bleach (which attacks the amine part of the dye molecule).

41.45 PRECAUTIONS FOR HANDLING DYES/SOLVENTS

Work Practices

- Don't eat, drink, smoke, or store food, beverages, or smoking materials in the dye work area. Post warning signs in conspicuous locations in the work area.
- Keep the work area clean. Clean up after experiments and remove as much visible stains as possible during cleanup. Janitors must not clean-up work.
- Cap off dye lines that are not in use.
- Keep containers of dye and solvent solutions closed. Label the containers clearly with the name of the dye and solvent and the concentration of the solution. Include the word "Toxic" if ethylene glycol is used as the solvent, and the word "Flammable" if an alcohol is used as the solvent. Similarly label the dye plumbing systems.
- Transport solutions in sealed, labeled containers. Containers need to be made of impact-resistant compatible material.

Personnel Protective Equipment

- Use safety eyewear.
- Use impervious gloves when handling dye powders.

Fire Safety

- Keep heat, flames, and other sources of ignition away from solutions of laser dyes in flammable solvents.
- Keep alcoholic waste solutions in flammable liquid safety containers with the labeling as described above.
- Keep oxidizing materials away from dyes and solvents.

Facilities and Equipment

- Locate dye/solvent pumping systems and handling areas within 100 ft walking distance of eyewash and/or shower.
- Pressure test dye laser systems and components if appropriate. Pay special attention to tubing connections.
- Install spill pans under pumps and reservoirs, or, preferably, enclose them. Knobs, etc., can pass through holes in the enclosure.

Spill Cleanup

- Clean up small spills (100 ml or less) with absorbent material (such as Kimwipes or "kitty litter"). Call EH&S for assistance when the spill exceeds 100 ml.
- Use gloves and safety eyewear, as specified above, during spill clean-up.
- Conclude Rhodamine dye solution spill clean-up with a thorough washing with chlorine bleach.
- Call work-site dispatch _____ if people are injured, have lost consciousness or if there is a need for the Fire Department.

41.46 ADDITIONAL PRECAUTIONS FOR DYE WORK WITH MODERATE ("M") CONTROLS

Work Practices

- Minimize the use of DMSO or dioxane solvents.

Personnel Protective Equipment

- Use a disposable lab coat or disposable coveralls.

Fire Safety

- Label containers with the word "Flammable" if alcohol, dioxane, or DMSO are used as solvents.
- Keep waste solutions with alcohol, DMSO, or dioxane in flammable liquid storage containers.

Facilities and Equipment

- Mix dyes in a laboratory fume hood or glove box that provides a designed face/opening velocity of 100 ft/min.

  Do not use a hood that blows back inside of a building, even if the exhaust is filtered.

Spill Clean-up

- Use personal protective eyewear during spill clean-up. Use a disposable dust respirator if exposure to dye dust is possible.
- Contact EH&S for assistance if exposure to dye dust is possible.

41.47 ADDITIONAL PRECAUTIONS FOR DYE WORK WITH STRICT ("S") CONTROLS

Work Practices

- Minimize the quantity of pure dye or solutions containing more than 1 percent of dye in storage or in use at any time. Minimize the use of dioxane or DMSO solvents.
- Limit access to dye work areas. Post signs at the approaches to dye work areas stating: "Caution-Mutagenic Dye Work Area-Authorized Personnel Only."
- Advise maintenance and emergency personnel of problems they may encounter in a dye work area before they enter the area.
- Use vacuum cleaners approved for toxic dust service or wet methods for housekeeping in the dye work areas. Use mechanical pipetting aids when handling dye solutions.
- Store powders or dye solutions containing more than 1 percent of dye in closed containers inside of a closed outer container. Label both containers to clearly identify the dye and solvent. Include the words "Toxic-Mutagenic" and, if alcohol, dioxane, or DMSO are used as solvents, the word "Flammable." Indicate the solution concentration.
- Transport dyes or solutions in sealed and labeled double containers. Put compatible absorbent material in the space between the inner and outer container. The inner container needs to be made of an impact-resistant compatible material. (The outer container should also be made of an impact-resistant compatible material.)

Personnel Protective Equipment

- Use disposable clothing (either disposable lab coat or coveralls).

Fire Safety

- Keep waste solutions in flammable-liquid storage containers.

Facilities and Equipment

- Use benches and floors with as few cracks, crevices, hard to reach places, and matte-textured surfaces as possible to make cleaning easy. Avoid using dark-colored materials that hide stains. Avoid installing equipment on false floors.
- Provide separate storage of articles that are contaminated by dyes and those that are not.
- Store pure dyes and solutions containing 1 percent or more of dyes in a designated storage space in the dye work area.
- Enclose dye pumps and reservoirs (knobs, etc., can pass through holes in the enclosures). Design equipment to minimize leakage.
- Mix dyes in a laboratory fume hood or a totally enclosing hood (i.e., glove box). The face velocity for a lab hood or the air velocity through any opening of an enclosing hood shall be 150 ft/min when used for dye mixing.
- The hood exhaust must pass through a HEPA filter. Don't use a hood that blows back inside of a building.

Spill Clean-Up

- Use a half-face respirator with a high- efficiency (HEPA) dust filter cartridge if exposure to dye dust is possible.

Schedule an appointment for proper respirator fit-testing, training and medical surveillance prior to using respirator.

- Keep people out of the spill area and contact EH&S if the spill is greater than 100 ml or if exposure to dye powder is possible. Report small spills and clean-ups to EH&S (x3293).

Glove Type	Neoprene	Butyl	PVC	Nitril	Latex	Natural Rubber	Viton	Silver Shield
Ethanol	X			X				
(ethyl alcohol) Methanol	X	X	X	X		X		
(methyl alcohol) Glycerol	X	X	X	X		X	X	
(Glycerine) Dimethyl	X			X	X			
Sulfoxide (DMSO) Propylene								
Carbonate		X		X				X
Benzyl alcohol	X	X					X	
Ethylene glycol								
Phenyl ether (2-phenoxyethanol)		X		X				X
Ethylene glycol	X		X	X	X	X	X	

41.48 OTHER CONSIDERATIONS

Examples of other concerns include hazards associated with cryogenic gases, toxic and carcinogenic material and noise.

When target irradiances exceed a certain threshold, approximately 107 W/cm2, certain target materials may liberate toxic and noxious airborne contaminants. These Laser Generated
Airborne Contaminants (LGAC) depend greatly on the laser beam irradiance and the chemical composition of the target. Adequate local exhaust ventilation shall be installed to reduce potentially hazardous fumes and vapors produced by laser target interactions to levels below the appropriate threshold limit values specified by the American Conference of Governmental Industrial Hygienists.

A complete listing of all possible non-beam hazards and control measures associated with laser systems is beyond the scope of this manual. Users of lasers systems are encouraged to contact EH&S for an evaluation of their laser system to determine the required control measures for these hazards.

42 MACHINE GUARDING

MACHINE GUARDING

42.1 GUIDELINES FOR MACHINE SAFEGUARDING

OSHA requires that machine guarding be provided and maintained in a manner sufficient to protect machine operators and other persons present in machine areas from hazards associated with the operation of machines. Such hazards include those created by points of operation, in-running nip points, rotating parts, flying chips and sparks. The following information is provided to assist machine operators and machine shop supervisors and managers in carrying out their responsibilities for assuring machine safety through hazard identification and evaluation, safeguarding, and safe operation.

42.2 TYPES AND POINTS OF HAZARDOUS MACHINE OPERATIONS

Motions

Rotating: in-running nip points, spindles, shaft ends, couplings
Reciprocating: back-and-forth, up-and-down
Transverse: movement in a straight, continuous line

Operations

Cutting: bandsaws, drills, milling machines, lathes
Punching: punch presses, notches
Shearing: mechanical, pneumatic, or hydraulic shears
Bending: press brakes, tube benders, plate rolls

42.3 SAFEGUARDING REQUIREMENTS

Machine safeguards should be installed and maintained to ensure that they:

- **Prevent Contact**
  Safeguards must minimize the possibility of the operator or another worker placing their hands into hazardous moving parts.
- **Remain Secure**
  Workers should not be able to easily remove or tamper with the safeguard.
- **Protect from Falling Objects**
  Safeguards should ensure that no objects can fall into moving parts.
- **Create No New Hazards**
  A safeguard defeats its purpose if it creates a hazard of its own.
- **Create no interference**
  A safeguard should not create an unacceptable impediment for the worker.
- **Allow Safe Maintenance and Lubrication**
  It should be possible to lubricate the machine without removing the safeguard.

42.4 TYPES OF MACHINE SAFEGUARDS

- Barriers and guards that prevent contact with machinery.
- Mechanical or electrical devices that restrict contact, such as presence-sensing, restraining, or tripping devices, two-hand controls, or gates.
- Feeding and ejection methods that eliminate part handling in the hazard zone.
- Aids such as awareness signs that do not provide physical protection but warn of a danger area.

42.5 COMMON ELEMENTS FOR SAFEGUARDING ALL MACHINES

Job Hazard Analysis

A job hazard analysis can be performed for all jobs in the workplace, whether the job task is “special” (non-routine) or routine. Even one-step jobs – such as those in which only a button is pressed – can and perhaps should be analyzed by evaluating surrounding work conditions.

To determine which jobs should be analyzed first, review your job injury and illness reports. Obviously, a job hazard analysis should be conducted first for jobs with the highest rates of disabling injuries and illnesses. Also, jobs where “close calls” or “near misses” have occurred should be given priority. Analyses of new jobs and jobs where changes have been made in processes and procedures should follow. Eventually, a job hazard analysis should be conducted and made available to employees for all jobs in the workplace.

42.6 INVOLVING THE EMPLOYEE

Once you have selected a job for analysis, discuss the procedure with the employee performing the job and explain its purpose. Point out that you are studying the job itself, not checking on the employee’s job performance. Involve the employee in all phases of the analysis – from reviewing the job steps and procedures to discussing potential hazards and recommended solutions. You also should talk to other workers who have performed the same job.

42.7 CONDUCTING THE JOB HAZARD ANALYSIS

Before actually beginning the job hazard analysis, take a look at the general conditions under which the job is performed and develop a checklist. Below are some sample questions you might ask.

Clear materials on the floor that are tripping hazards
Provide adequate lighting
Check for any live electrical hazards at the jobsite
Clear any chemical, physical, biological, or radiation hazards associated with the job or likely to develop
Remove tools – including hand tools, machines, and equipment in need of repair
Remove excessive noise in the work area, hindering worker communication or causing hearing loss
Follow known job procedures

42.8 BREAKING DOWN THE JOB

Nearly every job can be broken down into job tasks or steps. In the first part of the job hazard analysis, list each step of the job in order of occurrence as you watch the employee performing the job.

Be sure to record enough information to describe each job action, but do not make the breakdown too detailed. Later, go over the job steps with the employee.

42.9 IDENTIFYING HAZARDS

After you have recorded the job steps, next examine each step to determine the hazards that exist or that might occur. Ask yourself these kinds of questions.

- Is the worker wearing personal protective clothing and equipment, including safety harnesses that are appropriate for the job?
- Are work positions, machinery, pits or holes, and hazardous operations adequately guarded?
- Are lockout procedures used for machinery deactivation during maintenance procedures?
- Is the worker wearing clothing or jewelry that could get caught in the machinery or otherwise cause a hazard?
- Are there fixed objects that may cause injury, such as sharp machine edges?
- Is the flow of work improperly organized (e.g., Is the worker required to make movements that are too rapid)?
- Can the worker get caught in or between machine parts?
- Can the worker be injured by reaching over moving machinery parts or materials?
- Is the worker at any time in an off-balance position?
- Is the worker positioned to the machine in a way that is potentially dangerous?
- Is the worker required to make movements that could lead to or cause hand or foot injuries, or strain from lifting – the hazards of repetitive motions?
- Can the worker be struck by an object or lean against or strike a machine part or object?
- Can the worker be injured from lifting or pulling objects, or from carrying heavy objects?
- Do environmental hazards – dust, chemicals, radiation, welding rays, heat, or excessive noise – result from the performance of the job?

Repeat the job observation as often as necessary until all hazards have been identified.

42.10 RECOMMENDING SAFE PROCEDURES AND PROTECTION

After you have listed each hazard or potential hazard and have reviewed them with the employee performing the job, determine whether the job could be performed in another way to eliminate the hazards, such as combining steps or changing the sequence, or whether safety equipment and precautions are needed to control the hazards. An alternative or additional procedure is to videotape the worker performing his or her job and analyze the job procedures.

If safer and better job steps can be used, list each new step, such as describing a new method for disposing of material. List exactly what the worker needs to know to perform the job using the new method. Do not make general statements about the procedure, such as “Be Careful.” Be as specific as you can in your recommendations.

You may wish to set up a training program using the job hazard analysis to retrain your employees in the new procedures, especially if they are working with highly toxic substances or in hazardous situations. (Some OSHA standards require that formal training programs be established for employees.)

If no new procedures can be developed, determine whether any physical changes – such as redesigning equipment, changing tools, adding machine guards, personal protective equipment, or ventilation – will eliminate or reduce the danger.

If hazards are still present, try to reduce the necessity for performing the job or the frequency of performing it.

Go over the recommendations with all employees performing the job. Their ideas about the hazards and proposed recommendations may be valuable. Be sure that they understand what they are required to do and the reasons for the changes in the job procedures.

42.11 REVISING THE JOB HAZARD ANALYSIS

A job hazard analysis can do much toward reducing accidents and injuries in the workplace, but it is only effective if it is reviewed and updated periodically. Even if no changes have been made in a job, hazards that were missed in an earlier analysis could be detected.

If an illness or injury occurs on a specific job, the job hazard analysis should be reviewed immediately to determine whether changes are needed in the job procedure. In addition, if a “close call” or “near miss” has resulted from an employee’s failure to follow job procedures, this should be discussed with all employees performing the job.

Any time a job hazard analysis is revised, training in the new job methods, procedures, or protective measures should be provided to all employees affected by the changes. A job hazard analysis also can be used to train effectively new employees on the steps and job hazards.

42.12 COOPERATION AND ASSISTANCE

Safety in the workplace demands cooperation and alertness on everyone’s part. Supervisors, operators, and other workers who notice hazards in need of safeguarding, or existing systems that need repair or improvement, should notify the proper authority immediately.

Supervisors have these additional, specific responsibilities with regard to safety in the workplace; encouraging safe work habits and correcting unsafe ones; explaining to the worker all the potential hazards associated with the machines and processes in the work area; and being responsive to employer requests for action or information regarding machine hazards. The first-line supervisor plays a pivotal role in communicating the safety needs of the worker to management and the employer’s safety rules and policies to the worker.

Sometimes the solution to a machine safeguarding problem may require expertise that is not available in a given establishment. The readers of this manual are encouraged to find out where help is available and, when necessary, to request it.

The machine’s manufacturer is often a good place to start when looking for assistance with a safeguarding problem. Manufacturers can often supply the necessary literature or advice. Insurance carriers, too, will often make their safety specialists available to the establishments whose assets they insure. Union safety specialists can also lend significant assistance.

Some government agencies offer consultation services, providing for onsite evaluation of workplaces and the recommendation of possible hazard controls. OSHA funds one such program, which is offered free of charge to employers in every state. Delivered by state governments or private contractors, the consultation program is completely separate from the OSHA inspection effort; no citations are issued and no penalties are proposed. The trained professional consultants can help employers recognize hazards in the workplace and can suggest general approaches for solving safety and health problems. In addition, the consultant can identify sources of other available help, if necessary.

Anyone with questions about Federal standards, about the requirements for machine safeguarding, or about available consultation services should contact OSHA.

42.13 TRAINING

Employees must be trained on all machinery or equipment they are required to use. Usually, shop personnel are trained by their supervisor or a designated trainer, only trained personnel or those undergoing supervised on-the-job training should be allowed to operate shop machinery or equipment. All operators should be trained in the proper operation, safety procedures, hazard recognition, and emergency shutdown procedures for each machine or piece of equipment they use.

The operator training programs should be tailored to an employee's work area. Employees learn more and draw a greater benefit from training that duplicates their daily work rather than a "canned program." As a minimum, the training program should include:

- The nature of hazards for each piece of equipment.
- Safety procedures for special set-ups for each tool.
- How to use safeguards.
- What to do in case guards are missing.
- How to perform work in a safe manner.

Additionally, the training should be devised so employees can demonstrate their knowledge and skills required to perform their tasks. The supervisor must determine that the employee knows and understands the features of the equipment, all applicable safety rules, and is skilled in operating the equipment.

Employers should certify that employees have been trained by preparing a certification record which includes the identity of the person trained, the signature of the employer or the person who conducted the training, and the date the training was completed. The certification should be prepared at the completion of the training and maintained on file for the duration of the employee's employment. The certification record should be made available upon request.

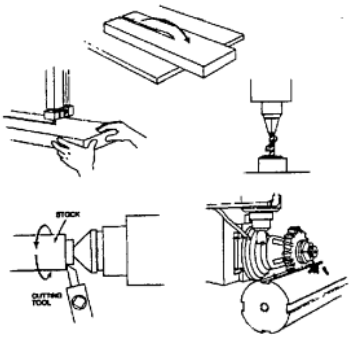
42.14 STANDARDS THAT ARE COMMON

29 CFR 1910.212 is applicable to machines found in general industry.

1910.212(a)(1) Requires employees to be protected from the point-of-operation. In-going nip points and rotating parts.

The Following are some machines which usually require point-of-operation guarding:

Guillotine Cutters
Shears
Alligator Shears
Hydraulic Presses
Riveters
Milling Machines
Power Saws
Jointers
Portable Power Tools
Forming Rolls and Calenders

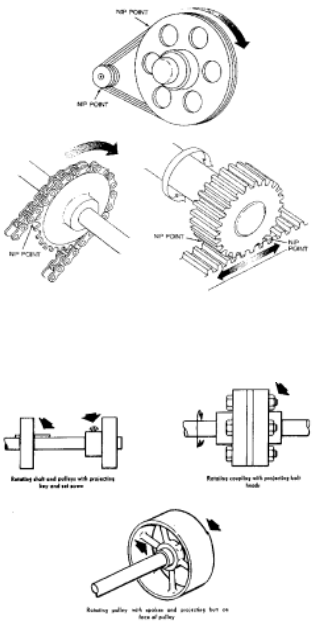


This standard also covers revolving barrels, drums and containers, guarding of fan blades and the anchoring of fixed machinery.

29 CFR 1910.219 Is applicable to mechanical power transmission apparatus.

The Following Is a List of Some Items Covered under this Standard:

V-belts
Cranks
Fly Wheels
Connecting Rods, Tails Rods
Extension Rod Pistons
Shafting, Projected Shaft Ends
Keyways, Projected Keys or Set Screws
Belt, Rope and Chain Drives
Gear, Sprocket and Chains
Collars and Couplings
Pulleys



42.15 SPECIFIC REQUIREMENTS FOR WOODWORKING MACHINES

42.16 OVERVIEW

Many injuries that occur in woodworking occupations result from employees failing to follow prescribed safe operational practices. These failures arise from worker attitudes, inadequate training, and supervisory failure to enforce safe job procedures. The use of machine guards, environmental controls, good training, and maintenance programs coupled with supervisory enforcement of protective equipment use and safe job practices can eliminate most mishap-producing factors.

Among the most frequently occurring woodworking accidents are two involving saws: (1) blade cuts or abrasions, (2) kickbacks.

42.17 STANDARDS

29 CFR 1910.213 is the specific standard that covers the principle hazards of woodworking equipment.

The following is a breakdown by category of some types of equipment covered under this standard.

42.17.1 CIRCULAR, CROSSCUT, AND RIP SAWS

Guarding beneath the table level should be provided to enclose the saw blade from unintentional contact and prevent contact with moving parts of the drive mechanism. Saws must be equipped with a hood that covers the blade and automatically adjusts itself to the thickness of the material upon which it rides. The hood covers the part of the saw blade exposed above the material and is adaptable to cover tilted blades. When ripping, table saws must be provided with a spreader to prevent the wood's internal stresses from clamping down on the saw blade and an anti-kickback device to prevent the stock from possible kickback.

42.17.2 RADIAL SAWS

Radial saws must be equipped with a hood that encloses the saw blade and the arbor ends. The lower section of the hood must be hinged so it rises and falls and adjusts itself automatically to the thickness of the material as the saw passes through it. An anti-kickback device or hold-down wheels must also be installed on saws used for ripping. The device must be adaptable to any thickness of stock.

42.17.3 BAND SAWS

Both upper and lower wheels must be completely enclosed on both sides. The enclosures should be capable of being removed easily to permit saw blade maintenance. The working part of a saw blade, between the guide rolls and the upper wheel enclosure, must be guarded to prevent accidental contact with the saw blade. The guard must be self-adjusting and attached to the gauge so that, in any position of the gauge, the guard completely covers the portion of the saw blade between the guide rolls and the upper wheel enclosure.

42.17.4 JOINTERS

Each hand-fed planer and jointer with a horizontal or vertical head should be equipped with a cylindrical cutting head, the knife projection of which must not exceed 0.125 inch (0.31 centimeters) beyond the cylindrical body of the head. Also, jointers with front-table-mounted fences must be equipped with an adjustable device to prevent thin stock from slipping laterally under the portion of the fence at the rear of the table. An automatic guard must be provided that covers the section of the cutter head near the operator (on working side of the fence) and contacts the wood to prevent any opening from remaining between the guard and wood during the operation. The guard should also cover the section of the cutter head on the non-working side of the fence, especially when the fence is moved toward the automatic guard. The guard over the section of the cutting head on the rear side of the fence should consist of a sliding metal shield that automatically adjusts to the exposed length of the cutter head.

42.17.5 POWER FEED PLANERS

Guards must be provided for feed rolls, cutting heads, and hold-down rolls at the discharge end. Feed rolls should be guarded by a metal strip in front of the rolls under which the material may pass. This prevents an operator's fingers from being drawn into the rolls while feeding the machine. Where the top roll is corrugated, the strip should extend over the top of the roll. Cutting heads and discharge rolls must be guarded by a solid metal enclosure of substantial construction. The hood of an exhaust system may form part or all of the enclosure. When other than corrugated top feed rolls are used, an anti-kickback device should be installed.

42.17.6 SHAPERS

Shapers must be equipped with a braking device that brings the cutting head to a stop within 10 seconds after power is shut off. Cutting heads must be enclosed by a guard. The guard must not be less than the greatest diameter of the cutter. Whenever possible, hold-downs and jigs should be used to limit exposure of hands to cutters. It is good practice when a blade is removed from a spindle for sharpening, or for some other purpose, that all other blades be removed at the same time.

42.17.7 LATHES

Rotating, cutter-head type lathes must be provided with a hinged metal shield or hood that completely covers the knifes and material when the machine is in operation. Exhaust system hoods may be included as part of the guard if they comply with standard guard designs. Automatic lathes should be equipped with a brake that brings the rotating material to a quick, but not instantaneous, stop after power is shut off.

42.17.8 SANDING MACHINES

Feed rolls of self-feed sanding machines should be protected with a semi-cylindrical guard to prevent hands from coming in contact with the in-running rolls at any point. The guard and its mounting should be designed to remain in adjustment for any thickness of stock. Drum/disk sanding machines should have an exhaust hood, or other guard, so arranged as to enclose the revolving drum/disk, except for the working portion of the drum/disk above the table. Belt sanding machines should be provided with guards at each nip point. These guards must effectively prevent hands or fingers from coming in contact with the nip points. The unused run of the sanding belt must be guarded against accidental contact.

42.17.9 BORING AND MORTISING MACHINES

The top of the driving mechanism must be enclosed.

42.17.10 TENONING MACHINES

Feed chains and sprockets of double end tenoning machines must be completely enclosed, except for that portion of chain used for conveying the stock. Sprockets and chains must be guarded at the sides by plates projecting beyond the periphery of sprockets and the ends of lugs at the rear ends of frame over which feed conveyors run. Each tenoning machine that has cutting heads and saws must be covered by metal guards when used. These guards should cover at least the unused part of the periphery of the cutting head. Where an exhaust system is used, the guard may form part or all of the exhaust hood.

42.18 SPECIFIC REQUIREMENTS FOR METAL WORKING MACHINES

OVERVIEW

Metal working machine safeguarding must protect the operator from mechanical hazards and prevent any part of the operator's body from making contact with dangerous moving parts, yet not create new hazards or create interference from performing.

OSHA requirements for safeguarding metal working machines are intended to minimize potential for injury while rotating, revolving, reciprocating, slitting, shearing, punching, or bending actions are occurring and to prevent entry of the hands or fingers or any part of the body into the point-of-operation by reaching over, through, under or around a guard through the use of guarding, safe distance location, hand tools or other devices.

42.19 STANDARDS

29 CFR 1910.215	Abrasive wheel grinders, control wheel breakage, prevent contact with abrasive surfaces, control angular exposure of the grinding wheel and insure secure mounting of the wheel.
29 CFR 1910.216	Mills and calendars, provide for and arrangement of safety stopping devices for rolls, control the stopping limits and provide for an alarm system for assistance in an emergency.
29 CFR 1910.217	Mechanical power presses, limit exposure to the point-of-operation by enclosing the dies with barrier guards, or through the use of presence sensing devices, two-hand controls, pull-backs, restraints or gates while initiating the stroke, as long as the devices maintain proper adjustment. Hand-feeding tools can be used in conjunction with some of the mentioned devices but are not recognized as a point-of-operation device themselves. Training and die-setting procedures are required before operation.

29 CFR 1910.218 Forging machines, require certification of records, recording inspections of guards and protective devices, training for proper inspection and maintenance and for proper anchoring of the hammer as well as the machine itself and the use of hand-tools.

42.20 METHODS OF MACHINE SAFEGUARDING

There are many ways to safeguard machinery. The type of operation, the size or shape of stock, the method of handling, the physical layout of the work area, the type of material, and production requirements or limitations will help to determine the appropriate safeguarding method for the individual machine.

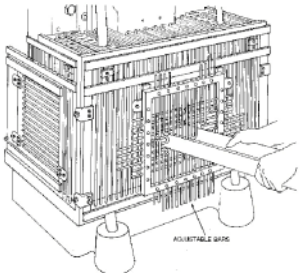
As a general rule, power transmission apparatus is best protected by fixed guards that enclose the danger area. For hazards at the point-of-operation, where moving parts actually perform work on stock, several kinds of safeguarding are possible. One must always choose the most effective and practical means available.

We can group safeguards under five general classifications.

42.20.1 GUARDS

Guards are barriers which prevent access to danger areas. There are four general types of guards:

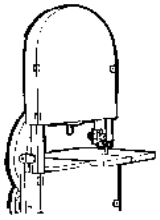
Fixed:



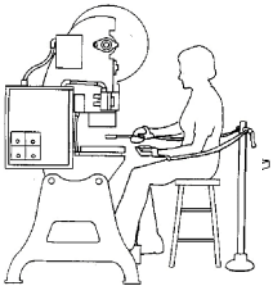
As its name implies, a fixed guard is a permanent part of the machine. It is not dependent upon moving parts to perform its intended function. It may be constructed of sheet metal, screen, wire cloth, bars, plastic, or any other material that is substantial enough to withstand whatever impact it may receive and to endure prolonged use. This guard is usually preferable to all other types because of its relative simplicity and performance.

Interlocked:
When this type of guard is opened or removed, the tripping mechanism and/or power automatically shuts off or disengages, and the machine cannot cycle or be started until the guard is back in place.

An interlocked guard may use electrical, mechanical, hydraulic, or pneumatic power or any combination of these. Interlocks should not prevent “inching” by remote control if required. Replacing the guard should not automatically restart the machine.



Adjustable:
Adjustable guards are useful because they allow flexibility in accommodating various sizes of stock.



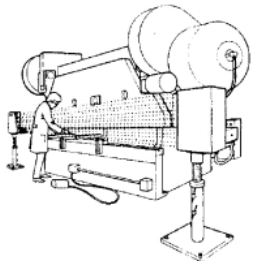
Self-Adjusting:

The openings of these barriers are determined by the movement of the stock. As the operator moves the stock into the danger area, the guard is pushed away, providing an opening which is only large enough to admit the stock. After the stock is removed, the guard returns to the rest position. This guard protects the operator by placing a barrier between the danger area and the operator. The guards may be constructed of plastic, metal, other substantial material. Self-adjusting guards offer different degrees of protection.

42.21 DEVICES

A safety device may perform one of several functions. It may: stop the machine if a hand or any part of the body is inadvertently placed in the danger area; restrain or withdraw the operator's hands from the danger area during operation; require the operator to use both hands on machine controls, thus keeping both hands and body out of danger; or provide a barrier which is synchronized with the operating cycle of the machine in order to prevent entry to the danger area during the hazardous part of the cycle.

Presence-Sensing

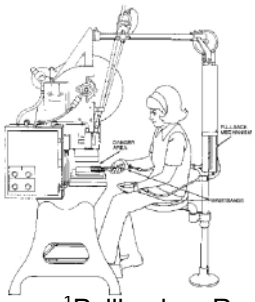


The *photoelectric* (optical) presence-sensing device uses a system of light sources and controls which can interrupt the machine's operating cycle. If the light field is broken, the machine will not cycle. This device must be used only on machines which can be stopped before the worker can reach the danger area.

The *radiofrequency* (capacitance) presence-sensing device uses a radio beam that is part of the machine control circuit. When the capacitance field is broken, the machine will stop or will not activate. Like the photoelectric device, this device shall only be used on machines which can be stopped before the worker can reach the danger area.

The *electromechanical* sensing device has a probe or contact bar which descends to a predetermined distance when the operator initiates the machine cycle. If there is an obstruction preventing it from descending its full predetermined distance, the control circuit does not actuate the machine cycle.

Pullback[1]



Pullback devices utilize a series of cables attached to the operator's hands, wrists, and/or arms. This type of device is primarily used on machines with stroking action. When the slide/ram is up, the operator is allowed access to the point-of-operation. When the slide/ram begins to descend, a mechanical linkage automatically assures withdrawal of the hands from the point-of-operation.

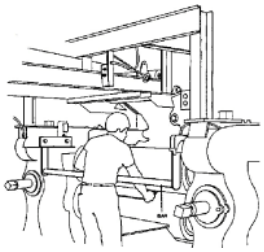
Restraint[2]

[1]Pullback or Restraint devices are used on power presses only.

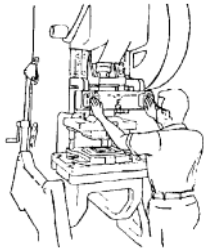
[1]Pullback or Restraint devices are used on power presses only.

The restraint (holdout) device utilizes cables or straps that are attached to the operator's hands and a fixed point. The cables or straps must be adjusted to let the operator's hands travel within a predetermined safe area. There is no extending or retracting action involved. Consequently, hand-feeding tools are often necessary if the operation involves placing material into the danger area.

Safety Trip Controls



Safety trip controls provide a quick means for deactivating the machine in an emergency situation. A pressure-sensitive body bar, when depressed, will deactivate the machine. If the operator or anyone trips, loses balance, or is drawn into the machine, applying pressure to the bar will stop the operation. The positioning of the bar, therefore, is critical.



Two-Hand Control

The two-hand control requires constant, concurrent pressure by the operator to activate the machine. This kind of control requires a part-revolution clutch, brake, and a brake monitor if used on a power press. With this type of device, the operator's hands are required to be a safe location (on control buttons) and at a safe distance from the danger area while the machine completes its closing cycle.

Two-Hand Trip

The two-hand trip requires concurrent application of both of the operator's control buttons to activate the machine cycle, after which the hands are free. This device is usually used with machines equipped with full-revolution clutches. The trips must be placed far enough from the point-of-operation to make it possible for the operator to move his or her hands from the trip buttons or handles into the point-of-operation before the first half of the cycle is completed. Thus, the operator's hands are kept far enough away to prevent them from being accidentally placed in the danger area prior to the slide/ram or blade reaching the full "down" position.

Gate

A gate is a movable barrier which protects the operator at the point-of-operation before the machine cycle can be started. Gates are, in many instances, designed to be operated with each machine cycle.

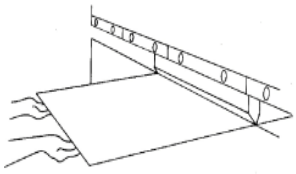
42.22 SAFEGUARDING BY LOCATION/DISTANCE

The examples mentioned below are a few of the numerous applications of the principle of safeguarding by location/distance. A thorough hazard analysis of each machine and particular situation is absolutely essential before attempting this safeguarding technique.

To safeguard a machine by location, the machine or its dangerous moving parts must be so positioned that hazardous areas are not accessible or do not present a hazard to a worker during the normal operation of the machine. This may be accomplished by locating a machine so that a plant design feature, such as a wall, protects the worker and other personnel. Additionally, enclosure walls or fences can restrict access to machines. Another possible solution is to have dangerous parts located high enough to be out of the normal reach of any worker.

The feeding process can be safeguarded by location if a safe distance can be maintained to protect the worker's hands. The dimensions of the stock being worked on may provide adequate safety. For instance, if the stock is several feet long and only one end of the stock is being worked on, the operator may be able to hold the opposite end while the work is being performed. An example would be a single end punching machine. However, depending upon the machine, protection might still be required for other personnel.

The positioning of the operator's control station provides another potential approach to safeguarding by location. Operator controls may be located at a safe distance from the machine if there is no reason for the operator to tend it.



Feeding and Ejection Methods to Improve Operator Safety

Many feeding and ejection methods do not require the operator to place his or her hands in the danger area. In some cases, no operator involvement is necessary after the machine is set up. In other situations, operators can manually feed the stock with the *assistance* of a feeding mechanism. Properly designed ejection methods do not require any operator involvement after the machine starts to function.

Some feeding and ejection methods may even create hazards themselves. For instance, a robot may eliminate the need for an operator to be near the machine but may create a new hazard itself by the movement of its arm.

Using these feeding and ejection methods does not eliminate the need for guards and devices. Guards and devices must be used wherever they are necessary and possible in order to provide protection from exposure to hazards.

Types of Feeding and Ejection Methods:

Automatic Feeds reduce the exposure of the operator during the work process, and sometimes do not require any effort by the operator after the machine is set up and running.

With ***semi-automatic feeding***, as in the case of a power press, the operator uses a mechanism to place the piece being processed under the ram at each stroke. The operator does not need to reach into the danger area, and the danger area is completely enclosed.

Automatic ejection may employ either an air-pressure or a mechanical apparatus to remove the completed part from a press. It may be interlocked with the operating controls to prevent operation until part ejection is accomplished. This method requires additional safeguards for full protection of the operator.

Using a ***semi-automatic*** *ejection* mechanism on a power press. When the plunger is withdrawn from the die area, the ejector leg, which is mechanically coupled to the plunger, kicks the completed work out.

Robots are machines that load and unload stock, assemble parts, transfer objects, or perform other tasks. Essentially, they perform work otherwise done by an operator. They are best used in high production processes requiring repeated routines. However, they may create high hazard themselves, and if they do, appropriate guards must be used.

Miscellaneous Aids

While these aids do not give complete protection from machine hazards, they may provide the operator with an extra margin of safety. Sound judgement is needed in their application.

The awareness barrier does not provide physical protection but serves only to remind a person that he or she is approaching the danger area. Generally, awareness barriers are not considered adequate where continual exposure to the hazard exists.

Shields, another aid, may be used to provide protection from protection from flying particles, splashing cutting oils, or coolants.

Holding tools can place or remove stock. A typical use would be for reaching into the danger area of a press or press brake.

A push stick or block may be used when feeding stock into a saw blade. When it becomes necessary for hands to be in close proximity to the blade, the push stick or block may provide a few inches of safety and prevent injury.

43 OVERHEAD CRANES

OVERHEAD CRANES

43.1 TRAINING

Training of all operators should include, but not be limited to, the following:

- Company rules, regulations and procedures.
- Capacities of equipment and attachments.
- Purpose use and limitation of controls.
- How to make daily checks.
- The energizing sequences, including pneumatic, hydraulic, and electrical sequences.
- Start-up and shutdown procedures.
- Emergency shutdown procedures.
- General operating procedures.
- All basic signaling procedures, including verbal, hand and radio signals, where required.
- Knowledge of accepted guidelines as published by the EOT (Electric Overhead
- Traveling) crane industry governing bodies as well as local, state and Federal rules and regulations.
- Practice in operating the assigned equipment through the mechanical functions necessary to perform the required task.
- Maximum rated capacity of the crane.
- Best practice and accepted operating procedures.
- Basic safety guidelines of operating an overhead crane.
- Dos and Don’ts of operating an overhead crane.
- How to avoid an accident when operating an overhead crane.
- What to do should an accident occur.
- Training of all riggers should include the following:
- Company rules, regulations and procedures.
- The requirements of the Code of Federal Regulation; Title 29, Part 1910.179, Overhead and Gantry Cranes
- The requirements of the Code of Federal Regulation; Title 29, Part 1910.184, Slings.
- Knowledge of accepted guidelines as published by the EOT (Electric Overhead
- Traveling) crane industry governing bodies as well as local, state and Federal rules and regulations.
- Maximum capacity of the crane.
- Best practice and accepted rigging procedures.
- Basic safety guidelines for rigging a load.
- Dos and Don’ts for rigging a load.
- How to avoid an accident when for rigging a load.
- What to do should an accident occur.

43.2 PERSONAL PROTECTIVE EQUIPMENT

When the employer conducts a personal protective equipment hazard assessment, they should include overhead cranes in their review.

An operator and any employee directing a lift must use the appropriate safety equipment recommended for use in this area. If the top of the load is lifted to a height greater than 5 feet, then the load is considered an overhead hazard and head protection (hard hat) should to be worn.

When an employee is performing maintenance on an overhead or gantry crane, either from a man lift or platform, the employee should wear an approved safety harness and lanyard, and/or a fall arrest device.

All crane operators and maintenance personnel shall be trained in a detailed LOCK OUT / TAG OUT procedure and supplied with a key operated lock that bears their name and company ID number. When a crane operator believes that the safe operating condition of a crane is in doubt or when maintenance personnel are actively inspecting, service or repairing a crane, it shall be locked out at the mainline disconnect switch by these individuals and no one other than the owner of the lock shall be permitted to remove the lock.

