SAFETY AND HEALTH PLAN
FOR THE
ASBESTOS ABATEMENT OF BUILDING 401
NIAGARA FALLS STORAGE SITE
LEWISTON, NEW YORK

PREPARED FOR:

DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS, BUFFALO DISTRICT
BUFFALO, NEW YORK
CONTRACT DACW49-00-D-0007

Prepared by:

Jacobs Engineering Group, Inc. - Federal Operations
13723 Riverport Drive
Maryland Heights, MO 63043

September 2001
Revision 1 – January 2002

ROUTING OF SHOP DRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE FOR APPROVAL

(Used to route ENG Form 4025 with items attached. Not to become a part of the Contractor's Record.)

	TO:	FROM:	DATE
1	Stephen Yaksich	Todd Kufel	17-Jan-02

The attached items listed on ENG Form 4025 are forwarded for approval action.

CONTRACT NUMBER	CONTRACTOR
DACW49-00-D-0007	Jacobs Engineering
TRANSMITTAL NUMBERS	**PROJECT TITLE AND LOCATION**
[redacted] Plan (Rev 1)	NFSS Building 401 Asbestos Abatement

COMMENTS (Attach additional sheet, if necessary.)

Revised work plan. All PDT comments have been resolved.

NO. OF INCL.	TYPED NAME AND TITLE	SIGNATURE
6	Todd Kufel, Project Engineer	Todd C Kufel

	TO:	FROM:	DATE
2			

COMMENTS (Attach additional sheet, if necessary.)

NO. OF INCL.	TYPED NAME AND TITLE	SIGNATURE

	TO:	FROM:	DATE
3			

COMMENTS (Attach additional sheet, if necessary.)

NO. OF INCL.	TYPED NAME AND TITLE	SIGNATURE

	TO:	FROM:	DATE
4	Judith Leithner	Stephen Yaksich	1/18/02

The following action codes are given to items listed on ENG Form 4025:

ACTION CODES

A - APPROVED AS SUBMITTED.
B - APPROVED, EXCEPT AS NOTED ON DRAWINGS. RESUBMISSION NOT REQUIRED.
C - APPROVED, EXCEPT AS NOTED ON DRAWINGS. REFER TO ATTACHED SHEET, RESUBMISSION REQUIRED.
D - WILL BE RETURNED BY SEPARATE CORRESPONDENCE.
E - DISAPPROVED (SEE ATTACHED)
F - RECEIPT ACKNOWLEDGE
G - OTHER (specify).

ACTION CODES TO BE INSERTED IN COLUMN G, SECTION I, ENG FORM 4025 (Attach sheets, when required.)

ITEM NO. *(Taken from ENG Form 4025)*	1.6a							
CODE GIVEN	B							

REMARKS

Item No. 1.6a - Approved, except as noted on attached comment sheet. Resubmission not required.

NO. OF INCL.	TYPED NAME AND TITLE	SIGNATURE
1	Stephen Yaksich, Chief, Engineering Division	Stephen Yaksich

FORM 4026 EDITION OF NOV 66 MAY BE USED. * U.S. GOVERNMENT PRING OFFICE: 1984-449-726:18'

ENG 1 NOV 74

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JACOBS ENGINEERING
Engineers and Constructors

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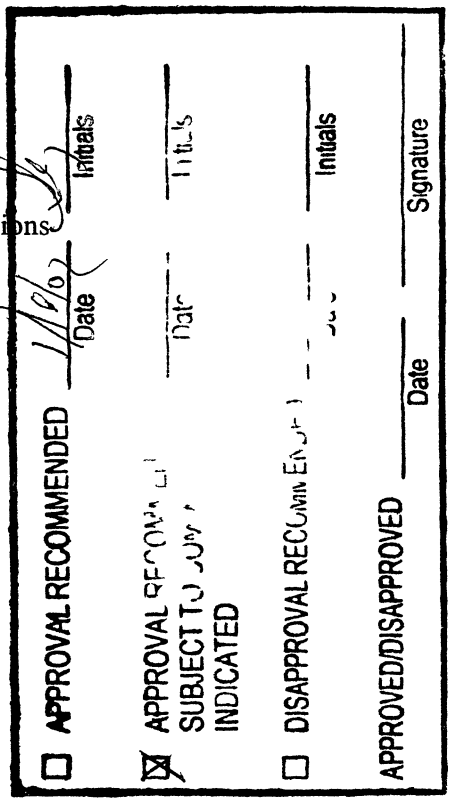
13723 Riverport Drive
Maryland Heights MO 63043



September 2001
Revision 1 – January 2002

COMPLETION OF INDEPENDENT TECHNICAL REVIEW

Jacobs has completed the Safety and Health Plan for the asbestos abatement of Building 401, Niagara Falls Storage Site, Lewiston, New York. Notice is hereby given that an independent technical review has been conducted of this document that is appropriate to the level of risk and complexity inherent in the project. During the independent technical review, compliance with established policy principles and procedures was verified. This included review of the technical content, the appropriateness of identified processes and procedures, compliant with project scope requirements, consistent with applicable laws and regulations and meeting the needs of the US Army Corps of Engineers.

Brian Knaus

Brian Knaus – CIH, CSP — 09-18-01

(Signature) (Date)

Study/Design Team Leader

Virgil W Jansen

Virgil Jansen - PE — 09-27-01

(Signature) (Date)

Independent Technical Review Team Member

Terry Briggs

Terry Briggs - PhD, CIH — 09-27-01

(Signature) (Date)

Independent Technical Review Team Member

Steve Green, CHP

Steve Green - CHP — 09-27-01

(Signature) (Date)

Independent Technical Review Team Member

CERTIFICATION OF INDEPENDENT TECHNICAL REVIEW

Significant concerns and the explanation of the resolution are as follows (Describe the major technical concerns, possible impact, and resolution):

1. Personnel radiation dosimeters should be worn. Without such devices there will be no documentation of worker external exposure to radiation. The intent of ER 385-1-92 will not be met. (Resolution – TLDs will be worn.)

2. Bioassay for Ra-226 and Th-232 should be provided to meet the intent of ER 385-1-92. If bioassay is not to be performed then a careful technical rationale for not performing bioassay should be provided. (Resolution – Bioassay will be performed.)

3. A procedure for radiation screening of bulk asbestos debris should be developed and accepted by the COE. Regulatory Guide 1.86 guidelines only apply to hard surfaces and do not apply to bulk material. Screening bulk material using Regulatory Guide 1.86 guidelines will not determine if radioactivity is incorporated within the volume of the material. This will place Jacobs and the COE at risk of having improperly disposed bulk asbestos in an approved landfill. (Resolution – Text has been added to the Sampling and Analysis Plan to address this comment.)

All concerns resulting from independent technical review of the project have been considered.

Steve Green, CHP

Steve Green - CHP — 09-27-01

(Signature) — (Date)

(ITR Team Member)

TABLE OF CONTENTS

APPENDICES

ABBREVIATIONS AND ACRONYMS

AAAP	Asbestos Assessment and Abatement Plan
AAP	Asbestos Abatement Plan
ACGIH	American Conference of Governmental Industrial Hygienists
ACM	Asbestos Containing Material
AHERA	Asbestos Hazard Emergency Response Act
APR	air-purifying respirator
ASHARA	Asbestos School Hazard Abatement Reauthorization Act
ASTM	American Society for Testing and Materials
BRA	Baseline Risk Assessment
BTEX	Benzene, Toluene, Ethylbenzene, Xylenes
C&D	construction and demolition
CAA	Clean Air Act
CAPE	Cape Environmental Management Inc
CEDE	Committed Effective Dose Equivalent
CERCLA	Comprehensive Environmental Response Compensation and Liability
cfm	cubic feet per minute
CFR	Code of Federal Regulations
CHSP	Corporate Health and Safety Procedure
CIH	Certified Industrial Hygienist
CMS	Corrective Measures Study
COC	Chain of Custody
COPC	Chemical of Potential Concern
COR	Contracting Officer Representative
CRs	Carcinogenic Risk
CRZ	Contamination Reduction Zone
CWA	Clean Water Act
DA	Department of the Army
DAC	Inhalation Derived Air Concentrations
DOE	U.S. Department of Energy
DOP	dioctylphthalate
DOT	U.S. Department of Transportation
EDC	Economic Development Conveyance Area
EMSL	EMSL Analytical, Inc.
EPA	U.S. Environmental Protection Agency
EZ	Exclusion Zone
F	Fahrenheit
f/cc	Fibers per cubic centimeter of air
FMEA	Failure Mode and Effects Analysis
FSP	Field Sampling Plan
GAC	Granulated Activated Carbon
GFCI	Ground Fault Circuit Interrupter
HAZOP	Hazard and Operability Study
HazWOPER	Hazardous Waste Operations and Emergency Response
HEPA	High Efficiency Particulate Air
HHE	Human Health Evaluation
HHRA	Human Health Risk Assessment
HI	Hazard Index
HQ	Hazard Quotient