43.3 GENERAL CONDUCT OF OPERATORS

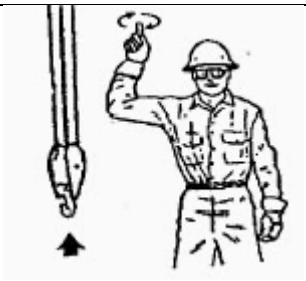
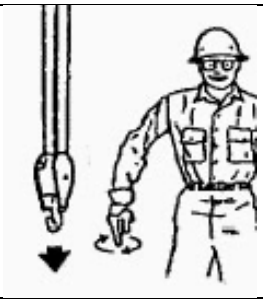
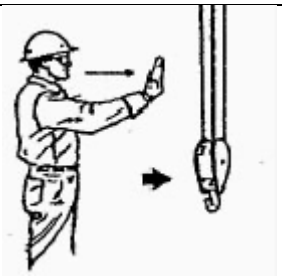
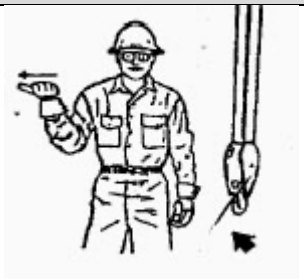
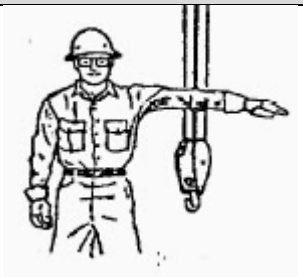
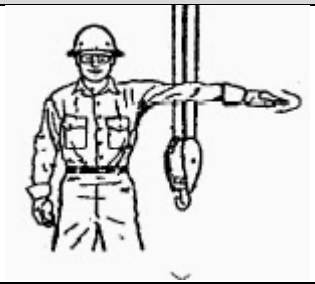
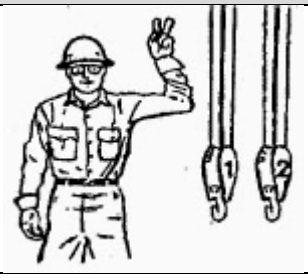
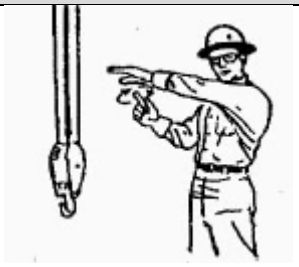
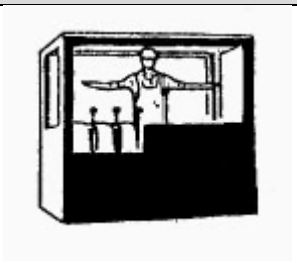
At the beginning of each shift during which a crane is to be used, a visual inspection should be made in accordance with Table 1 below. A visual inspection is limited to that which can be made from a catwalk or other safe observation point. Any defects must be reported to a supervisor for correction or repair.

Inspection Item	Description of Inspection Check Points
Tagged Crane or Hoist	Check that crane or hoist is not tagged with an out-of-order sign.
Control Devices	Test run that all motions agree with control device markings.
Brakes	Check that all motions do not have excessive drift and that stopping distances are normal.
Hook	Check for damage, cracks, nicks, gouges, deformations of the throat opening, wear on saddle or load bearing point, and twist. Refer to the manual furnished by the original manufacturer of the crane.
Hook Latch	If a hook latch is required, check for proper operation.
Wire Rope	Check for broken wires, broken strands, kinks, and any deformation or damage to the rope structure.
Reeving	Check that the wire rope is properly reeved and that rope parts are not twisted about each other.
Limit Switches	Check that the upper limit device stops lifting motion of the hoist load block before striking any part of the hoist or crane.
Oil Leakage	Check for any sign of oil leakage on the crane and on the floor area beneath the crane.
Unusual Sounds	Check for any unusual sounds from the crane or hoist mechanism while operating the crane or hoist.
Warning & Safety Labels	Check that warning and other safety labels are not missing and that they are legible.
Housekeeping & Lighting	Check area for accumulation of material, trip or slip hazards, and poor lighting.

An operator shall only respond to signals from the designated person directing the lift. The one and only exception to this rule is an emergency stop signal, which must be obeyed when given by any employee or other person in the area. The signals given to an operator should conform to table 2 below.

Table 2

Standard Hand Signals for Controlling Overhead and Gantry Cranes

		
HOIST. With forearm vertical, forefinger pointing up, move hand in small horizontal circle	LOWER. With arm extended downward, forefinger pointing down, move hand in small horizontal circle.	BRIDGE TRAVEL. Arm extended forward, hand open and slightly raised, make pushing motion in direction of travel.
		
TROLLEY TRAVEL. Palm up, fingers closed, thumb pointing in direction of motion, jerk hand horizontally.	STOP. Arm extended, palm down, hold position rigidly.	EMERGENCY STOP. Arm extended, palm down, move hand rapidly right and left.
		
MULTIPLE TROLLEYS. Hold up one finger for block marked “1” and two fingers for block marked “2”. Regular signals follow.	MOVE SLOWLY. Use one hand to give any motion signal and place other hand motionless in front of hand giving the motion signal. (Hoist Slowly shown as an example.)	MAGNET IS DISCONNECTED. Crane operator spreads both hands apart – palms up.

43.4 DOS AND DON'TS

An operator shall not carry a load over another person.

A crane shall not be used to make a side pull (except where it has been specifically authorized by a qualified person after making specific determinations).

Compressed gases shall only be lifted by a cradle or enclosed platform.

An employee shall not ride a hoisting device, such as a magnet, hook, ball, or load.

When rigging or moving a load, the crane operator and load rigger shall be certain of all of the following:

- The hoisting rope or chain is free of kinks or twist and not wrapped around the load.
- The load is attached to the load block hook by means of a sling or other approved device.
- The sling and load will clear all obstacles or obstructions.
- The load is balanced and secured before lifting the load more than a few inches.
- Multiple lines are not twisted around each other.
- The hook is brought over the load in a manner to prevent swinging.
- There is no sudden acceleration or deceleration of the moving load.

A hoisting limit switch on a crane or hoisting device shall not be used as an operational control, unless the hoist is also equipped with a backup limit switch.

A load shall not be lowered below a point where less than 2 full wraps of wire rope remain on the hoisting drum. If there is any doubt concerning the safety of a crane or hoisting component or system, the operator shall immediately stop the crane, and report the condition creating the doubt to their supervisor.

In the event of power failure, the operator shall place all controllers in the "off" position.

When an operator leaves a crane unattended for an extended period of time, he or she shall place any attached load on the floor or other surface that relieves the hoist of the lifted load, depress the on/off switch on the controller (push button pendant station or radio remote transmitter) and place the system mainline disconnect switch in the "off" position. The system mainlines disconnect switch does not need to be placed in the "off" position nor does the on/off switch on the controller (push button pendant station or radio remote transmitter) if the crane is left unattended for short periods.

43.4.1 INSPECTIONS

The inspection procedure for cranes in regular service is divided into 4 general classifications:

1. Pre-shift inspections; which should be performed prior to each shit of operation (as outlined in Table 1).
2. Frequent inspections; which can be performed monthly to quarterly, or at intervals of approximately 100 hours of use, depending on the severity of the crane usage.
3. Periodic inspections; which can be performed at intervals of 100 to 500 hours of use, depending on the severity of the crane usage.
4. Annual inspections; which shall be performed at a minimum of once every 12 months as specified by OSHA, regardless of the severity of the crane usage.

These inspections will yield a written report that shall detail the condition of, deficiencies or damage to, the crane that need to be corrected or repaired on a scale of importance that is called out in the body of the report. It is the responsibility of the owner or end user to have the items resolved in a timely manner.

NOTE: The written records of these inspections shall be kept by a designated person, on the company premises, so as to be available upon request by any regulatory person or agency.

43.4.2 MAINTENANCE

The employer shall maintain a crane and its accessories in a condition that will not unduly endanger an operator, employee or other person in the operating area of the crane.

A preventative maintenance program should be established and be based on the manufacturer's recommendations and for the application as reviewed by a qualified person.

Before adjustments or repairs are made on a crane, all of the following precautions should be taken:

- The crane will be moved to a location where it will cause the least interference with other moving equipment on the track or rails and operations in the area.
- The crane shall be tagged out with warning sign placed on the operator control station.
- Controllers will be placed in the "off" position.
- The mainline disconnect switch will be placed in the "off" position and locked out using a precise LOCK OUT / TAG OUT procedure, except where power is necessary to adjust or service the crane.
- Adequate lighting will be provided while maintenance is performed on the crane.

If any other crane uses the same runway, then a protective device should be used to prevent interference with the idle crane undergoing repairs. If a protective device is impracticable, then a signal person shall be placed at a visual vantage point to warn the operator of the active crane when it reaches the limit of safe distance from the idle crane.

A crane that has been serviced, inspected or repaired shall not be returned to normal operation until all guards have been replaced, locks removed by those who installed them, safety devices reactivated and the maintenance personnel and their access equipment and tools removed from the crane itself and the area under and around the crane travel.

44 PERSONAL PROTECTIVE EQUIPMENT

PERSONAL PROTECTIVE EQUIPMENT

44.1 PURPOSE

The purpose of the Personal Protective Equipment section is to set forth the procedures for the use, care, and maintenance of personal protective equipment required to be used by employees for the prevention of injuries.

44.2 SCOPE

Applies to all 3A Group employees. When work is performed on a non-owned or operated site, the operator's program shall take precedence, however, this document covers 3A Group employees and contractors and shall be used on owned premises, or when an operator's program doesn't exist or is less stringent.

44.3 KEY RESPONSIBILITIES

44.3.1 MANAGER

- Assists in the selection of appropriate PPE. If a task exposes an employee to hazards which cannot be eliminated through engineering or administrative controls, the HSE Manager assists the supervisor and project manager to identify and select PPE suitable for the specific task performed, conditions present, and frequency and duration of exposure. Employees need to give feedback to the supervisor about the fit, comfort, and suitability of the PPE being selected. Employees are provided reasons for selection of PPE.
- Assists supervisor and site managers in assuring all PPE obtained meets regulatory and this procedure's requirements.
- Performs Worksite Hazard Assessments - The hazard assessment must indicate a determination if hazards are present or are likely to be present, which necessitate the use of PPE. Sources of hazards include but are not limited to hazards from impact/motion, high/low temperatures, chemicals, materials, radiation, falling objects, sharp objects, rolling or pinching objects, electrical hazards, and workplace layout. Certifies in writing the tasks evaluated, hazards found, and PPE required to protect employees against hazards and ensures exposed employees are made aware of hazards and required PPE before they are assigned to the hazardous task. Certificate shall include certifier's name, signature, dates and identification of assessment documents.

44.3.2 MANAGERS AND SUPERVISORS

- Supervisors and managers shall regularly monitor employees for correct use and care of PPE and obtain follow-up training if required to ensure each employee has adequate skill, knowledge, and ability to use PPE.
- Supervisors and managers shall enforce PPE safety rules following the guidance of the 3A Group progressive disciplinary procedures and ensure Required PPE Poster is posted properly.

44.3.3 EMPLOYEES

- Complying with the correct use and care of PPE.
- Reporting changes in exposure to hazardous conditions that might require a follow-up assessment of the task for PPE.
- Reporting and replacing defective or damaged PPE, which shall not be used.
- Wearing of required PPE is a condition of employment.

44.4 PROCEDURE

44.4.1 GENERAL

Protective equipment, including personal protective equipment for eyes, face, head, and extremities, protective clothing, respiratory devices, and protective shields and barriers, shall be provided, used, and maintained in a sanitary and reliable condition wherever it is necessary by reason of hazards of processes or environment, chemical hazards, radiological hazards, or mechanical irritants encountered in a manner capable of causing injury or impairment in the function of any part of the body through absorption, inhalation or physical contact.

Employee owned equipment is NOT permitted, except for safety toe footwear and prescription safety glasses. 3A Group is still responsible for the assurance of its adequacy, maintenance and sanitation of those two items.

All PPE issued shall be at no cost to the employee. All employees will know and follow the procedures outlined in this Program.

44.5 EYE PROTECTION

Employees must use appropriate eye or face protection when exposed to eye or face hazards from flying particles, molten metal, liquid chemicals, acids or caustic liquids or chemical gases or vapors. Eye and Face PPE must comply with ANSI Standard Z87.1-2003 (Z87+), *Occupational and Educational Personal Eye and Face Protective Devices.*

44.5.1 SAFETY GLASSES

Safety glasses, with side shields, that meet ANSI Z-87.1-2003 standards with “high Impact lenses” are required to be worn by all employees, subcontractors, and visitors while on 3A Group property, at all times, as described below:

- At field locations, in shops and warehouses, except in approved, designated, striped safety zones.
- In all yard work zones or by everyone when in the vicinity of loading or unloading equipment, performing mechanic or maintenance work, test stand operations, operating equipment such as forklifts, welding, or any type of work which has the potential to inflict an eye injury.
- In any office, restroom, or any other building while performing any type of work where a potential eye injury may be present.
- Visitors will be provided with visitor glasses. In the absence of approved prescription safety glasses, “Over the glass” type safety glasses or goggles, must be worn over the non-safety glasses until approved prescription safety glasses are obtained.
- Workers assisting welders must wear absorbent safety glasses that protect the wearer from ultra-violet (UV) and/or infrared rays (IR).
- Dark shaded lens (sunglasses) darker than a # 1 shade is prohibited to be worn indoors unless welding or assisting a welder.
- A doctor must support “exceptions for medical reasons” in writing to exempt safety eyewear requirements.
- Safety glasses are not required:
    - Inside offices.
    - Parking lots when traveling from vehicles to and from office buildings by way of main doors that do not pass through shops.

44.5.2 GOGGLES

- Chemical splash proof goggles shall be worn when handling or mixing liquid chemicals, solvents, paints, etc., and/or as recommended on the Material Safety Data Sheet of the material being handled.
- Dust proof goggles shall be worn when blowing equipment down with air or while performing other jobs where safety glasses are not adequate to prevent airborne particles from entering the openings around the lenses and side shields.

44.6 FACE SHIELDS

- Full face shields shall be worn over safety glasses when operating handheld or stationery grinders with abrasive or wire wheels, while chipping paint or concrete or, performing jobs where there is the potential for flying objects striking the face and safety glasses or goggles would not provide adequate protection.

44.7 HEAD PROTECTION

Employees must wear protective helmets when working in areas where there is a potential for injury to the head from employee-initiated impact or impact from falling or other moving objects. Helmets must comply with ANSI Standard Z89.1-1997 Class E, *American National Standard for Industrial Head Protection* for Type II head protection or be equally effective.

- Employees must wear protective helmets when working in areas where there is a potential for injury to the head from falling objects.
- Hardhats are to be worn at all field, shop and warehouse locations, or where deemed necessary as per each location's PPE Hazard Assessment.
- Hardhats will not be altered in any way.
- Do not paint or apply unauthorized stickers, name plates, etc.
- Do not drill, cut, bend, or apply heat.
- Do not alter the suspension system.
- Hardhats will be inspected by the employee regularly for cracks, chips, scratches, signs of heat exposure (sun cracks), etc.
- Defective hardhats will be replaced immediately.
- Hardhats shall not be placed in rear windows of vehicles where they will be exposed to the sun or become projectiles during an accident.
- A supply of hardhats must be made available to visitors.
- 3A Group shall provide hardhats.
- Employees will be trained in the use, care and maintenance of head protection equipment.

44.8 HEARING PROTECTION

Hearing protection is required to be worn by all employees, subcontractors, and visitors while in posted "High Noise" areas. Refer to the 3A Group Hearing Conservation Program for more information.

Warning signs will be posted in areas known or suspected to have noise levels exceeding 85 dBA either constantly or intermittently.

When signs are not posted, employees shall wear hearing protection when noise caused by machinery, tools, etc., prevents normal conversations to be heard clearly.

Rule of thumb: If you have to yell to be heard, hearing protection is required

44.8.1 TYPES

- Molded Inserts (ear plugs)
- Canal Caps (head band type)
- Muff, either headband or hard hat mounted Earmuffs and earplugs shall be provided to the employee in sizes and configurations that will be comfortable to the employee.

44.8.2 CARE AND MAINTENANCE

- Inspect hearing protection prior to each use.
- Hearing protection must be kept clean to prevent ear infections.
- Most earplugs used today are disposable and must be discarded when they become dirty, greasy, or cracked.
- Earmuffs that have deteriorated foam inserts, cracked seals or are defective must be replaced.

44.8.3 FIT

- Due to individual differences, not everyone can wear the same type of hearing protection. A variety of styles may have to be tried before one is found to be comfortable and provide adequate protection.
- Employees shall be instructed how to obtain the proper fit.

44.9 HAND PROTECTION

44.9.1 GLOVES

- Gloves are required to be worn when performing work, which may expose the hands to extreme temperatures, cuts and abrasions, or exposure to chemicals.
- Welding: Welding gloves made of leather or other heat resistant materials shall be worn when performing arc welding or oxy/gas cutting.
- Chemical: Impervious (chemical resistant) gloves shall be worn when handling chemicals that specify gloves as personal protection equipment when handling.
- Refer to the specific chemical's Material Safety Data Sheet for the correct glove type.
- Persons assigned to working with chemicals, i.e., solvent vats, shall be issued their own individual gloves for hygiene purposes.
- Leather: Leather gloves should be worn when working with sharp materials or when handling rigging equipment.
- Cloth: Cloth gloves should be worn when handling objects or materials, which could cause blisters, splinters, cuts, etc.
- Heat Resistant: Heat resistant gloves shall be worn when handling hot bearings, races, or other materials or objects that have been heated beyond ambient temperatures.
- Insulated: Insulated gloves shall be worn to prevent frostbite in extreme cold climates.
- Glove Inspections
    - Gloves shall be inspected before each use for holes, tears, and worn areas.
    - Chemical gloves shall be periodically air tested for pinholes by twisting the cuff tightly, apply low air pressure to expand the glove, and then submersing in water to check for bubbles.
    - Defective gloves shall be discarded immediately. Exception: machinists are exempted from wearing gloves while working with rotating machinery.

44.10 FOOT PROTECTION

Safety footwear shall be worn by all employees with regularly assigned duties at field locations, in shops and warehouses.

- Office workers and visitors who enter these areas on an infrequent basis will not be required to wear foot protection provided they stay clear of the work being performed.
- If required to be in the close proximity of the work, the work will be stopped while visiting the area or safety footwear will be worn.
- Shops, Field Locations, Warehouses and Parts Departments: Leather or equivalent boots, either lace up or pull up, shall be worn.
- The boot must provide ankle protection and have soles designed to protect from punctures with defined heels for climbing ladders.
- Metatarsal guards will be worn when duties present a hazard of equipment or material crushing the foot.
- All safety footwear must meet ANSI Z41-1999 standards.
- Client locations may require safety footwear to be worn by everyone; check with the local supervisor for client requirements before visiting field locations.

44.11 FALL PROTECTION

Personal fall protection is required when performing certain elevated jobs in excess of six feet. Consult the 3A Group Fall Protection Program.

44.12 ELECTRICAL PROTECTION

Consult the 3A Group Electrical Safety Program.

44.13 WORKSITE HAZARD ASSESSMENT

A written hazard assessment shall be performed. During the hazard assessment a determination if hazards are present or are likely to be present, this necessitates the use of PPE. The following sample hazard sources will be identified:

- High or low temperatures; Chemical exposures (use SDS for guidance)
- Flying particles, molten metal or other eye, face, or skin hazards
- Falling objects or potential for dropping objects; employee falling from a height of 6’ or more
- Sharp objects; Rolling or pinching that could crush the hands or feet;
- Electrical hazards

Where these hazards could cause injury to employees, personal protective equipment must be selected to substantially eliminate the injury potential. Employees will be notified for the selection and reason.

The results of this assessment shall be communicated to each affected employee and kept at the local office.

Selected/identified PPE shall be fitted to each affected employee. Fitting, including proper donning, doffing, clean and maintenance of PPE is addressed in the Training section. Exemptions for use of PPE must be supported by the PPE hazard assessment.

44.14 MONITORING

Supervisors and site managers monitor worksite tasks for changes in, or the introduction of new hazards. If new hazards are discovered, they advise the HSE Manager who then conducts a hazard assessment for appropriate PPE. The HSE Manager monitors the effectiveness of the PPE Procedure and makes recommendations to management to improve the procedure.

44.15 TRAINING

Employees who require or may need to wear PPE shall be properly trained and PPE must be fitted to each affected employee. Training shall include:

- When PPE is necessary.
- What PPE is necessary.
- How to properly don, doff, adjust and wear PPE.
- The limitations of PPE.
- Useful life and disposal of PPE.
- How to clean and maintain PPE in a sanitary and reliable condition.
- Reporting and replacing defective or damaged PPE, which shall NOT be used.

44.16 RETRAINING

Retraining is required when:

- The workplace changes, making the previous training obsolete.
- The type of PPE changes.
- When the employee demonstrates lack of use, improper use, or insufficient skill or understanding in PPE selection, necessity, use and limitations.

44.17 DOCUMENTATION

Training shall be documented, and records kept at the local (head office, shop or project site) office. The training certification shall include:

- Name of employee(s) trained;
- The dates of training; and
- The certification subject.

45 RESPIRATORY PROTECTION PROGRAM

RESPIRATORY PROTECTION PROGRAM

45.1 PURPOSE

It is the intention of 3A Group to provide a respirator protection program that meets or exceeds all federal standards. 3A Group will attempt to engineer potential harmful vapors and oxygen deficient atmosphere exposure hazards out of the work environment. If engineering control measures are not feasible or during emergency situations with high exposure, then respirators shall be provided which are applicable and suitable for purpose intended.

45.2 SCOPE

This program applies to all 3A Group projects and operations.

45.3 RESPIRATORY PROGRAM ADMINISTRATOR

Overall responsibility for the respiratory protection program is assigned to the 3A Group Safety Manager in order to ensure that specific requirements are followed.

The Administrator must be knowledgeable of the complexity of the program, able to conduct evaluations and have the proper training.

This assignment is made, however, with the understanding that individual supervisors will have to implement and enforce major portions of the program. It is understood that the Program Administrator will report performance problems to the appropriate manager for resolution. The person who will have responsibility for administering all the aspects of this program will be the Project Manager or their designee.

The responsibilities of the Program Administrator will include, but are not limited to:

- Conducting an annual written evaluation of the program. The program evaluation should be completed no later than December 31st of each year.
- Ensuring an adequate supply of respirators, cartridges, and repair/replacement parts. The Program Administrator may delegate this duty but will retain overall responsibility. The person(s) to whom this duty has been delegated is the Project Manager and/or Field Supervisor.
- Identifying hazards and ensuring only NIOSH certified respirators must be selected and provided based on those hazards and factors affecting performance.
- Ensuring that all respirator users have been trained in the use, selection and limitations of the type of respirators they will be using prior to the first time the respirator must be used. While the duty of conducting the training may be delegated, the Program Administrator retains final responsibility for seeing that all employees are appropriately trained.
- Ensuring that all respirator users have been medically evaluated and found fit to use the type of respirators that will be required in their job. The medical evaluation must be completed prior to assigning any employee to a task that requires use of a respirator.
- Ensuring that all respirator users are fit tested at least annually and more often if other federal requirements apply.
- Ensuring that respirators are individually issued, are cleaned and sanitized on a regular basis, and respirators are stored in a clean and accessible location. This duty may also be delegated but the Program Administrator retains final responsibility for seeing that it is done.

- Ensuring that respirators are selected based on the hazard that will be encountered. This program describes the basic respirators that will be used at this site and the tasks for which they will be required. In special circumstances, the Program Administrator will contact the corporate health and safety staff for guidance in selecting the correct respirator.
- Ensuring that employee exposure is monitored to assure correct respirator type is used. Exposure monitoring may be delegated to others; however, the Program Administrator has final responsibility of monitoring completion and to request assistance when necessary.
- Ensuring surveillance of employees who wear respirators shall leave the area to wash, change cartridges or if they detect break through or resistance.
- Ensuring that the elements of the Respiratory Protection Program for the selection, use, cleaning/maintenance, storage and fit testing of respirators are followed.
- Ensuring that respirator parts are not exchanged between brands of respirators.
- Ensuring medical evaluations, respirators and required training are provided at no cost to the employee.

45.4 MEDICAL REQUIREMENTS

45.4.1 GENERAL

3A Group shall provide a medical evaluation to determine the employee's ability to use a respirator, before the employee is fit tested or required to use the respirator in the workplace. 3A Group may discontinue an employee's medical evaluations when the employee is no longer required to use a respirator.

45.5 MEDICAL EVALUATION PROCEDURES

3A Group shall identify a physician or other licensed health care professional (PLHCP) to perform medical evaluations using a medical questionnaire or an initial medical examination that obtains the same information as the medical questionnaire. The medical evaluation shall obtain the information requested by the Medical Questionnaire in Forms section (or equivalent).

The medical evaluation prior to fit-testing will be confidential, conducted during normal working hours, be at a convenient time and location, be understandable and the employee will be given a chance to discuss the results with the PLHCP.

45.6 SUPPLEMENTAL INFORMATION FOR THE PLHCP

The following information must be provided to the PLHCP before the PLHCP makes a recommendation concerning an employee's ability to use a respirator:

- The type and weight of the respirator to be used by the employee;
- The duration and frequency of respirator use (including use for rescue and escape);
- The expected physical work effort;
- Additional protective clothing and equipment to be worn; and
- Temperature and humidity extremes that may be encountered.

3A Group shall provide the PLHCP with a copy of the 3A Group Respiratory Protection Program.

Note: When 3A Group replaces a PLHCP, 3A Group must ensure that the new PLHCP obtains this information, either by providing the documents directly to the PLHCP or having the documents transferred from the former PLHCP to the new PLHCP. However, OSHA does not expect employers to have employees medically re-evaluated solely because a new PLHCP has been selected.

45.7 MEDICAL DETERMINATION

In determining the employee's ability to use a respirator, 3A Group shall obtain a written recommendation regarding the employee's ability to use the respirator from the PLHCP. The recommendation shall provide only the following information:

- Any limitations on respirator use related to the medical condition of the employee, or relating to the workplace conditions in which the respirator will be used, including whether or not the employee is medically able to use the respirator;
- The need, if any, for follow-up medical evaluations; and
- A statement that the PLHCP has provided the employee with a copy of the PLHCP's written recommendation.

All recommendations are to be sent to 3A Group's Safety Manager.

45.8 ADDITIONAL MEDICAL EVALUATIONS

At a minimum, 3A Group shall provide additional medical evaluations that comply with the requirements of this program if:

- An employee reports medical signs or symptoms that are related to ability to use a respirator;
- A PLHCP, supervisor, or the respirator Program Administrator informs 3A Group that an employee needs to be re-evaluated;
- Information from the respiratory protection program, including observations made during fit testing and program evaluation, indicates a need for employee re-evaluation; or
- A change occurs in workplace conditions (e.g., physical work effort, protective clothing, and temperature) that may result in a substantial increase in the physiological burden placed on an employee.

45.9 WORK SITE PROCEDURES

Each work site where respirators are required to protect the health of the worker shall have work site procedures that follow the guidelines of this program. Specific procedures may also be required by our client which will be followed. The following areas shall be included:

- Identification of specific hazard requiring respiratory protection
- The selection of the appropriate respiratory protection equipment based on the specific hazard and concentration levels, characteristics, etc. Specific brand and models of respiratory equipment to be used shall be identified in the procedures.
- Verification that each user of respiratory protection is qualified (medical approval, current fit test, annual training and demonstrates competency.

45.10 RESPIRATOR SELECTION CRITERIA

The selection of the respiratory equipment is based on the hazards the employee is exposed to. 3A Group shall:

- Perform hazard identification,
- Select and provide respirators based on those hazards and factors affecting performance,
- Establish brands and models to be used, and
- Estimate exposures and contaminant information.

45.11 HAZARD IDENTIFICATION

Due to the many varied work locations 3A Group's identification of respiratory hazards will be contained in the various work site specific safety plans. However, common respiratory hazards that will be encountered include:

- Dust
- Fumes
- Gases
- Chemical particles
- Oxygen Deficiency

45.12 CHARACTERISTICS OF HAZARDOUS OPERATION OR PROCESS

- Hot operations: welding, chemical reactions, soldering, melting, melding and burning
- Liquid operations: painting, degreasing, dipping, spraying, brushing, coating, etching, cleaning, pickling, plating, mixing, galvanizing and chemical reactions
- Solid operations: pouring, mixing, separations, extraction, crushing, conveying, loading, bagging and demolition.
- Pressurized spraying: cleaning parts, applying pesticides, degreasing, sand blasting and painting
- Shaping operations: cutting, grinding, filing, milling, melding, sawing and drilling

45.13 GASEOUS CONTAMINANTS

- Inert gases (helium, argon, etc.), which do not metabolize in the body but displace air to produce an oxygen deficiency.
- Acid gases (SO2, H2S, HCl, etc.) which are acids or produce acids by reaction with water.
- Alkaline gases (NH3, etc.), which are alkalies or produce alkalies by reaction with water.
- Organic gases (butane, acetone, etc.), which exist as true gases or vapors from organic liquids.
- Organometallic gases (tetraethyl lead, organo-phosphates, etc.), which have metals attached to organic groups.

45.14 PARTICULATE CONTAMINANTS

- Dusts are mechanically generated solid particulates (0.5 to 10µm)
- Fumes are solid condensation particles of small diameter (0.1 to 1.0 µm)
- Mists are liquid particulate matter (5 to 100 µm)
- Smoke is chemically generated particulates (solid and liquid) of organic origins (0.01 to 0.3 µm)

45.15 SELECTION OF RESPIRATOR

The following factors shall be taken into account when selecting the proper respirator:

45.16 CONCENTRATION AND TYPE OF CONTAMINANT

The concentration and type of contaminant will determine the model and type of respirator and cartridges/filters or filters to be used. The concentration is based on a sampling of the atmosphere.

45.17 LOCATION OF HAZARDOUS AREA

(Confined Space, nearby contaminants, etc.)

45.18 WORKER ACTIVITY

(Extreme heat, cold, welding hood requirement, etc.)

45.19 TYPES OF RESPIRATORS

Air-purifying respirators can be either full-face or half masks with mechanical or chemical cartridges to filter dusts, mists, fumes, vapors or gases.

Powered air-purifying respirators use a blower to pass the contaminated air through a filter. The purified air is then delivered into a mask or hood. They filter dusts, mists, fumes, vapors and gases, just like ordinary air-purifying respirators.

Air-purifying respirators cannot be used in oxygen-deficient atmospheres, which can result when another gas displaces the oxygen or consumption of oxygen by a chemical reaction occurs. Oxygen levels below 19.5% require either a source of supplied air or supplied-air respirator protection. Levels below 16% are considered to be unsafe and could cause death. To determine the proper cartridge for air-purifying respirators contact the 3A Group Safety Manager or a qualified on-site safety representative of the client. You should also consult the Material Safety Data Sheet of the substance that needs to be filtered.

All cartridges are assigned a color designating the type of contaminant they will filter:

White:	Acid gas
Black:	Organic vapors
Green:	Ammonia gas
Yellow:	Acid gas and organic vapors
Purple:	Radioactive materials
Orange:	Dust, fumes and mists
Olive:	Other gases and vapors

Once the wearer of the respirator can detect an odor, irritation, or taste of the contaminant, the cartridge should be replaced. All cartridges and/or filters shall be changed at the beginning of each shift.

Supplied-air respirators provide the highest level of protection against highly toxic and unknown materials. Supplied air refers to self-contained breathing apparatuses (SCBAs) and air-line respirators. SCBAs have a limited air supply that is carried by the user, allowing for good mobility and fewer restrictions than air-line respirators.

Air-line respirators have an air hose that is connected to a fresh air supply from a central source. The source can be from a compressed air cylinder or air compressor that provides at least Grade D breathing air.

Emergency Escape Breathing Apparatuses (EEBAs) provide oxygen for 5, 10 or 15 minutes depending on the unit. These are for emergency situations in which an employee must escape from environments immediately dangerous to life or health (IDLH).

SCBA (Self Contained Breathing Apparatus)

3A Group does NOT allow employees to work in an Immediately Dangerous to Life and Health (IDLH) environment.

In order to maintain the NIOSH/MSHA approval of any respirator, mixing parts from other respirator manufacturers is prohibited. This includes airline hoses, valves, gaskets, cartridges, etc. For example, do not use North cartridges or valve gaskets with an MSA product.

45.20 BRAND AND MODELS

3A Group has selected North Safety as its NIOSH-certified respirator. Only this brand of respirator shall be used in compliance with the conditions of the certification of its Respiratory Protection Program (fit testing model, no mixing of different manufacturer parts, cartridges, filters, etc.).

The specific model will be based on the hazard, concentration of contaminant, oxygen level, work environment and type of work being performed. To aid in the selection process the following will be used to identify the proper North respiratory equipment for the work being performed and hazard that is present.

- NIOSH Pocket Guide to Chemicals
- North Cartridge Selection Guide
- North Respirator Selection Guide

45.21 ESTIMATE OF EXPOSURES AND CONTAMINANT INFORMATION

- No employee shall enter an IDLH environment.
- Normal oxygen levels shall be maintained.
- No employee shall be exposed to an atmosphere containing concentrations that would exceed the STEL or PEL for the identified atmospheric hazard.

45.22 RESPIRATOR FIT TESTING

Before an employee may be required to use any respirator with a negative or positive pressure tight-fitting face piece, the employee must be fit tested with the same make, model, style, and size of respirator that will be used. This section specifies the kinds of fit tests allowed, the procedures for conducting them, and how the results of the fit tests must be used.

All respirator users are fit tested at least annually and more often if other federal requirements apply.

Supplied Air Respirators are required to be fit tested as well.

3A Group shall ensure that employees using a tight-fitting face piece respirator pass an appropriate qualitative fit test (QLFT) or quantitative fit test (QNFT) as stated in this program.

3A Group shall ensure that an employee using a tight-fitting face piece respirator is fit tested prior to initial use of the respirator, whenever a different respirator face piece (size, style, model or make) is used, and at least annually thereafter.

3A Group shall conduct an additional fit test whenever the employee reports, or 3A Group's PLHCP, supervisor, or Program Administrator makes visual observations of, changes in the employee's physical condition that could affect respirator fit. Such conditions include, but are not limited to, facial scarring, dental changes, cosmetic surgery, or an obvious change in body weight.

If after passing a QLFT or QNFT, the employee subsequently notifies 3A Group, Program Administrator, supervisor, or PLHCP that the fit of the respirator is unacceptable, the employee shall be given a reasonable opportunity to select a different respirator face piece and to be retested.

The fit test shall be administered using an OSHA-accepted QLFT or QNFT protocol. The OSHA-accepted QLFT and QNFT protocols and procedures are contained in this section.

QLFT may only be used to fit test negative pressure air-purifying respirators that must achieve a fit factor of 100 or less. Half face air filtering respirators may be fit tested with irritant smoke while full face air filtering respirators require Portacount fit testing.

If the fit factor, as determined through an OSHA-accepted QNFT protocol, is equal to or greater than 100 for tight-fitting half face pieces, or equal to or greater than 500 for tight-fitting full-face pieces, the QNFT has been passed with that respirator.

Fit testing of tight-fitting atmosphere-supplying respirators and tight-fitting powered air-purifying respirators shall be accomplished by performing quantitative or qualitative fit testing in the negative pressure mode, regardless of the mode of operation (negative or positive pressure) that is used for respiratory protection.

Qualitative fit testing of these respirators shall be accomplished by temporarily converting the respirator user's actual face piece into a negative pressure respirator with appropriate filters, or by using an identical negative pressure air-purifying respirator face piece with the same sealing surfaces as a surrogate for the atmosphere-supplying or powered air-purifying respirator face piece.

Quantitative fit testing of these respirators shall be accomplished by modifying the face piece to allow sampling inside the face piece in the breathing zone of the user, midway between the nose and mouth. This requirement shall be accomplished by installing a permanent sampling probe onto a surrogate face piece, or by using a sampling adapter designed to temporarily provide a means of sampling air from inside the face piece.

Any modifications to the respirator face piece for fit testing shall be completely removed, and the face piece restored to NIOSH-approved configuration, before that face piece can be used in the workplace.

Fit Test Procedures

The requirements in this section apply to all OSHA-accepted fit test methods, both QLFT and QNFT.

The test subject shall be allowed to pick the most acceptable respirator from a sufficient number of respirator sizes so that the respirator is acceptable to, and correctly fits, the user.

Prior to the selection process, the test subject shall be shown how to put on a respirator, how it should be positioned on the face, how to set strap tension and how to determine an acceptable fit. A mirror shall be available to assist the subject in evaluating the fit and positioning of the respirator. This instruction may not constitute the subject's formal training on respirator use, because it is only a review.

The test subject shall be informed that he/she is being asked to select the respirator that provides the most acceptable fit. Each respirator represents a different size and shape, and if fitted and used properly, will provide adequate protection.

The test subject shall be instructed to hold each chosen face piece up to the face and eliminate those that obviously do not give an acceptable fit.

The more acceptable face pieces are noted in case the one selected proves unacceptable; the most comfortable mask is donned and worn at least five minutes to assess comfort. Assistance in assessing comfort can be given by discussing the following points:

- If the test subject is not familiar with using a particular respirator, the test subject shall be directed to don the mask several times and to adjust the straps each time to become adept at setting proper tension on the straps.
- Position of the mask on the nose
- Room for eye protection
- Room to talk
- Position of mask on face and cheeks

The following criteria shall be used to help determine the adequacy of the respirator fit:

- Chin properly placed;
- Adequate strap tension, not overly tightened;
- Fit across nose bridge;
- Respirator of proper size to span distance from nose to chin;
- Tendency of respirator to slip;
- Self-observation in mirror to evaluate fit and respirator position.

Use the Fit Test form.

45.23 USER SEAL CHECK

Before conducting the negative and positive pressure checks, the subject shall be told to seat the mask on the face by moving the head from side-to-side and up and down slowly while taking in a few slow deep breaths. The test subject shall conduct a user seal check, either the negative or positive pressure seal checks described below:

45.24 POSITIVE PRESSURE CHECK

Close off the exhalation valve and exhale gently into the face piece. The face fit is considered satisfactory if a slight positive pressure can be built up inside the face piece without any evidence of outward leakage of air at the seal. For most respirators this method of leak testing requires the wearer to first remove the exhalation valve cover before closing off the exhalation valve and then carefully replacing it after the test.

45.25 NEGATIVE PRESSURE CHECK

Close off the inlet opening of the canister or cartridge(s) by covering with the palm of the hand(s) or by replacing the filter seal(s), inhale gently so that the face piece collapses slightly, and hold the breath for ten seconds. The design of the inlet opening of some cartridges cannot be effectively covered with the palm of the hand. The test can be performed by covering the inlet opening of the cartridge with a thin latex or nitrile glove. If the face piece remains in its slightly collapsed condition and no inward leakage of air is detected, the tightness of the respirator is considered satisfactory.

The test shall not be conducted if there is any hair growth between the skin and the face piece sealing surface, such as stubble beard growth, beard, moustache or sideburns which cross the respirator sealing surface. Any type of apparel which interferes with a satisfactory fit shall be altered or removed, including glasses.