HVAC	heating, ventilation, and air conditioning
IDLH	Immediately Dangerous to Life or Health
IHT	Industrial Hygiene Technician
IS	Interim Standards
JE	Jacobs Engineering
JEG	Jacobs Engineering Group
LEL	Lower Explosive Limit
LOOW	Lake Ontario Ordnance Works
LPM	liters per minute
MAP	Model Accreditation Plan
MCE	mixed-cellulose ester
MCLGs	Maximum Contaminant Level Goals
MCLs	Maximum Contaminant Levels
MED	Manhattan Engineering District
MSDS's	Material Safety Data Sheets
MSL	Mean Sea Level
NAM	Negative Air Machine
NAWQC	National Ambient Water Quality Criteria
NCP	National Contingency Plan
NEPA	National Environmental Policy Act
NESHAPS	National Emissions Standards for Hazardous Air Pollutants
NFSS	Niagra Falls Storage Site
NIOSH	National Institute for Occupational Safety and Health
NOB	Non-friable Organically Bound
NPDES	National Pollution Discharge Elimination System
NRC	Nuclear Regulatory Commission
NYCRR	New York Code of Rules and Regulations
NYSDOL	New York State Department of Labor
ORISE	Oak Ridge Institute for Science and Education
OSHA	Occupational Safety and Health Administration
PACM	Presumed Asbestos Containing Materials
PAPR	Powered Air Purifying Respirator
PBC	Public Benefit Conveyance Area
PCM	Phase Contrast Microscopy
PDU	Personal Decontamination Unit
PEL	Permissible Exposure Limit
PHA	Process Hazard Analysis
PLHCP	Physician or other Licensed Health Care Professional
PLM	Polarized Light Microscopy
PPE	personal protective equipment
PRGs	Preliminary Remediation Goals
PVC	polyvinyl chloride
QAPP	Quality Assurance Plan
QC	quality control
QCR	Quality Control Reports
QLFT	Qualitative Fit Test Requirements
QNFI	Quantitative Fit Test Requirements
RA	Restricted Area
RAD	Radiation
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation

RFP	Request For Proposal
RGOs	Remedial Goal Objectives
RME	Reasonable Maximum Exposure
SAR	Supplied-Air Respirator
SCBA	Self-Contained Breathing Apparatus
SCS	Soil Conservation Service
SDWA	Safe Drinking Water Act
SEV	Screening Ecological Value
SHM	Safety and Health Manager
SHP	Safety and Health Plan
SMCLs	Secondary Maximum Contaminant Levels
SOP	Standard Operating Procedures
SOR	Safety Observation Report
SSHO	Site Safety and Health Officer
SSHP	Site Safety and Health Plan
SSL	Soil Screening Level
STL	Severn Trent Services Laboratories
SVOCs	Semi-volatile Organic Compounds
SWMU	Solid Waste Management Unit
SZ	Support Zone
TAL	Total Analyte List
TBC	To Be Considered
TCLP	Toxicity Characteristic Leaching Procedure
TDS	Total Dissolved Solids
TEDE	Total Effective Dose Equivalent
TEM	Transmission Electron Microscopy
TLV	Threshold Limit Value
TSI	Thermal System Insulation
TSS	Total Suspended Solids
TWA	Time-Weighted Average
UCL	Upper Confidence Level
UCS	Unconfined Compressive Strength
UEL	Upper Explosive Limit
USACE	United States Army Corps of Engineers
USAEC	United States Army Environmental Center (formerly USATHAMA)
USATHAMA	United States Army Toxic and Hazardous Materials Agency (now USAEC)
USDA	United States Department of Agriculture
VOCs	Volatile Organic Compounds
WA	Work Area (Asbestos Regulated Area)
WBGT	Wet Bulb Globe Temperature Index
WCS	Waste Containment Structure

1.0 SITE DESCRIPTION AND CONTAMINATION CHARACTERIZATION

1.1 SITE LOCATION, TOPOGRAPHY, SIZE, PAST USES

Niagara Falls Storage Site (NFSS) is located at 1397 Pletcher Road, Lewiston, New York. The site is owned by the U.S. Department of Energy (DOE) and consists of an engineered Waste Containment Structure (WCS), buildings, and open areas. The site was originally a part of the Lake Ontario Ordnance Works (LOOW). The primary use of the site from early 1940s through mid 1950s was for storage, trans-shipment, and disposal of radioactive wastes from various sources.

Building 401 was initially the powerhouse for the production of TNT at LOOW, and was used to store radioactive materials in support of Manhattan Engineering District (MED) activities during World War II. The building was used for the production of Boron-10 from 1953 to 1959 and from 1965 to 1971 and then became a waste storage facility by MED. In 1971, Building 401 was gutted and its instrumentation and hardware were disposed of as surplus materials. The building has been inactive since.

Building 401 is steel frame four story structure approximately 100,000 square feet of floor area. The main structural system of the building consists of steel and concrete load bearing walls supporting the roof. There are multiple floors that contain rooms and offices and building service areas. There is a tower area and high bay. The building floor is concrete slab on grade.

The site location is rural, flat terrain, fenced and gated. Building 401 is also fenced and gated.