If a test subject exhibits difficulty in breathing during the tests, she or he shall be referred to a physician or other licensed health care professional, as appropriate, to determine whether the test subject can wear a respirator while performing her or his duties. If the employee finds the fit of the respirator unacceptable, the test subject shall be given the opportunity to select a different respirator and to be retested.

Prior to the commencement of the fit test, the test subject shall be given a description of the fit test and the test subject's responsibilities during the test procedure. The description of the process shall include a description of the test exercises that the subject will be performing. The respirator to be tested shall be worn for at least 5 minutes before the start of the fit test.

The fit test shall be performed while the test subject is wearing any applicable safety equipment that may be worn during actual respirator use which could interfere with respirator fit.

45.26 TEST EXERCISES

Each test exercise shall be performed for one minute except for the grimace exercise which shall be performed for 15 seconds. The test subject shall be questioned by the test conductor regarding the comfort of the respirator upon completion of the protocol. If it has become unacceptable, another model of respirator shall be tried. If due to medical or health conditions the employee cannot perform the test exercises the fit test shall not be performed and the employee not allowed to use a respirator until all elements of the fit test can be achieved.

The respirator shall not be adjusted once the fit test exercises begin. Any adjustment voids the test, and the fit test must be repeated.

The following test exercises are to be performed for all fit testing methods prescribed in this procedure:

- Normal breathing. In a normal standing position, without talking, the subject shall breathe normally.
- Deep breathing. In a normal standing position, the subject shall breathe slowly and deeply, taking caution so as not to hyperventilate.
- Turning head side to side. Standing in place, the subject shall slowly turn his/her head from side to side between the extreme positions on each side. The head shall be held at each extreme momentarily so the subject can inhale at each side.
- Moving head up and down. Standing in place, the subject shall slowly move his/her head up and down. The subject shall be instructed to inhale in the up position (i.e., when looking toward the ceiling).
- Talking. The subject shall talk out loud slowly and loud enough so as to be heard clearly by the test conductor. The subject shall read from the Rainbow Passage

Rainbow Passage

> "When the sunlight strikes raindrops in the air, they act like a prism and form a rainbow. The rainbow is a division of white light into many beautiful colors. These take the shape of a long round arch, with its path high above, and its two ends apparently beyond the horizon. There is, according to legend, a boiling pot of gold at one end. People look, but no one ever finds it. When a man looks for something beyond reach, his friends say he is looking for the pot of gold at the end of the rainbow." Continue to read for one minute.

- Grimace. The test subject shall grimace by smiling or frowning. (This applies only to QNFT testing; it is not performed for QLFT)
- Jogging in place. The test subject shall jog in place being careful to be aware of their surroundings.
- Normal breathing. Same as exercise (1).

45.27 QUALITATIVE FIT TEST (QLFT) PROTOCOLS

45.27.1 GENERAL

3A Group shall ensure that persons administering QLFT are able to prepare test solutions, calibrate equipment and perform tests properly, recognize invalid tests, and ensure that test equipment is in proper working order. 3A Group shall ensure that QLFT equipment is kept clean and well maintained so as to operate within the parameters for which it was designed.

45.27.2 IRRITANT SMOKE (STANNIC CHLORIDE) PROTOCOL

This qualitative fit test uses a person's response to the irritating chemicals released in the ``smoke'' produced by a stannic chloride ventilation smoke tube to detect leakage into the respirator.

General Requirements and Precautions. The respirator to be tested shall be equipped with high efficiency particulate air (HEPA) or P100 series filter(s).

Only stannic chloride smoke tubes shall be used for this protocol. No form of test enclosure or hood for the test subject shall be used.

The smoke can be irritating to the eyes, lungs, and nasal passages. The test conductor shall take precautions to minimize the test subject's exposure to irritant smoke. Sensitivity varies, and certain individuals may respond to a greater degree to irritant smoke. Care shall be taken when performing the sensitivity screening checks that determine whether the test subject can detect irritant smoke to use only the minimum amount of smoke necessary to elicit a response from the test subject.

The fit test shall be performed in an area with adequate ventilation to prevent exposure of the person conducting the fit test or the build-up of irritant smoke in the general atmosphere.

The person to be tested must demonstrate his or her ability to detect a weak concentration of the irritant smoke.

- The test operator shall break both ends of a ventilation smoke tube containing stannic chloride, and attach one end of the smoke tube to a low flow air pump set to deliver 200 milliliters per minute, or an

aspirator squeeze bulb. The test operator shall cover the other end of the smoke tube with a short piece of tubing to prevent potential injury from the jagged end of the smoke tube.

- The test operator shall advise the test subject that the smoke can be irritating to the eyes, lungs, and nasal passages and instruct the subject to keep his/her eyes closed while the test is performed.
- The test subject shall be allowed to smell a weak concentration of the irritant smoke before the respirator is donned to become familiar with its irritating properties and to determine if he/she can detect the irritating properties of the smoke. The test operator shall *carefully direct a small amount* of the irritant smoke in the test subject's direction to determine that he/she can detect it.

45.27.3 IRRITANT SMOKE FIT TEST PROCEDURE

- The person being fit tested shall don the respirator without assistance and perform the required user seal check(s).
- The test subject shall be instructed to keep his/her eyes closed if wearing a half face respirator.
- The test operator shall direct the stream of irritant smoke from the smoke tube toward the face seal area of the test subject, using the low flow pump or the squeeze bulb. The test operator shall begin at least 12 inches from the face piece and move the smoke stream around the whole perimeter of the mask. The operator shall gradually make two more passes around the perimeter of the mask, moving to within six inches of the respirator.
- If the person being tested has not had an involuntary response and/or detected the irritant smoke, proceed with the test exercises.
- The exercises identified in the Test Exercises of this procedure shall be performed by the test subject while the respirator seal is being continually challenged by the smoke, directed around the perimeter of the respirator at a distance of six inches.
- If the person being fit tested reports detecting the irritant smoke at any time, the test is failed. The person being retested must repeat the entire sensitivity check and fit test procedure.
- Each test subject passing the irritant smoke test without evidence of a response (involuntary cough, irritation) shall be given a second sensitivity screening check, with the smoke from the same smoke tube used during the fit test, once the respirator has been removed, to determine whether he/she still reacts to the smoke. Failure to evoke a response shall void the fit test.
- If a response is produced during this second sensitivity check, then the fit test is passed. The glass tube shall be disposed of properly.

45.28 QUANTITATIVE FIT TEST (QNFT) PROTOCOLS

Using controlled negative pressure and appropriate instrumentation to measure the volumetric leak rate of a face piece to quantify the respirator have been demonstrated to be acceptable to OSHA.

3A Group shall ensure that persons administering QNFT are able to calibrate equipment and perform tests properly, recognize invalid tests, calculate fit factors properly and ensure that test equipment is in proper working order.

3A Group shall ensure that QNFT equipment is kept clean and is maintained and calibrated according to the manufacturer's instructions so as to operate at the parameters for which it was designed.

45.29 PORTACOUNT FIT TEST REQUIREMENTS

- Check the respirator to make sure the respirator is fitted with a high-efficiency filter and that the sampling probe and line are properly attached to the face piece.
- Instruct the person to be tested to don the respirator for five minutes before the fit test starts. This purges the ambient particles trapped inside the respirator and permits the wearer to make certain the respirator is comfortable. This individual shall already have been trained on how to wear the respirator properly.
- Check the following conditions for the adequacy of the respirator fit: Chin properly placed; Adequate strap tension, not overly tightened; Fit across nose bridge; Respirator of proper size to span distance from nose to chin; Tendency of the respirator to slip; Self-observation in a mirror to evaluate fit and respirator position.
- Have the person wearing the respirator do a user seal check. If leakage is detected, determine the cause. If leakage is from a poorly fitting face piece, try another size of the same model respirator, or another model of respirator.
- Follow the manufacturer's instructions for operating the Portacount and proceed with the test.
- The test subject shall be instructed to perform the exercises in Test Exercises section of this procedure.
- After the test exercises, the test subject shall be questioned by the test conductor regarding the comfort of the respirator upon completion of the protocol. If it has become unacceptable, another model of respirator shall be tried.

45.30 PORTACOUNT TEST INSTRUMENT

The Portacount will automatically stop and calculate the overall fit factor for the entire set of exercises. The overall fit factor is what counts. The Pass or Fail message will indicate whether or not the test was successful. If the test was a Pass, the fit test is over. Since the pass or fail criterion of the Portacount is user programmable, the test operator shall ensure that the pass or fail criterion meet the requirements for minimum respirator performance.

A record of the test needs to be sent to the Safety Manager and kept on file, assuming the fit test was successful. The record must contain the test subject's name; overall fit factor; make, model, style, and size of respirator used; and date tested.

45.31 USE, MAINTENANCE AND CARE OF RESPIRATORS

This section requires 3A Group to provide for the use, cleaning and disinfecting, storage, inspection, and repair of respirators used by employees. Appendix B - Respirator Cleaning Procedures (Mandatory) shall be followed.

45.31.1 USE

- Items that can affect the face to mask seal are prohibited. This includes facial hair, glasses, clothing, etc.
- Each time a respirator is put on a positive and negative pressure check shall be performed.

45.31.2 CLEANING AND DISINFECTING REQUIREMENTS

3A Group shall provide each respirator user with a respirator that is clean, sanitary, and in good working order. 3A Group shall ensure that respirators are cleaned and disinfected using the procedures in this Respiratory Protection Program, or procedures recommended by the respirator manufacturer, provided that such procedures are of equivalent effectiveness. The respirators shall be cleaned and disinfected at the following intervals:

- Respirators issued for the exclusive use of an employee shall be cleaned and disinfected by the employee as often as necessary to be maintained in a sanitary condition,

- Respirators used in fit testing and training shall be cleaned and disinfected after each use by the Safety Manager or designated person.
- Each individual who is assigned a cartridge respirator is responsible for seeing that the respirator is cleaned, inspected and properly stored.
- Remove filters, cartridges, or canisters. Disassemble face pieces by removing speaking diaphragms, demand and pressure-demand valve assemblies, hoses, or any components recommended by the manufacturer. Discard or repair any defective parts.
- Wash components in warm water with a mild detergent or with a cleaner recommended by the manufacturer. A stiff bristle (not wire) brush may be used to facilitate the removal of dirt.
- Rinse components thoroughly in clean, warm, preferably running water. Drain.
- When the cleaner used does not contain a disinfecting agent, respirator components should be immersed for two minutes in commercially available cleansers of equivalent disinfectant quality. Another alternative is to use wipes containing alcohol that are intended for use with respirators.
- Rinse components thoroughly in clean, warm, preferably running water. Drain. The importance of thorough rinsing cannot be overemphasized. Detergents or disinfectants that dry on face pieces may result in dermatitis. In addition, some disinfectants may cause deterioration of rubber or corrosion of metal parts if not completely removed.
- Components should be hand-dried with a clean lint-free cloth or air dried. Reassemble face piece, replacing filters, cartridges, and canisters where necessary. Test the respirator to ensure that all components work properly.

45.31.3 STORAGE AND INSPECTION

- Respiratory equipment shall be stored in a manner to protect it from damage, contamination, temperature extreme, etc.
- Respiratory equipment intended for emergency use shall be stored in an area that is readily accessible and be clearly marked.

3A Group shall ensure that respirators are inspected as follows:

- All respirators used in routine situations shall be inspected by the employee before each use and during cleaning;
- A check by the employee of respirator function, tightness of connections, and the condition of the various parts including, but not limited to, the face piece, head straps, valves, connecting tube, and cartridges, canisters or filters; and
- A check of elastomeric parts for pliability and signs of deterioration.
- Emergency respiratory equipment will be inspected at least monthly, and before and after each use.
- Escape only respiratory equipment will be inspected before being carried into workplace.

45.31.4 BREATHING AIR QUALITY AND USE

3A Group shall ensure that compressed air accords with the following specifications:

- Compressed breathing air shall meet at least the requirements for Type 1-Grade D breathing air described in ANSI/Compressed Gas Association Commodity Specification for Air, G-7.1-1989, to include:
    - Oxygen content (v/v) of 19.5-23.5%;
    - Hydrocarbon (condensed) content of 5 milligrams per cubic meter of air or less;
    - Carbon monoxide (CO) content of 10 ppm or less;
    - Carbon dioxide content of 1,000 ppm or less; and

- Lack of noticeable odor.

- 3A Group shall ensure that oxygen is not used in compressed air units.
- 3A Group shall ensure that oxygen concentrations greater than 23.5% are used only in equipment designed for oxygen service or distribution.
- 3A Group shall ensure that cylinders used to supply breathing air to respirators meet DOT requirements and that:
  - Cylinders are tested and maintained as prescribed in the Shipping Container Specification Regulations of the Department of Transportation (49 CFR part 173 and part 178);
  - Cylinders of purchased breathing air have a certificate of analysis from the supplier that the breathing air meets the requirements for Type 1--Grade D breathing air; and
  - The moisture content in the cylinder does not exceed a dew point of -50 deg. F (-45.6 deg. C) at 1 atmosphere pressure.

- 3A Group shall ensure that compressors used to supply breathing air to respirators are constructed and situated so as to:
  - Prevent entry of contaminated air into the air-supply system;
  - Minimize moisture content so that the dew point at 1 atmosphere pressure is 10 degrees F (5.56 deg. C) below the ambient temperature;
  - Have suitable in-line air-purifying sorbent beds and filters to further ensure breathing air quality. Sorbent beds and filters shall be maintained and replaced or refurbished periodically following the manufacturer's instructions.

- Have a tag containing the most recent change date and the signature of the person authorized by 3A Group to perform the change. The tag shall be maintained at the compressor.
- For compressors that are not oil lubricated, 3A Group shall ensure that carbon monoxide levels in the breathing air do not exceed 10 ppm.
- For oil-lubricated compressors, 3A Group shall use a high-temperature or carbon monoxide alarm, or both, to monitor carbon monoxide levels. If only high-temperature alarms are used, the air supply shall be monitored at intervals sufficient to prevent carbon monoxide in the breathing air from exceeding 10 ppm.
- 3A Group shall ensure that breathing air couplings are incompatible with outlets for non-respirable worksite air or other gas systems. No asphyxiating substance shall be introduced into breathing air lines.

45.31.5 REPAIRS

3A Group shall ensure that respirators that fail an inspection or are otherwise found to be defective are immediately removed from service, and are discarded or repaired or adjusted in accordance with the following procedures:

- Repairs or adjustments to respirators are to be made only by persons appropriately trained to perform such operations and shall use only the respirator manufacturer's NIOSH-approved parts designed for the respirator;
- Repairs shall be made according to the manufacturer's recommendations and specifications for the type and extent of repairs to be performed; and

45.32 VOLUNTARY USE

If an employee chooses to voluntarily wear a respirator when not required by this Program (contaminants do not meet protection standards, odors, etc.) they will be advised of the following in their training:

Respirators are an effective method of protection against designated hazards when properly selected and worn. Respirator use is encouraged, even when exposures are below the exposure limit, to provide an additional level of comfort and protection for employees.

However, if a respirator is used improperly or not kept clean, the respirator itself can become a hazard to the employee. Sometimes, employees may wear respirators to avoid exposures to hazards, even if the amount of hazardous substance does not exceed the limits set by OSHA standards. If your employer provides respirators for your voluntary use, of if you provide your own respirator, you need to take certain precautions to be sure that the respirator itself does not present a hazard.

You should do the following:

- Read and heed all instructions provided by the manufacturer on use, maintenance, cleaning and care, and warnings regarding the respirator's limitations.
- Choose respirators certified for use to protect against the contaminant of concern. NIOSH, the National Institute for Occupational Safety and Health of the U.S. Department of Health and Human Services, certifies respirators. A label or statement of certification should appear on the respirator or respirator packaging. It will tell you what the respirator is designed for and how much it will protect you.
- Do not wear your respirator into atmospheres containing contaminants for which your respirator is not designed to protect against. For example, a respirator designed to filter dust particles will not protect you against gases, vapors, or very small solid particles of fumes or smoke.
- Keep track of your respirator so that you do not mistakenly use someone else's respirator.

45.33 WORKPLACE MONITORING

A program of monitoring potential employee exposures has been implemented through the corporate health and safety department. Project personnel may also be assigned with the task of conducting air monitoring. Direct-reading instruments will also be used in the characterization of potential exposures. All the data collected is used to determine the appropriateness of the respiratory equipment.

45.34 RECORDKEEPING

3A Group will establish and retain written information regarding medical evaluations, fit testing and the respirator program. Records of medical evaluations required by this section must be retained and made available in accordance with 29 CFR 1910.1020. 3A Group shall provide the employee with an opportunity to discuss the questionnaire and examination results with the PLHCP.

Records will be treated confidentially and maintained on file in the 3A Group corporate office by the Safety Manager.

45.35 PROGRAM EVALUATION

3A Group shall conduct evaluations of the workplace as necessary to ensure that the provisions of the current written program are being effectively implemented and that it continues to be effective.

3A Group shall regularly consult employees required to use respirators to assess the employees' views on this program's effectiveness and to identify any problems. Any problems that are identified during this assessment shall be corrected. Factors to be assessed and verified include, but are not limited to:

- Respirator fit (including the ability to use the respirator without interfering with effective workplace performance); Appropriate respirator selection for the hazards to which the employee is exposed;

- Proper respirator use under the workplace conditions the employee encounters; and
- Proper respirator maintenance.

45.36 TRAINING

All employees will receive respirator training during their initial health and safety training class and on at least an annual basis, if required for their job classification. Training shall address employee knowledge of respirators, fit, use, limitations, emergency situations, wearing, fit checks, maintenance & storage, medical signs and symptoms of effective use and general requirements of the OSHA standard. The training must be provided before requiring the employee to use the respirator.

45.37 RETRAINING

Retraining shall be administered annually, and when the following situations occur:

- Changes in the workplace or the type of respirator render previous training obsolete;
- Inadequacies in the employee's knowledge or use of the respirator indicate that the employee has not retained the requisite understanding or skill; or
- Any other situation arises in which retraining appears necessary to ensure safe respirator use.

45.38 3A GROUP QUALITATIVE RESPIRATORY FIT TEST RECORD SHEET

Note: Employee Must Have Completed Respiratory Protection Training and Passed Airway Exam Prior To Fit Testing

Test Date: _____

Employee Name: _____ **Employee #** _____

Test Agent: Irritant Smoke (Stannic Chloride)

Respirator Identification:

Model: North 7700 Series Half Mask Size (circle one): Small Medium Large
Manufacturer: North Safety Products Approval No: 42 CFR 84
Additional Information: Respirator must be equipped with North HEPA filters

Fit Test Protocol (Test Subject Initials indicate steps were performed):

___ TOLD TO KEEP EYES CLOSED DURING SMOKE EXPOSURE

___Test subject smelled irritant smoke before fit test
___Protocol reviewed before fit test
___Shown how to wear respirator
___Mirror available for use by subject
___Must wear PPE (hard hat, etc.) if needed
___Wore respirator 5 minutes before fit test
___Test subject did not have hair in fitting area
___Performed positive pressure & negative fit check successfully after seating respirator

Fit Test Steps (1 minute each except Grimace = 15 seconds)

___ Breath normally
___ Nod up and down
___ Jog in place
___ Breathe deeply
___ Talking (Read Rainbow Passage)
___ Breath normally
___ Turned head side to side
___ Grimace

"When the sunlight strikes raindrops in the air, they act like a prism and form a rainbow. The rainbow is a division of white light into many beautiful colors. These take the shape of a long round arch, with its path high above, and its two ends apparently beyond the horizon. There is, according to legend, a boiling pot of gold at one end. People look, but no one ever finds it. When a man looks for something beyond his reach, his friends say he is looking for the pot of gold at the end of the rainbow".

Fit Test Results: _____ Pass _____ Fail

Test Subject Signature: _____ Date: _____

Examiner's Name: _____

Examiner's Signature: _____ Date: _____

Distribution: Employee Local File – 3A Group Safety & Training Dept

46 RIGGING & MATERIALS HANDLING

RIGGING & MATERIALS HANDLING

46.1 PURPOSE

The purpose of this training program is to ensure a safe and incident free lifting operation.

46.2 SCOPE

When work is performed on a non-owned or operated site, the operator's program shall take precedence, however, this document covers 3A Group employees and contractors and shall be used on owned premises, or when an operator's program doesn't exist or is less stringent.

46.3 KEY RESPONSIBILITIES

Management shall determine if this program is required for regulatory compliance within his/her region. Management shall select a training facility or use an in-house qualified trainer to supply and document the training.

Supervisors shall assist the managers in the tasks described above. The supervisor shall verify that each of their employees have the proper training before being involved in rigging operations.

Only qualified and trained personnel can attach or detach lifting equipment to loads or lifting loads.

46.4 PROCEDURE

46.4.1 GENERAL

Only "qualified riggers" are allowed to attach any loads to a lifting hook and only "qualified operators" are allowed to operate a crane while engaged in lifting operations.

46.4.2 MATERIAL HANDLING

- Rigging equipment shall be inspected to ensure it is safe. Rigging equipment for material handling shall be inspected prior to use and on each shift and as necessary during its use to ensure that equipment is safe.
- Defective rigging shall be removed from service. Defective equipment shall not be used and removed from service immediately.
- Rigging equipment shall not be loaded in excess of its recommended safe working load. Rigging equipment shall not be loaded beyond its recommended safe working load and load identification shall be attached to the rigging.
- Rigging equipment, when not in use, shall be removed from the immediate work area. Rigging equipment not in use shall be removed from the immediate work area so as not to present a hazard to employees.
- Tag lines shall be used unless their use creates an unsafe condition.
- Latches will be in place on all hooks, eliminating the hook throat opening. Hooks on overhaul ball assemblies, lower load blocks, or other attachment assemblies shall be a type that can be closed and locked, eliminating the hook throat opening. Alternatively, an alloy anchor type shackle with a bolt, nut and retaining pin may be used.
- All employees shall be kept clear of loads about to be lifted and of suspended loads. No employee shall be allowed under a suspended load.

46.5 RIGGING TOOLS AND DEVICES

The *Regulations for Construction Projects* require that an inspection and maintenance program be implemented to ensure that rigging equipment is kept in safe condition. Procedures must ensure that inspection and maintenance have not only been carried out but have been duly recorded.

Rigging operations often involve the use of various tools and devices such as jacks, rollers, hoists, and winches. Each has its own unique features, uses, and requirements for safe operation and maintenance.

The construction regulations also require that the manufacturer's operating instructions for such tools and devices be available on site. The rigger must read and follow all of these instructions to operate and maintain the equipment properly. The rigger must also read any warning information which may be stamped, printed, tagged, or attached to the rigging device.

This section identifies some of the commonly used rigging tools and devices and explains procedures for their safe operation and maintenance.

46.6 JACKS

While there are a great many types of jacks, the ratchet jack and heavy-duty hydraulic jack are the two types most commonly used in construction.

- Ratchet jacks are usually limited to capacities under 20 tons because of the physical effort required to raise such a load. They do, however, have a much longer travel than hydraulic jacks and can therefore lift loads higher without having to re-block. Most ratchet jacks have a foot lift or "toe" near the base to lift loads which are close to the ground. Lifts can be made from the "head" or the "toe" of the jack. These jacks are often called toe jacks or track jacks,
- Do not use extensions or "cheaters" on the handles supplied with ratchet jacks. If cheaters are necessary, the jack is overloaded.
- Hydraulic jacks are very popular in construction because they are quite compact and can lift very heavy loads. They are readily available in capacities ranging from a few tons to 100 tons. Some specialty units have capacities up to 1,000 tons. Lift heights are usually limited to approximately 8-inches or less, but some can go as high as 36 inches.
- Hydraulic jacks are also available in low profile models that can be positioned under a load close to the ground. Also known as "button jacks", these are useful for lifting a load high enough to get a regular jack in place.
- Like ratchet jacks, hydraulic jacks are available with toe lifts.
- The pumps powering hydraulic jacks may be contained in the jacks or be separate external power units. Separate units may be hand-operated or electrically powered, but the self-contained pumps are always hand-operated.
- With all types of hydraulic jacks, it is critical that no further force be applied after the ram has run its full travel. The resultant high pressure in the hydraulic fluid can damage the seals and, in the case of external power units, burst the hoses.
- Most external power units are equipped, however, with pressure relief valves. At the factory one valve will be set at the absolute maximum pressure while another will be adjustable to lower settings by the user. Make sure you are familiar with the operation of this safety feature.
- Most hydraulic jacks can be fitted with a gauge on the housing or at the pump to monitor hydraulic pressure. When used with a given jack, the gauges can be calibrated to measure the approximate load on the unit.

- Hoses connecting pumps to jacks require careful attention. Make sure they are free of kinks and cracks. Check the couplings, especially at the crimp. This area is prone to cracking and is often the weak link in the hose assembly. Threads should also be checked for damage, wear, cross-threading and tightness. Remember that these hoses have to withstand pressures up to 10,000 psi.
- Don't use hoses that are unnecessarily long. Shorter hoses will leave the area less congested and reduce the chance of accidental damage.
- The handles on jacks or hand-operated pump units are designed so that the rated capacity and pressure can be obtained with little physical effort. Don't use extensions or "cheaters" on the handles. Again, if the load can't be raised with the handle supplied the jack is overloaded.
- Jacks should only be used in a true vertical position for lifting. Otherwise side-loading can cause the piston to rub against the housing. If this happens, the piston will be scored and allow fluid to leak at the seal which may cause the jack to slip.
- Be extremely careful when using hydraulic jacks in welding areas or around corrosive chemicals.
- Sparks or acids can cause pitting on the ram or damage hoses.
- Hydraulic jacks are generally not equipped with check valves. But check valves can be installed in the hoses of an external pump and are recommended. Alternatively, some hydraulic jacks have retaining nuts that can be screwed against the housing to hold the load for a short time.
- Jacks should never be used for long-term support of a load. Blocking is much more stable and safer. Whenever possible, the load should be progressively blocked as jacking proceeds. This will allow for the unexpected.
- Always jack loads one end at a time. Never jack loads one side at a time as this will be far less stable than jacking the ends.
- If it is necessary to work or even reach under a load on jacks, place safety blocking under the load as a precaution.
- Make sure timbers used for blocking or cribbing are long enough to distribute the load over a large enough area and provide sufficient stability. Crib height should not exceed the length of timbers used.
- All jacks should be thoroughly inspected periodically, depending on how they are used. For regular use at one location they should be inspected every six months or more frequently if the lifts approach capacity. Jacks sent out for special jobs should be inspected when received and when returned. Jacks subjected to high loads or shock should be inspected immediately.
    - Because jack bases are relatively small, care must be taken to ensure that the floor or ground can withstand the high pressures often associated with jacking operations. Blocking or matting under the jacks will distribute the load over a greater area and reduce bearing pressure.

46.7 JACKS – INSPECTION

Whether ratchet or hydraulic, all jacks should be inspected before each shift or use. Check for:

- improper engagement or extreme wear of pawl and rack
- cracked or broken rack teeth
- cracked or damaged plunger
- leaking hydraulic fluid
- scored or damaged plunger
- swivel heads and caps that don't function properly
- damaged or improperly assembled accessory equipment

Remember: When using jacks, always try to block as you go. Never use jacks for long-term support. Block properly instead.

46.8 BLOCKING AND CRIBBING

Blocking or cribbing must

- be sufficient to support load
- be set on firm, level ground or floor
- be close together
- be dry and free of grease
- be stacked no higher than the length of the timbers used
- follow the jacking process
- distribute load over enough area to provide stability.

Note: In some cases, solid blocking may be required.

46.9 ROLLERS

Rollers can be used for moving loads horizontally or on slight inclines, provided the surface is firm and even. Rollers may be aluminum or steel round stock, heavy steel pipe, or a manufactured caster unit.

Cylinder rollers are useful for short distances or where the load will have to negotiate corners. The rollers can be placed on angles to swing the ends of the load, allowing turns in tight areas.

Cylinder rollers should be round, true and smooth to minimize the force required to move the load. Caster rollers can be supplied in a number of configurations for flat surfaces, tracks, I-beams or channels. They create very little friction and allow heavy loads to be moved with little force. In fact, the rigger may sometimes require more friction to provide an extra measure of control.

The most important aspect in rolling is control of the load. Make sure that all equipment including slings and hardware is sufficient to handle the loads that will be developed at each stage of the operation. Always attach a second means of restraint such as a tirfor or winch to the load to allow for the unexpected. The possibility of shock loads should be considered when sizing winches or tirfors for back-up protection.

Check the condition of floors or ground before using rollers. Bearing pressure can be reduced by using more rollers and large steel or aluminum plate to distribute the load. Make sure the joints in the plates or skids are staggered. It is often necessary to assess the structure supporting floors. Temporary shoring may be necessary.

46.10 INCLINED PLANES

The method used to calculate the required pull up an incline is only approximate. Though widely used because of its simplicity, the method yields value higher than the actual force required. The formula is more accurate for slight inclines (1:5) than steep inclines (1:1).

For most applications the simplified method is adequate because the value used for friction is itself only approximate.

Formula (5% Friction)
F = W x H/L + .05W
Where
F = Required Force

H = Height
L = Length
W = Weight of Load

46.11 LEVER-OPERATED HOISTS OR COME-ALONGS

Come-along are a very portable means of lifting or pulling loads short distances. They can be used vertically, horizontally or on an angle. Otherwise, all points covered in the section on chain hoists apply equally to come-along.

A come-along that requires the use of a cheater or the help of another worker to move a load is inadequate for the job. Use a come-along with a larger capacity.

Lever-Operated Hoist – Safety Precautions

- Inspect for defects.
- Do not use cheater on hoist handle.
- Do not overload. Working load limit (WLL) should be marked on device.
- Do not apply the load to the tip of the hook.
- Do not use the hoist chain as a sling or choker.
- Make sure of your footing before operating the hoist.
- Do not leave the suspended load unattended.
- Keep hoist chain straight.
- Stand clear of load and pulling path of hoist chain.
- Keep upper and lower hooks in a straight line so that the frame is free to swivel.
- Do not use a hoist with a twisted, kinked, damaged, or worn chain.
- Ensure that anchorage and structure will support the load.

46.12 CHAIN HOISTS

Chain hoists are useful because the load can be stopped and kept stationary at any point. Because of their slow rate of travel, chain hoists also allow precise vertical placement.

Chain hoists should be rigged so that there is a straight line between the upper and lower hooks. They are intended for use in a vertical or near vertical position only. If rigged at an angle, the upper hook can be damaged at the shank and the throat may open up. If the gear housing is resting against an object while under load it can be damaged or broken.

Always make sure that the hoist is hanging freely.

Before using the hoist, inspect the chain for nicks, gouges, twists, and wear. Check the chain guide for wear. Hooks should be measured for signs of opening up. Ensure that the hooks swivel freely and are equipped with safety catches. If the hoist has been subjected to shock loads or dropped, it should be inspected thoroughly before being put back in service. Check the load brake by raising the load a couple of inches off the ground and watching for creep.

If the hoist chain requires replacement, follow the manufacturer's recommendations. Different manufacturers use different pitches for their load chain. Chain intended for one brand of hoist will not mesh properly with the lift wheel of another brand and the hoist will not operate properly, if at all.

The load chain on chain hoists is case-hardened to reduce surface wear and is unsuitable for any other use. Load chain will stretch 3% before failing, whereas Grade 8 alloy chain will stretch at least 15%. Load chains are too brittle for any other application. Any load chain removed from a hoist should be destroyed by cutting it into short pieces. Never try to repair a load chain yourself.
Welding will destroy the heat treatment of the chain entirely.

46.13 CHAIN HOIST – SAFETY PRECAUTIONS

- Inspect for wear and damage regularly.
- Do not overload.
- Do not leave a suspended load unattended.
- Do not stand under the load.
- Do not use the hoist chain as a sling or choker.
- Do not apply the load to the tip of the hook.
- Avoid hoisting on angles.
- Chain hoists must be used in the vertical position.
- Only one operator should pull on a single hand chain at one time.
- Ensure that load chain is properly seated in wheels or sprockets before lifting.
- Ensure that anchorage and structure will support the load.
- Maintain the chain hoist according to manufacturer's specifications.

46.14 GRIP ACTION HOISTS OR TIRFORS

Grip-action hoists, commonly known by the trade name Tirfor, are useful for long lifts or pulls since they act on a continuous length of wire rope. Like the come-along, they can be used in any orientation. The tirfor can draw rope through the unit, as a come-along draws chain, or pull itself along a fixed rope, as on a swingstage.

Tirfors are available with capacities ranging from 3/4 to 31⁄2 tons. The rope can be reeved through a block system to gain mechanical advantage and increase the capacity of the unit.
Tirfors are operated by two levers – one for forward motion, the other for reverse. The levers operate two jaws which alternately grip and draw the rope through the unit. Figure 12 illustrates the action of the jaws on the rope. A third lever releases both jaws to allow rope to be installed, tensioned, or disengaged.

Tirfors can be fitted with hydraulic rams to operate the levers. Up to four units can be operate simultaneously from a single hydraulic power supply.

Another type of grip-action hoist uses discs to clamp and drive the rope in a continuous motion. These are available with electric, air, or hydraulic motors. Disc type hoists provide greater rope speed but less capacity than the jaw type.

Tirfor ropes are specifically designed for the clamping and pulling forces applied to them. The ropes are galvanized and unlubricated and have very tight diameter tolerance. No other rope should ever be used on tirfors.

Handle tirfor rope carefully to ensure that it does not kink. Kinked rope will jam in the mechanism and prevent the rope from passing through the hoist. Ropes must be kept free from dirt and oil to ensure smooth, safe operation.

Like chain falls and come-along tirfors should be tested under load to ensure that the unit functions properly in both directions and that there is no slippage.

46.15 ELECTRIC WIRE ROPE HOISTS, ELECTRIC CHAIN HOISTS, PENDANT CRANES

Electric wire rope and electric chain hoists may be suspended from a fixed point or a trolley. The trolley may be motorized but very often the hoist is moved by tugging gently on the pendant. These units can only move along a fixed straight line (beam).

Pendant cranes, on the other hand, trolley along a bridge (east-west) which travels on rails (north-south).

Pendant cranes have greater capacity than the other hoists and usually have two or more parts of line.

Apart from these differences, the devices are quite similar in operating procedures and precautions. Hoist operators must adhere to the following points.

- Know and never exceed the working load limit of the hoisting equipment.
- Ensure that controls work properly without excessive play, delay or effort.
- Check pendant control cable for cuts, kinking, or signs of wear.
- Check hoist cables for fraying, kinking, crushing, and twisting between the cable and the drum.
- Look at the hoist drum for proper alignment and stacking of the cable.
- Inspect the hook for cracks, bending, or distortion, and the safety latch for proper operation.
- Don’t try to lengthen or repair the load chain or rope.
- Read and follow manufacturer’s instructions and all instructions and warnings on the hoist.
- Position the hoist directly over the load.
- After the hook is placed in the lifting ring, apply slight pressure to the hoist to ensure that the lifting ring is seated in the bottom of the hook and that the hook is properly aligned.
- Between lifts, check whether the rope is properly seated on the drum.
- Ensure that the intended path of travel is clear of people and obstructions and that the intended destination is ready to receive the load.
- Check brakes for excessive drift.
- Ensure proper clearance for movement.
- Position yourself on the pendant side of the hoist to get maximum clearance from the load and to prevent entanglement of cables.
- Avoid sudden starts, stops, or reverses.
- Raise the load only high enough to avoid obstructions.
- Do not hoist loads over workers; wait until the area is vacated.
- Be alert for any variation in hoist operation and any possible malfunction.
- Do not leave a load suspended in the air. If a short delay is unavoidable, lock the controls.
- Do not allow unqualified personnel to operate hoists.
- Never operate hoist to extreme limits of chain or rope.
- Avoid sharp contact between two hoists, between hoist and end post, and between hooks and hoist body.
- Never use the hoist rope or chain as a sling.

- Never use chain or rope as a ground for welding or touch a live welding electrode to the chain or rope.
- Avoid swinging the load or hook when travelling the hoist.
- Pull in a straight line so that neither hoist body, load chain nor rope is angled around anything.

Some hoists are equipped with limit switches. Generally, these devices stop the wind automatically at its maximum allowable up position, down position and travel limits (if rail-mounted). Check limit switches daily for correct operation.

Whenever the operator does not have a clear view of the load and its intended path of travel, a signaler must direct operations. Signals for pendant cranes differ from those for mobile and tower cranes since machine movements are different (Figure 15). Make sure that everyone involved knows the signals required for pendant cranes.

46.16 WINCHES

Base-mounted winches, or tuggers, are a compact, versatile tool for many hoisting and rigging operations
.
They are particularly useful in areas not accessible to mobile cranes or where there is not enough headroom for a crane to operate. Make sure that the rope leaves the drum at a downward angle and that the loose end is securely anchored.

The forces on snatch blocks and their anchorage points depend on the angle by which the direction of pull is changed.

46.17 ANCHORAGE POINTS

Hoists, winches, Tirfors, and other rigging devices require secure anchorage points. Anchors may be overhead, in the floor, or at lateral points in walls or other structures. The arrangement may involve columns, beams, beam clamps, welded lugs, slings, or block and tackle. Whatever the method, riggers must be certain of the loads involved and the anchorage required.

46.18 LOAD ON STRUCTURE

Lead Line Load = Load + Parts of Line at Load
Lead Line Load A = 500 ÷ 1 = 500 Ib
Lead Line Load B = 6000 ÷ 4 = 1500 lb
Load on Structure = Load + Lead Line Load
Load on Structure A = 500 + 500 = 1000 Ib
Load on Structure B = 6000 + 1500 = 7500 Ib

Columns
Columns are generally not designed to withstand significant lateral forces. Anchorage points should be placed at the base, near a connection to a beam or other lateral support.

Because the member is already in compression, the effect of a small deflection is amplified, and the column could buckle.

46.19 BEAMS

Load beams near column or other vertical support points to minimize bending. If the beam is an I section, it may be necessary to weld stiffeners to the web to withstand the additional shear force applied.

46.20 BEAM CLAMPS

Beam clamps provide a very secure anchorage point if used correctly. They are commonly available with capacities up to 12 tons and have various jaw widths. Figure 5 shows different types.

The jaws are usually designed for a range of flange widths. For example, one clamp might fit flanges 41⁄2" to 9" wide. Clamps should never be used on flanges outside the range specified as they will not afford sufficient grip on the member.

Most beam clamps are designed for use at 90° to the flange. For applications requiring an angle loading, make sure that the clamp is designed for it and that the beam can withstand it.

Be particularly careful that the load does not deform the flange. This is most likely to occur with light sections where the flange is wide and thin.

Beam clamps should be centered on the flange and properly seated.
Manufacturers are required to mark beam clamps with working load limits. But the ratings apply only to the clamps. The capacity of the beam must be evaluated separately.

46.21 SLINGS

Slings are a common method of anchoring equipment to a structure. The double wrap basket hitch is the preferred method since the load in the sling is shared on two legs and the double wrap distributes the load on the member. It is also less prone to slippage than a single choker or single basket hitch. Make sure that the sling is long enough to avoid sharp angles in the legs.

The use of softeners will protect the member and the sling from damage and increase the radius of bending in the sling.

46.22 WELDED LUGS

Lugs welded to a beam or column must be compatible with the member in metallic composition.

The appropriate welding rod must also be used. The lug should be welded on the center line of the flange, in line with the web. Keep loading in line with the lug. Avoid side loading.

Whatever the method of attachment, it is important to realize that the structure is usually not designed for the additional loads applied. The only way to be sure is through evaluation by a structural engineer.

46.23 TRAINING AND EDUCATION

3A Group employees shall display their competency in the following topics:

- The selection of proper hardware (eye bolts, shackles, hooks, wire rope products, synthetic slings, chain slings, etc.) for the correct application (weight, hitches, angles, temperatures, center of gravity, etc.).
- The inspection of the selected hardware before, during and after the lift.
- The proper methods of securing the load, attaching the load to the hook, lifting the load, handling of the load during the movement of the load and lowering and placement of load.

- The proper storage of the rigging equipment.
- All 3A Group employees shall re-certify their training on a four (4) year basis.

47 SAFETY/INCENTIVE PROGRAM

IMPLEMENTING AND ADMINISTERING A PROGRAM

47.1 WHY HAVE A SAFETY/INCENTIVE PROGRAM?

"I am paying my employees good money. Why should I pay them more, just to do their jobs?"
If your reaction to a safety/incentive program is something like this, you are not alone. But you are probably overlooking some pretty good reasons why an incentive ought to be offered to everyone in the company.

47.2 SALESPEOPLE RESPOND TO INCENTIVES

How do you feel about your best salespeople earning commission? No problem is the answer most people give. Why? Because they are bringing in orders that drive the company and keep you in business. But don't they have a job for which they are being paid? Commissions are paid because there is a belief that the opportunity to earn extra money and other rewards will get the salespeople to work harder and produce more than they otherwise would. This belief has been proven true in thousands of situations in all forms of business.
So, if salespeople react positively to incentives, and produce more as a result, how about your other employees? Wouldn't they also appreciate the opportunity to earn money or rewards? The answer is "YES", and they are also willing to produce more and do a better job to do so.
They cannot call on clients and prospects to generate extra sales, and often they don't have much to do with meeting a production schedule; but they can be motivated to do a better job in the one area that they do directly control: Safety.

47.3 INCENTIVES ARE THE ENGINE TO A SAFETY PROGRAM

People...ALL people...respond to a benefit. Most of what we do is with the understanding that there will be a benefit to our actions. With workers' compensation, the only tangible benefit is when your employee gets injured. States even refer to the money paid to an injured worker as receiving his "Benefits". What a safety/incentive does is establish an incentive to not get injured. It encourages each employee to do things the right way; to wear safety goggles, to get help when lifting heavy objects, to pick up loose items on the floor, or clean up spills.

47.4 TEAMWORK WORKS TO REDUCE INJURIES

If implemented correctly, it puts pressure on those employees who don't care about safety to start caring, because their carelessness has an impact on everyone else. It makes it socially unacceptable to perform a job in an unsafe manner. Teamwork is the key to teams and departments staying injury-free.
By staying injury-free, your employee has contributed to the profit and well-being of your company. By providing him an incentive to do so, you will have reduced your measurable workers' comp costs, as well as your "soft costs", such as productivity, turnover, and administration. Your employee will understand that safety is important to you, and that you recognize his efforts in preventing injuries.

47.5 COMPONENTS OF YOUR SAFETY/INCENTIVE PROGRAM

- ✓ Teams
- ✓ Monthly Safety Cards
- ✓ Raffle Box
- ✓ Prizes and Awards
- ✓ Safety Bulletin Board

47.5.1 TEAMS

The greatest problem that companies are faced with today is a lack of loyalty. Too many employees feel like they are on their own, and that their employer does not care about them. Sometimes the first reaction of an injured worker is to find a lawyer, anticipating that his employer may contest the injury, or in some way deny him his benefits. Trust has greatly diminished in the last decade.

Teams give employees a sense of belonging to something. Most importantly, they remind the employees that they have a responsibility to other people in the company, and that they are accountable to other people. Peer pressure is created. Employees are encouraged to help each other out, and to stay safe for the benefit of the team. Conversely, the employee who does not care, does not follow safety procedures, or considers filing fraudulently, is now pressured to do the right thing, as his actions may jeopardize all the members of his team.

47.5.2 MONTHLY SAFETY CARDS

The cards are distributed and collected every month by the supervisors or managers. On the card, each employee signs his/her name, verifying that he/she has been injury-free during that month. This provides a record for the company, and a reminder to the employee that helps discourage that helps discourage any post-termination claims.

47.5.3 RAFFLE BOX

The safety cards with each employee's name are collected in the Raffle Box. It is from this box that a drawing is held each month, with the winners receiving the prizes. The box should be kept in a safe place, and checked each month prior to any cards being dropped in.

47.5.4 PRIZES AND AWARDS

The most important rule of thumb for a successful safety/incentive program is to offer at least one prize that is of significant value. The equivalent of one week's pay can be used as a yardstick. If the top prize is too low in value, the employees will not be motivated to change their behavior. It is also possible to set the prize too large. The result of this is often unreported, but legitimate injuries. Resentment of the injured worker may also result if the lost prize is too large. The number of prizes may vary, but the rule of thumb should be roughly one prize per twenty-five (25) employees. Over the course of a year, that would give the employee a one in two chance of winning, if the company was injury-free. In a company of 100 employees, the prizes might be as follows:

1st Prize:	$100.00	2nd Prize:	$ 50.00	3rd Prize:	$ 25.00

47.5.5 SAFETY BULLETIN BOARD

One area needs to be identified for all the safety announcements, posting of teams, and celebration of accomplishments. Pictures taken of the winners should be displayed prominently every month, with certificates of recognition. The area should be easily accessible to all employees and should be updated promptly. It is logical to put this Bulletin board in the same area as your safety announcements and required posters.

47.6 WHO PARTICIPATES IN THE PROGRAM?

- ✓ EMPLOYEES...YES

- ✓ SUPERVISORS...YES
- ✓ UPPER MANAGEMENT...NO

47.6.1 EMPLOYEES

All non-management employees should be eligible to participate in the program, regardless of the level of risk. Unnecessary resentment may arise if you selectively make the incentives available to only some departments. You may choose to have departments with lower risk have more persons on their teams. In companies where there is a clear and fairly even split between a higher and lower risk group of employees, some employers have required that teams be composed of an equal number of employees from each risk group. Splitting the risk and/or altering the size of the teams are both examples of fine-tuning, and not necessary for your program to be successful. The only overriding factor is that the program be for the employees.

47.6.2 SUPERVISORS

The role of supervisors can be a key to the success of the program. If they work in an environment where they are interacting with their employees on a daily basis, they should be part of the total program, but separate.
Their own pool should be established, with only one prize awarded if the supervisor pool is less than twenty-five (25). The prize will only be made available if the company experiences no injuries during that month. The size of the prize should be roughly equivalent to the top prize made available to other employees. If the number of supervisors is less than ten, consider monthly awards of a smaller nature, since the likelihood of repeat winners is strong. Inclusion in the program means greater involvement from the supervisors in seeing that all the employees conform to safety precautions and regulations.
If the company's supervisors are in a hands-off, non-involved capacity, due to geographical separation or other circumstance, it may not be necessary to establish a pool for them and include them in the program.

47.6.3 UPPER MANAGEMENT

One of the factors that make this program so successful is the belief that it is for the employees. It is! Upper management is rarely in a high-risk position, and typically has great motivation to take safety precautions to do things the right way. Resentment will occur if upper management participates and wins any of the raffle prizes, so they are best left out.

47.7 BEFORE YOU BEGIN YOUR PROGRAM

1. Set Firm and Measurable Goals for reducing the number of claims that your company has.
   Set the number based on claims, since this is the area that can truly be controlled. Unfortunately, you can do everything right, and still experience one severe injury that throw your dollar numbers off unfairly. If you control your total number of claims, the likelihood of reducing your severe claims is equal to the success of reducing all other claims.
2. Share Your Goals with your Employees.
   Let them know how important safety is to the company and let them know the financial ramifications. Tell them who pays for workers' compensation insurance, as they sometimes labor under the impression that it is a federal program, or that they pay for it with their taxes, or that it is in some way just another impersonal insurance policy. Then relate how saving the money that is currently spent on workers' comp can save jobs, allow for raises and bonuses, and contribute to the overall health of your company.
3. Share Your Goals with your Supervisors.

They are the daily carriers of the safety message. If they support the program, and constantly remind their employees of safety precautions, and the need to prevent injuries, the employees will better understand that the whole company is in concert. Your supervisors will have a great impact on the success of your program and must be encouraged to participate in every way. The leaders of the safety meetings, per your IIPP, should be further encouraged to consistently hold their meetings, presenting topics of relevance and discussing situations that arise in the workplace.

47.8 BEGINNING YOUR PROGRAM

1. **Inform Your Employees**.
   Post notices around your facility, put information in your newsletter, provide a one-page flyer, etc. that an exciting new injury prevention program will be starting. If you hold company meetings, announce it at that time. If you do not, consider doing so. Do not give out specific details of the program, but rather whet their curiosity with an announcement that a program for the employees will be introduced shortly.
2. **Post Team Sign-Up Sheets or Departmental Listings**.
   Decide if you want to use existing departments within the company or create new teams. Base your decision on size, risk and experience. Teams should contain between ten (10) and twenty-five (25) people. The rule of thumb is, the higher the risk, the smaller the teams.
3. **the Announcements to Their Homes**.
   The announcement should contain a letter from the company president, stating the importance of injury-prevention; an outline of the rules of the program, and a statement of what the prizes will be the first month. You may want to consider cash for most months, since people have the greatest response to it as a motivator. The first month, however, there can be an advantage to making a specific prize available, such as a television set, so that the employees can picture it all month. For maximum value, the prizes should be occasionally changed.
4. **Hold a Kick-Off Meeting to Start the Program**.
   The program should be announced with a kick-off meeting on the first day of the month and run every calendar month. If it is done on a fiscal month, or broken up in any other way, it is more difficult for the employees to focus, and that, of course, is the goal of the whole program. If they know that it is every month, they can concentrate on safety one month at a time. At the kick-off meeting, the person responsible for administering the program should explain to the employees the purpose of having a safety/incentive program (injury prevention and cost savings), share the company's goal and target for injury reduction, and be prepared to answer all questions.

47.9 RUNNING THE MONTHLY AWARDS RAFFLE

1. **Pick a Convenient Time and Place.**
   Your objective is to get as many people as possible to attend the drawing and the awarding of prizes or cash. For every company it will vary, so give it a great deal of thought, and don't be afraid to change, if your first option does not prove to be the best. Because it is the employees' program, we do not recommend that you make attendance at the meeting mandatory; employees will want to attend if they can. Some companies have had success holding the drawing a few minutes prior to work, others at lunch break, or at a shift change. If all your employees are in one facility, your options are a good deal easier.
2. **Make It a Party!**
   Your employees should have the award drawing in an upbeat atmosphere, where they can feel good about their accomplishments. The spirit should be one of celebration. Make sure that everyone can see what is going on and allow talking. Remember, this is not a board meeting, but an employee meeting. It

is **their** meeting. Some companies play music, and many provide donuts or fast food, served by supervisors or managers. The specifics are not as important as the atmosphere that you create.

3. **Keep the Employees Involved.**
   Although the management representative that has been designated to administer the program should be responsible for conducting the awards meeting, the employees should play a major role. Let the previous month's winner start the drawing off, choosing the lowest prizewinner. Then let that winner choose the next award recipient, and so on. The administrator should read the winner's name, after the employee draws the card from the raffle box, to prevent any possible conflicts. Encourage (lead the) applause after every winner's name is announced, popular employees won't have a problem, but new or shy employees will need to be supported with applause, as well.

4. **How to Handle Eliminate Teams.**
   If your company is using the team or department split, there are a couple ways to handle it, if an injury has occurred, and a team is eliminated.
   Prior to the drawing, the administrator can physically remove the cards of all members of the eliminated team.
   Or the cards can be left in, with an announcement at the drawings of which team(s) has/have been eliminated due to the filing of a claim. If a member of the eliminated team's card is drawn, the administrator simply says, "The winner would have been a member of team X, but team X had an injury this month, and all members are thus ineligible for an award". Then another drawing should immediately take place. Without naming the actual person who would have won, the impression is left with everyone that it might have been them. Positive peer pressure to avoid injuries next month is the result.

5. **Make Prizes Available Immediately.**
   If you have decided to use cash as your incentive, it should be put in company envelopes and presented to the winners as soon as their names are announced. There is something very motivational about instant gratification. If you are awarding prizes, have a certificate for the prize or prize group ready to present to the winner.
6. **Take Pictures of the Winners.**
   Whether you take them of the group of winners, or individually makes little difference. The important thing is to give recognition of the winners who represented a safe effort for your company.
7. **Leave the Meeting with Words of Encouragement**.
   Tell the employees before you break how much you appreciate their efforts. Tell them how important it is that they continue to concentrate on injury-prevention and remind them that their efforts are paying off.
8. **Do Your Paperwork.**
   If you need to order prizes, now is a good time to do so. If you need to write an article for your company newsletter, do it while the drawing is fresh in your mind. The more immediate the response, the more your employees will understand how important their efforts are, and how much they are appreciated.

47.10 TIPS AND HELPFUL HINTS

47.10.1 REWARD EXTRA EFFORT FROM YOUR EMPLOYEES

One of the questions that came up in designing the plan was how to reward the employees who put forth extra effort, who helped others or corrected unsafe conditions to the benefit of everyone. Their efforts need to be recognized by their supervisors, who should be allowed to put employees names into the monthly drawing extra

times, for extra effort. One way to monitor this is to allow each supervisor a prescribed number of extra safety cards, or the equivalent, to add to the raffle every month, in recognition of "extra effort".

If an employee makes a valid safety suggestion, his/her name should automatically be added to the raffle. It is that kind of involvement that you are trying to stimulate. If the suggestion is relevant, you may want to read it prior to the drawing. If not, the person's name should at least be read, and recognition given prior to the drawing.

47.10.2 FINE-TUNE THE PROGRAM TO KEEP IT FRESH

The last thing you need to worry about is if the incentives motivate your employees. If your top prize is a meaningful one, they will be motivated. But it is a good idea to keep the program fresh by occasionally changing things. For example, if you use cash as your award, then one month announce in advance that the top prize the following month will be a prize, such as a television or "boom box", etc. Another month, either as an addition, or in place of your lowest prize, offer $10 gift certificates to a pizza or fast-food restaurants to every member of a team. This way you get greater participation in the winnings, even though the amount is small.

If the results are not what you want, change the teams, and talk to your employees. Share with them that they are still experiencing too many injuries and ask for reasons. The better job that you do in conveying your concern, the more people will focus on safe practices. If your incentives are not high enough, this is an obvious area to adjust. Some companies have made the "Penny-wise, Dollar foolish" decision to cut corners on their incentive money. The reality is that large incentives get through to people as a large benefit, and the focus on safety is greater.

SAFETY MEETING & INCENTIVE PARTICIPATION

ATTENDANCE FORM

I hereby certify that I attended my Company's Safety Meeting on _____
DATE

The subject of the meeting was _____

I hereby certify that I have been injury free for the past month and am eligible to participate in this month's Safety Incentive Program.

FOLD HERE

_____ _____
SIGNED DATE

_____
Employee #

48 SANDBLASTING SAFETY & SILICA EXPOSURE

SANDBLASTING SAFETY & SILICA EXPOSURE

48.1 INSPECTION PROCEDURES

Every component of a sandblasting setup must be checked out and its proper
Operation/Function assured before any attempt is made to put the unit into service.

1. Hoses valves, handles, and adjustment knobs must be in good condition. Hoses with soft spots, broken couplings, and damaged outer casings are not to be used.
2. Dead man lines and switches must be in good condition. Electric dead man lines must not have cracked insulation or bad splices, pneumatic dead man lines must be crack free and must not have abraded outer castings. Dead man switches/valves must operate freely and without obstruction.
3. Sandblast hoods must be complete; that is, they must have a helmet, suspension, “sock,” cape, apron, and belt with needle valve or vortex tube for conditioning and controlling air flow. The helmet must have a clear faceplate.
4. Couplings that are missing parts or that are noticeably worn or deformed are to be removed from service.
5. Never override dead man switches with tape, rope, or other means.
6. Signs and/or barricades should be posted to warn workers about the hazards and specify any protective equipment required.
7. Supervisors are responsible to ensure the appropriate sandblasting equipment is used.

48.2 ABRASIVE MATERIAL TOXICITY

1. Whenever hazardous substances such as dust, fumes, mists, vapors, or gases exist or are produced in the course of construction work, their concentrations shall not exceed the limits specified in 1926.55(a). When ventilation is used as an engineering control method, the system shall be installed and operated according to requirements of this section.

Abrasives and the surface coatings on the materials blasted are shattered and pulverized during blasting operations and dust formed will contain particles of reparable size. The composition and toxicity of the dust from these sources shall be considered in making an evaluation of the potential health hazards.

The use of Silica Based Abrasive Material can result in silicosis, which is characterized by shortness of breath, fever and bluish skin. It could be diagnosed as pulmonary edema (fluid in lungs), pneumonia or tuberculosis. Silica dust causes severe fungal infection to develop. This condition could be fatal.

48.3 SILICOSIS IS CATEGORIZED INTO THREE TYPES:

- **Chronic -** Ten years exposure to low concentrations.
- **Accelerated -** Exposure to high concentrations and develops five to ten years after initial exposure.
- **Acute -** Exposure to extremely high concentrations and symptoms develop within a few weeks to a few years.

48.3.1 HAZARDOUS COATINGS AND METALS

- When removing coatings and cleaning certain metals, hazardous materials may be released into the air. Respiratory protection may be required.

48.4 HAZARDS OF STATIC ELECTRICITY AND EXPLOSIVE MIXTURES

Organic abrasives, which are combustible, shall be used only in automatic systems. Where flammable or explosive dust mixtures may be present, the construction of the equipment, including the exhaust system and all electric wiring, shall confirm to the requirements of American National Standard Installation of Blower and Exhaust Systems for Dust, Stock, and Vapor Removal or Conveying, The blast nozzle shall be bonded and grounded to prevent the build-up of static charges. Where flammable or explosive dust mixtures may present, the abrasive blasting enclosure, the ducts, and the dust collector shall be constructed with loose panels or explosion venting areas, located on sides away from any occupied area, to provide for pressure relief in case of explosion.

48.5 SETUP PROCEDURES

1. Position air compressor upwind of sandblasting areas, if possible.
2. Position sandblast machine as close to work area as practical.
3. Lay out hoses, couple together, and wire or otherwise secure couplings to prevent them from being twisted apart.
4. Couple bull-hose to compressor and sand pot, wire couplings, and use rope to tie hose to compressor and sand pot.
5. Couple sandblast hose to sand pot and wire couplings.
6. Dead man Lines
7. Electric dead man lines should be plugged into the terminal on the junction box at the front of the sand pot.
8. Pneumatic dead man lines should be connected to the couplings at the rear of the pot.

> ***WARNING**: It is possible to connect these lines in reverse if the couplings are the same (either two male snap-couplings or two threaded fittings) and in this case, the hoses and their respective couplings must be color-coded to prevent mix-up. The result of connecting the lines in reverse is that the system will turn on when the trigger is pressed but will not shut off when it is released.*

9. Attach dead man switch/valve to whip hose near nozzle. The switch/valve may be wired to the coupling or taped to the hose.
10. Tape the dead man lines to the whip hose and sandblast hoses.
11. Close dump valve, choke valve, and inlet valve.
12. Start air compressor.
13. Sandblaster puts on hood and takes control of sandblast hose.
14. (Electric controls only) Connect lead wire to compressor battery.
15. Open inlet valve; once sand pot is pressured up, open choke valve and signal sandblaster to begin.
16. Operational Procedures and General Safety-Dust shall not be permitted to accumulate on floor or on ledges outside of an abrasive blasting enclosure, and dust spills shall be cleaned up promptly. Aisles and walkways shall be kept clear of steel shot or similar abrasive, which may create a slipping hazard.
17. Compressed air shall not be used for cleaning purposes except where reduced to less than 30 psi and then only with effective chip guarding and personal protective equipment as referenced in 1910.242(b) and 1926.302(b)(4).

48.6 SHUT DOWN PROCEDURES

1. Close choke valve and inlet valve.
2. Shut down air compressor.
3. Open dump valve.

4. CAUTION: A 3/4-inch dump valve will produce noise in excess of 130 dB when it is opened, as well as blowing sand and pieces of ice with great force. Stand clear and wear hearing protection.
5. (Electric controls only) Disconnect lead wire from compressor battery.

48.7 REFILLING SAND POT (FIVE AND SEVEN-TON-MOBILE UNITS ONLY)

1. Follow shutdown procedures under 4 above.
2. Uncouple bull-hose and pull out of the way.
3. Uncouple both (if using two) sandblast hoses and both sets of dead man lines.

***WARNING**: When re-attaching hoses to sand pot, be sure they are attached to the same couplings they were removed from. Connecting the sandblast hoses to the wrong couplings could result in one of the sandblast hoses being activated by the control mechanism on the other hose.*

48.8 PERSONAL HYGIENE

- All sandblasters should wash their hands and faces before eating, drinking or smoking.
- No eating, drinking or tobacco products in the blasting area.
- Workers should shower before leaving work site.
- Vehicles should not be parked in a contaminated area.
- Workers should change into disposable or washable work clothes at the work site.
- Workers should change into clean clothing before leaving the work site.

48.9 PRECAUTIONS AND SPECIAL SITUATIONS

48.10 HOSES

1. Hoses should be examined by feel; if a soft spot is found by flattening the hose between the hands, the hose must be taken out of service and repaired or discarded.
2. Bull hoses do not normally develop soft spots. They do develop blisters that are visible when the hose is under pressure. If a bull hose has a blister, it must be taken out of service.
3. Hose couplings are normally made of brass or bronze (aluminum couplings are available but are not recommended due to their brittleness).
    a. Couplings that are noticeably worn or deformed must be removed and discarded.
    b. If the wiring holes in a coupling are worn through, the coupling must be discarded.
    c. A full complement of screws must be installed on each coupling; missing screws must be replaced before the hose may be used.

48.11 DEAD MAN SWITCHES/VALVES

48.12 ELECTRIC EQUIPMENT

1 The dead man switch must be in good condition, with no parts missing or substituted.
2 The cable from the switch to the junction box and from the junction box to the compressor battery must be in good condition; the outer insulation must be undamaged, and any splices must be well made and securely taped with vinyl electrician's tape.
3 It is NEVER permissible to block the wobble stock of an electric dead man switch sandblasting. The switch must be manually depressed and held in during blasting.
4 Pneumatic Equipment
5 Pneumatic dead man valves must be clean and grit free before being used.

6 The duplex hose must be in serviceable condition, with no cuts, abrasions, or cracks in the outer casting.
7 Couplings or threaded fittings must be clean and free of damage.

***WARNING**: If similar couplings (e.g., two male snap-couplings) are used on the sand pot, one of them and the matching hose coupling must be color-coded to prevent reversing the air flow through the dead man valve. In at least one brand of equipment, this creates a very dangerous situation.*

48.13 BREATHING AIR FILTERS

1 In most cases, the filters provided for breathing air will either be a Bullard 41A or a similar one manufactured under license from Bullard. This filter must be changed, and the filter case cleaned at least every six months.
2 An odor of hot oil or the pretenses of water mist in the hood air means a filter malfunction. Blasting must stop and the problem must be corrected before work resumes.
3 The filter case is equipped with a petcock-type bleeder on the bottom to allow expulsion of water condensate. This petcock must be left partially opened during use of the filter.

48.14 HOSE AND COUPLINGS

1 Bull hose couplings may not be replaced in the field unless a hydraulic bonding tool is available, this tool is essential to ensure that the couplings stay on once they are replaced.

48.15 SANDBLASTING IN CONFINED SPACES

1 All applicable procedures in the Confined Space Policy and Respiratory Protection Policy, sections of this manual must be followed.
2 A positive means of communication must be established between the sandblaster and his attendant. The sandblaster's attendant must remain in the area at all times during the course of operations.
3 In the event of an emergency, the attendant will close the choke valve. This will be a signal to the sandblaster that he must leave the confined space in the quickest way commensurate with his personal safety.

48.16 MODIFICATION OF SANDBLASTING EQUIPMENT

1 Sand pots
    a. All modifications to sand pots must be checked and approved by the equipment manufacturer.
    b. Any welding and/or cutting modifications to sand pots must be done in accordance with applicable provisions of the ASME Boiler and Pressure Vessel Code or applicable state or local regulations.
2 Other Equipment
    a. Sandblasting equipment may not be modified IN ANY WAY.

48.17 RESPIRATORY PROTECTION EQUIPMENT GUIDELINES

1 All equipment used to supply breathing air to sandblasters, including air compressor, must conform to 29 CFR 1926.57.
    a. Air produced by a compressor and used for breathing purposes must conform to the Compressed Gas Associations specification for Grade D air. The CGA imposes the following limitations on Grade D air:
        1.a.3 Oxygen content: 19.23%
        1.a.4 Carbon Dioxide: 1000 parts per million (.001percent)
        1.a.5 Carbon Monoxides: 20 parts per million (.0002 percent)
        1.a.6 Oil vapor: *5* mg per cubic meter.

1.a.7 Water vapors: vanes - the water vapor present in the air must not be so great as to cause condensation in the air lines and subsequent delivery of liquid water into the sandblast hood.

2 Air supplied by oil-lubricated compressors must be monitored for carbon monoxide content. Carbon monoxide monitoring may be performed in the following manner.
   a. A continuous, in-line monitor may be installed.
   b. A purifying filter that removes carbon monoxide may be installed.
   c. The air may be tested at regular intervals with a detector type sampler designed for carbon monoxide. Test intervals will vary depending upon conditions.

3 Filters used for purifying breathing air will be serviced regularly.
   a. Filters used to remove water vapor, oil mist and particulate from breathing air will be serviced at intervals not to exceed six months.
      3.a.3 Filters used to remove carbon monoxide from breathing air will be serviced according to the manufacturer's recommendations, however, the intervals between service will not exceed one month or whenever the filter material changes color (if a color changing type), whichever is less.
      3.a.4 Servicing of filters for breathing air must be documented as to the date the filters were changed, and date of all periodic inspections.

48.18 TRAINING

1 All training shall be documented on the Record of Training Form.
2 Additional training materials can be obtained from a Service District library and Safety Director.

48.19 TESTING AND CERTIFICATION

1 Project Supervisor shall ensure that all testing is done in an ethical manner.
2 A written test shall be handed out after training material has been presented. The test is a closed book test.
3 Any trainee who completes the test, missing more than three questions will be required to review the training material with the instructor.
4 The instructor can present the test questions orally, one on one, with a trainee when necessary.

The instructor shall complete the Record of Training Form, for those trainees who complete the training. The Record of Training Form and written tests shall be kept in the local service area office.

49 SCAFFOLDING SAFETY

SCAFFOLDING SAFETY PROGRAM

49.1 PURPOSE

The purpose of this program is to prevent injuries due to falls from elevated work areas and ensure employees and contractors are able to inspect scaffolding materials and erected scaffolds.

49.2 SCOPE

This program is applicable at every work area where scaffolding is erected. When work is performed on a non-owned or operated site, the operator's program shall take precedence, however, this document covers 3A Group employees and contractors and shall be used on owned premises, or when an operator's program doesn't exist or is less stringent.

49.3 DEFINITIONS

- Bearer - A horizontal member of a scaffold upon which the platform rests and which may be supported by ledgers.
- Brace - A tie that holds one scaffold member in a fixed position with respect to another member.
- Coupler - A device for locking together the components of a tubular metal scaffold which shall be designed and used to safely support the maximum intended loads.
- Double pole or independent pole scaffold - A scaffold supported from the base by a double row of uprights, independent of support from the walls and constructed of uprights, ledgers, horizontal platform bearers, and diagonal bracing.
- Guardrail - A rail secured to uprights and erected along the exposed sides and ends of platforms.
- Heavy Duty Scaffold - A scaffold designed and constructed to carry a working load not to exceed 75 pounds per square foot.
- Ledger (stringer) - A horizontal scaffold member which extends from post to post and which supports the putlogs or bearer forming a tie between the posts.
- Light Duty Scaffold - A scaffold designed and constructed to carry a working load not to exceed 25 pounds per square foot.
- Manually Propelled Mobile Scaffold - Manually propelled mobile scaffold.
- Maximum intended load - The total of all loads including the working load, the weight of the scaffold, and such other loads as may be reasonably anticipated.
- Medium duty scaffold - A scaffold designed and constructed to carry a working load not to exceed 50 pounds per square foot.
- Mid-Rail - A rail approximately midway between the guardrail and platform, used when required, and secured to the uprights erected along the exposed sides and ends of platforms.
- Putlog - A scaffold member upon which the platform rests.
- Runner - The lengthwise horizontal bracing or bearing members or both.
- Scaffold - Any temporary elevated platform and its supporting structure used for supporting workmen or materials or both.
- Toe board - A barrier secured along the sides and ends of a platform, to guard against the falling of material.
- Tube and coupler scaffold - An assembly consisting of tubing, which serves as posts, bearers, braces, ties, and runners, a base supporting the posts, and special couplers which serve to connect the uprights and to join the various members.

- Tubular welded frame scaffold - A sectional, panel, or frame metal scaffold substantially built up of prefabricated welded sections that consist of posts and horizontal bearer with intermediate members. Panels or frames shall be braced with diagonal or cross braces.
- Working Load - Load imposed by men, materials, and equipment.

49.4 KEY RESPONSIBILITIES

49.4.1 MANAGERS AND SUPERVISORS

- Responsible for ensuring that scaffolds are erected by a qualified person, that set up inspections are performed, and all daily inspections are performed before work starts for the day.
- Responsible for ensuring that all employees, and/or contractors have been trained in the use and inspection methods for scaffolds. Only qualified and competent personnel are allowed to use or modify scaffolding systems.
- Responsible for ensuring that all employees and contractors are aware that if an inspection discovers a defect, the scaffold cannot be used until repairs are made.

49.4.2 EMPLOYEES

- Responsible for following this program by inspecting the scaffolds daily and report any damages or repairs that may be needed to their supervisor.

49.5 PROCEDURE

49.5.1 GENERAL REQUIREMENTS

- Scaffolds shall be furnished and erected in accordance with applicable standards for persons engaged in work that cannot be done safely from the ground or from solid construction. Except that ladders used for such work shall conform to ladder safety standards.
- Scaffolds shall only be erected by a qualified third party, who is competent to certify the scaffolding safe to use.
- The footing or anchorage for scaffolds shall be sound, rigid, and capable of carrying the maximum intended load without settling or displacement. Unstable objects such as barrels, boxes, loose boards shall not be used to support scaffolds or planks.
- Scaffolds and their components shall be capable of supporting without failure at least four times the maximum intended loads. Scaffold components must meet OSHA requirements 29 CFR 1910.28 and 29 CFR 1926.451.
- Wood scaffold planks must be cross-supported every 8 feet. Scaffold deck boards shall be cleated, wired or nailed into place.
- All working levels of scaffolds will be floored completely except where internal ladders require space for ladder openings.
- Scaffolds and other devices mentioned or described in this program shall be maintained in safe condition. Scaffolds shall not be altered or moved horizontally while they are occupied.
- Any scaffold damaged or weakened from any cause shall be immediately repaired and shall not be used until repairs have been completed.
- Scaffolds shall not be loaded in excess of the working loads for which they are intended.
- Bolts used in the construction of scaffolds shall be of adequate size and in sufficient numbers at each connection to develop the designed strength of the scaffold.
- All platforms shall be overlapped (minimum 12 inches) and secured from any movement.
- An access ladder or equivalent safe access shall be provided.

- Scaffold planks shall extend over their end supports not less than 6 inches or more than 18 inches.
- The poles, legs, or uprights of scaffolds shall be plumb, and securely and rigidly braced to prevent swaying and displacement.
- Materials being hoisted onto a scaffold shall have a tag line.
- Overhead protection shall be provided for workers on a scaffold exposed to overhead hazards.
- Toe boards and guardrails shall be installed if a scaffold or platform is erected to a height of 6 feet or more. Scaffolds shall be provided with a screen between the toe board and the guardrail, extending along the entire opening, consisting of No. 18 gauge wire one-half inch mesh or the equivalent, where workers are required to work or pass under the scaffolds.
- Work shall not be performed on a scaffold during storms or high winds.
- Work shall not be performed on scaffolds that are covered with snow or ice, unless all snow and ice has been removed and all planking has been sanded to prevent slipping.
- Tools, material, and debris shall not be allowed to accumulate in quantities to cause a hazard.

49.6 INSPECTIONS

Scaffolding shall be inspected, by a qualified person, in conjunction with the manufactures required recommendations. The competent person must also ensure scaffolds are safe prior to and during scaffold use.

- At a minimum, the following shall be inspected by the competent person after erection, before the start of the day or beginning of a shift change to ensure scaffolds are safe prior to and during use:
  - Ground or surface footing shall be inspected to ensure that there is no settling.
  - All main supports and cross braces shall be inspected for any signs of damage, missing pins, bolts and any locks and/or safety keepers.
  - All walking surfaces and/or planks shall be inspected for damage and proper placements and any possible movement.
  - All walkways and planks must be secure to prevent any movement.
- Inspection shall be made to ensure that the scaffold is stable, and any movement is prevented.
- If during the inspection, a defect or damage to the scaffold is discovered, the scaffold shall be tagged out by the competent person, complied with and use prohibited until needed repairs are made.

49.7 MANDATORY SIGNS AND TAGS FOR DEFECTS FOUND

Signs and tags shall be visible at all times when work is being performed and shall be removed or covered promptly when the hazards no longer exist. Employees shall be instructed in complying with signs and tags.

Defective or unsafe equipment or conditions shall be tagged out by the competent person using a weather resistant tag secured to the scaffolding structure on all four sides and must be complied with. An example would be improper footing conditions were observed.

Danger signs shall be used only where an immediate hazard exists. Danger signs must be posted around the immediate area of the scaffold, to alert other workers of possible danger from falling objects from the scaffold.

Caution Signs and/or barricade tape shall be used to mark off a larger area around scaffolding warning other workers to use caution.

49.8 MODIFICATIONS

Modification and repairs shall be performed by a qualified person, who is competent to certify the scaffolding safe to use to ensure non-qualified personnel do not create additional hazards.

Employees shall not perform any modifications or repairs, unless they have been trained and certified, and failure to comply may result in disciplinary action and or termination.

49.9 TRAINING REQUIREMENTS

3A Group is required to train all employees that work on scaffolds regarding hazards by "qualified" persons. The supervisor shall have each employee who performs work while on a scaffold trained by a person qualified in the subject matter to recognize the hazards associated with the type of scaffold being used and to understand the procedures to control or minimize those hazards. The training shall occur before use and include the following areas:

- Basic safety information and duties of a competent person assembling/disassembling scaffolding (see below). Basic safety information must be provided prior to use and when conditions change.
- Hazards including fall protection, electrical safety, falling object protection (see below).
- Tags – types and the requirement to comply with.
- The proper use of the scaffold, and the proper handling of materials on the scaffold.
- The correct procedures for dealing with electrical hazards and for erecting, maintaining, and disassembling the fall protection systems and falling object protection systems being used.
- The maximum intended load capacity of the scaffolds used.

The supervisor shall have each employee who is involved in erecting, disassembling, moving, operating, repairing, maintaining, or inspecting a scaffold trained by a competent person to recognize any hazards associated with the work in question.

- The training shall include the following topics, as applicable:
- The nature of scaffold hazards.
- The correct procedures for erecting, disassembling, moving, operating, repairing, inspecting, and maintaining the type of scaffold in use.
- The design criteria, maximum intended load-carrying capacity and intended use of the scaffold.

When the employer has reason to believe that an employee lacks the skill or understanding needed for safe work involving the erection, use or dismantling of scaffolds, the employer shall retrain each employee so that the requisite proficiency is regained. Retraining is also required in at least the following situations:

- Where changes in scaffolding at the worksite present a hazard about which an employee has not been previously trained.
- Where changes in the types of scaffolds, fall protection, falling object protection, or other equipment present a hazard about which an employee has not been previously trained.
- Where inadequacies in an affected employee's work involving scaffolds indicate that the employee has not retained the requisite proficiency.

49.10 HAZARDS ASSOCIATED WITH THE USE OF SCAFFOLDS

- Nearby electrical lines or source of electrical hazards
- Poor foundation – scaffold shall be erected on a firm and stable base.
- Damaged scaffold components.
- Overload of scaffold components (load capacity).
- Unstable, incomplete or incorrect use of scaffold.
- Base frames not adequately braced, tied or supported.
- Scaffold exceeds height to base dimensions ratio.

- Inappropriate access or egress points.
- Slips and falls.
- Falling objects.
- Manual handling.
- Movement of plant and machinery – all cranes and mobile machinery shall keep within designated areas and away from scaffolding.

49.11 DUTIES OF A COMPETENT PERSON ASSEMBLING/DISASSEMBLING SCAFFOLDING

49.11.1 GENERAL

- To select and direct employees who erect, dismantle, move, or alter scaffolds.
- To determine if it is safe for employees to work on or from a scaffold during storms or high winds and to ensure that a personal fall arrest system or wind screens protect these employees. (Note: Windscreens should not be used unless the scaffold is secured against the anticipated wind forces imposed.)

49.11.2 FOR TRAINING

- To train employees involved in erecting, disassembling, moving, operating, repairing, maintaining, or inspecting scaffolds to recognize associated work hazards.

49.11.3 FOR INSPECTIONS

- To inspect scaffolds and scaffold components for visible defects before each work shift and after any occurrence which could affect the corrective actions.
- To inspect ropes on suspended scaffolds prior to each work shift and after every occurrence which could affect the structural integrity and to authorize prompt corrective actions.
- To inspect manila or plastic (or other synthetic) rope being used for top rails or midrails.

49.11.4 FOR SUSPENSION SCAFFOLDS

- To evaluate direct connections to support the load.
- To evaluate the need to secure two-point and multi-point scaffolds to prevent swaying.