1.2 CONTAMINANTS

Asbestos debris, primary radiological contaminants of Radium 226 and Thorium 232, and bird and animal debris have contaminated the building. Friable and nonfriable asbestos from pipe and boiler insulation and fittings, floor tile, and transite board are to be abated.

Section 4.8 of the Scope of Work states there is fixed low level radioactive contamination in designated areas within Building 401, and Attachment 2, Bechtel National, Inc. August 1998, Current Radiological Contamination Status of NFSS – Buildings 401, 403 and the Soils Outside Building 401, provide details pertaining to these locations. Attachment 2 implies that the primary radioactive contaminants are Ra-226 and Th-232, and that their guidelines were used to assess the radiological conditions of Building 401. The U.S. Nuclear Regulatory Commission (NRC) Regulatory (Reg.) Guide 1.86 Table I acceptable surface contamination levels for Ra-226 and Th-232 are (dpm is disintegrations per minute):

Nuclide	Average[1] (dpm/100 cm^2)	Maximum[2] (dpm/100 cm^2)	Removable (dpm/100 cm^2)
Ra-226	100	300	20
Th-232	1,000	3,000	200

Notes 1: For total contamination. Will not be averaged over more than 1 square meter.
2: For total contamination. Maximum applies to areas not more than 100 cm^2.

Table 4a of Attachment 2 provides Building 401 total and removable alpha and beta surface contamination measurement results which exceed NRC Reg. Guide 1.86 Ra-226 and Th-232 guidelines. Reference 3 of Attachment 2 provides additional data including the ranges of total and removable alpha and beta surface contamination measurement results within the various rooms of Building 401. These two sources were used to provide a description of nature and extent of radioactive contamination within Building 401. The description is detailed in Section 1.2 of the Sampling and Analysis Plan (SAP) for the Asbestos Abatement of Building 401 Niagara Falls Storage Site Lewiston, New York. A summary is provided here:

Surface Measurement	Minimum Value (dpm/100 cm^2)	Maximum Value (dpm/100 cm^2)
Total Alpha	<37	2,900
Total Beta	<430	240,000
Removable Alpha	<12	29
Removable Beta	<16	42

In addition to surface scans performed for total alpha and beta activity, the following approximate numbers of individual fixed point measurements were collected within Building 401 during a September 1994 building characterization effort:

- 1,000 floor measurements
- 680 lower wall (i.e. up to 2 m) measurements
- 200 upper wall and ceiling measurements

Areas where surface contamination levels exceeded NRC Reg. Guide 1.86 criteria included: I-beams, floors, a mezzanine, lockers, wall ledges, within floor drains, within blowers and an air duct, and within a pipe.

Neither total nor removable surface contamination was found to be widespread. Individual areas exceeding the NRC Reg. Guide 1.86 limits for total activity were typically 1 m^2 or less. The largest reported contaminated area (total activity only, no removable activity present) includes 19 m^2 of floor area within Room 121.

Removable alpha and beta activity was rarely found. Removable beta activity never exceeded the NRC Reg. Guide 1.86 limit. Removable alpha activity exceeding the NRC Reg. Guide 1.86 limit was only found within Rooms 115 and 122. Maximum removable alpha activity was 29 dpm/100 cm^2, which is only slightly above the 20 dpm/100 cm^2 NRC Reg. Guide 1.86 limit.

Based on survey results reported in Attachment 2 of the Scope of Work and in Reference 3 of Attachment 2, the nature and extent of radioactive contamination within Building 401 is not sufficient to cause a significant external radiation hazard to workers. Also the extremely rare occurrences of removable activity (at very low levels) present in the building make it unlikely that airborne radioactivity and removable contamination track-out will be a significant concern during non-abatement phases of work activities. During the abatement phase engineering controls will limit extent of airborne radioactivity to the immediate work areas, and personnel and equipment radioactive contamination monitoring will maintain contamination within radioactive material areas. Respiratory protection requirements during asbestos assessment and abatement will minimize or eliminate worker intakes of airborne radioactivity.

Due to the nature and extent of radioactive contamination within Building 401, external beta-gamma radiation levels within radioactive material areas should be at or only slightly above ambient background levels. Outside of radioactive material areas external beta-gamma radiation levels should be at ambient background levels.

According to the radiological characterization results the very small amount of Ra-226 and Th-232 contamination present within Building 401 will not be sufficient to significantly increase ambient background airborne radon-220 or radon-222 gas and daughter concentrations, either within or outside of the building.

In order to anticipate airborne radioactivity levels, a work area dust loading of 3 mg/m^3 along with an average dust concentration of 20 pCi/g Ra-226 and 20 pCi/g Th-232 will be assumed. This assumed dust loading is equivalent to the American Conference of Governmental Industrial Hygienists (ACGIH) threshold limit value (TLV) for nuisance dust. These assumptions lead to anticipated work area airborne radioactivity concentrations of 6 E–14 uCi/mL of these isotopes. When compared to their most restrictive derived air concentrations (DACs), this provides an anticipated work area airborne radioactivity concentration of:

(6 E–14 uCi/mL) / (5 E–13 uCi/mL) + (6 E–14 uCi/mL) / (3 E–10 uCi/mL)

= 0.12 DAC or 12% DAC.