49.11.5 FOR ERECTORS AND DISMANTLERS

- To determine the feasibility and safety of providing fall protection and access.
- To train erectors and dismantlers to recognize associated work hazards.

49.11.6 FOR SCAFFOLD COMPONENTS

- To determine if a scaffold will be structurally sound when intermixing components from different manufacturers.
- To determine if galvanic action has affected the capacity when using components of dissimilar metals.

Tube and Coupler Scaffolds - Light Duty

Uniformly distributed load	Not to exceed 25 p.s.f.

Post Spacing (longitudinal)		10 ft. 0 in.
Post Spacing (transverse)		6 ft. 0 in.
Working Levels	**Additional Planked Levels**	**Maximum Height**
1	8	125 ft.
2	4	125 ft.
3	0	91 ft. 0 in.

Tube and Coupler Scaffolds - Medium Duty

Uniformly distributed load		Not to exceed 50 p.s.f
Post spacing (longitudinal)		8 ft. 0 in.
Post spacing (transverse)		6 ft. 0 in.
Working Levels	**Additional Planked Levels**	**Maximum Height**
1	6	125 ft.
2	0	78 ft. 0 in.

50 SLIPS, TRIPS & FALLS

SLIPS, TRIPS & FALL

50.1.1 SLIP, TRIP, & FALL HAZARDS

Common slip, trip and fall hazards result from:

1. Wet or contaminated floors (e.g. grease, liquids, ice, oil, dust fine powders, etc.).

Containment	Source
Rainwater	Transmitted internally from open external doors or from the feet, coats or umbrellas of pedestrians. Building leaks
Water, other fluids	From spills, plumbing leaks, cleaning, ice machines
Floor cleaning products	Resulting from failure to follow appropriate protocol
Body fluids	Blood, vomit
Condensation	Variations in temperature
Dusts	Natural or from stored materials
Debris	Bags, paper, food residues, soil, cardboard boxes

2. Uneven walking surfaces, holes, changes in level, broken or loose floor tiles, defective or wrinkled carpet or uneven steps/thresholds.
3. Mats or rugs not lying flat on the floor.
4. Obstructions and accumulation of objects in walkways (e.g. hoses, cords, cables, debris, etc.).
5. Unguarded platforms, walkways, and work areas 30 inches above ground.
6. Inadequate illumination (refer to Appendix B for specific requirements).

50.2 HIGHER RISK AREAS

For purposes of this Manual, an area where slip, trip, or fall hazards may likely arise during a typical work shift, is considered a “higher risk area”. Examples of higher risk areas include:

- Break rooms – wet floor
- Locker rooms – wet floor
- Loading docks – elevated locations

50.3 INSPECTIONS

Inspections to identify slip, trip and fall hazards are recommended at least annually, ideally prior to the wet season. For higher risk areas, a formal inspection is recommended at least on a quarterly basis; more frequently depending on the likelihood for changing conditions. For building common areas, recommend the building manager conduct inspections.

Recommended inspections should minimally include evaluation of the following:

- Condition of floors, carpets, and steps
- Floor maintenance protocol
- Housekeeping practices
- Lighting levels
- Presence and condition of guardrails/ handrails at elevated work surfaces. Refer to Appendix B for specific requirements.

50.4 HAZARD CONTROL MEASURES

50.4.1 GENERAL HOUSEKEEPING PROCEDURES / SAFE WORK PRACTICES

The following housekeeping procedures and safe work practices must be followed to prevent accidents associated with slip, trip and fall hazards:

50.4.2 GENERAL SAFETY

- Avoid running or walking too fast, especially in higher risk areas.
- Avoid carrying items that will obstruct one's view of their walking pathway.
- Avoid walking through potential slip, trip and fall hazards.
- Use extra caution when traveling both outdoors and indoors during/ following wet weather.

50.4.3 GENERAL HOUSEKEEPING PROCEDURES

- Clean up spills immediately. For greasy liquids, use suitable cleaning agent.
- Do not leave floors wet after cleaning – clean them to a completely dry finish if possible. If "clean-to-dry" is not possible, then use barriers and "wet floor" warning signs to keep people off the wet area.
- Use cleaning methods that do not spread the problem. Small spills are often better dealt with using a paper towel instead of a mop that wets a larger area of floor.
- Do not use cardboard to soak up spills.

50.4.4 SLIP HAZARDS

- Floors, platforms, and walkways **shall** be maintained in good repair, and reasonably free of oil, grease, or water. Mats, grates, or other methods that provide equivalent protection **shall** be used on areas where operation requires walking on slippery surfaces.
- Slip-resistant floor coatings should be used in areas that are likely to get wet or subject to frequent spills.
- Slip hazards must be identified and removed promptly.
- Warning signs or other equally effective means (barricades) should be used as a warning system in areas where a slip hazard is present.

50.4.5 TRIP HAZARDS

- Platforms and walkways **shall** be free of obstructions & dangerous projections (e.g. extension cords, power cables, hoses, carts, boxes, debris).
- Position equipment to avoid cables crossing pedestrian routes; use cable covers securely fix to surfaces or consider use of cordless tools.
- Surfaces in poor repair (i.e. holes, surface upheaval, and broken tiles) **shall** be repaired or guarded by readily visible barricades, rails or other equally effective means.
- Ensure floor mats and rugs are securely fixed and do not have curling edges.

50.4.6 FALL HAZARDS

- Elevated Locations
- Guardrails **shall** be provided on all open sides of unenclosed elevated locations.
- Example of elevated locations include balconies, runway ramps, or working surfaces that are more than 30 inches above the floor, ground, or other working areas of a building.
- For Roofs: Guardrails **shall** be provided at locations where there is routine need for an employee to approach within 6 feet of the edge of the roof. Where such

- roof access is needed no more than 4 times a year, safety belts, lanyards, or an approved fall protection system may be used in lieu of guardrails.

50.4.7 STAIRWAYS:

- Stairways **shall** have handrails or stair rails on each side. Refer to Appendix B for specific requirements.

50.4.8 LADDER USE:

- When a ladder is used, the employee shall follow safe ladder practices. Ladder safety training is available from EH&S for 3A Group employees.
- Elevating Work Platforms & Aerial Devices (e.g. vertical tower, scissor lift, mast-climbing work platform):

Only employees who have been trained and approved by the supervisor shall operate elevating work platforms and aerial devices. NOTE: Aerial device and elevating work platforms are vehicle-mounted or self-propelled device designed to elevate a platform/ individual in a substantially vertical axis.

50.4.9 FLOOR MATS AND OTHER FLOOR TREATMENTS

Where work processes are expected to create wet floor surfaces, such surfaces shall be protected against slipping by using mats, grates, cleats, or other methods that provide equivalent protection.

Where wet processes take place, drainage shall be maintained and false floors, platforms, mats, or other dry standing places provided.

50.4.10 FLOOR MATS

Floor mats shall be placed in building entrances and higher risk areas where walking-working surfaces may encounter wetness or other slippery conditions.

Examples of these areas include:

1. Areas adjacent to food counters and food preparation areas
2. Cooking areas
3. Dishwashing areas
4. Frying station

The design of floor mats should have the following features:

- Slip resistant surface on both top and bottom sides.
- Beveled edges, flat edges or similar design to help reduce the likelihood of workers tripping on the mat's edges.
- Slots or similar design to help promote drainage and prevent accumulation of water & grease.
- Antibacterial treatment or similar design to help prevent the growth of mold and mildew.

Floor mats should not be installed and used in a way where the mat itself becomes a slip or trip hazard.
Other Methods

- Where wet processes are used drainage shall be maintained and false floors, platforms, mats, or other dry standing places provided.

50.5 SLIP-RESISTANT FOOTWEAR

Employees who work in potentially slippery higher risk areas must wear slip-resistant footwear.
When selecting slip-resistant footwear, the following should be considered:

- Level of slip-resistance (i.e. Polyurethane and microcellular urethane soles are more slip-resistant compared to nitrite and styrene rubber).
- Tread design, tread hardness, and shape of sole and heel. (i.e. High elastic soles with raised-tread and crosshatch patterns are more slip-resistant compared to rough and flat soles. Tread patterns should cover the whole sole and heel area.)
- Proper support and comfort.

NOTE: The use of slip-resistant footwear alone is not adequate in preventing slip-related accidents. General housekeeping procedures, safe work practices, and matting/ floor treatments (as necessary) must be used.

50.6 FLOOR MAINTENANCE PROCEDURES

A floor maintenance procedure must exist where routine or occasional floor cleaning is performed by departmental staff. Recommend consulting with floor cleaner product manufacturer for guidance on suggested cleaning procedures. The following should be considered when developing a floor maintenance procedure:

- The type of floor finish products used, including slip-resistant polymer finishes, strippers, degreasers and general cleaners.
- Proper application methods for products, including proper dilution and time schedules for each component or process.
- Proper warning system used during floor maintenance operation to alert building occupants of the presence of potential slip, trip and fall hazards.
- Documentation of products used, including Safety Data Sheets, and specifications regarding the slip-resistance level of the product.
- Periodic review of maintenance program, especially after a report of an employee “near miss” or actual accident.

50.7 TRAINING

For employees working in higher risk areas, training **shall** be provided to ensure employees are in compliance with safe work practices.

50.8 GENERAL HOUSEKEEPING / SAFE WORK PRACTICES

All employees who may be required to work in a higher risk area **shall** be trained on the following:

• Recognition of potential hazards associated with working in a higher risk area.
• The use of control measures to prevent slip, trip and fall related accidents.

The frequency of training provided to the employees is to be determined by the supervisor, building manager, and EH&S.

50.9 FLOOR MAINTENANCE PROCEDURES

Where departmental staff are assigned to perform routine or occasional floor maintenance, recommend training be provided on established floor maintenance procedures. When new products and/or equipment are used, recommend the departmental staff receives adequate retraining for proper usage.

50.10 RECORDKEEPING

Supervisors **shall** keep records of health and safety training received by employees for at least one year, except for training records of employees who have worked for less than one year which are provided to the employee upon termination of employment (in accordance with 3A Group’s Illness and Injury Prevention Program).

50.11 SLIP, TRIP AND FALL HAZARDS –CHECKLIST

1. Floor is kept free from slip hazards such as food or liquid spills, and other debris.
2. Walkway is kept free from trip hazards such as torn carpets, electrical cords, fallen articles, broken tiles, etc.
3. Carpet/rugs are in good condition & secured to the floor.
4. Floors are properly designed to allow for good drainage.
5. Floors drains are not plugged/ allow adequate drainage.
6. Floor mats are in good condition, free of grease, and used appropriately (i.e. mat is not a trip hazard).
7. Floor mats have beveled edges, and where appropriate, are grease resistant and promote drainage.

50.12 OTHERS

1. Portable signs, and equipment used for spills cleanup are available for use.
2. Slip-resistant footwear is worn by employee.
3. Illumination is adequate.
4. Stepladders are in good condition and have non-skid feet.

50.13 BUILDING PERIMETER / STAIRWAYS/SPECIAL AREAS

1. Sidewalks & ramps are free of defects (e.g. cracks, breaks, holes).
1. Sidewalks & ramps do not show signs of surface upheaval or unevenness.
2. Stairway's surface and nosing (leading edge of stair tread) are free of defects (e.g. broken steps, cracks).
3. Handrail is present and secured at stairways & ramps.
4. Guardrails are present and secured on working surfaces that are more than 30 inches above floor or other working areas (Exception: loading dock).
5. Restroom floors free from defects and properly maintained. No evidence of plumbing leaks.

50.14 DESIGN GUIDLINES

The design of guardrails **shall** comply with the following standards:

1. Guardrails **shall** be provided on all open sides of unenclosed elevated work areas such as roof openings, platforms, ramps, or any other working location that are more than 30 inches above the floor, ground, or other working areas of a building. Exception: Platforms, ramps, runways, or other working level constructed prior to January 1, 1967, that are less than 4 feet above floor, ground, or other working level, are not required to have guardrails.
2. A standard guardrail **shall** consist of a top rail, a midrails or an equivalent protection and posts.
3. The distance between the floor and the upper surface of the top rail **shall** be within the range of 42 inches to 45 inches.
4. The top rail **shall** be smooth surfaced through the length of the railing.
5. The midrails **shall** be approximately halfway between the top rail and the floor, ground or other surface it is attached to. NOTE: Local building regulations may require 9- inch spacing of midrails.
6. The mounting of guardrails **shall** be such that the top rail is capable of withstanding a downward load of 20 pounds per linear foot applied either horizontally or vertically.

50.15 HANDRAILS

The design of handrails **shall** comply with the following standards:

1. Stairways **shall** have handrails or stair rails on each side. Every stairway required to be more than 88 inches in width **shall** be provided with at least one intermediate stair rail for each 88 inches of required width. EXCEPTION:

a. Stairways less than 44 inches in width may have one handrail unless the other side of the stairway is open. In that case, the open side **shall** have a handrail.
b. Stairways with less than four risers are not required to have a handrail.
c. Stairways giving access to portable work stands less than 30 inches high are not required to have a handrail.

2. The upper surface of handrails **shall** be placed no less than 34 inches or more than 38 inches above the nosing of treads and landings.
3. Handrails **shall** be continuous the full length of the stairs.
4. Handrails **shall** be designed to prevent falls by providing a grasping surface to the user.
5. In handrails projecting from a wall, the space between the wall and the handrail **shall** be at least 1 ½ inches.
6. The mounting of handrails **shall** be such that the completed structure is capable of withstanding a load of at least 200 pounds applied in any direction at any point on the rail.

50.16 STAIRWAYS

The designs of stairways **shall** comply with the following standards:

1. Stairways that serve an occupant load of more than 50 **shall** have a width no less than 44 inches.
2. The run **shall** not be less than 10 inches as measured horizontally between the vertical planes of the furthermost projection of adjacent treads. The largest tread run within any flight of stairs **shall** not exceed the smallest by more than 3/8 inch. The greatest riser height within any flight of stairs **shall** not exceed the smallest by more than 3/8 inch.
3. Treads of stairways **shall** be slip-resistant.
4. Headroom clearance of stairway **shall** be no less than 6 feet 6 inches. Such clearance is determined by measuring the vertical distance between a plane parallel and tangent to the stairway tread nosing, to the soffit above at all points.

50.17 RAMPS

The designs of ramps **shall** comply with the following standards:

1. Surface of ramps **shall** be roughened or **shall** be of non-slip materials.
2. Ramps that serves any exit way, provides handicap access or is in the path of travel **shall** not have a slope that exceeds 1-foot rise to 12 feet of horizontal run. Exception:
3. Existing ramps **shall** not exceed 1-foot rise to 8 feet of horizontal run.
4. Ramps with slopes exceeding 1-foot rise to 15 feet of horizontal run **shall** have handrails or stair rails as required for stairways.
5. Ramps more than 30 inches above the adjacent ground or floor are to be provided with guardrails.

50.18 LOADING DOCK

For loading docks equipped with a dock lift, the following requirements apply:

1. Posts, stanchions & chain rails or other guardrails which will provide equivalent protection when the dock lift is not in active use **shall** be installed to prevent accidental falls from the dock level down to the lowered dock lift.
2. Posts, stanchions & chain rails or other guardrails which will provide equivalent protection, should be located at least 3 feet from the edges of the dock lift.
3. Dock levelers/dock plates **shall** be rated to support the load expected.
4. Awareness training regarding recognition of potential hazards associated with working in an elevated area must be provided for employees working at loading docks.

50.19 LIGHTING

Working areas, stairways, aisles, passageways, work benches and machines **shall** be provided with either natural or artificial illumination which is adequate and suitable to provide a reasonably safe place of employment.

51 SHORT SERVICE EMPLOYEE PROGRAM

SHORT SERVICE EMPLOYEE PROGRAM

51.1 PURPOSE

This program is intended to help employers keep new employees, whether experienced or inexperienced, safe and on the job. Employers should adapt the program to fit their unique needs.

51.2 IMPORTANCE

During the past decade, newly assigned employees in the Industrial and Construction Industry suffered the highest rates of fatalities and catastrophic injuries.

Approximately 65% of fatalities occurred within the first year of service. About 34% of fatalities occurred within the first three months of a new assignment!

There is clearly an urgent need and opportunity for employers to address this problem and safeguard newly hired workers. The following information will help you create a Short Service Employee Program or improve an existing program.

51.3 SCOPE

This procedure applies to all company facilities and worksites. It is important to ensure that newly placed employees work under the direction of experienced personnel.

Short Service Employees should make up no more than 50% of a single crew at one time. Further, a crew of 5 employees or less should include no more than one Short Service Employee at a time. Subcontractors should be included in this program.

A Short Service Employee (SSE) should be under this program for at least six months and until the SSE demonstrates the knowledge and skills necessary to perform their tasks safely.

51.4 DEFINITIONS

Mentoring - a process of transferring skills and knowledge from one person to another in a work environment.
Supervisor – The individual responsible for the direct supervision and oversight of an employee.
Short Service Employee (SSE) – A newly placed full-time or temporary employee or subcontractor with less than six months' experience in assigned job.
Short Service Employee Mentor-Person with at least 6 months' employment with the company who has demonstrated safe and efficient work habits.

51.5 RESPONSIBILITIES

The responsibilities of company leadership and management are to set expectations, evaluate effectiveness and:

- Make and demonstrate a personal commitment to a strong and functional Health Safety and Environmental work culture,
- Establish a written, signed and dated HSE policy that sets compliance expectations for management and employees,
- Provide employees access to company policies, standards and procedures,
- Establish written HSE Orientation and Short Service Employee Programs for all employees newly assigned to any job or task,

- Ensure that all employees new to a job assignment are identified to the responsible supervisor(s) and placed into the HSE Orientation and Short Service Employee Programs, and
- Audit, review performance and take timely corrective actions to continually improve the effectiveness of the orientation and Short Service Employee Programs.

51.6 SUPERVISOR RESPONSIBILITIES

The responsibilities of Supervisors in the Short Service Employee Program are:

- Know which jobs and crews are using Short Service Employees,
- Ensure Short Service Employees are appropriately identified per this plan,
- Develop and communicate Pre-Task Planning (PTP) to affected personnel upon initial assignment and when the operation changes,
- Ensure Short Service Employee Mentor possesses proper knowledge and skills in the job task assigned,
- Ensure Short Service Employee Mentor is adequately training SSE,
- Ensure Short Service Employee is gaining the necessary knowledge and skills in the job tasks, and
- Follow all safety rules and company policies.

51.7 MENTOR RESPONSIBILITIES

The responsibilities of the Mentor in the Short Service Employee Program are to:

- Be an experienced and responsible person assigned by the supervisor to work with the new employee,
- Be selected based on a history of safe work and policy/procedural knowledge,
- Be able to communicate the expectations and characteristics of work tasks and their associated hazards,
- Have a patient disposition, as well as the desire and willingness to devote the necessary time to succeed as a mentor,
- Possess knowledge and skills in the job tasks assigned to the SSE,
- Be willing and able to effectively listen to the SSE to determine if the SSE is learning and retaining the knowledge being shared,
- Be willing to watch a SSE perform a job without interfering as long as the SSE is not in a position to harm themselves, others, the environment or the equipment,
- Adopt a positive safety attitude, avoid criticism, and strive to build confidence and self-esteem in the SSE,
- Be able to teach the SSE the proper way to create a quality JSA and to follow that JSA in performing tasks,
- Keep abreast of new equipment in their field of expertise,
- Refrain from taking shortcuts and doing anything else that jeopardizes health or safety,
- Demonstrate a positive work ethic at all times, and
- Introduce the SSE Checklist (Appendix B) to the new employee. The checklist is a tool to train the new employee and monitor progress,
- Review the checklist with the new employee periodically over a six-month period, and forward the information for supervisor and management review, and
- Follow all company policies and procedures.

51.8 SHORT SERVICE EMPLOYEE RESPONSIBILITIES

The responsibilities of the Short Service Employee are to:

- Be willing to watch and listen to the Mentor,
- Establish a positive safety attitude toward assigned job tasks,
- Learn how to create and follow the PTP,
- Be willing to learn how to do each task in a safe and environmentally sound manner,

- Stop and report unsafe conditions immediately,
- Participate in safety meetings, and
- Follow all safety rules and company policies.

51.9 HSE COORDINATOR RESPONSIBILITIES

The responsibilities of the HSE Coordinator in the Short Service Employee Program are to:

- Serve as subject matter resource to support the Supervisor and SSE
- Ensure the SSE gets the necessary safety training, and
- Follow all policies and procedures.

PROCEDURES - SHORT SERVICE EMPLOYEE PROGRAM.

- **NOTIFICATION (APPENDIX A)**

The HR department notifies worksite management/supervision and safety department of all newly hired or reassigned employees. In turn, Management will notify the Safety Coordinator of new employees in their region who require training.

51.10 ORIENTATION

- Management will provide a company-approved orientation. The orientation will include a Job Orientation Checklist (Appendix C) that the supervisor reviews with each newly hired employee.
- Each SSE will be provided orientation specifically based on job position and job-related topics prior to performing job tasks.
- Each SSE will be taught how to access company policies, standards and procedures.
- Satisfactory completion of the orientation must be signed and dated by the employee and supervisor.

51.11 TRAINING

The supervisor will ensure that each SSE is properly trained per federal, state, industry, company and operator requirements before starting work when:

- The employee is hired;
- The employee is appointed a new job assignment; and
- The employee is exposed to new substances, processes, procedures, equipment, etc. that represent a new hazard to the employee.

The supervisor will ensure that each SSE is properly trained in:

- The hazard(s) present in the workplace;
- The policies, procedures, processes and ppe utilized to control these hazards and prevent illnesses, injuries, property damage and/or environmental incidents; and
- The skills necessary to conduct their assigned jobs safely and efficiently while providing quality and economy.

51.12 IDENTIFICATION SYSTEM

It is important for supervisors, co-workers and project managers to recognize a Short Service Employee; therefore, an identification system is developed for this purpose. The identification system is a means of communicating to the workforce that the Short Service Employee is in a transitional period. It will not be a designation of in-experience or used to mark an employee as having lower skill sets.

The SSE will be identified by a vest, colored hardhat, decal or other clothing or PPE that prominently identifies the employee as a SSE employee. For example, if a hardhat decal is used, it should be placed on each side of the hardhat with a label under the decal indicating the date when the employee is no longer considered to be a Short Service Employee. The Supervisor and the SSE Mentor will provide supervision and not allow the SSE to perform any task in which they have not been properly trained. The Supervisor and the SSE Mentor will ensure that the SSE understands the task to be performed and the associated hazards.

The Supervisor removes the decals and other identifiers upon expiration of the SSE term, and after verifying that the SSE exhibits a knowledge and skill level to perform the job tasks assigned.

51.13 DOCUMENTATION

The HR Specialist completes the SSE Notification form for new employees (Appendix A) and forwards to the Supervisor.

Upon completion of training, supervisor signs off and forwards notification form to HR.

All records for the SSE Orientation and Training should be maintained at the employee's location by the Supervisor.

51.14 SSE QUALITY ASSESSMENT AND CONTROL

- Management should review the effectiveness and quality of the Short Service Employee Program at least annually.
- SSE Orientation and Training documentation should be audited for accuracy, timeliness and completeness.
- Onsite inspections should be conducted to ensure that supervisors, mentors and Short Service Employees are adhering to the SSE Program.
- The number of incidents involving new employees should be measured, compared to the general workforce and evaluated for trends or performance variations.
- Management should ensure that all program deficiencies are promptly corrected and documented.

Appendix A

3A GROUP SHORT SERVICE EMPLOYEE NOTIFICATION FORM

- Short Service Employee Information (completed by HR Specialist)

Employee Name (Print)	
• Employee Hire Date	Change Date:
• Current Job Title	
• Time in Present Position	
• Years of Experience	
• Types of Experience	

SSE Mentor Information (completed by Supervisor)

Employee Name (Print)	
Employee Hire Date	
Current Job Title	
Time in Present Position	
Years of Experience	
Types of Experience	

Supervisor Sign-Off (Send to Project Manager)

Print Name:	Print Job Title:	Signature:

Send to Safety and HR Directors and retain in employee's files.

Employee has received the required Safety Orientation	Yes		No	
Employee has received all required Safety Training *	Yes		No	
Employee has received the required safety training except (Attach list of any exceptions)	Yes		No	

* Safety training shall be determined and conducted by individual company policies and procedures, in compliance with all regulatory requirements.

- **Appendix B - Short Service Employee Check List**

Mentor's Initials as Completed	SSE Initials as Completed	Short Service Employee sets clear expectations and consequences for safe behaviors.
		Does not take unnecessary risks.
		Asks for help when needed.
		Does not try to lift or handle too heavy of a load. Gets mechanical help when needed.
		Raises awareness of possible hazards.
		Intervenes with unsafe behaviors.
		Understands his/her "stop work" authority and responsibility
		Short Service Employee demonstrates ability to do job required:
		Works in a craftsman-like manner.
		Has clear understanding of job to be done.
		The new employee can use tools safely by:
		Communicating
		Demonstrating
		Observing
		New Employee is able to identify the following at the work site:
		Struck by hazards
		Crushed by hazards
		Burns and scalds
		Sharp objects and precautions
		Trip hazards and precautions
		Electrical hazards and precautions
		Fall hazards and precautions
		Hot and / or cold surfaces, piping and equipment
		Chemical hazards and precautions
		Emergency procedures
		Emergency communications
		Respiratory hazards and precautions
		Toxic substance hazards and precautions
		Any additional hazards specific to the job site
		Short Service Employee exhibits compliance to:
		General safety rules and policies
		Safety rules and policies specific to the job being performed
		Housekeeping policies
		PPE requirements
		Short Service Employee shows competency on following equipment:
		a. Equipment Name:
		b. Equipment Name:
		c. Equipment Name:
		Other:

_____ _____ _____ _____
Mentor | New Employee | Today's Date | New Hire Date

Review Dates: _____ _____ _____ _____ _____ _____
30-day Review | 60-day Review | 90-day Review | 120-day Review | 150-day Review | 180-day Review

Appendix C **Job Orientation Guide**

Company: 3A GROUP
Trainer: _____
Date _____

Employee: _____
Hire Date: _____
Position: _____

This checklist is a guideline for conducting employee safety orientations for employees new to *(Customize by adding the name of your company)*. Once completed and signed by the supervisor and employee, it serves as documentation that orientation has taken place.

		Date	Initials
1.	Explain the company safety program, including:		
	Orientation	_____	_____
	On-the-job training	_____	_____
	Safety meetings	_____	_____
	Accident investigation	_____	_____
	Disciplinary action	_____	_____
2.	Use and care of personal protective equipment, (e.g., hard hat, fall protection, eye protection, foot protection, FRC, etc.)	_____	_____
3.	Line of communication and responsibility for immediately reporting accidents.		
	A. When to report an injury	_____	_____
	B. How to report an injury	_____	_____
	C. Who to report an injury to	_____	_____
	D. Filling out accident report forms	_____	_____
4.	General overview of operation, procedures, methods and hazards as they relate to the specific job	_____	_____
5.	Pertinent safety rules of the company	_____	_____
6.	"Stop Work" Authority and responsibility is understood		
7.	First aid supplies, equipment and training		
	A. Obtaining treatment	_____	_____
	B. Location of Facilities	_____	_____
	C. Location and names of First aid trained personnel	_____	_____
8.	Emergency plan		
	A. Exit location and evacuation routes	_____	_____
	B. Use of firefighting equipment (extinguishers, hose)	_____	_____
	C. Specific procedures (medical, chemical, etc.)	_____	_____
9.	Vehicle safety	_____	_____
10.	Personal work habits		
	A. Serious consequences of horseplay	_____	_____
	B. Fighting	_____	_____
	C. Inattention	_____	_____
	D. Smoking policy	_____	_____
	E. Good housekeeping practices	_____	_____
	F. Proper lifting techniques	_____	_____

NOTE TO EMPLOYEES: Do not sign unless ALL items are covered, and ALL questions are satisfactorily answered. The signatures below document that the appropriate elements have been discussed to the satisfaction of both parties, and that the supervisor and the employee accept responsibility for maintaining a safe and healthful work environment.

_____ _____

Supervisor's Signature Employee's Signature

52 TRAFFIC CONTROL FLAGGER PROCEDURES

TRAFFIC CONTROL FLAGGER PROCEDURES

52.1 GENERAL REQUIREMENTS

With the hazards that come with the task of flagging, flaggers must take note of the following requirements:

52.1.1 TRAINING

Flaggers must be trained in safe traffic control practices to be able to ensure the safety of everyone, including themselves.

52.1.2 GOOD PHYSICAL CONDITION

Flagging is physically taxing work that may last for many hours. For this reason, flaggers must be physically fit. They must particularly have good vision and hearing.

52.1.3 ALERTNESS

Danger is always around the corner so flaggers must always be mentally alert. This is especially true at night when pedestrians and vehicles might miss spotting signs, signals and other important traffic control devices. Flaggers must also be ready to respond to emergencies that may happen any second.

52.1.4 HIGH-VISIBILITY CLOTHING

Flaggers must wear high-visibility clothing so that pedestrians and vehicles can see them easily even from a far distance. During daytime, the flagger's vest, jacket or shirt should be orange, yellow, yellow-green or a fluorescent version of these colors.

52.2 FLAGGING POSITION

- Flaggers must remain alert and standing at all times. No lawn chairs or straddling barricades.
- However, a small plastic footrest can go a long way to reducing fatigue and back pain.
- Always face oncoming traffic and never turn your back to oncoming traffic or stand in the path of moving traffic.
- A flagger's normal station is on the shoulder of the road, not in the line of traffic.
- Stand in a location that allows approaching traffic adequate time to respond.
- Vehicle drivers must be able to recognize you as a flagger for at least the minimum site distance.
- As an example, if the posted speed limit is 30 miles per hour, minimum site distance is approximately 550 feet.

52.3 EQUIPMENT

- The clothing worn must be approved and according to your state's standards.
- Flagger garments must meet Class 2 American standards for high visibility safety apparel.
- Generally, your vest, shirt, or jacket and pants should be orange, yellow, strong yellow-green, or a fluorescent version of these colors.
- At night and in low visibility situations, the vest, shirt, or jacket should be reflective.
- Reflectorized pants must be worn at night and in low visibility situations.
- Reflective clothing must be visible at a minimum distance of 1,000 feet and must identify the wearer as a person through the full range of body motions.

- Generally, a hard hat with reflective material attached is required as well.
- Again, be sure to maintain a neat appearance.
- Your basic tools are a standard stop/slow paddle with a minimum of 18” by 18” octagon.
- The staff of the stop/slow paddle should be a minimum of 5 feet to the bottom of the sign, but a 7-foot staff is recommended.
- It’s a good practice to use a paddle with a staff to help prevent fatigue as well. The paddle should be reflectorized in standard colors.
- When two flaggers are used on one job, 2-way radios should be used to coordinate efforts.
- Floodlights illuminating the flagger and a flashlight with wand are required for nighttime operations.

52.4 SINGLE FLAGGER

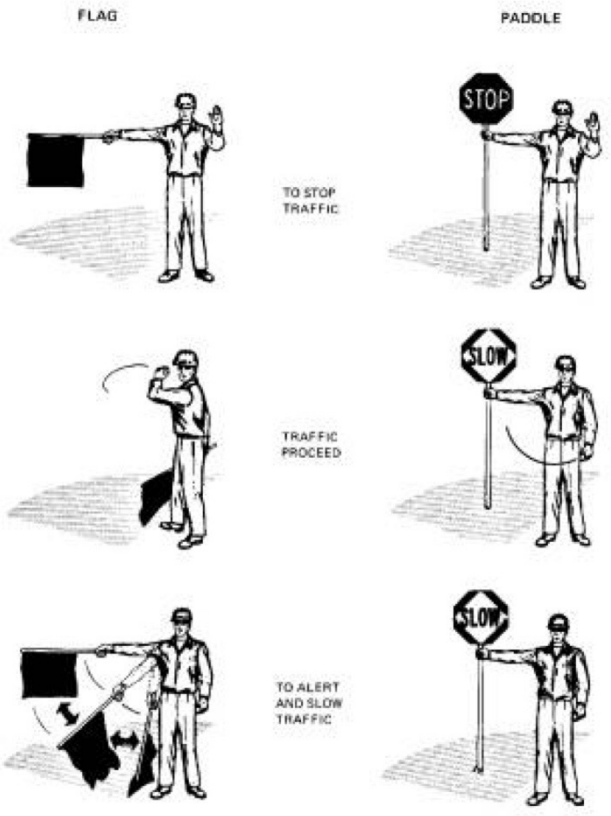
- Basically, there are 2 different applications requiring a single flagger situation.
- On a low volume road with good visibility, a single flagger may be used to control one direction of traffic, while the other direction flows freely.
- In this situation, the flagger is positioned in the closed lane at the beginning of the taper.
- The flagger stops the traffic approaching in the closed lane.
- When the open lane is clear, the flagger allows traffic to proceed.
- Two flaggers may be required during low sight distance situations and during high peak traffic periods, or if there is a major intersection near the activity area.
- A single flagger may also be used to stop traffic in a lane while that lane is closed.
- An example would be a truck depositing material off the edge of the roadway.
- In this situation, the flagger would stop the traffic in this lane while the other lane flows freely.

52.5 TWO FLAGGERS

- When two flaggers are required, lines of communications must be established prior to the start of flagging operations.
- This is a good time to conduct a tailgate meeting to ensure everyone is on the same page.
- The two flaggers must be able to see each other or have 2-way radios or other methods designated for clear communications.
- One flagger should be assigned as the lead flagger and coordinate all activities.
- Two flaggers may also be used in conjunction with a pilot vehicle.
- In this situation, the flagger stops the traffic until the pilot vehicle arrives and has pulled into position to lead the traffic through or around the activity area.
- The flagger shall then stop all traffic until the pilot vehicle has returned for the next trip.
- An advance flagger may be used where there is limited sight distance to the activity area or where long lines of traffic form.
- In a situation such as limited sight distance, the advance flagger should stop each vehicle and inform the driver of the situation ahead.
- Where there are long lines of stopped traffic waiting to proceed, the advance flagger should move down the line and inform each driver of the reason for the delay and the approximate length of the delay.

52.6 FLAGGER PROCEDURES

- To stop traffic, stand in a safe location on the shoulder of the road, away from moving traffic.
- Face traffic and extend the Stop paddle in a stationary position with your arm extended horizontally away from your body.
- Your free arm should be raised with your palm toward approaching traffic.
- Look directly at the approaching driver. Make sure that you make direct eye contact with the driver.
- Remain on the shoulder of the road after the first vehicle has stopped.
- Always make certain that the flagger and the paddle are visible to the drivers of all stopped vehicles.
- The flagger should never stand in the traffic lane unless, in the flagger's opinion, the drivers of the stopped vehicles are unaware of the flagger's presence.
- If it's necessary for the flagger to stand in the traffic lane, the flagger may only stand near the center line and never cross it.
- When the flagger is satisfied that the drivers of all stopped vehicles are aware of his or her presence, the flagger should return to the shoulder of the road.
- To direct stopped traffic to proceed, remain at your station on the shoulder. If you're in the stopped traffic lane, return to the shoulder.
- Face traffic and turn the Slow paddle to face traffic. Hold the Slow paddle in a stationary position with your arm extended horizontally away from your body.
- Do not wave the paddle around as it creates a confusing message.
- To alert or slow traffic, stand on the shoulder of the road and face traffic with the Slow sign paddle held in a stationary position with your arm extended horizontally away from your body.
- You may motion up and down with the free hand, palm down, indicating that the vehicle should slow down.
- Never stand in the path of oncoming traffic.
- At night, flagger stations should be well illuminated.
- The flagger shall wear reflective pants, and vest, shirt, or jacket, or another approved garment such as a jumpsuit.
- Reflective channelizing devices should also be used. In an emergency situation, a minimum size 24-inch by 24-inch red flag may be used instead
- of a paddle, until a paddle is available.
- However, as soon as a paddle is available, it should be used.



53 VEHICLES - INDUSTRIAL TRUCKS (FORKLIFTS)

INDUSTRIAL TRUCKS

53.1 PURPOSE

The purpose of this program is to establish requirements for the safe operation and use of Powered Industrial Trucks.

53.2 SCOPE

This program applies to all 3A Group employees who operate a Powered Industrial Truck in the scope of their job duties and assignments. When work is performed on a non-owned or operated site, the operator's program shall take precedence, however, this document covers 3A Group employees and contractors and shall be used on owned premises, or when an operator's program doesn't exist or is less stringent. *NOTE*: All employees are required to be trained and certified prior to operating each specific type of forklift equipment. 3A Group shall certify all authorized employees regarding competency on all types of equipment.

53.3 DEFINITIONS

Authorized Employee – A person, at least 18 years of age and who has completed the company's required safety training for the safe operations of forklifts.

Forklift (Powered Industrial Truck) – Any mechanical device used for the movement of supplies, material or finished a product that is powered by an electric motor or an internal combustion engine.

53.4 KEY RESPONSIBILITIES

53.4.1 MANAGER/SUPERVISOR

- Shall ensure that each powered forklift operator is competent to operate a forklift safely, as demonstrated by the successful completion of the training and evaluation program.
- Shall ensure that all forklifts are inspected before each shift and all repairs are made before the forklift is operated.

53.4.2 EMPLOYEES

- Shall be current on applicable training.
- Operate forklift in accordance to the forklift standards and manufacture requirements.
- Inspect forklift at the start of shift and remove from service if defects are found until they are corrected.
- Operate forklift in a safe manner.

53.5 PROCEDURE

53.5.1 GENERAL

All approved forklifts shall have a manufactures identification plate attached showing all specifications of the forklift and that the forklift is accepted by a nationally recognized testing laboratory.

Modifications and additions, that affect capacity and safe operation, shall not be performed without manufacturer's prior written approval. Capacity, operation, and maintenance instruction plates, tags, or decals shall be changed reflect the modification or addition.

If the forklift is equipped with front-end attachments other than factory installed attachments, the supervisor shall ensure that the forklift is marked to identify the attachments and show the approximate weight of the forklift and attachment combination at maximum elevation with load laterally centered.

The operator shall see that all nameplates and markings are in place and are maintained in a legible condition.

All forklifts shall be equipped with safety seat belts. All forklifts shall be equipped with a horn, backup alarm, beacon light, headlights and taillight.

53.6 SAFETY GUARDS

Forklifts shall be fitted with an overhead rollover cage, as per manufactures specifications.

If the type of load presents a hazard to the operator, the forklift shall be equipped with a vertical load backrest extension, as per manufactures specifications.