Engineering controls should be effective at keeping airborne concentrations outside of immediate work areas to a factor of 100 or more below this level.

2.0 HAZARD/RISK ANALYSIS

2.1 HAZARDS

Tasks during asbestos assessment and abatement remedial actions are identified in the following table. Safety, chemical, physical, radiological and biological hazards are delineated. Any hazardous materials brought on-site will have a Material Safety Data Sheet with the material. Hazards associated with any hazardous material will be communicated to all on-site employees.

Task	Hazard	Control	Equipment	Inspection	Training
Assessment mobilization	Vehicle collision	Defensive driving techniques will be used to minimize collisions.	Automobiles, Trucks	Before vehicle use	1910
	Back strain from manual lifting during facilities setup and hookup	Try out the load first. If it is too bulky or heavy, get help. Keep the back straight and lift with the legs. Lift slowly and carefully and do not jerk the load. Keep the load as close to the body as possible. Do not twist or turn the spine while lifting or carrying the load. Lowering the load can be more stressful than lifting it.	2 wheeled carts	Daily	1910 and 1926
Asbestos assessment	Asbestos inhalation	Personal protection equipment and wet methods will be used to minimize exposure. PPE will include air purifying respirator, P100 filters, full body disposable coverall, head protection, and boot covers.	Full facepiece respirator with P100 filters	Daily before use	1910.1001 1910.134 1910.1200 40 CFR 61 subpart M 10 CFR 19.12 appropriate sections of EM-385-1-80 Chapter 3

	Slips, trips, falls	Most samples will be collected from the floor level. When ladders are used to access elevated sample areas, ladders will be nonconductive and secured from movement. Protrusions from the floor will be barricaded prior to work in all areas.	Ladders, Scaffolds, Warning tape, Florescent paint	Daily before use	1910.1001 1910.134 1910.25 and .28 10 CFR 19.12 appropriate sections of EM-385-1-80 Chapter 3
	Lack of adequate illumination	Illumination will be provided for all work areas using portable lights.	Portable lights	Daily before use	1910.1001 1910.134 10 CFR 19.12 appropriate sections of EM-385-1-80 Chapter 3
	Heat and cold stress	Acclimatization and regular work rest cycles will be used to reduce heat stress. Potable water will be available for consumption. Disposable coveralls and boots will be worn to reduce cold stress.	Potable water	Daily before use	1910.1101 1910.120(e)(3)(i) or(iv) 1926.103 10 CFR 19.12 appropriate sections of EM-385-1-80 Chapter 3

	Radiological contaminated materials	A health physics technician will screen all areas before bulk asbestos samples are collected and screen the sample after collection to verify alpha and beta- gamma radiation does not exceed appropriate radiological release criteria (NRC Reg. Guide 1.86). Screening may also include area radiation and airborne radioactivity levels. All personnel will be screened on leaving the exclusion zone.	Gas Proportional Detectors Scintillation Detectors Geiger Mueller Detectors TLD Alpha/Beta Sample Probe	Daily before use	1910.1001 1910.134 10 CFR 20 10 CFR 19.12 appropriate sections of EM-385-1-80 Chapter 3
	Bird and animal debris	Personal protection equipment and wet methods will be used to minimize exposure. PPE will include air purifying respirator, P100 filters, full body disposable coverall, head protection, and boot covers.	Coveralls, Respirator, Head protection, Boot covers	Daily before use	1910.1001 1910.134 10 CFR 19.12 appropriate sections of EM-385-1-80 Chapter 3
	Electrocution	Electrical power will be provided from outside of the building 401 to an onsite power panel. All electrical power from this panel will be supplied through ground fault circuit interrupters. All extension cords will be in good condition and without splicing. All power tools will operate through the GFCIs.	GFCIs	Daily before use	1910.1101 1910.120(e)(3)(i) or(iv) 1926.103 10 CFR 19.12 appropriate sections of EM-385-1-80 Chapter 3
Abatement Mobilization	Vehicle collision	Defensive driving techniques will be used to minimize collisions.	Automobiles, Trucks	Before vehicle use	1910

	Back strain from manual lifting during facilities setup and hookup	Try out the load first. If it is too bulky or heavy, get help. Keep the back straight and lift with the legs. Lift slowly and carefully and do not jerk the load. Keep the load as close to the body as possible. Do not twist or turn the spine while lifting or carrying the load. Lowering the load can be more stressful than lifting it.	2 wheeled carts	Daily	1910 and 1926
Asbestos abatement	Asbestos inhalation	Abatement will be performed inside a series of enclosures under at least 0.02 inches negative pressure. Local exhaust ventilation systems with high efficiency particulate air filtration will be used to provide negative pressure and filter the enclosure air. The ventilation systems will be vented to the building exterior. A three-stage decontamination unit will be used to decontaminate employees before exiting the enclosure. A manometer will monitor negative pressure from the time the enclosure is erected until final visual and air clearance. Personal protection equipment and wet methods will be used to minimize exposure. PPE will include air purifying respirator, P100 filters, full body disposable coverall, head protection, and boot covers.	Full facepiece respirator with P100 filters	Daily before use	1910.1101 1910.120(e)(3)(i) or(iv) 1926.103 1926.59 12 NYCRR Part 56 10 CFR 19.12 appropriate sections of EM-385-1-80 Chapter 3

	Asbestos contaminated waste and shower water	All shower and wastewater from asbestos abatement will be filtered, collected, then sampled for radiological contamination before disposal.	Water storage tank	Daily before use	1910.1101 1926.103 1910.120(e)(3)(i) or(iv) 10 CFR 19.12 appropriate sections of EM-385-1-80 Chapter 3
	Slips, trips, falls	Most work will be performed from the floor level. When ladders are used to access elevated areas, ladders will be nonconductive and secured from movement. When scaffolds are used, the scaffold will be safeguarded and inspected daily before use. Boots with nonslip soles will be worn to reduce falls from wet floors. Drains inside the containments will be plugged; floor holes will be covered. Protrusions from the floor will be barricaded prior to work in all areas.	Ladders, Scaffolds, Warning tape, Florescent paint	Daily before use	1910.1101 1910.120(e)(3)(i) or(iv) 1926.103 1926.26 1926.1060 10 CFR 19.12 appropriate sections of EM-385-1-80 Chapter 3
	Lack of adequate illumination	Illumination will be provided for all work areas using portable lights.	Portable lights	Daily before use	1910.1101 1910.120(e)(3)(i) or(iv) 1926.103 1926.26 10 CFR 19.12 appropriate sections of EM-385-1-80 Chapter 3

	Radiological contaminated materials	A health physics technician will screen all abatement areas before asbestos abatement begins and will provide monitoring as required of all ACM for radioactive residuals during abatement activities. All debris with radiological contamination exceeding appropriate radiological release criteria (NRC Reg. Guide 1.86) will be segregated and remain onsite. No visible water ponding will be used on the segregated debris. Screening may also include area radiation and airborne radioactivity levels.	Gas Proportional Detectors Scintillation Detectors Geiger Mueller Detectors TLD Alpha/Beta Sample Probe	Daily before use	1910.1101 1910.120(e)(3)(i) or(iv) 1926.103 10 CFR 20 10 CFR 19.12 appropriate sections of EM-385-1-80 Chapter 3
	Electrocution	Electrical power will be provided from outside of the building 401 to an onsite power panel. All electrical power from this panel will be supplied through ground fault circuit interrupters. All extension cords will be in good condition and without splicing. All power tools will operate through the GFCIs.	GFCIs	Daily before use	1910.1101 1910.120(e)(3)(i) or(iv) 1926.103 10 CFR 19.12 appropriate sections of EM-385-1-80 Chapter 3
	Cuts and punctures	Hand protection will be worn to reduce cuts and punctures.	Leather or cut resistant gloves	Daily before use	1910.1101 1910.120(e)(3)(i) or(iv) 1926.103 10 CFR 19.12 appropriate sections of EM-385-1-80 Chapter 3

	Noise	A hearing conservation program will be provided for all employees working in areas where the noise level equals or exceeds 90-dBA time weighted average. Hearing protection, earmuffs or earplugs will be worn is all areas noise exceeds 90 dBA-TWA.	Ear muffs, Ear plugs	Daily before use	1910.1101 1910.120(e)(3)(i) or(iv) 1926.103 1926.52 10 CFR 19.12 appropriate sections of EM-385-1-80 Chapter 3
	Heat and cold stress	Acclimatization and regular work rest cycles will be used to reduce heat stress. Potable water will be available for consumption. Disposable coveralls and boots will be worn to reduce cold stress.	Potable water	Daily before use	1910.1101 1910.120(e)(3)(i) or(iv) 1926.103 10 CFR 19.12 appropriate sections of EM-385-1-80 Chapter 3
	Bird and animal debris	Personal protection equipment and wet methods will be used to minimize exposure. PPE will include air purifying respirator, P100 filters, full body disposable coverall, head protection, and boot covers.	Coveralls, Respirator, Head protection, Boot covers	Daily before use	1910.1101 1910.120(e)(3)(i) or(iv) 1926.103 10 CFR 19.12 appropriate sections of EM-385-1-80 Chapter 3
Demobilization	Vehicle collision	Defensive driving techniques will be used to minimize collisions.	Automobiles, Trucks	Before vehicle use	1910