53.7 TRAINING

Training shall consist of a combination of formal instruction (e.g., lecture, discussion, interactive computer learning, video tape, and written material), practical training (demonstrations performed by the trainer and practical exercises performed by the trainee) and evaluation of the operator's performance in the workplace.

All operator training and evaluation shall be conducted by authorized persons who have the knowledge, documented training, and experience to train powered industrial truck operators and evaluate their competence.

Each operator is required to be re-evaluated every three years.

Training shall include the following topics, except in topics for locations where they are not applicable to safe operation of the truck due to type of equipment or facility conditions.

1. Operating instructions, warnings, and precautions for the types of truck the operator will be authorized to operate,
2. Differences between the truck and the automobile,
3. Truck controls and instrumentation: where they are located, what they do, and how they work,
4. Engine or motor operation,
5. Steering and maneuvering,
6. Visibility (including restrictions due to loading),
7. Fork and attachment adaptation, operation, and use limitations,
8. Vehicle capacity,
9. Vehicle stability,
10. Any vehicle inspection and maintenance that the operator will be required to perform,
11. Refueling and/or charging and recharging of batteries,
12. Operating limitations,
13. Any other operating instructions, warnings, or precautions listed in the operator's manual for the types of vehicle that the employee is being trained to operate,
14. Surface conditions where the vehicle will be operated,
15. Composition of loads to be carried and load stability,
16. Load manipulation, stacking, and unstacking,
17. Pedestrian traffic in areas where the vehicle will be operated,
18. Narrow aisles and other restricted places where the vehicle will be operated,
19. Hazardous (classified) locations where the vehicle will be operated,

20. Ramps and other sloped surfaces that could affect the vehicle's stability,
21. Closed environments and other areas where insufficient ventilation or poor vehicle maintenance could cause a buildup of carbon monoxide or diesel exhaust,
22. Other unique or potentially hazardous environmental conditions in the workplace that could affect safe operation, and
23. The requirements of CFR 1910.178 (Powered Industrial Trucks).

Mandatory refresher training shall be provided when unsafe operations are observed, after an incident, if operating a different vehicle type, changes in conditions or any time 3A Group feels an operator requires refresher training.

53.8 CERTIFICATION

Only trained and certified operators, including supervisors, are allowed to operate the device (this includes refresher training requirements).

The trainer shall certify in writing that each operator has been trained and evaluated as required.

The certification shall include the name of the operator, the date of the training, the date of the evaluation and the identity of the person(s) performing the training and/or evaluation.

53.9 OPERATIONS

53.9.1 GENERAL

- All operators shall wear a safety seat belt when operating a forklift.
- Forklifts shall not be driven up to anyone standing in front of a bench or other fixed object.
- No person shall be allowed to stand or pass under the elevated portion of any forklift, whether loaded or empty.
- Unauthorized personnel shall not be permitted to operate forklifts.
- No riders or passengers are permitted.
- It is prohibited for arms or legs to be placed between the uprights of the mast or outside the running lines of the forklift.
- When a forklift is left unattended, load engaging means shall be fully lowered, controls shall be neutralized, power shall be shut off, and brakes set.
- Wheels shall be blocked if the forklift is parked on an incline.
- A forklift is unattended when the operator is 25 ft. or more away from the vehicle, which remains in view, or whenever the operator leaves the forklift and it is not in view.
- When the operator of a forklift is dismounted and within 25 ft. of the forklift still in view, the load engaging means shall be fully lowered, controls neutralized, and the brakes set to prevent movement.
- A safe distance shall be maintained from the edge of ramps or platforms while on any elevated dock, or platform or freight car.
- Forklifts shall not be used for opening or closing freight doors.
- Brakes shall be set, and wheel blocks shall be in place to prevent movement of trucks, trailers, or railroad cars while loading or unloading.
- Fixed jacks may be necessary to support a semi-trailer during loading or unloading when the trailer is not coupled to a tractor.
- The flooring of trucks, trailers, and railroad cars shall be checked for breaks and weakness before they are driven onto.
- There shall be sufficient headroom under overhead installations, lights, pipes, sprinkler system, etc.
- An overhead guard (cages) shall be used as protection against falling objects.
- An overhead guard is intended to offer protection from the impact of small packages, boxes, bagged material, etc., representative of the job application, but not to withstand the impact of a falling capacity load.
- Fire aisles, access to stairways, and fire equipment shall be kept clear.

53.10 TRAVELING

- The operator shall slow down and sound the horn at cross isles and other locations where vision is obstructed.
- If the load being carried obstructs forward view, the operator shall be required to travel with the load trailing.
- The operator shall be required to look in the direction of and keep a clear view of the path of travel.
- Grades shall be ascended or descended slowly.
- When ascending or descending grades in excess of 10 percent, loaded forklifts shall be driven with the load upgrade.
- On all grades the load and load engaging means shall be tilted back if applicable and raised only as far as necessary to clear the road surface.
- Under all travel conditions the forklift shall be operated at a speed that will permit it to be brought to a stop in a safe manner.
- Stunt driving and horseplay are prohibited.
- The operator shall slow down for wet and slippery floors.
- Dock board or bridge plates shall be properly secured before they are driven over.
- Dock board or bridge plates shall be driven over carefully and slowly, and their rated capacity never exceeded.
- While negotiating turns, speed shall be reduced to a safe level by means of turning the hand steering wheel in a smooth, sweeping motion.
- Except when maneuvering at a very low speed, the hand steering wheel shall be turned at a moderate, even rate.

53.11 LOADING

- Only stable or safely arranged loads shall be handled.
- Caution shall be exercised when handling off-center loads, which cannot be centered.
- Only loads within the rated capacity of the forklift shall be handled.
- Forklifts equipped with attachments shall be operated as partially loaded forklifts when not handling a load.
- A load engaging means shall be placed under the load as far as possible; the mast shall be carefully tilted backward to stabilize the load.
- Extreme care shall be used when tilting the load forward or backward, particularly when high tiering.
- Tilting forward with load engaging means elevated shall be prohibited except to pick up a load.
- An elevated load shall not be tilted forward except when the load is in a deposit position over a rack or stack.
- When stacking or tiering, only enough backward tilt to stabilize the load shall be used.

53.12 OPERATION OF THE TRUCK

- If at any time a forklift is found to be in need of repair, defective, or in any way unsafe, the forklift shall be taken out of service until it has been restored to safe operating condition.
- Fuel tanks shall not be filled while the engine is running.
- Spillage of oil or fuel shall be carefully washed away or completely evaporated and the fuel tank cap replaced before restarting engine.
- When fueling with Liquefied Petroleum Gas (LPG), precautions and handling requirements set forth in the “Safe Handling of LPG” program shall be followed.
- No forklift shall be operated with a leak in the fuel system.
- Open flames shall not be used for checking electrolyte level in storage batteries or gasoline level in fuel tanks.
- Operator must verify trailer chocks, supports, and dock plates are secured prior to loading/unloading.

53.13 MAINTENANCE AND INSPECTION OF FORKLIFTS

- Only authorized personnel shall perform maintenance and make repairs.
- Those repairs to the fuel and ignition systems of forklifts, which involve fire hazards, shall be conducted only in locations designated for such repairs.
- Forklifts in need of repairs to the electrical system shall have the battery disconnected prior to such repairs.
- Only parts equivalent with those used in the original design shall replace all parts of any forklift requiring replacement parts.
- Forklifts shall not be altered so that the relative positions of the various parts are different from what they were when originally received from the manufacturer, nor shall they be altered either by the addition of extra parts not provided by the manufacturer or by the elimination of any parts.
- Additional counter weighting of fork trucks shall not be done unless approved by the truck manufacturer.
- Forklifts shall be inspected daily by the operator before being placed in service and shall not be placed in service if the inspection shows any condition adversely affecting the safety of the forklift.
- Inspection shall be made at least daily – prior to each shift. (visual – non documented) Inspection items shall be posted on each forklift. Operators must ensure the vehicle is safe prior to operating.
- Where forklifts are used on a round-the-clock basis, they shall be inspected before each shift.
- Defects when found shall be immediately reported to the supervisor and corrected before operating the forklift.
- When the temperature of any part of any forklift is found to be in excess of its normal operating temperature, thus creating a hazardous condition, the forklift shall be removed from service and not returned to service until the cause for such overheating has been eliminated.
- Forklifts shall be kept in a clean condition, free of lint, excess oil, and grease.
- Noncombustible agents, where at all possible, shall be used for cleaning trucks.
- Low flash point (below 100 degrees F.) solvents shall not be used.
- High flash point (at or above 100 degrees F.) solvents may be used if precautions regarding toxicity, ventilation, and fire hazard are mitigated with the agent or solvent used.

54 VEHICLES - MAINTENANCE

VEHICLE MAINTENANCE

54.1 GENERAL

In the normal activities of vehicle maintenance, it is essential that adequate safety standards be prescribed and observed by all shop and company personnel. This should help promote efficiency and reduce the possibility of personal injury and property damage.

Oil and grease-soaked rags or other waste should be disposed of in self-closing metal waste cans approved (UL or FM) by SAFETY recognized fire protection laboratories.

54.2 MECHANICAL HOIST/LIFTS

1. Every mechanical automotive hoist should have a brake that will automatically hold twice the rated load at whatever level it may be when lifting ceases.
2. Hydraulic lifts have devices that will hold the load independently of the lifting means at the maximum "up" position.
3. Hoists should never be used to lift vehicles that weigh beyond the rate lift's capacity or to lift one end of the vehicle only.
4. The condition of lifts should be checked monthly. Leaks should be repaired, and oil levels maintained on hydraulic lifts.
5. Controls on lifts should require continuous pressure from the operator and at a distance so the operator will not be struck by the falling load if the lift falls.
6. No person should stand in front of vehicles being driven onto the lifts and no person should remain in a vehicle being lifted. No bystanders should be allowed near equipment being lifted.
7. All lifts should have safety legs which will hold the load if the lift fails.
8. Employees must always place these legs properly before working under raised equipment.
9. Wearing safety goggles will save the annoyance of workers getting dust and an occasional serious injury from foreign particles in the eye.
10. Employees should never put their hands over grease gun nozzles (grease can be forced under the skin if the gun handle is pulled).
11. When lubricating springs, stand clear of lubricant spray to avoid inhalation.
12. The tops of grease cylinders must be securely screwed or clamped in place to prevent blowing off under pressure.

54.3 JACKS

The rated load should be legibly and permanently marked in a prominent location on the jack by casting, stamping, or other suitable means.

54.4 OPERATION AND MAINTENANCE:

1. In the absence of a firm foundation, the base of the jack should be blocked. If there is a possibility of slippage of the cap, a block should be placed in between the cap and the load.
2. The operator should watch the stop indicator, which should be kept clean, in order to determine the limit of travel. The indicated limit should not be overrun.
3. After the load has been raised, it should be cribbed, blocked, or otherwise secured at once.
4. Hydraulic jacks exposed to freezing temperatures should be supplied with an adequate antifreeze liquid.

54.5 TIRE REPAIRS (MULTI-PIECE AND SINGLE PIECE RIM WHEELS)

All employees will be instructed in and expected to follow the established safe operating procedures.

54.6 EMPLOYEE TRAINING:

All employees who service rim wheels must be trained in the hazards involved and the safety procedures to be followed in a manner which the employee is able to understand.

Employees should demonstrate and maintain the ability to perform the following tasks:

1. Demounting of tires (including deflation);
2. Mounting of tires (including inflation with restraining device or another safeguard);
3. Use of the restraining device or barrier, and other equipment required;
4. Handling of rim wheels;
5. Inflation of the tire when a single piece rim wheel is mounted on a vehicle;
6. An understanding of the necessity of standing outside the trajectory both during inflation of the tire and during inspection of the rim wheel following inflation; and
7. The Installation and removal of rim wheels.

Employees will be evaluated on their ability to perform the above-mentioned tasks and to service rim wheels safely. Additional training will be provided as necessary to assure employee proficiency is maintained.

54.7 TIRE SERVICING EQUIPMENT

A restraining device or barrier for inflating tires on multi-piece wheels and single piece wheels is provided, unless on the single piece wheels the rim wheel will be bolted onto a vehicle during inflation.

Each restraining device or barrier should have the capacity to withstand the maximum force that would be transferred to it during a rim wheel separation occurring at 150 percent of the maximum tire specification pressure for the type of rim wheel being serviced.

Restraining devices and barriers should be capable of preventing the rim wheel components from being thrown outside or beyond the device or barrier.

Restraining devices and barriers should be visibly inspected prior to each day's use after any separation of the rim wheel components or sudden release of contained air.

Any of the following defects exhibited on any restraining device or barrier should be removed from service:

1. Cracks at welds;
2. Cracked or broken components;
3. Bent or sprung components;
4. Pitting of components due to corrosion; or
5. Other structural damage that would decrease its effectiveness.

Restraining devices or barriers removed from service should not be returned to service until they are repaired and re-inspected. Any structural repairs such as component replacement or re-welding should not be returned to service until either the manufacturer or a Registered Professional Engineer certifies them.

For inflating tires, an airline assembly should be provided and consist of the following:

1. A clip-on chuck;
2. An in-line valve with a pressure gauge or one that can be pre-set; and
3. A sufficient length of hose between the clip-on chuck and the in-line valve (if one is used) to allow the employee to stand outside the trajectory.

Current charts (rim manuals) should have instructions available in-service areas for the types of wheels being serviced.

Only tools recommended in the rim manual for the type of wheel being serviced should be used to service rim wheels.

54.8 WHEEL COMPONENT ACCEPTABILITY

1. Multi-piece wheel components should not be interchanged, except as provided in the charts or in the applicable rim manual.
2. Multi-piece wheel components and single piece wheels should be inspected prior to assembly.
3. Any wheel or wheel component exhibiting damage or defects such as cracks, bands, corrosion, etc. should not be used, tagged unserviceable, and removed from the service area.
4. Damaged or leaky valves should be replaced.
5. Rim flanges, rim gutters, rings, bead seating surfaces, and the bead areas of tires should be free of any surface rust, scale or loose or flaked rubber build-up prior to mounting and inflation.
6. The size and type of both the tire and the wheel should be checked for compatibility prior to assembly of the rim wheel.

54.9 CONTROLLING MOVING VEHICLES/TRAFFIC

1. Movement of vehicles inside shops, and garages should be regulated by rigidly enforced traffic rules.
2. Vehicles with air brakes should not be moved until sufficient air pressure has been built up.
3. Mirrors should be installed at blind corners.
4. Vehicles should be moved in low gear and at low speed inside shop areas, especially up and down ramps.
5. Employees should stand out of the way of moving vehicles.
6. No vehicle should be backed in a garage without assistance from a signalman.
7. Mechanics should not work under vehicles while lying on "creepers" if there is any danger another vehicle will pass over the area where their legs are sticking out. If necessary, adjacent vehicles should be locked and tagged and/or adjacent spares should be blocked with barricades.
8. Mechanics should follow lockout procedures when working on vehicles to ensure that engines are not started, and vehicles are not moved while they are at work.
9. Mechanics should:
    a. Lockout the starting switch;
    b. Place a warning tag on the starting control or steering wheel; and
    c. Block wheels and all moving parts during maintenance.
10. Tilt cabs and engine hoods should be propped up when not in place.
11. To prevent steam burns, all vehicles should be equipped with a safety petcock, which should be opened to bleed steam off before removing radiator caps.

55 VEHICLES - DRIVING SAFETY

DRIVING SAFETY

55.1 PURPOSE

This program is written to be in compliance with local regulatory requirements and provide directives to managers, supervisors, and employees about their responsibilities in the operations and management of 3A Group vehicle safety.

55.2 KEY RESPONSIBILITIES

55.2.1 3A GROUP SAFETY MANAGER

- The designated Safety Manager is responsible for developing and maintaining the program and related procedures. These procedures are kept in the designated safety manager's office.

55.2.2 SITE MANAGER

- Responsible for the implementation and maintenance of the program for their site and ensuring all assets are made available for compliance with the plan.

55.2.3 EMPLOYEES

- All shall be familiar with this procedure and the local workplace vehicle safety program.
- Follow all requirements, report unsafe conditions, and follow all posted requirements.

55.3 VEHICLE AND TRANSPORTATION RELATED

55.4 DRIVING SAFETY

- Operators of 3A Group or client on or off-road vehicles shall be qualified by possession of a valid, current driver's license for the type of vehicle being driven.
- Only authorized employees will drive a motor vehicle in the course and scope of work or operate a company owned vehicle.
- Drivers shall have 3 years of driving experience on the vehicle he/she is licensed to drive & regularly drives.
- Drivers will be appropriately assessed, licensed and trained to operate the vehicle they have been authorized to operate.
- No passengers shall be on trucks used to deliver goods.
- Backing is prohibited whenever practicable. Where backing is required, drivers, when parking, should make every effort to park the vehicle in a manner that allows the first move when leaving the parking space to be forward.
- Drivers must have either a reversing alarm, use a spotter or walk around the truck/trailer prior to backing.
- Passenger compartments are to be free from loose objects that might endanger passengers in the event of an incident. Any vehicle with non-segregated storage shall be equipped with a cargo net or equivalent to separate the storage area.
- Vehicles (light vehicles, heavy vehicles and trailers) may not be modified without the endorsement of the manufacturer.
- Signs, stickers or labels are to be fitted in such a manner that they do not obstruct the driver's vision or impede the driver's use of any controls.
- Reporting of Traffic Violations and Vehicle Accidents - Authorized drivers will report any collision or traffic violation while driving on company duties to the appropriate personnel.

55.5 EMPLOYEES DRIVING VEHICLES ARE REQUIRED TO FOLLOW SAFE DRIVING PRACTICES:

- Obey all federal and local driving laws or regulations as well as requirements of clients;
- Immediately report any restriction or change to their driving privileges to the supervisor.
- Driver and all passengers must wear seatbelts. Seatbelts shall be worn by all occupants at all times whenever a vehicle is in motion.
- Defensive drivers continually assess conditions and hazards and remain prepared for any challenge that may approach them;
- When speaking with a passenger, always keep your eyes on the road;
- Both hands on the wheel;
- No use of cell phones, radios or other electronic devices while driving any vehicle - vehicle must be safely parked prior to using a mobile phone or 2-way radio.
- Slow down around construction, large vehicles, wildlife, fog, rain, snow, or anything else that adds a hazard to your driving;
- Drive for conditions, not just the speed limit;
- Alcohol or illegal drugs are not allowed to be in a company, client or leased vehicle at any time;
- Drivers shall not operate a motor vehicle while under the influence of alcohol, illegal drugs, or prescription or over-the counter medications that might impair their driving skills.

55.6 DRIVERS ARE TO BE PREPARED BEFORE LEAVING:

- Perform 360 walk around – report new damage;
- Check windshield for cracks that could interfere with vision;
- Inspect for vehicle damage and immediately report any damage to the supervisor if not previously observed;
- Make sure dirt or snow is removed from lights on all sides of the vehicle;
- Brush or clean off snow or ice on all windows to ensure complete vision;
- Check fuel level to be certain the destination can be reached;
- Check to ensure the license plates and inspection tag on vehicle are current;
- Ensure that there is a first aid kit and inspected fire extinguisher in the company vehicle;
- Ensure driver is rested and alert for driving;
- Employees are not to perform repairs or maintenance other than routine fluid additions.

55.7 VEHICLE REQUIREMENTS

Vehicles shall be maintained is safe, working order

- Vehicles are of the correct size and designed for intended use. The vehicle shall be used for its purpose.
- No vehicle less than 1000 kg is to be used on public roads.
- Tires, including spares if full size, are to be of same type, profile and tread pattern, except when the vehicle or tire Manufacturer recommends a different type for certain axles.
- Tire type and pattern is to be recommended by the vehicle or tire manufacturer for use on the vehicle in the area of operation.
- Vehicles are to be fitted with a spare wheel and changing equipment to safely change a wheel, or a suitable alternative.
- Vehicles longer than 6 meters/20 feet or with restricted rear view (i.e. pickup trucks that are fully loaded) are to be fitted with an audible reversing alarm.
- All seats are to be fitted with headrests
- All light duty vehicles (including buses) are to be equipped with an adjustable left, right and central rear-view mirrors

- Loads shall be secure and shall not exceed the manufacturer's specifications and legal limits for the vehicle.
- All vehicles are to be equipped with a multipurpose fire extinguisher with a capacity of at least 0.9 kg/2 lb.
- The fire extinguisher shall be securely mounted on a bracket and located so that it is easily accessible in an emergency without becoming a hazard in case of an incident.
- All light vehicles shall be equipped with a securely stowed first aid kit.
- All drivers of light vehicles shall carry a high visibility jacket for use in case of emergency stops.
- All light duty vehicles carry a minimum of one collapsible hazard warning triangle.
- Rollover protection will be installed in any vehicle to address high risk environments. The rollover protection engineered will conform to recognized regulatory standard and industry preferred practices.
- All light equipment vehicles shall be outfitted with two red high-intensity lights located as high, as far apart, and as far back as practical, wired to the headlight switch, but also with an override switch, if permitted by local regulations.

55.8 TRANSPORTATION

If workers are required to travel in a worker transportation vehicle 3A Group must ensure that reasonable measures are taken to evaluate road, weather and traffic conditions to ensure the safe transit of the workers.

The operator of a worker transportation vehicle must ensure that the worker transportation vehicle has been inspected by a qualified person before first use on a work shift.

Seated workers must wear seat belts while being transported in a vehicle equipped with seat belts.

A worker must not ride in a vehicle in a standing position, unless protected from being thrown off balance.

A worker must not ride in a vehicle with any part of the body outside the vehicle unless essential to the work process and then only if the worker is adequately restrained.

Materials, goods, tools or equipment carried in a portion or compartment of a vehicle in which workers are riding must be located and secured to prevent injury to the operator or workers.

Any enclosed portion or compartment of a vehicle in which workers are transported must have:

- effective ventilation, independent of doors, providing clean air,
- adequate lighting and means for heating and cooling,
- an effective means of communication between the operator and passengers, and
- more than one means of exit.

55.9 TRAFFIC CONTROL

3A Group shall develop, in writing, and implement a traffic protection plan for its workers at a worksite if any of them may be exposed to a hazard from vehicular or pedestrian traffic that may endanger the safety of any worker. It shall include the following control measures:

- Effective means of traffic control shall be provided whenever the unregulated movement of vehicular traffic constitutes a hazard to workers.
- Traffic control shall include barricades and cones as the primary control and, where required, signs, flagmen or other techniques and devices made necessary by the prevailing circumstances.
- Operations or equipment, encroaching on the traveled way, shall be protected by barricades and cones as the primary control and, where required other effective devices.

- 3A Group must train workers in the traffic control safe work procedures.
- 3A Group will ensure that before a worker is designated as a flag person, the worker is trained in the safe work procedures for the safe control of traffic operations and wears the appropriate high visibility outer clothing and/or equipment.
- If a worker at a project on a highway may be endangered by vehicular traffic unrelated to the project, the project shall make use of as many measures as necessary to adequately protect the worker.
- A worker who is required to set up or remove traffic control measures on a roadway or a shoulder of a roadway shall be a competent worker, shall be equipped with the appropriate high visibility apparel, shall not perform any other work while setting up or removing the measures and shall be given adequate written and oral instructions in a language that he or she understands, with respect to setting up or removing the measures.

55.10 ATV VEHICLES

If an 3A Group work site utilizes ATV vehicles, then the following shall apply:

- If the manufacturer has not set limits for operation of the ATV on sloping ground, 5% is the maximum allowable slope unless 3A Group has developed and implemented written safe work procedures appropriate for any steeper slope on which the equipment is to be used.
- 3A Group must ensure that each ATV operator is properly licensed and trained in the safe operation of the vehicle. The training program for an ATV operator must cover:
    - the operator's pre-trip inspection,
    - use of personal protective apparel,
    - operating skills according to the ATV manufacturer's instructions,
    - basic mechanical requirements, and
    - loading and unloading the vehicle, if this is a job requirement.
- An ATV operator and any passenger on an ATV must wear approved eye and hearing protection as required by local regulatory requirements and the 3A Group PPE Program. An ATV operator and any passenger on an ATV must wear clothing suitable for the environmental conditions and when necessary to protect against the hazards presented at the worksite, suitable gloves and clothing which covers the ankles and legs and the arms to the wrists and appropriate footwear.
- 3A Group requires that approved helmets shall be worn by the operator and passenger.
- Loading and unloading of an ATV onto or off a carrier vehicle must be done in a safe manner. If ramps are used when loading or unloading an ATV they must be placed at a suitable angle, be sufficiently wide and have a surface finish which provides an adequate grip for the ATV's tires.

56 VEHICLES - FLEET

FLEET VEHICLES

3A Group policy is committed to instituting and maintaining a Fleet Safety Program. The goal of the Fleet Safety Program is to take the proper steps to prevent loss of life, injury, or property damage to all employees and members of the general public. 3A Group recognizes that the responsibilities for safety and loss prevention must be shared by everyone.

56.1 RESPONSIBILITIES

56.1.1 MANAGEMENT

- Assume responsibility for the driving record of employees while they are on duty.
- Frequently check for compliance of the established requirements and policies in which all personnel are required to adhere to.
- Personally, review the decisions on accidents and take all steps necessary to prevent a recurrence.
- Establish and adhere to policies on disciplinary actions in accordance with the policy regarding actions that will be taken against employees who show a repeated disregard for good driving practices.
- Insist that all assigned vehicles are maintained adequately for safe operation.
- Establish periodic inspection of assigned vehicles for safety discrepancies, malfunctions, signs of abuse, unreported damage and cleanliness. Have repairs made as soon as possible.
- Fully support the 3A Group's driver training program to promote defensive driving.
- Review each preventable vehicle accident and unsafe driving report with the employee and his supervisor to emphasize management's intolerance of irresponsibility behind the wheel.
- Establish an aggressive campaign to enforce the wearing of seat belts on all trips.

56.1.2 SUPERVISORS

- Insure that employees do not drive any 3A Group vehicle unless they have a VALID Drivers' License and are familiar with 3A Group driving rules and regulations.
- Ensure that only authorized personnel be allowed to operate 3A Group vehicles, special purpose vehicles, and trucks.
- Must be alert in observing unsafe practice of employees and ensure that action is taken immediately to correct the driver.
- Review all preventable vehicle collisions with employees at Safety Meetings and discuss each unsafe act that was responsible.
- Periodically ride with the vehicle and truck drivers to check for compliance with operating instructions and traffic regulations.
- Ensure that unsafe vehicles are not driven until safety discrepancies have been corrected.

56.1.3 EMPLOYEES

Employees who drive 3A Group vehicles are responsible for following all of the guidelines set forth in the Fleet Safety Program. These responsibilities include:

- Safe operation of vehicles and for the safety of passengers and cargo
- Having a valid driver's license in their possession
- Inspecting the vehicle which they are about to drive, in accordance with established policies
- Reporting any vehicle accidents

56.1.4 SAFETY / LOSS CONTROL OFFICER

The Safety/Loss Control Officer will be in charge of implementing the policies the Fleet Safety Program. Responsibilities will include:

- Monitoring the driving experience of employees who operate entity vehicles.
- Be sure proper maintenance procedures are being followed to keep vehicles in a safe operating condition.
- Verify that adequate insurance limits are maintained by drivers who use their personal vehicle for entity business.

56.2 VEHICLE OPERATOR RESPONSIBILITIES

The driver is responsible for checking the safety and general condition of the vehicle, including gas, oil, and other fluid levels, lights, and brakes. With the assistance of the Safety/loss Control Officer, supervisors will furnish vehicles with inspection checklists. If there is something wrong with the vehicle, which may affect safety, repairs will be made before use.

1. Vehicle Abuse. No employee will use a vehicle or equipment for any purpose for which it was not designed, operate it beyond its designed limits, operate it in areas or locations for which it was not designed, or cause damage through neglect, misuse, improper driving techniques, or improper handling.
2. Transporting Employees in 3A Group Vehicles No more than 2 employees will ride in the front seat or cab of a vehicle. Each position will be equipped with a seat belt, and each person will use the seat belt provided. No employee will be authorized to ride or work from the bed or rear of a vehicle while it is in motion.
3. Traffic Laws Employees will adhere to all traffic laws and regulations when operating 3A Group vehicles. An employee will at all times operate 3A Group vehicles in such a manner as to avoid injury to persons or damage to property. 4. Unauthorized Use of Vehicles 3A Group vehicles are to be used for 3A Group business only. Persons found using 3A Group vehicles for their personal errands may be subject to disciplinary action.
4. Operation and Occupancy of Entity Vehicle by Unauthorized Persons Employees will not permit unauthorized employees or non-employees of 3A Group to ride in vehicles, except when such persons are conveyed in the performance of duty or authorized to ride by supervisory staff.
5. Parking Vehicles All employees will park their vehicles in a legal and proper manner. Employees will remove the keys and lock the vehicles, except when specifically instructed otherwise. Employees will not park on the wrong side of a street or highway, unless it is mandatory to park in such a location to perform a job. All signs, cones, lights, and warning devices as required by law will be used when vehicles are parked or in use in a public travel lane. Employees will use all safety brakes, lockout devices, and other parking safety methods when parking equipment.
6. Use of Personal Vehicles for 3A Group Business Supervisors will identify and authorize those employees who are required, as part of their normal job duties to use their personal vehicle to conduct 3A Group business. The employee's own insurance policy is the primary coverage and, therefore, 3A Group will not be responsible for any claims that arise out of any motor vehicle accident that the employee is involved while operating their personal vehicle. The mileage reimbursement the employee receives is intended to fully cover all costs of the operation of the employee's personal vehicle including but not limited to fuel, maintenance, repairs, insurance, etc.
7. Transporting Equipment Employees using 3A Group vehicles will exercise caution when transporting equipment, packages or other materials in the driver/passenger compartment that would become flying projectiles in the event of an accident. Such items as briefcases, laptop computers, tools, etc. need to be transported in the trunk of passenger vehicles. Pickups, whether standard cab or extended, should have secured storage capabilities in the bed of the vehicle such as tool storage or camper shells if they are used with any regularity in the transport of items that could injure the driver or passenger(s) in the event of an accident. Vans used in the regular transport of such items should have screen type barriers between such

cargo and the driver/passenger compartment. It is always important to keep the driver/passenger as free as possible of objects that could distract their attention or could cause from unexpected movement.

56.3 DRIVER SELECTION

3A Group believes knowing the ability, experience and attitude of drivers is a key factor in the selection process. An important area in this process is to establish qualification standards for new employees and existing employees that have driving duties. To enforce these standards, 3A Group has implemented the following driver qualification procedures.

1. **Driver Age Requirements**
   All drivers must be a minimum of (21) years of age.
2. **Application for Employment**
   All driver applicants shall complete an Application for employment and Driving Position Supplement containing all of the information required for positions in which driving is required. 3A Group's hiring standards also require that driver applicants list all former employers for the past (2) years. Any gaps in employment for more than a (6 months) period must be satisfactorily accounted for on the application.
3. **License**
   3A Group will obtain a legible copy of the license of all driver applicants. A review of the license will be conducted to be certain it is valid, has not expired, and is the appropriate for the class of vehicles in which driving is required.
   Whenever driving 3A Group vehicles or operating their personal vehicle for company business, employees must have in their possession a valid driver's license. Employees will notify their supervisor if their license is suspended, revoked, or expired.
   Employees who drive vehicles, which require a Heavy Vehicle Driver, will comply with the current State or Territory Department of Motor Vehicles' requirements for medical examinations and license renewal. Supervisors will maintain a system that insures all employees operating vehicles have the proper class of license and check licenses for current status at frequent intervals.
4. **MVR Check and Evaluation**
   3A Group will request an MVR for driver applicants being considered for employment in which driving entity vehicles or operating their own vehicle for entity business will be required. An MVR will be requested from every state the applicant has lived in during the past (enter number of years) years. The Safety/Loss Control Officer will review all MVR information to determine if driver applicant meets the qualification standards regarding driving records. A formal review of the driver's MVR will be conducted on a/an annual basis (or more frequently where warranted) to ensure that existing drivers are meeting the established qualification standards. MVR's are personal and confidential and should only be discussed with the driver or other persons authorized to know. The Safety/Loss Control Officer will receive results of the MVR check and any needed corrective action will be applied in a timely manner.
5. **Driver Qualification**
   Standards to ensure that potential new and existing drivers meet 3A Group's qualification standards for motor vehicle records set forth in the Commercial Vehicle Safety Program, the following policies have been instituted regarding: 1. Actions taken based on the number of points and violations shown from the MVR checks and evaluations, and 2. Standards and penalties for drivers involved in preventable accidents. 3A Group has established a point structure system to evaluate potential new and current driver motor vehicle records. If a driver meets or exceeds (enter number here) points total within the previous (enter number of years) or exceeds (enter number here) points within the previous (enter time interval here), he/she will not be eligible to drive (a/an) 3A Group vehicle. If the MVR reveals (enter violation or number of points here) then the following corrective action will be taken: (Enter answer here) No potential new or existing driver

will not be allowed to drive (a/an) 3A Group vehicle or other vehicle on 3A Group business if there MVR reveals: (Enter violations here) Each employee involved in a preventable, at fault vehicular accident, whether it involves the public or not, will be required to: (Enter answer here) An employee who receives any moving violation must notify his/her supervisor of the incident within (enter number here) days. Any corrective action will be evaluated based on the type and severity of the incident.

6. **Investigation of Previous Employment**
   3A Group will contact all former and current employers of the driver applicant for the previous (enter number of years) years to verify as much of the following information as possible: Dates of employment
   - Type of work performed
   - Type of vehicle(s) operated
   - Extent of driving experience
   - Vehicle accident record
   - Overall work history and performance All former and current employer information gathered from the inquiries must be in writing and will be retained in the driver's (if hired) qualification file. In the event a former or current employer refuse to release information, a note stating this will be placed in the file. The Safety/ Loss Control Officer will review all former and current employer information to determine if the driver applicant meets the hiring standards regarding past and current employment, and to determine if the applicant was truthful about information listed on the employment application.
7. **Driver Performance**
   3A Group requires all driver applicants who will require a CDL (Heavy) license for their driving position to successfully complete a road test examination conducted by (enter your answer) prior to an offer of employment. Note: the road test may be waived if the employee will only be driving automobiles and mini vans and has a clean driving record. The road test examination shall be performed in the type of vehicle the driver will operate. Performance will be monitored during the selection process as well as at periodic intervals throughout the driver’s career using information obtained from motor vehicle records and file data.
8. **Driver Qualification File**
   The driver selection process includes developing a driver qualification file. Elements of this file will include such items as:
   - Employment Application
   - Interview notes
   - MVR checks
   - Driver training information
   - Driver evaluation and performance reviews

Driver Training and Reviews

3A Group's goal is to have a process in place to hire only qualified and safe drivers. Once on board, 3A Group is committed to retaining these drivers. In order to keep drivers and supervisors well trained and informed, 3A Group has instituted a number of policies regarding driver training. These policies include driver orientation, periodic driver meetings, and driver performance evaluation and reviews.

1. **Driver Orientation**
   3A Group has an orientation program which all new drivers are required to complete. The orientation program consists of comprehensive classroom training that will cover a variety of subjects. Among the topics are established driving policies and procedures, regulatory compliance, vehicle maintenance and inspections, accident reporting procedures, and defensive driving procedures After successfully completing the classroom portion of the orientation, all new drivers will be assigned to a driver trainer. The purpose is to evaluate the new employee's overall driving skills and techniques, and to apply what has been learned in classroom to an actual job situation. This time should also be used to familiarize the new driver with

paperwork procedures relating to vehicle maintenance and inspections and to answer any questions or concerns that were not addressed in the classroom training.

2. **Driver Meetings**
   Every (enter time interval), a drivers meeting will be conducted by driver supervisors. These meetings between supervisors and drivers are held to share news and information, and to give our drivers a forum to discuss issues, questions, or concerns. All drivers are expected to participate in these meetings, and all driver input is welcomed and appreciated.
3. **Driver Evaluation and Performance Reviews**
   Driver supervisors are responsible for conducting a periodic, structured performance review with each of their drivers a minimum of every (enter your answer) months. It is important for 3A Group drivers to understand that their performance will be evaluated on an on-going basis, and they may request, or their supervisor may recommend, a review at any time. However, all drivers will receive periodic structured reviews of their individual performance.
4. **On Road Performance Evaluation**
   The on-road evaluation is conducted by the supervisor to monitor the performance of current drivers by riding with them or following them. The supervisor should document the results and counsel drivers concerning problems or deficiencies that were observed. This is the best way for the supervisor to ensure that the driver is following the proper vehicle inspection and defensive driving procedures.
5. **Performance Review**
   Driver performance reviews should be held in private and away from the operation area. The review is considered the driver's time and interruptions should not be allowed. The actual driver performance review should cover, but is not limited to, five basic areas. These are:
   - The measurement of the driver's actual results against established goals and standards of the company.
   - Recognition of the driver's contributions and accomplishments.
   - Correction of any new or existing performance problems.
   - Establishment of goals or standards for the next review period.
   - Review of Driver’s MVR

Once the driver and his/her supervisor have concluded their discussion of past performance; addressed any development, training, or corrective action needs; and have established new goals and standards for the future, they are expected to reach mutual agreement and wrap up the review. The wrap-up should include the following:

- A positive summary of the performance review discussion including all mutually agreed upon plans and goals.
- An opportunity for the driver to react, ask questions, and give additional ideas and suggestions.
- A sincere and meaningful expression of appreciation for the driver's participation, time, and efforts.
- A written record of what was discussed, agreed upon, and corrective action/training plans.
- Recordkeeping A copy of the written performance review and MVR check shall be given to the driver, the supervisor's immediate manager, and the original placed in the driver's personnel file.

56.4 ACCIDENT INVESTIGATION

3A Group's policy is to fully investigate any accident involving 3A Group personnel and vehicles. All accidents involving 3A Group vehicle regardless of the severity must be reported immediately. The investigation of minor accidents involving 3A Group property only is the responsibility of the driver and supervisor only. The Safety/Loss Control Officer will be in charge of the investigation of accidents in which serious property damage or death to (a/an) 3A Group employee has occurred. The Safety/Loss Control Officer will also be in charge of accident investigations in which a third party is involved. Management may initiate any other investigations deemed appropriate.

56.4.1 ACCIDENT INVESTIGATORS

At the scene, the accident investigator(s) will carefully survey the scene, noting the position of any debris from the accident. The investigator(s) should take photos of the scene, with careful notes of what the photos depict. A map of the site should be drawn to scale, with any landmarks near the scene noted as to position. Photos of all vehicle and property damages incurred from accident should be taken from all sides, with careful notes made. The more accurate the information provided is, the easier it is when it comes to canvassing the accident scene. It is important that the accident investigator(s) be as objective as possible in gathering and evaluating data from the accident scene.

56.4.2 DRIVER RESPONSIBILITY IN ACCIDENT INVESTIGATION

Certain driver responsibilities must be carried out at the scene of an accident. Two main concerns at the scene of an accident are to deal with immediate problems and to gather and report pertinent accident information promptly. These two items can be broken down into a 6-step accident procedure for drivers to follow.

Step 1: Stop, stay calm

Step 2: Turn on your emergency flashers as an immediate warning signal. Then do a quick evaluation of accident victims, if any, and provide assistance. Next, set out emergency warning devices on the roadway.

Step 3: Either contact local law enforcement personnel and your supervisor yourself or arrange to have someone do it for you. Be courteous and cooperative when providing information to authorities. Never admit guilt or liability at the scene of an accident. Never leave the scene of an accident.

Step 4: Write down names, license numbers and other information regarding the accident and those people involved in it. Draw a simple diagram of the accident scene. The more detail you can provide, the better it will be for insurance and/or legal purposes later. If you have a camera for use at the accident scene, document the situation with photographs from various angles.

Step 5: After the vehicle has been secured, warning devices put in place, assistance rendered to injured person(s) (if any), and law enforcement personnel contacted, you (the driver) should communicate the accident to your supervisor.

Step 6: Complete Vehicle Accident Report Form at the scene of the accident.

56.5 VEHICLE ACCIDENT REVIEW

The Safety/Loss Control Committee will review all vehicle accidents to determine the true cause and whether it was preventable or non-preventable. A preventable collision is one in which the driver failed to do all that could be reasonably expected of them to avoid the collision. The functions of the Committee in reviewing vehicle collisions are as follows:

1. Convene as soon as possible after a collision involving a/an 3A Group vehicle to objectively consider the evidence presented. This evidence includes any information given by the driver, his or her supervisor and the police report of the accident. These same rules also apply to any employee officially authorized to drive his or her personal cars on official 3A Group business.
2. Determine the true cause of the collision and whether it was preventable or non-preventable.
3. Review the driver's past driving record.
4. Report in writing to Management the Committee's findings, and the recommendations for corrective action.
5. In the case of a preventable ruling, schedule a personal one-to-one meeting with the driver to discuss the decision, possible remedial training, and/or possible disciplinary action. This meeting will be scheduled as soon as possible after the preventability determination has been made.

56.5.1 VEHICLE SELECTION

It is important to ensure that vehicles selected for a specific function are adequate in design and capability for the intended purpose. It is the responsibility of each driver to select the appropriate vehicle to be used in performing tasks.

56.5.2 VEHICLE MAINTENANCE

It is the policy of 3A Group to keep all vehicles well maintained and in safe and efficient operating condition at all times. The specifics of that approach will be detailed in the procedures to follow. A good preventive maintenance program lowers repair frequency and lowers overall maintenance cost. The service portion of Preventive Maintenance is actually scheduled maintenance. 3A Group vehicles will be given Preventive Maintenance according to the current fleet maintenance schedule.

56.5.3 VEHICLE INSPECTIONS

3A Group is committed to following a strong daily inspection program. All vehicles are to be inspected every day they are operated.

56.5.4 DRIVER PRE-TRIP INSPECTION

Each driver must be satisfied that his/her assigned vehicle is in proper working condition prior to operating. Each driver must also be satisfied that any cargo is properly distributed and secured. The driver will also review the last completed Driver's Vehicle Inspection Report to verify that any needed repairs were made to the vehicle. If the defects noted were not acknowledged by an authorized signature, the driver shall not drive the vehicle until the defects are handled appropriately. When a driver reports safety related problems or vehicle damage, the vehicle inspection report should be submitted to his/her Supervisor. The Supervisor will sign the report indicating that repairs have been made (or are not required to be made). The original inspection report and certification of repairs will be retained in the Vehicle Maintenance File. The original inspection reports on which no defects were noted and on which defects were noted, and the certification of repairs, will be retained in the Vehicle Maintenance File.

56.5.5 DRIVER ON-THE-ROAD INSPECTIONS

Once on the road, the driver must examine any cargo and its load securing devices and make any necessary adjustments. If a problem is found, the driver will notify his/her supervisor and either have the necessary repairs or adjustments made prior to operating the vehicle, or safely travel to the nearest repair facility.

56.5.6 VEHICLE MAINTENANCE FILE

A complete record on each vehicle in the fleet will be kept. It will include basic vehicle information and information indicating the nature and due date of any inspection and maintenance operations to be performed on the vehicle, and a record of any inspections, repairs and maintenance performed on the vehicle in question, including dates performed and specifics on the nature of the operations.

56.5.7 VEHICLE BREAKDOWN

Driver's responsibilities when a breakdown happens include: Safely stopping and securing the vehicle and load,

- Safely placing the warning devices,
- Diagnosing and calling in the breakdown to his/her Supervisor responsibilities when a breakdown occurs include: Determining the nature of the breakdown and best course of action
- Locating, contacting, and dispatching a vendor to facilitate repairs

- Obtaining all vehicle repair records

56.5.8 MVR CHECK AND POINT STRUCTURE SYSTEM

MVR Check If a potential employee will be required to operate an entity vehicle as part of his/her job requirements, an MVR check must be completed either by The Safety/Loss Control officer or the supervisor for that employee before an employee may be offered employment. A point system structure has been established to evaluate new hire and current employee motor vehicle records. If a potential new employee meets or exceeds seven (7) points total within the previous three (3) years or exceeds four (4) points within the previous 12 months, they are not eligible for a position that requires driving an entity vehicle. The same point policy applies to existing employees as in the hiring process in terms of points assigned to traffic violations or motor vehicle offenses. Driver must not meet or exceed seven (7) points accumulated in a three (3) year period. Motor Vehicle Records will be obtained on all entity vehicle drivers every twelve months. Each MVR received will be reviewed in a timely manner and evaluated for compliance. A copy of all records will be maintained in the employees file along with any corrective action documentation.

56.5.9 POINT STRUCTURE

Automatic Disqualification to operate an entity vehicle No potential new or current employee will allowed to drive a company vehicle (including personal vehicle) for entity business if his/her MVR reveals:

- Murder or assault with a motor
- Theft of a vehicle
- Hit and run
- Negligent homicide
- An alcohol related offense in the last 3 years
- Illegal drug offense in the last 3 years

7-Point offenses:

- DWI, DUI, OWI (alcohol or drugs)
- Reckless driving resulting in bodily injury or property damage
- Fleeing a police official
- Leaving the scene of an accident
- Driving with a suspended/cancelled/revoked license
- Racing on public road

4-Point offenses:

- Speed in excess of 15 mph over posted speed limit
- Failing to stop for a school bus
- Failing to stop at a railroad crossing
- Second preventable accident

3-Point offenses:

- Failure to obey a traffic control device
- Failure to yield right of way
- Speed too fast for conditions
- Following too close
- Careless/Reckless driving
- One preventable accident

1-Point offenses:

- Seat belt violations
- Failure to use turn signal
- Improper stop/parking

56.6 DEFENSIVE DRIVING POLICY

3A Group is strongly committed to a sound and thorough defensive driving policy. While operating entity vehicles, drivers should always drive in the safest manner possible. Specifically, our drivers must operate entity vehicles in accordance with all provisions of The Commercial Vehicle Safety Program. Full-time and designated part-time employees driving 3A Group vehicles shall be required to attend the Defensive Driving Course.

1. Assignments for classes shall be made by the employee's supervisor to ensure class quotas are met and to maintain satisfactory work schedules.
2. Frequency of employee attendance of Defensive Driving Courses shall be once per year.
3. New employees required to drive Entity vehicles shall be required to complete the Defensive Driving Course satisfactorily before starting their driving assignment.

The core concepts of defensive driving are:

- Recognize the hazard.
- Understand the defense.
- Act in time.

56.7 DEFENSIVE DRIVING PROCEDURES

- Intersections. Getting into and out of intersections without an accident is a mark of a good defensive driver. Besides your own skill level, intersections also demand anticipation of the actions of other drivers and taking appropriate evasive action as required.
- Backing is an extremely hazardous maneuver. If you are backing with the assistance of a guide, the ultimate responsibility for the safety of the backing maneuver remains with you as the driver.
- Front-End Collisions. The primary way to avoid front-end collisions is by maintaining a safe and adequate following distance. You should be prepared for possible obstructions on the roadway, either in plain sight or hidden by curves or the crests of hills. A special situation occurs at night, when speed should be kept to a level that will allow you to stop within the distance illuminated by the headlights of your vehicle.
- Rear-End Collisions. As a driver, you risk being struck from behind if you do not maintain an adequate margin of safety in your own following distance. If enough space is not allowed in front of your vehicle, chances go way up that somebody can (and will) impact you from the rear. Passing Failure to pass safely indicates faulty judgment on your part as a defensive driver, and failure to consider one or more of the factors that need to be checked:
    - Is there enough room ahead?
    - Is there adequate space to move back into your lane of traffic after passing?
    - Have you signaled your intentions?
- Being Passed. As a driver, you must be aware of the actions of other drivers and give way if another driver begins to sideswipe you or to cut you off. A good defensive driver will avoid problems with this kind of accident situation.
- Encroaching on Other Traffic Lanes. Observant defensive drivers will not usually get trapped when other drivers change lanes abruptly. In the same manner, entrapment in merging traffic can be successfully avoided by a good defensive driver with a little preplanning and willingness to yield. Blind spots are not valid excuses for this kind of accident - allowances must be made in areas of limited sight distance.
- Railroad Grade Crossings. Driving across railroad crossings, or in areas where there are rail vehicles of some sort, demands special care. Careful observance of the traffic situation is your best defense.
- Oncoming Traffic. A defensive driver will avoid a collision with an oncoming vehicle at all costs. Even if the vehicle enters your lane of traffic, an accident can be avoided with some evasive maneuvers.
- Turning. Turning, like passing, is a dangerous maneuver, and demands special care and an observant eye from you as a defensive driver. You should be aware of other vehicles in your path, and of the complete configuration of the turn you are about to undertake.

- Pedestrians. As a sensible defensive driver, always assume that if there is a pedestrian (or small vehicle of some sort) involved in a situation, slowing down is your best defense. Be certain to give people and small vehicles the benefit of the doubt.
- Extreme Weather and Road Conditions. Bad weather and other road hazards place special stress upon any defensive driver. The best rule in any kind of bad weather or extreme road condition is get off the road safely and as soon as possible. If you absolutely must continue, slowing way down and increasing following distance are your best defenses, along with increased awareness.

56.8 FOG

- Fog reduces available visibility and impairs distance perception, making it perhaps the most dangerous type of extreme weather condition. Because of this, it is company policy that, whenever possible, drivers are to avoid driving in foggy conditions. Pull off the road and park safely until such time as the fog dissipates or is burned off, if at all possible. If you cannot safely pull off the road, follow these procedures:
    - You should never assume the depth or thickness of any fog. Fog can range from a momentary blurring of the windshield to be several miles thick.
    - Slow your vehicle's speed. Reduction in speed should be done gradually in order to avoid becoming a hazard for other motorists. Determining a correct and safe speed depends on the thickness of the fog and is left to your best judgment.
    - Use low-beam headlights only when driving in fog. Low beams serve two purposes. They help you see the immediate roadway and also allow other motorists to see your vehicle.
    - Avoid the use of high-beam headlights while driving in fog. The water particles that make up fog will reflect more light back at you than onto the roadway when high beams are used and will further reduce visibility for you.
    - You should make use of windshield wipers and the defroster when driving in fog. Driving in foggy conditions will cause a constant fine mist of water to develop on the vehicle's windshield, reducing visibility in the process. Using the windshield wipers and defroster will alleviate this condition.
    - Avoid passing other vehicles while driving in fog.
    - You should avoid stopping on any roadway while driving in foggy conditions unless absolutely necessary. If you must stop, use the emergency or breakdown lane, activate your emergency flashers, turn off the headlights, and follow approved breakdown procedures

56.9 RAIN

- Rain causes roadways to become slippery, especially when it first begins. Roadways become covered with a thin layer of oil and other residues. When rain mixes with this layer, it results in an extremely slippery and dangerous road surface. This condition remains until additional rain can break down and wash away the oily mixture from the pavement. This process can take anywhere from a few minutes to several hours, depending on the severity of the rain. Water on the road surface can also create a potential hazard of hydroplaning. Hydroplaning happens when a thin layer of water separates the vehicle's tires from the road surface. When a vehicle is hydroplaning, it is literally riding on water. When the tires ride on water, they lose all traction and create an extremely dangerous situation. The faster a vehicle travels on standing water, the greater the chance of hydroplaning. Reducing speed is the best and safest way to avoid hydroplaning. Rain also reduces visibility. Because rain presents these hazards, drivers are expected to adhere to the following procedures when driving in rainy conditions:
    - You should slow the vehicle's speed to avoid hydroplaning. Reduction in speed should be done gradually in order to avoid becoming a hazard for other motorists. Determining the correct and safe speed depends on how heavy the rain is and will be left to your best judgment.

- You are expected to increase your following distance from other motorists. Since rain causes the road surface to become slippery, you need to allow for greater stopping distance if the need to stop arises.
- You should make use of windshield wipers and the defroster when driving in rain. Driving in rainy conditions will cause a constant film of water to develop on the vehicle's windshield, reducing visibility in the process. Using the windshield wipers and defroster will alleviate this condition.
- You should avoid passing other vehicles while driving in rain. In addition, you are encouraged to follow other vehicles at a safe distance since vehicles traveling ahead will throw water off the pavement and leave "tracks". Driving in these tracks will give you the best possible traction under rainy conditions.
- Snow, depending on the type and severity, can present a variety of dangerous conditions. Because of this, the following procedures have been developed for this defensive driving policy:
- Light, powdery snow presents few problems since it is quickly blown of the road surface. However, if there is enough of this type of snow to cover the roadway, it will form a slick, smooth surface. You should reduce speed and increase following distance. Determining the correct speed and safe following distance will be left to your best judgment.
- Heavier, slushy snow can affect vehicle control. If snow becomes hard packed it can cause an ice hazard on the road surface. Again, you should reduce speed and increase following distance. Determining the correct speed and safe following distance will be left to your best judgment.
- All slow maneuvers such as starting out, steering, backing, and turning should be done smoothly and with extreme care to minimize skids and slides.
- Falling or blowing snow can greatly reduce visibility. In addition, falling and blowing snow can make it hard to see the road, road markings, road signs, and off ramps. If you must continue in snowy conditions, reducing speed and increasing following distance are the best techniques a driver can use to maintain vehicle control.
- As with driving in foggy conditions, the use of high beam headlights while driving in snowy conditions should be avoided at all times. The high beam "shooting" light will reflect off falling and blowing snow and reflect back at you, further reducing visibility.
- Drivers will also be educated on the dangers of "snow hypnosis". Snow hypnosis occurs when a driver is traveling directly into heavy snow and begins to focus on the falling snow instead of the road ahead. This can cause a hypnotic-like effect on the driver. The danger of snow hypnosis is especially prevalent at night.
- In extreme conditions, chains may be necessary

56.10 ICE

- All drivers need to be aware of changes in road surface conditions that may affect the vehicle's traction. To help, the following procedures for driving on icy roads for this defensive driving policy have been developed:
- As with all extreme weather conditions, if you must continue, the safest techniques to employ are to reduce speed and increase your following distance. But of these two, increasing following distance is by far the most important. Depending on the temperature and road conditions, stopping distance (distance needed to come to a complete stop) on icy roads can increase four to ten times versus stopping from the same speed on a dry road.
- “Black Ice” forms when temperatures drop rapidly and any moisture on the road surface freezes into a smooth, almost transparent layer of ice. What makes black ice particularly dangerous is that you may not realize you are on it until it's too late. Determining the correct speed and safe following distance will be left to your best judgment.

- Bridges and overpasses are other areas to which you should give special attention. Ice will tend to form first on bridges and overpasses because cold air circulates both above and below these structures causing the temperature to drop more rapidly than on normal roads. Any moisture on the road surface of a bridge or overpass will freeze quicker and harder than elsewhere on the road. Extreme caution and a reduction in speed should be used while traveling over bridges and overpasses.

56.11 NIGHT DRIVING

- All drivers need to be aware of the potential hazards driving at night present. These hazards include fatigue, reduced visibility, poor lighting, other (impaired) motorists, and animals on the road. To help drivers better prepare for driving at night, the following procedures have been developed for this defensive driving policy: Fatigue is perhaps the most dangerous hazard of driving at night. Nothing we do is worth any one getting hurt. Fatigue usually sets in at night, but a tired driver, at any time of day, is an unsafe driver. Fatigue reduces drivers' reaction time and perception. All drivers are to review the following fatigue warning signs:
- Your eyes close or go out of focus by themselves.
- You can't stop yawning.
- You are experiencing trouble keeping your head up.
- You experience short-term memory loss. For example, you can't remember the last several miles you have driven.
- Your thoughts wander or you begin to daydream.
- You start drifting into other lanes of traffic, tailgate, or miss traffic signs.
- You experience an inability to maintain a constant rate of speed.
- You must jerk the steering wheel hard to correct a drift and get back into your lane. If you experience any of these signs, it's time to get off the road as soon as safely possible and get some rest.

57 WELDING SAFETY PROGRAM

WELDING AND CUTTING SAFETY

57.1 PURPOSE

The purpose of this program is to assure a safe work environment during welding, cutting and hot work operations.

57.2 SCOPE

This program is applicable to all employees directly involved or assisting in the welding, cutting and hot work operations. When work is performed on a no owned or operated site, the operator's program shall take precedence, however, this document covers 3A Group employees and contractors and shall be used on owned premises, or when an operator's program doesn't exist or is less stringent. Operators of equipment should report any equipment defect or safety hazards and discontinue use of equipment until its safety has been assured. Repairs shall be made only by qualified personnel.

If fire hazards cannot be taken to a safe place or guards cannot be used to confine heat, sparks, slag and protect the immovable fire hazards, the welding and cutting shall not be performed.

57.3 DEFINITIONS

Welding/Hot Work Procedures - any activity which results in sparks, fire, molten slag, or hot material which has the potential to cause fires or explosions. Examples of Hot Work - Cutting, Brazing, Soldering, Thawing Pipes, Grinding, using an electric tool in a hazardous area and Welding. Special Hazard Occupancies - any area containing Flammable Liquids, Dust Accumulation, Gases, Plastics, Rubber and Paper Products. Hazards - includes, but not limited to the following; fires and explosions, skin burns, welding "blindness", and respiratory hazards from fumes and smoke.

57.4 KEY RESPONSIBILITIES

57.4.1 MANAGERS AND SUPERVISORS

- Determine if its property is safe for welding and cutting operations.
- Establish safe areas for welding and cutting operations.
- Provide training for all employees whose task includes heat, spark or flame producing operations such as welding, brazing, or grinding.
- Develop and monitor effective hot work procedures.
- Provide safe equipment for hot work.
- Provide proper and effective PPE for all hot work.
- Monitor all hot work operations.
- Ensure all hot work equipment and PPE are in safe working order.
- Allow only trained and authorized employees to conduct hot work and conduct inspections of the hot work area before operations begin.
- Ensure permits are used for all hot work outside authorized areas.

57.4.2 EMPLOYEES

- Follow all hot work procedures.
- Properly use appropriate hot work PPE.
- Inspect all hot work equipment before use.
- Report any equipment problems or unsafe conditions.

57.5 PROCEDURE

57.5.1 GENERAL

A hot work permit must be completed before performing hot work. Precautions that are to be taken shall be in the form of a written permit. Before cutting or welding is permitted the area shall be inspected and a written permit shall be used to authorize welding and cutting operations.

Where practicable all combustibles shall be relocated at least 35 feet from the work site. Where relocation is impractical, combustibles shall be protected with flameproof covers, shielded with metal, guards, curtains, or wet down the material to help prevent ignition of material.

Ducts, conveyor systems, and augers that might carry sparks to distant combustibles shall be protected or shut down.

Where cutting or welding is done near walls, partitions, ceilings, or openings in the floor (grating, manholes, etc.), fire-resistant shields or guards shall be provided to prevent ignition.

If welding is to be done on a metal wall, partition, ceiling, or solid decking/flooring, precautions shall be taken to prevent ignition of combustibles on the other side, due to conduction or radiation of heat. Where combustibles cannot be relocated on the opposite side of the work, a fire watch person shall be provided on the opposite side of the work.

Welding shall not be attempted on a metal partition, wall, and ceiling or decking/flooring constructed of combustible sandwich panels.

Cutting or welding on pipes or other metal in contact with combustible walls, partitions, floors, ceilings, or roofs shall not be undertaken if the work is close enough to cause ignition by combustion.

Cutting or welding shall not be permitted in the following situations:

- In areas not authorized by management.
- In sprinkled buildings while such protection is impaired.
- In the presence of potentially explosive atmospheres, e.g. flammables.
- In areas near the storage of large quantities of exposed, readily ignitable materials.
- In areas where there is dust accumulation of greater than 1/16 inch within 35 feet of the area where welding/hot work will be conducted.
- All dust accumulation shall be cleaned up before welding or hot work is permitted.

Whenever welding or cutting is performed in locations where other than a minor fire might develop or any of the conditions mentioned above cannot be met, a fire watch shall be provided.

- The fire watch shall be provided during and for a minimum of 1/2 hour past the completion of the welding project.
- The fire watch shall be trained in the use of fire extinguishers and the facility's alarm system.
- During this time the fire watch will have appropriate fire extinguishers readily available.
- Suitable extinguishers shall be provided and maintained ready for instant use.
- A hot-work permit will be issued on all welding or cutting outside of the designated welding area.

57.6 FIRE PREVENTION MEASURES

A designated welding area shall be established to meet the following requirements:

- Floors swept and cleaned of combustibles within 35 feet of work area.
- Flammable and combustible liquids and material will be kept 35 feet from work area.
- Adequate ventilation providing 20 air changes per hour.
- At least one 10-lbs dry chemical fire extinguisher shall be within access of 35 feet of the work area.
- Protective dividers such as welding curtains or noncombustible walls will be provided to contain sparks and slag to the combustible free area.

Requirements for welding conducted outside the designated welding area:

- Portable welding curtains or shields must be used to protect other workers in the welding area.
- A hot-work permit must be completed and complied with prior to initiating welding operations.
- Respiratory protection is mandatory unless an adequate monitored airflow away from the welder and others present can be established and maintained.
- Plastic materials must be covered with welding tarps during welding procedures.
- Fire Watch must be provided for all hot-work operations.

After welding operations are completed, the welder shall mark the hot metal or provide some other means of warning other workers.

57.7 CONFINED SPACE

- A space that Is large enough and so configured that an employee can bodily enter and perform assigned work;
- Has limited or restricted means for entry or exit (for example, tanks, vessels, coolers, storage bins, hoppers, vaults, and pits are spaces that may have limited means of entry); and
- Is not designed for continuous occupancy.

Refer to 3A Group's Confined Space Program before commencing any welding, cutting, and/or brazing operations in an area meeting the requirements of a confined space.

Ventilation is a prerequisite to work in confined spaces.

When welding or cutting is being performed in any confined spaces, the gas cylinders and welding machines shall be left on the outside. Before operations are started, heavy portable equipment mounted on wheels shall be securely blocked to prevent accidental movement.

When a welder must enter a confined space through a manhole or other small opening, means shall be provided for quickly removing him in case of an emergency.

- When safety belts and lifelines are used for this purpose, they shall be so attached to the welder's body that it cannot be jammed in a small exit opening.
- An attendant with a preplanned rescue procedure shall be stationed outside to observe the welder at all times and be capable of putting rescue operations into effect.

When arc welding is to be suspended for any substantial period of time, such as during lunch or overnight, all electrodes shall be removed from the holders and the holders carefully located so that accidental contact cannot occur, and the machine shall be disconnected from the power source.

In order to eliminate the possibility of gas escaping through leaks of improperly closed valves, when gas welding or cuffing, the torch valves shall be closed and the fuel-gas and oxygen supply to the torch positively shut off at some point outside the confined area whenever the torch is not to be used for a substantial period of time, such as during lunch hour or overnight. If practical, the torch and hose shall also be removed from the confined space.

When welding must be performed in a space entirely screened on all sides, the screens shall be so arranged that no serious restriction of ventilation exists. It is desirable to have the screens so mounted that they are about 2-feet (0.61 m) above the floor unless the work is performed at so low a level that the screen must be extended nearer to the floor to protect nearby workers from the glare of welding.

A fixed enclosure shall have a top and not less than two sides which surround the welding or cutting operations, and a rate of airflow sufficient to maintain a velocity away from the welder of not less than 100 linear feet (30 m) per minute.

All welding and cutting operations carried on in confined spaces shall be adequately ventilated to prevent the accumulation of toxic materials or possible oxygen deficiency. This applies not only to the welder, but also to helpers and other personnel in the immediate vicinity. All air withdrawn will be replaced with air that is clean.

In circumstances for which it is impossible to provide such ventilation, airline respirators or hose masks approved for this purpose by the National Institute for Occupational Safety and Health (NIOSH) will be provided. In areas immediately hazardous to life, a full-face piece, positive pressure, self-contained breathing apparatus or a combination full-face piece, positive pressure supplied-air respirator with an auxiliary, self-contained air supply approved by NIOSH must be used.

Where welding operations are carried on in confined spaces and where welders and helpers are provided with hose masks, hose masks with blowers or self-contained breathing equipment, a worker shall be stationed on the outside of such confined spaces to ensure the safety of those working within.

57.8 FUMES, GASES AND DUST

Fumes produced by some welding processes can be toxic and may require source extraction. An assessment of the work to be performed must be completed before each job is undertaken. Fumes generally contain particles from the material being welded. Welding fumes can have an acute effect on the respiratory system.

Any welding, cutting or burning of lead base metals, zinc, cadmium, mercury, fluorides, beryllium or exotic metals or paints not listed here that could produce dangerous fumes shall have proper ventilation or respiratory protection. This includes inert-gas metal-arc welding or oxygen cutting of stainless steel.

Welders and helpers will refer to 3A Group's Respiratory Protection Program to determine the appropriate respiratory protection to be used during welding operations.

All welding and cutting operations shall be adequately ventilated to prevent the accumulation of toxic materials. This applies not only to the welder, but also to helpers and other personnel in the immediate vicinity.

57.9 PERSONAL PROTECTION

Helmets and hand shields shall be made of a material, which is an insulator for heat and electricity. Helmets, shields, and goggles shall not be readily flammable and shall be capable of withstanding sterilization.

Helmets and hand shields shall be arranged to protect the face, neck and ears from direct radiant energy from the arc.

Helmets shall be provided with filter plates and cover plates designed for easy removal.

All parts shall be constructed of a material, which will not readily corrode or discolor the skin.

Goggles shall be ventilated to prevent fogging of the lenses as much as practicable.

All glass for lenses shall be tempered, substantially free from scratches, air bubbles, waves and other flaws. Except when a lens is ground to provide proper optical vision correction, the front and rear surfaces of lenses and windows shall be smooth and parallel.

Lenses shall bear some permanent distinctive marking which may readily identify the source and shade.

The following is a guide for the selection of the proper shade numbers. These recommendations may be varied to suit the individual's needs.

Shielded metal — arc welding 1/16", 3/32", 1/8-5/32" electrodes		10
Gas-shielded arc welding (nonferrous) 1/16", 3/32", 5/32" electrodes		11
Gas-shielded arc welding (ferrous) 1/16", 3/32", 1/8", 5/32" electrodes		12
Shielded metal arc welding: 3/16	7/32",1/4" electrodes	12
	5/16", 3/8" electrodes	14
Atomic hydrogen welding		10 – 14
Carbon arc welding		14
Soldering		2
Torch brazing		3 or 4
Light cutting, hp to 1 inch		3 or 4
Medium cutting, 1 inch to 6 inches		4 or 5
Healy cutting, 6 inches or over		5 or 6
Gas welding (light) up to 1/8 inch		4 or 5
Gas welding (medium) 1/8 - 1/2 inch		5 or 6
Gas welding (heavy) 1/2 inch or over		6 or 8

NOTE:
In gas welding or oxygen cutting where the torch produces a high yellow light, it is desirable to use a filter or lens that absorbs the yellow or sodium line in the visible light of the operation. All filter lenses and plates shall meet the test for transmission of radiant energy prescribed in ANSI Z87.1 — 1968 — American National standard Practice for Occupational and Educational Eye and face Protection. Where the work permits the welder to be enclosed in an individual booth painted with a finish of low reflectivity such as zinc oxide (an important factor for absorbing ultraviolet radiation) and lamp black or shall be enclosed with noncombustible screens similarly painted. Booths and screens shall permit circulation of air at floor level. Workers or other persons adjacent to the welding areas shall be protected from the rays by noncombustible or flameproof screens or shields or shall be required to wear appropriate goggles.

Adequate hand protection and clothing must be used to protect the body from welding hazards.

57.10 CLEANING COMPOUNDS

In the use of cleaning materials, because of their possible toxicity or flammability, appropriate precautions such as manufacturer instructions shall be followed.

- Degreasing and other cleaning operations involving chlorinated hydrocarbons shall be so located that no vapors from these operations will reach or be drawn into the atmosphere surrounding any welding operation.

- In addition, trichloroethylene and perchloroethylene shall be kept out of atmospheres penetrated by the ultraviolet radiation of gas-shielded welding operations.

Oxygen cutting, using a chemical flux, iron powder or gas shielded arc cutting for stainless steel shall be performed using mechanical ventilation adequate to remove the fumes generated.

57.11 CYLINDERS

Compressed gas cylinders shall be DOT-approved and legibly marked near the shoulder of the cylinder for the purpose of identifying the gas content with either the chemical or trade name of the gas.

- All compressed gas cylinder connections must comply with ANSI B57. 1-1965 Standards.
- Compressed gas cylinders shall be secured in an upright position at all times except, if necessary, for short periods of time while cylinders are actually being hoisted or carried.

All cylinders shall be kept away from sources of heat and from radiators and piping systems that may be used for grounding purposes. Cylinders and cylinder valves including couplings and regulators shall be kept free from oily or greasy substances and must not be handled with gloves or rags in the same condition.

Stored oxygen cylinders shall be kept at least 20 feet from the fuel gas cylinders or combustible materials, especially oil or grease, or separated by a non-combustible barrier at least 5 feet high with a fire rating of at least one-half hour. All empty cylinders shall have closed valves. Valve protection caps shall always be in place and hand-tight except when cylinders are in use or connected for use.

Cylinders shall not be kept in unventilated enclosures such as lockers and cupboards.

Fuel gas cylinders stored inside buildings shall be limited to a total capacity of 2000 cubic feet (300 pounds) of liquefied petroleum gas, except for those in actual use or attached ready for use.

All acetylene cylinders shall be stored valve-end up.

Assigned storage spaces shall be located where cylinders cannot be knocked over or damaged by falling objects or subject to tampering by unauthorized persons.

- Back flow protection shall be provided by an approved device that will prevent oxygen from flowing into the fuel-gas system or fuel from flowing into the oxygen system.
- An approved device that will prevent flame from passing into the fuel-gas system shall provide flashback protection.
- An approved pressure-relief device set at the appropriate pressure shall provide backpressure protection.

Special care must be taken when transporting gas cylinders:

- Cylinders must be secured with valve cap installed.
- Cylinders shall not be lifted by the valve protection caps; the regulators must be removed, and cylinders shall not be dropped or permitted to strike each other.
- Removed regulators must be carried in the cab of the vehicle.
- Cylinders shall not be tampered with nor should any attempt be made to repair them.
- They shall be handled carefully - rough handling, knocks, or falls are liable to damage the cylinder, valve or safety device and cause leakage.

Safety devices shall not be tampered with.

57.12 ARC WELDING AND CUTTING

All personnel operating, installing, and maintaining welding equipment shall be qualified or trained to operate and maintain such equipment.

- All workmen assigned to operate or maintain equipment shall be familiar with and electrical welding equipment shall be chosen for safe operation and comply with applicable Requirements for Electric Arc Welding Standards to include: 29 CFR 1910.254, 29 CFR 1910.252 (a)(b) (c) and if gas shielded arc welding is done the must be familiar with the American Welding Society Standard A6-1-1966.
    - Arc welding equipment must be designed to meet conditions such as exposure to corrosive fumes, excessive humidity, excessive oil vapor, flammable gasses, abnormal vibration or shock, excessive dust and seacoast or shipboard conditions.
    - It shall be operated at recommended voltage in accordance to the manufacturer recommendations.
    - All leads shall be periodically inspected and replaced if insulation is broken or splices are unprotected.
    - Leads shall not be repaired with electrical tape.
- All ground connections shall be checked to determine that they are mechanically strong and electrically adequate for the required current.

A disconnecting switch or controller shall be provided at or near each welding machine along with over current protection.

All direct current machines shall be connected with the same polarity and all alternating current machines connected to the same phase of the supply circuit and with the same polarity.

- To prevent electrical contact with personnel, all electrode holders shall be placed where they do not make contact with persons, conducting objects or the fuel of compressed gas tanks.
- All cables with splices within 10 feet of the holder shall not be used.

If the object to be welded or cut cannot readily be moved, all moveable fire hazards should be removed.

If an object to be welded or cut cannot be moved and if all the hire hazards cannot be removed, then guards shall be used to confine the heat sparks and slag and to protect the immovable fire hazards.

57.13 RESISTANCE WELDING

All personnel operating, installing, and maintaining welding equipment shall be qualified or trained to operate and maintain such equipment.

- Voltage, interlocks, guarding, grounding and shields shall be in accordance with manufacturer recommendations.
- Precautions such as flash guarding, ventilation and shields shall be provided to control flashes, toxic elements and metal fumes.

If the object to be welded or cut cannot readily be moved, all moveable fire hazards should be removed.

57.14 TRANSMISSION PIPELINE

When arc welding is performed in wet conditions, or under conditions of high humidity, special protection against electric shock shall be supplied.

Pressure testing:

- In pressure testing of pipelines, the workers and the public shall be protected against injury by the blowing out of closures or other pressure restraining devices.

- Protection shall be provided against expulsion of loose dirt that may have become trapped in the pipe.

The welded construction of transmission pipelines shall be conducted in accordance with the Standard for Welding Pipelines and Related Facilities, API Std. 1104-1998.

57.15 OXYGEN FUEL GAS WELDING AND CUTTING:

Only approved apparatuses such as torches, regulators or pressure-reducing valves, setting generators and manifolds shall be used:

- Mixtures of fuel gases and air or oxygen may be explosive and must be guarded against.
- All hoses and hose connections shall comply with the Compressed Gas Association and Rubber Manufacturers' Associations' applicable standards.
- Workers in charge of the oxygen or fuel-gas supply equipment, including generators, shall be instructed and judged competent by the 3A Group before being left in charge.

If the object to be welded or cut cannot readily be moved, all moveable fire hazards should be removed.

57.16 FIRE WATCH REQUIREMENTS

A fire watch shall be under these conditions as a minimum and when welding, cutting, brazing and/or soldering is performed near combustible materials and/or locations where fire may develop:

- Locations where other than a minor fire might develop.
- Combustible materials are closer than 35 feet to the point of operation.
- Combustibles that are 35 feet or more away but are easily ignited.
- Wall or floor openings within a 35 feet radius of exposed combustible materials.
- Combustible materials are adjacent to the opposite side of metal partitions, ceilings or roofs.

Fire watch personnel shall be maintained at least a half an hour after welding or cutting operations have been completed and fire watchers shall have fire extinguishers readily available.

57.17 FIRST AID EQUIPMENT

First aid equipment shall be available at all times. All injuries shall be reported as soon as possible for medical attention. First aid shall be rendered until medical attention can be provided.

57.18 TRAINING

Training shall include:

- Position Responsibilities
- Cutters, welders and their supervisors must be suitably trained in the safe operations of their equipment and the safe use of the process.
- Fire Watch Responsibilities - specifically, the fire watch must know:
    - That their ONLY duty is Fire Watch.
    - When they can terminate the watch.
    - How to use the provided fire extinguisher(s).
    - Be familiar with facilities and how to activate fire alarm, if fire is beyond the incipient stage.
    - Operator Responsibilities
    - Contractor Responsibilities
    - Documentation requirements
    - Respirator Usage requirements
    - Fire Extinguisher training.

58 WORKING NEAR WATER

WORKING NEAR WATER

58.1 PURPOSE

The purpose of this program is to provide general safety guidelines for working on or near water.

58.2 SCOPE

This program covers all 3A Group employees involved in working on or near water.

58.3 PROCEDURE

58.3.1 HAZARD ASSESSMENT

3A Group requires a pre-task plan to be completed and signed by all members of the crew that may be working over or near water before employees may begin to work over or near water. The following items will be included:

- Discussion of work to be perform
- Review of required PPE
- Review of emergency procedures and contact numbers
- Reminder that employees with together at least in 2-men teams in case of man overboard emergency

58.3.2 LIFE SAVING EQUIPMENT

Employees working over or near water shall be provided with a U.S. Coast Guard approved life jacket or buoyant work vest when the danger of drowning exists.

If the deck of a barge or work platform is not equipped with an OSHA-compliant railing system, employees walking or working on deck must wear a U.S. Coast Guard approved life jacket or buoyant work vest, also called a life preserver or personal flotation device (PFD). These PFDs should be fully buckled, snapped, or zipped whenever there is a hazard of falling into the water, regardless of the size of the barge. While a PFD is not required to be worn while an employee is inside an enclosed cab or equipment compartment on a barge, each employee should have a PFD accessible to them at all times. This safety precaution will allow employees the opportunity to don a PFD in a reasonable amount of time during an emergency (i.e., vessel sinking, fire, etc.).

<u>PFDs</u>

- An approved and readily available PFD is required to be on board the vessel for each individual on board. An immersion/exposure suit is considered to be an acceptable substitute for a PFD. All lifesaving equipment designed to be worn is required to be readily available and in serviceable condition.
- Each vessel 26 feet or longer must have at least one approved ring life buoy which is immediately available. All lifesaving equipment designed to be thrown into the water is required to be immediately available and in serviceable condition.
- An approved commercial hybrid PFD is acceptable if worn when the vessel is underway and the intended wearer is not within an enclosed space, is labeled for use on uninspected commercial vessels and used as marked and in accordance with the owner's manual.
- An approved light is required for all PFDs and immersion/exposure suits. Also, all PFDs must have approved retro reflective material installed.
- Employees shall inspect buoyant work vests or life preservers for defects which could alter their strength or buoyancy prior to and after each use. Defective units shall not be used.

Have the necessary safety equipment to hand so it is ready for immediate use:

- Ring Lifebuoy
- 90’ Buoyant Heaving Line
- Life Saving Skiff

Ring buoys will be provided and readily available for emergency rescue operations with at least 90 feet of line and the distance spaced between ring buoys may not exceed 200 feet.