	Back strain from manual lifting during temporary facility removal and utility disconnect	Try out the load first. If it is too bulky or heavy, get help. Keep the back straight and lift with the legs. Lift slowly and carefully and do not jerk the load. Keep the load as close to the body as possible. Do not twist or turn the spine while lifting or carrying the load. Lowering the load can be more stressful than lifting it.	2 wheeled carts	Daily	1910 and 1926

Asbestos

Route of Entry:	Inhalation, Ingestion, Skin or Eye Contact
Target Organs:	Eyes, Gastrointestinal Tract, Respiratory System
Hazard:	Toxic
PEL:	0.1 f/cc Excursion Limit: 1.0 f/cc
TLV:	0.2 f/cc (Crocidolite)
IDLH:	Not reported

Asbestos is a fibrous mineral silicate. Minerals that are included in this group are chrysotile, crocidolite, amosite, tremolite, anthophyllite, and actinolite. Asbestos exposure can cause an increased incidence of lung cancer, pleural and peritoneal mesothelioma, gastrointestinal cancer, and asbestosis. Asbestos exposure has been associated with an increased incidence of esophageal, kidney, laryngeal, pharyngeal, and fuccal cavity cancers. Adverse effects from chronic exposure appear in about 20 years. There are no known acute effects associated with exposure to asbestos. Epidemiological studies indicate the risk of lung cancer is greatly increased among smokers over nonsmokers. The signs and symptoms of lung cancer or gastrointestinal cancer induced by exposure to asbestos include shortness of breath, and chest or abdominal pain. Mesothelioma has a longer latency period compared with lung cancer, 40 years versus 15-20 years. Mesothelioma is always fatal.

Radium 226

Route of Entry:	Inhalation, Ingestion, Skin Absorption
Target Organs:	Bone, Respiratory System, Whole Body
Hazard:	Toxic
NRC:	Inhalation Derived Air Concentrations (DAC) = 3E-10 uCi/ml (air)
IDLH:	Not reported

Radium is formed in nature by the radioactive decay of uranium. During radioactive decay, uranium 238, the heaviest naturally occurring isotope of uranium, and its radioactive daughter products emits radiation in the form of alpha particles, beta particles, and gamma rays. Uranium 238 becomes uranium 234, which later changes into thorium 230. This unstable radioactive isotope breaks down into radium 226.

Radium 226 decays into an unstable isotope of a gas called radon and eventually into a stable isotope of lead. Radon and its associated alpha decay products represent an inhalation hazard and increased risk of lung cancer.

Radium releases high-energy gamma radiation, which can be harmful to human health. The element resembles calcium chemically, and so it tends to accumulate in the bones after being absorbed by the body. The radiation given off by radium bombards the bone marrow and destroys tissue that produces red blood cells. It also can cause bone cancer.

Thorium 232

Route of Entry:	Inhalation, Ingestion, Percutaneous Absorption
Target Organs:	Bones, Respiratory System, Lymphatic System, Whole Body
Hazard:	Toxic
NRC:	Inhalation DAC (Class W) = 5E-13 uCi/ml (air)
IDLH:	Not reported

Thorium and thorium compounds are relatively inert, but irritant effect may occur depending on the anion present. Gas and aerosols can penetrate the body by way of the respiratory system, the digestive system, and the skin.
Thorium and thorium compounds are toxicologically inert on the basis of chemical toxicity. Approximately, 0.001% of an ingested dose is retained in the body. Thorium, once deposited in the body, remains for long periods of time. It has a predilection for bones, lungs, lymphatic glands, and parenchymatous tissues. Characteristic effects of the activity of thorium and its disintegration products are changes in blood forming, nervous, and reticuloendothelial systems, and functional and morphological damage to lung and bone tissue. Only much later does illness and symptoms characteristic of chronic radiation disease appear. Over time, neoplasm's may occur and the immunological activity of the body may be reduced. Thorium-232 decays to Ra-228, Th-228, Ra-224 and to Rn-220. Rn-220 is a radioactive gas known as thoron. It eventually decays into a stable isotope of lead. Thoron and its associated decay products represent an inhalation hazard and increased risk of lung cancer.

2.2 ACTION LEVELS AND METHODS TO MITIGATE HAZARDS

Friable and nonfriable asbestos containing materials are to be assessed and abated. Radium and thorium contamination has been identified in Building 401. Level C personal protection equipment will be donned during both assessment and abatement. Employees may don full facepiece powered air purifying respirators or full facepiece air purifying respirators with disposable full body coveralls. Engineering controls including wet methods and local exhaust ventilation will be used to keep potential exposure to asbestos below 0.1 f/cc as an 8 hour time weighted average and 1.0 f/cc based upon a 30 minute excursion limit. We do not anticipate downgrading to a less protective respirator or upgrading to an air supplied respirator. Refer to Section 14 for emergency response procedures. The public will not have access to the asbestos assessment activities or asbestos abatement enclosures.