At least one lifesaving skiff shall be made immediately available when employees are working over or adjacent to water. Each skiff shall be checked daily prior to work beginning to ensure the capability of the skiff to respond to an emergency.

58.3.3 MAN, OVERBOARD PREVENTION

- Employees are not permitted to work alone when performing work over or near water. Employees, who will be performing work over or near water, where the danger of drowning exists, are not permitted to work alone at any time by 3A Group.
- Railing should be continuous around the deck. The ends should be secured with lashings or quick release slips so that you can cut or release them to recover a person from the water.
- Treat any slippery areas with either non-skid paint or stick on strips. Pay particular attention to the tops of hatches and sloping sides which become walkways when the deck is heeled.
- Use harnesses in rough weather and at night. Ensure they are adjusted to a tight fit or you can fall out of them.
- Fit suitably placed harness attachment points close to the companionway so that you can clip on before coming on deck and on both sides of the cockpit.
- Rig jackstays on both sides of the boat so that you can walk the full length of the deck without having to unclip.
- Flat webbing straps are in some ways better than wire because the wire tends to roll underfoot when you stand on it.
- Wear suitable protective clothing and a USCG approved lifejacket fitted with reflective tape and a light.

58.3.4 MAN, OVERBOARD RESPONSE

- When you first discover that someone has fallen overboard, the most important thing to remember is DON'T PANIC!
- If the person is on a lifeline, stop the boat immediately and then recover them using the lifeline/harness as necessary.
- If you are well prepared and have practiced the drill regularly, you will automatically know how to react.
- Immediately throw a lifebuoy and attachment overboard.
- Raise the alarm by shouting: “MAN OVERBOARD" (Even if you are the only one left aboard, shouting "man overboard" may provide reassurance to the person in the water).
- If there are others on board, instruct a crew member to watch the person in the water and point continuously.
- Start your recovery maneuver.
- If you are the only person remaining on board, do not leave the deck as you may become disorientated and lose sight of the person in the water.

- During the hours of darkness, a white parachute flare, which will pick up the retro reflective tape on clothing/lifejacket, can be used to illuminate area.
- If you cannot see the person in the water or have any doubt about your ability to recover him/her, send a mayday call on your VHF radio.

58.4 SLIPS, TRIPS AND FALLS

58.4.1 MINIMIZING HAZARDS ON DECK

- Keep all walking and working surfaces clean, dry, and unobstructed.
- Keep all areas free of debris.
- Clean up and/or report any spill immediately.
- Stack materials in a stable manner.
- Secure gear and equipment that is not in use.
- Keep stairs, doorways, walkways, and gangways free of equipment and stowed materials.
- Secure ramps during loading and offloading operations.
- Repair leaks from hoses, pipelines, and valves immediately.
- Use non-skid protective deck compound and do not paint over the non-skid compound with standard paint.
- Have de-icing procedures in place when necessary.
- Paint the perimeter and tripping hazards in a contrasting color.

58.4.2 PRECAUTIONS IN WALKING

- Walk at a normal rate, keeping your hands out of your pockets.
- Slow down when moving between different surfaces.
- Do not run.
- Minimize short stops.
- Avoid sharp turns.
- Modify your way of walking to match the surface, such as an icy deck.
- Do not jump from one vessel to another.
- Do not climb on cargo, supplies, or equipment instead of using a ladder.
- Do not step on hatch covers.
- Avoid walking along the unguarded edge of a vessel.
- Watch out for reduced visibility due to poor lighting and weather conditions. If working at night, be sure there is adequate illumination (e.g., flashlight, headlight, light tower).

58.4.3 WEARING APPROPRIATE FOOTGEAR

- Wear safety shoes or boots with slip-resistant soles as appropriate.
- Keep shoes clean of mud, snow, ice, spilled liquids, and debris.

58.4.4 PREVENTING ELEVATED FALLS

- Always maintain three-points of contact on a ladder—two hands and a foot, or two feet and a hand—so that only one limb is in motion at any one time.
- Avoid overextending the body when performing tasks such as checking sounders, checking lights, and wiring rigging, which can lead to falls from ladders.
- Falls from portable ladders are one of the leading causes of occupational fatalities and injuries. Use the following safe work practices when using ladders:
  - Use ladders only for their designed purpose (i.e., step ladders should not be used as portable rung ladders).

- Position the ladder so that for every four feet in height, the ladder extends out from the vertical surface at the base approximately one foot.
- Make sure that the ladder is long enough for the job—if used for access to an upper landing surface the side rails must extend at least three feet above that surface.
- Make sure that there is proper footing to keep the ladder from slipping or sliding.
- Tie the ladder to a secure object. Remember that the vessel(s) that the ladder is secured to can move. Use the buddy system, if possible, so that one person can hold the ladder to stop it from moving.
- Never use portable metal ladders near energized electrical equipment (such as conductors or electric arc welding machines).
- Keep your body near the middle of the step and always face the ladder while climbing.
- Do not move, shift, or extend ladders while in use. Move the ladder instead of stretching or leaning to the side to reach your work.
- Use hand lines or a tool bag/belt to keep hands free when using a ladder.
- Fully enclosed slip-resistant footwear should always be worn when using ladders.

- An adequate guard rail should be installed, or employees should wear Personal Fall Arrest Systems when work is being performed above a solid surface (e.g., to prevent falls from the deck to the dock).
- Use gangplanks with guardrails to prevent falls on the dock or pilings.
- All deck holes, openings, and hatches should be covered or guarded.
- Pigeonholes should not be used to access vessel walking or working surfaces.

58.5 MACHINERY AND EQUIPMENT HAZARDS

Hazards related to the use of machinery and equipment can result in injuries to hands, feet, or limbs that become caught in moving machinery; head and other injuries from being struck by falling objects or moving equipment; and burns. Other potential hazards include getting pinned under a load; falling off equipment; and electric shock.

To reduce hazards from machinery and equipment:

- Inspect all equipment before use.
- Maintain equipment properly. Always shut down and lockout the power source before repairing mechanical systems. Make repairs according to the manufacturer's guidelines.
- Ensure that the person using the equipment is trained in its proper use and maintenance.
- Install appropriate rails, temporary or permanent, to avoid equipment being driven off the vessel or dock.
- Ensure retaining pins are properly installed and positively secured with a keeper or locking device.
- Emergency shut offs must be easily accessible, and sufficient guarding should be used for equipment controls.

58.6 HOISTS, CRANES AND DERRICKS

Hazards of hoists include being struck by a heavy object, such as the boom or the load being moved. To reduce these hazards:

- Stay clear when a hoist is being used unless you are part of the procedure and, in which case, never stand under a load or boom with a suspended load.
- Wear personal protective equipment, such as head, foot, eye, and hand protection at all times.
- Assess the hoisting systems for structural soundness by inspecting regularly for problems with welds, rivets, chains, pulleys, lines, blocks, hooks, etc.
- Secure power blocks with a safety chain.
- Ensure that cranes in use are secured to the vessel.
- Do not try to help lift a load being hoisted.

58.6.1 WINCHES

Operating or working near winches may potentially expose employees to hazards such as body parts caught in a winch drum, being struck by a broken line or cable, and tripping over a line or cable. To reduce hazards:

- Use a device or tool, never your hand, to keep the winch line spooling properly.
- Enclose the winch drum in a cage if practical.
- Stay off the deck unless you are part of the operation.
- Never stand in, on, over, or in line with lines or cables connected to winches when they are under tension. The danger zone lies within 15 degrees of either side of a line under tension.
- Never step on or walk over the winch drum.
- Inspect the winch system regularly for problems associated with general or localized deterioration, cracked welds, and other structural, mechanical, or electrical deficiencies.
- Inspect lines and cable systems regularly, including blocks, hooks, and associated components, for signs of damage or deterioration.
- A guard should be installed between the winch operator and the connected cables to protect the operator from potential whiplash.
- Never stand in the bight of a line.

58.7 FIRE HAZARDS

Steps that can be taken to prevent fires on board a vessel include the following:

- Store engine fuel tanks and compressed gas tanks properly, away from sources of ignition. Only keep onboard quantities of flammable and combustible materials that are necessary for operations and maintenance. Post appropriate danger signs.
- When dealing with work that is capable of providing a source of ignition through a flame or spark (hot work), such as welding, cutting, burning, drilling, grinding, etc., follow these precautions:
  - Ensure the space is properly tested by a qualified or shipyard-competent person and deemed safe before work is begun. (See 29 CFR 1915.7 and 1915.15.).
  - Make sure that proper fire extinguishing equipment is near the work area and that it is maintained in a state of readiness for emergency use.
- Do not leave oxygen or acetylene hoses unattended.
- Consider where sparks will fall when doing hot work and employ a fire watch.
- Shield fuel sources to protect them from ignition sources.
- Cover openings to prevent sparks from entering.
- Stop any hot work if you smell fuel or gas until the source has been identified and the problem fixed.
- When welding or burning on the deck of a vessel, the space below should be inspected to ensure that no flammable atmosphere or combustible materials are present.
- Use good housekeeping practices to limit the amount of clutter, debris and combustible/flammable material.

Follow these safety measures to help prevent electrical fires:

- Make sure that electrical systems are installed by a qualified marine electrician and that electrical systems are inspected regularly.
- Regularly conduct visual inspections of connections, switches and wiring, which may be subject to corrosion from saltwater and damage from use.

58.7.1 FIRE EXTINGUISHING EQUIPMENT

- Hand-portable fire extinguishers and semi-portable fire extinguishing systems must be of the "B" type (i.e.,

suitable for extinguishing fires involving flammable liquids, greases, etc.).

- Hand-portable fire extinguishers and semi-portable fire extinguishing systems must have a metal name plate listing the name of the item, rated capacity (gallons, quarts or pounds), name and address of person/firm for whom approved, and the manufacturer's identifying mark.
- Portable fire extinguishers must be inspected and weighed every six months.
- Minimum number of B-II hand-portable fire extinguishers required to be on board motor vessels: one if less than 50 tons, two if 50-100 tons, three if 100-500 tons, six if 500-1,000 tons and eight if over 1,000 tons.
- Fixed fire extinguishing systems must be an approved carbon dioxide type and must meet U.S. Coast

58.7.2 VENTILATION

Fuel tanks and engine spaces, using fuel with a flashpoint of 110 degrees Fahrenheit or less, must be provided with adequate ventilation to remove explosive or flammable gases from the fuel tank compartment and bilges.

58.8 TRAINING

Employees working over or near water will be provided training on the hazards. Employees working over or near water must be adequately trained in their responsibilities and the safe work practices associated with this task and the identified hazard for the site and equipment they are working with.

Training will also be conducted on pre-task planning and hazard identification and daily equipment checks prior to beginning work.

Practice man overboard drills regularly - This can be achieved by using a fender and bucket as the casualty.

59 WORKPLACE SECURITY PROGRAM

WORKPLACE SECURITY PROGRAM

59.1 SECURITY OFFICERS

Appointed Security Officers shall uphold their office during their prescribed time of duty with the utmost concern for security and safety of 3A Group's premise. Security Officers shall also perform their duties in a professional manner and demonstrate courteous service to all who request or require. Each Security Officer will preserve his/her post until properly relived or otherwise instructed from this companies Executive Management.

59.2 TRAFFIC CONTROL

Each vehicle allowed to access the Southern mechanical gate entrance to building 1, shall be recorded for daily security accountability. See *Appendix A*: *Security Gate Entry Accountability Log*. When gate monitoring is required, the on-duty security officer shall cease all other operations and attend to the gate opening and closing activities until the gate operation has commenced. At no time will the Southern gate to building one be left in the open position while unattended. At all times the on-duty Security Officer will follow the procedure for controlling the gate.

Gate Operation Procedure:

1. Log in the person(s), vehicle and conduct a quick security check of the vehicle's contents.
2. Activate gate to open, prohibit entry until the gate completely stops in the open position.
3. Instruct person(s) to enter gate.
4. Activate gate to close, prohibit access to all traffic during this process.
5. Do not leave the gate unattended until the gate comes is completely closed.

59.3 ENFORCEMENT

The following areas are standard enforcement duties performed by the on-duty security guard, but not limited to;

- Enforcing fire prevention and reporting safety hazards
- Prevention of unauthorized Incendiary or explosive materials carried onto company property
- Determine proper badge identification, guest passes, and material releases
- Enforce zero tolerance of possessing of or use of intoxicants or non-prescription narcotic-type drugs
- Enforce zero tolerance of possessing weapons
- Secure exposed classified or important documents
- Enforce zero tolerance of smoking where not permitted
- Enforce zero tolerance of loitering
- Enforce zero tolerance of tampering with fire equipment or utilities
- Enforce zero tolerance to sabotage, espionage, or subversive activities
- Report all violations of safety rules
- Report all theft of client and employee property
- Report all misconduct, immoral or indecent behavior
- Prohibit horseplay or malicious mischief
- Prohibit all forms of gambling or soliciting on company property
- Control all forms of profane or indecent language
- Report all abuse or destruction of property, or equipment
- Smoking where not permitted
- Demonstration or disturbance on company or client property

- Creating unsanitary conditions
- Unauthorized distribution of literature on company or client property
- All other violations of company policies or rules
- Observing irregular conditions and activities
- Maintain an excellent relationship with the Police Agency
- Correcting or reporting irregular conditions
- Enforcing rules and laws
- Rendering service to management and employees
- Planning against potential harm
- Allowing only authorized materials in and out of buildings
- Acquiring the respect and good will of all employees, thereby preserving and improving employee/management relations

3A GROUP
CONSTRUCTION | MANAGEMENT | BUILDING SERVICES

SECURITY GATE ENTRY ACCOUNTABILITY LOG

NAME:	TITLE:	DATE:	TIME IN:	TIME OUT:
I understand that I am responsible for the accountability of each person that enters the company property. This checklist shall be properly completed during each shift, and provided to the H.R. Department as required.	**SIGNATURE:** X_____		PAGE ____ OF ____	

#	NAME	ID/DRIVER LIC.	3A Group	VEHICLE MAKE/MODEL	LIC. PLATE NUMBER	PURPOSE OF VISIT	TIME IN	TIME OUT
1.								
2.								
3.								
4.								
5.								
6.								
7.								
8.								
9.								
10.								
11.								
12.								
13.								
14.								

3A GROUP
CONSTRUCTION | MANAGEMENT | BUILDING SERVICES

SECURITY WALK-IN GUEST LOG

NOTICE *to our Guest:* Welcome to 3A Group and thank you for visiting us today. Please sign in after you have read our Visitor Policy. All visitors shall abide by all personal hygiene and safety policies set forth in the Visitor's Policy. As required by our standing Security and Bio-Terrorism programs, all plant visitors must be serviced these documents and provide the requested information before entering these premises.

#	Name	Id/Driver Lic.	Visitor Badge #	3A Group	Purpose Of Visit	Time In	Time Out
1.							
2.							
3.							
4.							
5.							
6.							
7.							
8.							
9.							
10.							
11.							
12.							
13.							

NAME:	TITLE:	DATE:	TIME IN:	TIME OUT:

I understand that I am responsible for the accountability of each person that enters the company property. This checklist shall be properly completed during each shift, and provided to the H.R. Department as required.	**OFFICER'S SIGNATURE:** X_____	PAGE ____ OF ____

3A GROUP
CONSTRUCTION | MANAGEMENT | BUILDING SERVICES

3A GROUP PLANT SECURITY TRUCK INSPECTION LOG

NAME:	TITLE:	DATE:	TIME IN:	TIME OUT:
I understand that I am responsible for the accountability of each person that enters the company property. This checklist shall be properly completed during each shift, and provided to the H.R. Department as required.	**SIGNATURE:** X_____		PAGE ____ OF ____	

#	Driver's Name	Trucking Line	Company Product In From/Out To	License Plate Number And State	Cargo Goods	Time In	Time Out	Seal Number	Truck Or Trailer Locked?	# Pallets Arriving	# Pallets Leaving
1.											
2.											
3.											
4.											
5.											
6.											
7.											
8.											
9.											
10.											

NAME:	TITLE:	DATE:	TIME IN:	TIME OUT:
I understand that I am responsible for the accountability of each person that enters the company property. This checklist shall be properly completed during each shift, and provided to the H.R. Department as required.	**OFFICER'S SIGNATURE:** X_____		PAGE ____ OF ____	

60 WORKPLACE VIOLENCE PREVENTION PLAN

WORKPLACE VIOLENCE PREVENTION

60.1 POLICY

It shall be the policy of the 3A Group to provide all employees and members of the public with a safe and healthful work environment. It shall be the policy of 3A Group to take appropriate actions to protect, as fully as possible, state employees and members of the public from acts of violence, threats, intimidation and harassment which may occur at state workplaces, and during the performance of state duties. The (department name) shall also take action, including involving state or local law enforcement, in pursuing prosecution through judicial or other appropriate administrative remedies when such incidents occur.

60.2 PURPOSE

The purpose of the "Workplace Violence Prevention Program" is to ensure that 3A Group provides employees and members of the public with a place to conduct the business of this Department free of threats, intimidation, harassment, and acts of violence.

60.3 DEFINITIONS

- **Act of Violence** - An act of violence is the attempt (coupled with the ability), or actual use of force of violence with the intent to threaten, harass, intimidate, commit a violent injury, or damage/destroy property.
- **Threat** - A threat is a statement (verbal, written or physical) which is intended to intimidate by expressing the intent to either harass, hurt, take the life of another person, or damage/destroy property. This includes threats made in jest, but which others could perceive as serious.
- **Harassment** - The creation of a hostile work environment through unwelcome words, actions, or physical contact not resulting in physical harm. Verbal harassment may include disparaging or derogatory comments or slurs, unreasonable or excessive criticism, or name calling.
- **Intimidate** - To make afraid; to frighten, alarm, annoy, or scare. To force a person into, or deter them from, some action by inducing fear by, or as if by, threats.
- **Stalking** - Stalking occurs when any person willfully, maliciously and repeatedly follows or harasses another and makes a credible threat with the intent to place that person in reasonable fear for his/her safety or the safety of his/her immediate family.
- **Workplace Violence** - The three major types of workplace violence are:
    - **Type I** - The aggressor has no legitimate business relationship to the workplace and usually enters the affected workplace to commit a robbery or other criminal act such as robbery.
    - **Type II** - The aggressor is either the recipient or the object, of a service provided by the affected workplace or the victim, such as a current or former client, patient, customer, passenger, criminal suspect, inmate or prisoner.
    - **Type III** - The aggressor has some employment-related involvement with the affected workplace such as a current or former employee, supervisor, manager; a current/former spouse or significant other, a relative, friend; or some other person who has a dispute with an employee of the affected workplace.

60.4 RESPONSIBILITY

60.4.1 MANAGER/SUPERVISOR

Managers and supervisors are responsible for ensuring compliance with the provisions of the Workplace Violence Prevention Program. It is the responsibility of each and every employee to immediately report any and all acts of workplace violence to their supervisor or manager without fear of reprisal. All reports must be taken seriously. The initial verbal report must be followed up with written documentation which should include the following critical information: Names of the involved parties (i.e. perpetrator, victim and witnesses), exactly what occurred, when the incident occurred, where the event took place, and if known why it happened.

60.5 COMPLIANCE

3A Group is committed to ensuring that all safety and health policies and procedures involving workplace violence prevention are clearly communicated and understood by all employees. All employees are responsible for using safe work practices, for following all directives, policies and procedures, and for assisting in maintaining a safe, healthy and secure work environment. Our system of ensuring that all employees, including supervisors and managers, comply with work practices that are designed to make the workplace more secure, and do not engage in threats or physical actions which create a security hazard for others in the workplace, include:

1. Training employees, supervisors, and managers of the provisions of the Department's Workplace Violence Prevention Program (WVPP) when they are hired and periodically through memos, electronic mail, staff meetings, and training.)
2. Evaluating employees to ensure compliance with the Department's WVPP.
3. Recognizing employees who demonstrate work practices that promote the WVPP in the workplace by (example: memos of accommodation from the director).
4. Providing training and/or Employee Assistance Program services to employees whose compliance is deficient with the WVPP.
5. Disciplining employees for failure to comply with WVPP. (You can either refer to the department's existing discipline process or outline specific steps for the WVPP)
6. Ensuring proper public notice of WVPP.

60.6 COMMUNICATION

3A Group recognizes that to maintain a safe, healthy and secure workplace we must communicate to all employees, including managers and supervisors, all workplace safety, health and security issues. We have a communication system designed to encourage a continuous flow of safety, health and security information between management and our employees without fear of reprisal and in a form that is readily understandable. We will communicate the WVPP policies and procedures through:

1. New employee orientation.
2. Periodic (designate weekly, monthly, quarterly, yearly based on the frequency and severity of workplace violence incidents) review of our WVPP with all employees.
3. Training programs designed to address specific aspects of workplace violence prevention and security unique to our location. [The following training is offered: (list training). You can call your Crime/Workplace Violence Prevention Coordinator for more information.]
4. Posting and distributing workplace violence prevention information.
5. Reporting workplace violence/security hazards or threats of violence. (Talk to your supervisors first, if that isn't possible, call your (Crime/Workplace Violence Prevention Coordinator or the Personnel Office)
6. Protecting employees who report incidents of workplace violence from retaliation by the person making the threats. Employees who report incidents of workplace violence will be protected from the person making the threats by the Department immediately taking the appropriate actions such as removing the person,

making the threats, from the work area until the situation is resolved. For serious threats or acts of violence, Security and/or the local police will be called. See the posted Standard in your work area for emergency phone numbers.

7. Addressing security issues at our workplace violence prevention/security team meetings. (Security issues will be discussed at safety/workplace violence/joint Labor Management safety committee meetings. The committee will recommend solutions to management. The Crime/Workplace Violence Prevention Coordinator will implement approved solutions.
8. Ensuring proper public notice of WVPP.

60.7 HAZARD ASSESSMENT

3A Group will perform workplace hazard assessment for workplace violence prevention/security in the form of periodic inspections. Periodic inspections to identify and evaluate workplace violence/security hazards and threats of workplace violence are performed by: (area/location specific person's name) Periodic inspections are performed according to the following schedule:
No less than once a quarter, (see Appendix C)
When the Workplace Violence Prevention Program is implemented;
When new, previously unidentified workplace violence/security hazards are recognized;
When occupational injuries or threats of injury occur; and
Whenever workplace conditions warrant an inspection.
Within 30 days of reported incident a follow-up inspection is warranted. Periodic inspections for violence prevention/security hazards consist of identification and evaluation of workplace hazards and changes in business practices and may require assessing for more than one type of workplace violence. Our establishment performs inspections for each type of workplace violence by using the methods specified below to identify and evaluate workplace hazards.

60.7.1 INSPECTIONS FOR TYPE I WORKPLACE SECURITY HAZARDS INCLUDE ASSESSING:

- The exterior and interior of the workplace for its attractiveness to robbery or other criminal acts.
- The need for security surveillance measures, such as mirrors or cameras.
- Posting of signs notifying the public that limited cash is kept on the premises.
- Procedures for employee response during a robbery or other criminal act.
- Procedures for reporting suspicious persons or activities.
- Posting of emergency telephone numbers for law enforcement, fire and medical services where employees have access to a telephone with an outside line.
- Limiting the amount of cash on hand and using safes for large amounts of cash, or armor car pickup.
- Building alarm systems and Crime Prevention through Environmental Design.

60.7.2 INSPECTIONS FOR TYPE II WORKPLACE SECURITY HAZARDS INCLUDE ASSESSING:

- Access to, and freedom of movement within, the workplace.
- Adequacy of workplace security systems, such as door locks, security windows, physical barriers, and restraint systems.
- Frequency and severity of threatening or hostile situations that may lead to violent acts by persons who are service recipients of our establishment.
- Employee’s skill in safely handling threatening or hostile service recipients.
- Effectiveness of systems and procedures to warn others of a security danger or to summon assistance, e.g., alarms or panic buttons.
- The use of work practices such as "buddy" systems for specified emergency events.

- The availability of employee's posted escape routes.

60.7.3 INSPECTIONS FOR TYPE III WORKPLACE SECURITY HAZARDS INCLUDE ASSESSING:

- How well our establishment's workplace violence prevention policy has been communicated to employees, supervisors, or managers.
- How well our establishment's management and employees communicate with each other.
- Our employees', supervisors' and managers' knowledge of the warning signs of potential workplace violence.
- Access to, and freedom of movement within, the workplace by non-employees, including former employees or persons with whom one of our employees is having a dispute.
- Frequency and severity of worker reports of incidents of physical or verbal abuse by managers, supervisors or other employees.
- Any prior violent acts, threats of physical violence, verbal abuse, property damage or other signs of strain or pressure in the workplace.
- Worker progressive disciplinary procedures.

60.8 HAZARD CORRECTION

Hazards, which threaten the security of employees, shall be corrected based on severity when they are first observed or discovered.

60.8.1 CORRECTIVE MEASURES FOR TYPE I WORKPLACE SECURITY HAZARDS CAN INCLUDE:

1. Making the workplace unattractive to robbers and other criminal acts.
2. Utilizing security guards and surveillance measures, such as cameras or mirrors, to provide information as to what is going on outside and inside the workplace.
3. Reporting procedures for notifying designated employees of suspicious persons or activities.
4. Posting emergency telephone numbers for law enforcement, fire and medical services where employees have access to a telephone with an outside line.
5. Posting signs to notify the public that limited cash is kept on the premises.
6. Limiting cash on hand and using time access safes and armored car services for large amounts of cash.
7. Training on emergency action procedures for employees, supervisors and managers. 8. Using alarm systems and access control systems.
8. Applying Crime Prevention through Environmental Design practices.

60.8.2 CORRECTIVE MEASURES FOR TYPE II WORKPLACE SECURITY HAZARDS INCLUDE:

- Controlling access to the workplace and freedom of movement within it, consistent with business necessity.
- Ensuring adequate workplace security/access control systems, such as door locks, security windows, physical barriers, and restraint systems.
- Providing worker training in recognizing and handling threatening or hostile situations that may lead to violent acts by persons who are service recipients of our establishment.
- Placing effective systems to warn others of a security danger or to summon assistance, e.g., alarms or panic buttons.
- Providing procedures for a "buddy" system for specified emergency events. 6. Ensuring adequate emergency escape routes.

60.8.3 CORRECTIVE MEASURES FOR TYPE III WORKPLACE SECURITY HAZARDS INCLUDE:

1. Communicating effectively our department's workplace violence prevention policy to all employees, supervisors, and managers.

2. Improving how well our establishment's management and employees communicate with each other.
3. Increasing employees, supervisors', and managers' awareness of the warning signs of potential workplace violence.
4. Controlling access to, and freedom of movement within, the workplace by nonemployees, including recently discharged employees or persons with whom one of our employee's is having a dispute.
5. Providing counseling to employees, supervisors or managers who exhibit behavior that represents strain or pressure which may lead to physical or verbal abuse of coworkers.
6. Ensuring all reports of violent acts, threats of physical violence, verbal abuse, property damage or other signs of strain or pressure in the workplace are handled effectively by management and that the person making the report is not subject to retaliation by the aggressor.
7. Ensuring worker disciplinary and discharge procedures address the potential for workplace violence.
8. Applying crime prevention measures through environmental design and administrative measures including but not limited to:
    - well lighted areas
    - security/controlled access to work area
    - Employees must visibly display employee ID badge at all times while in a Department facility
    - code word recognized by coworkers to indicate you need help
    - visitor sign-in
    - visitor badges
    - well lighted parking lots and area surrounding the building
    - buddy system for walking to car or locations away from the building I. security cameras
    - bullet resistant glass
    - mounted area mirrors L. onsite security guards
    - eliminate hiding places in areas surrounding the building, i.e. overgrown shrubs, dark areas
    - panic buttons
    - locks on restroom doors
    - remove sharp objects from view that could be used as a weapon (offices with public access)
    - caller ID on phones
    - field staff check in (cell phones)
    - cash locked in vault

60.9 TRAINING AND INSTRUCTION

We have established the following policy with respect to training all employees on workplace security. All employees, including managers and supervisors, shall have training and instruction on general and job-specific workplace security practices. Training and instruction shall be provided when the Workplace Violence Prevention Program (WVPP) is first established and periodically thereafter. Training shall also be provided to all new employees, to other employees for whom training has not previously been provided and to all employees, supervisors, and managers given new job assignments for which specific workplace security training for that job assignment has not previously been provided. Additional training and instruction will be provided to all personnel whenever the employer is made aware of new or previously unrecognized security hazards.

General workplace security training and instruction includes, but is not limited to, the following:

1. Specific WVPP and crime prevention training for the Department Crime/Workplace Violence Prevention Coordinator to develop and maintain the workplace violence/crime prevention program.
2. Explanation of the WVPP including measures for reporting any violent acts or threats of violence.
3. Recognition of workplace security hazards including the risk factors associated with the three types of workplace violence.
4. Measures to prevent workplace violence, including procedures for reporting workplace security hazards or threats to managers and supervisors.
5. Ways to defuse hostile or threatening situations.
6. Measures to summon others for assistance.
7. Routes of escape.
8. Notification of law enforcement authorities when a criminal act may have occurred.
9. Emergency medical care to be provided to a victim of any violent act upon a worker;
10. Post-event trauma counseling for those employees desiring such assistance.
11. California Victim Compensation and Government Claims Board.
12. Department of Personnel Administration Rules.
13. Union Contracts.

In addition, we provide specific instructions to all employees regarding workplace security hazards unique to their job assignment, to the extent that such information was has not previously been covered in other training.

60.10 RECORDKEEPING

An effective record keeping system helps in selecting the appropriate level of controls to prevent recurrence and in determining required training. Records should be kept up to date

- OSHA 300 - Pursuant to Title 8 California Code of Regulations, Sections 14300 through 14400, employers are required to record on their OSHA 200 Log all fatalities and illnesses and specified injuries which occur as a result of work-related injuries or illnesses including workplace violence:

Those injuries which are recordable are those which result in the following:

- Loss of consciousness;
- Restriction of work or motion;
- Transfer to another job or termination of employment; or
- Medical treatment beyond first aid.

Workplace violence includes assaults that take place on the employer's premises and at other locations where employees are engaged in work-related activities or are present as a condition of employment.

The following records should be kept in a separate file for Workplace Violence Prevention Incident Reports in accordance with departmental policies:

- **Incident Reports** - any acts of aggression should be recorded; they may be threatening to the worker, but may not result in injury, (i.e. pushing or shouting). The report should describe who was threatened or assaulted, the type of activity, (i.e. unprovoked sudden attack), and all other circumstances of the incident. The records should include a description of the location/environment, potential or actual costs, lost time, nature of injuries sustained, etc.
- **Minutes of safety meetings** - should be taken and should contain findings, corrective actions recommended relative to workplace violence, along with department's response and completion dates for action items.
- **Employee questionnaires** - which should that assess employee views of high-risk work areas and activities.

The following records should be maintained.

- **Training records** - which should include dates that training was conducted, type of training given, employees trained, etc.
- **Inspection records** - which should include dates of inspection, areas inspected, all findings and recommendations, any control measures implemented, etc.

60.11 INCIDENT REPORT FORM

VICTIMS NAME: _____ JOB TITLE: _____

VICTIMS ADDRESS: _____

HOME PHONE NUMBER: _____ WORK PHONE NUMBER: _____

EMPLOYERS NAME AND ADDRESS: _____

DEPARTMENT/SECTION: _____

INCIDENT DATE: _____

INCIDENT TIME: _____

INCIDENT LOCATION: _____

WORK LOCATION (if different): _____

TYPE OF INCIDENT: (circle one): Assault, Robbery, Harassment, Disorderly Conduct, Sex Offense, Other.
(Please Specify) _____

(See DEFINITION OF INCIDENTS)

WERE YOU INJURED? (circle) Yes No

If yes, please specify your injuries and the location of any treatment:

_____

_____

_____

_____

_____

61 WORKPLACE VISITORS

WORKPLACE VISITORS

61.1 GENERAL REQUIREMENTS

3A Group has a policy concerning visitors to the workplace. These policies not only protect visitors, they also protect the safety and security of our workplace and workforce.

61.2 DEFINITIONS

a. "Visitor" includes personal visitors, such as family members, as well as students, patients, customers, vendors, or professional colleagues.
- A person or group that accesses 3A Group property that:
  - Does not normally report to that location for work
  - Delivers goods and services to 3A Group; or
  - Participates in site tours

b. "Workplace" refers to all 3A Group facilities that may be used as laboratories, studios, classrooms, hospitals and clinics, or offices, as well as any other spaces used in carrying out 3A Group's threefold mission of teaching, research, and service.
c. "Personal safety hazards" that may exist in 3A Group's workplaces include both physical and material hazards (chemical, radioactive, and/or biological) related to the functions of the various working environments at 3A Group.

61.3 RESPONSIBILITY FOR POLICY AND PROCEDURES

- 3A Group employees are responsible for developing and implementing appropriate and reasonable restrictions on visitor access insofar as it is necessary to:
  - Protect the health and safety of occupants and of visitors to 3A Group workplaces.
  - Protect the confidentiality of data and information that may relate to students, patients, employees, and others served by the 3A Group community.
  - Minimize activity that might detract from the productivity and effectiveness of 3A Group faculty and staff in the workplace.
  - Maintain the security of 3A Group property and resources.
  - Such restrictions may provide for limitations on access, frequency, and duration of visits and must provide for appropriate supervision of all workplace visitors. Some visitors may require close and ongoing supervision, particularly in areas with known hazards. Unit-based policies may vary in the degree of restriction due to the nature of the local workplace but will consistently maintain the protections specified above.

    For example, visitors should not be brought to areas in which hazardous equipment, materials, or activities are present (e.g., laboratories, studios), except for conducting 3A Group business and only when utilizing appropriate safety precautions. Colleagues, prospective students, and students from primary and secondary schools may enter these areas as part of educational programs or for academic, scholarly, artistic, or research purposes; however, they must be fully supervised during their visit. Full supervision of visitors in areas with known hazards requires the undivided attention of the supervisor(s) to the visitor(s), and visits should be limited in frequency and duration.

Visitors brought into areas that do not normally entail hazards beyond those usually encountered in public spaces (e.g., administrative offices, libraries, lecture classrooms) should be supervised at a level that is necessary

and sufficient to ensure both the safety of the occupants and visitor(s). Even these visits should be limited insofar as it is necessary to assure that the quality and quantity of work being carried out by all employees and students in the area are not compromised, and that the quality and integrity of all 3A Group data, services, and resources are maintained.
Questions or concerns regarding specific visitors and/or the applications of the policy should be directed to the administrative official responsible for the unit.

61.4 METHOD/PRACTICE

61.4.1 HAZARD IDENTIFICATION

- Each Registration unit shall identify potential hazards and associated risk relevant to its facilities and worksites
- Visitor access and controls shall be based on the level of risk and security protocols. This shall include personal protective equipment (PPE) requirements.

61.4.2 CONTROL METHODS

- Controls shall be in place, where reasonably practicable, to ensure that visitors are not exposed to unacceptable risk. This includes restricting access through fencing, locked doors, marked walkways, alarms and security measures.
- Other controls include orientation, tour guides, accounting for visitors while on premises and appropriate signage

61.4.3 ORIENTATION

- An orientation commensurate to the level of risk shall be conducted prior to accessing controlled areas
    - Unaccompanied visitors shall be orientated to restricted areas, PPE requirements, site hazards, facility safety rules and the emergency plan.
    - Accompanied visitors shall remain with the guide at all times. A review of the emergency plan and PPE shall be done with the visitor.

61.4.4 TOUR AREAS

- Every facility at 3A Group that conducts tours shall identify tour zones.
- Tour zones shall be reassessed when site conditions and/or activities change.

61.5 PERSONAL PROTECTIVE EQUIPMENT (PPE)

- PPE shall be in compliance with 3A Group Personal Protective Equipment Policy and supporting standards.

61.6 SAMPLE VISITORS POLICY

No visitors are allowed in our workplace or on company property unless authorized by a department manager. All requests for permission for nonemployees to enter company property must be made at the front office. Employees who wish to visit the workplace for any reason during hours or shifts when they are not assigned to work must also have the permission of a department manager. Applications for such visits must be made at the front office. Visitors must wear a visitor's pass on the jacket or shirt pocket to display that the individual is an authorized visitor. Supervisors are to challenge strangers in the plant who do not display the visitor's pass to determine their authority for access to our facility. Unauthorized visitors should be escorted courteously but

quickly from the workplace or to the front office. Applications to visit the facility during second or third shift hours must be made at the front office prior to 4:00 p.m.

61.7 SAMPLE POINTS TO COVER

- **Visits by nonemployees.** State that such visits are not allowed unless authorized by the company.
- **Authorization procedures.** How does a visitor obtain authorization? Who within the company has the power to authorize visitors?
- **Off-limit areas.** Identify any areas that are off limits to all visitors (for example, confidential records, equipment, computer network).
- **Identification of visitors.** Must visitors sign in and out? Must they present a photo identification? What type of photo identification? Must visitors wear identification badges or passes? Must they be escorted by a supervisor or company official?
- **Heightened requirements.** Are there times when you need to increase restrictions (for example, after hours, while key operations or processes are in progress, during holidays and weekends, after terrorist alerts)?
- **Visits by employees during nonworking hours.** Some companies restrict regular employees' access to the plant or office during off-hours. What procedures should be followed by an employee who has a legitimate reason to visit the premises after work hours?
- **Visits by employees on leave.** Employees who are on leave may also stop by. Address how these individuals should be treated. For example, can the proud parent on a parental leave bring the newborn to the office for coworkers to see? What access is permitted for employees who are on partial leave and are working at home?
- **Former employees.** How are former employees treated? Are they treated just like nonemployees?
- **Vendors, suppliers, and contractors.** Are vendors and others required to sign in? Is there a color-coded badge? Are they escorted everywhere? Is their access limited?
- **Temporary employees.** Are temporary employees treated like regular employees or like contractors?
- **Visits by friends and family members.** Some employers consider friends and family members "outsiders" and restrict their visits accordingly; others feel that with the supervisor's authorization, family members in particular should be allowed to visit on occasion to see where the employee works. What about emergency situations, when a friend or family member must see an employee immediately?
- **Recording devices.** May visitors bring into your building recording devices, such as cameras and camera phones?
- **Supervisors' responsibilities.** Should supervisors challenge unescorted strangers who aren't wearing the proper identification? Should they direct or escort unauthorized visitors to the front office or out of the building? Should they contact Security or escort someone in Human Resources or another department to assist in escorting the person off the premises?
- **Discipline.** What discipline is imposed for employees who violate the policy or observe violations but do not report them?

3A GROUP
CONSTRUCTION | MANAGEMENT | BUILDING SERVICES

THE FUTURE IS OURS TO BUILD.