Task	Expected Exposure Concentration	Action Level for Upgrade
Asbestos Assessment	< 0.1 f/cc PEL-TWA < 1.0 f/cc EL < 1 DAC Th-232 (5E-13 uCi/ml (air) long-lived alpha activity)	> 0.1 f/cc PEL-TWA > 1.0 f/cc EL > 1 DAC Th-232 (5E-13 uCi/ml (air) long-lived alpha activity)
Asbestos Abatement	< 0.1 f/cc PEL-TWA < 1.0 f/cc EL < 1 DAC Th-232 (5E-13 uCi/ml (air) long-lived alpha activity)	> 0.1 f/cc PEL-TWA > 1.0 f/cc EL > 10 DAC Th-232 (5E-12 uCi/ml long-lived alpha activity

3.0 STAFF ORGANIZATION, QUALIFICATIONS, AND RESPONSIBILITIES

3.1 STAFF ORGANIZATION

The staff organizational structure and key project personnel are identified in the following table.

PERSONNEL	RESPONSIBILITY
Virgil Jansen, PE, Program Manager Jacobs Engineering Group, Inc.	Overall hazardous materials program management responsibility
Leo Mann, Project Manager Jacobs Engineering Group, Inc.	Coordinates task work with USACE, and subcontractors. Responsible for meeting the USACE, and contract requirements. Project Manager reports to the Program Manager
David Fleming Site Safety and Health Officer(SSHO) Jacobs Engineering Group, Inc.	Responsible for coordinating the SHP. The SSHO shall also function as the Radiation Safety Officer. Reports to the Health and Safety Regional Manager
Brian Knaus, CIH, CSP Health and Safety Regional Manager Jacobs Engineering Group, Inc.	Develop, implement and monitor the SHP. Reports to the Jacobs Health and Safety Manager Terry Briggs, PhD, CIH
Mitch Zavon, PhD Physician Jacobs Engineering Group, Inc.	American Board of Preventative Medicine Certified Physician monitors medical surveillance
Cape Environmental Subcontractor	Performs asbestos abatement labor. Reports to the Project Manager
Chopra Lee Subcontractor	Performs third party environmental air monitoring during asbestos abatement. Reports to the Project Manager
EMSL Analytical Inc. Subcontractor	Performs asbestos laboratory analysis. State of New York licensed, NVLAP and AIHA accredited

3.2 LINES OF AUTHORITY, RESPONSIBILITIES AND COMMUNICATION PROCEDURES

The lines of authority, responsibilities and communication procedures of Jacobs management, supervisors and employees and subcontractors relative to the implementation of this safety and health plan and emergency response are described below.

3.2.1 Program Manager

Verify this project is performed in a manner consistent with the Jacobs SHP, Jacobs operational procedures, and Corps of Engineers procedures.

Verify compliance with this SHP by all site personnel.

Coordinate with the Jacobs Health and Safety Regional Manager on health and safety matters.

Temporarily suspend field activities if an uncontrolled hazard exists.

Virgil Jansen is the Program Manager.

3.2.2 Project Manager

Responsible to implement the SHP, has the authority to direct work to be performed under the contract and verify compliance with the contract documents.

Leo Mann is the Project Manager and reports to the Program Manager.

3.2.3 Safety and Health Manager

Responsible for the development, implementation, and enforcement of this SHP.

Conduct initial site-specific training.

Visit the site as needed to audit the effectiveness of the site-specific safety and health plan.

Be available for emergencies.

Provide on-site consultation as needed to verify the site-specific safety and health plan is fully implemented.

Coordinate any modifications to the site-specific safety and health plan with the Project Manager, the SSHO, and the Contracting Officer's Representative.

Provide continued support for upgrading /downgrading of the level of personal protection.

Responsible for evaluating air monitoring data and recommending changes to engineering controls, work practices, and PPE.

Review accident reports and results of daily inspections.

Brian Knaus is the Jacobs Regional Manager Health and Safety and reports to the Jacobs Health and Safety Manager.

3.2.4 Site Safety and Health Officer

A Jacobs employee will serve as Site Safety and Health Officer (SSHO) for the duration of the field activities. The SSHO has the following responsibilities:

Assist and represent the Safety and Health Manager in on-site training and the day to day on-site implementation and enforcement of the accepted site-specific safety and health plan.

Be assigned to the site on a full time basis for the duration of field activities. If operations are performed during more than one work shift per day, a site Safety and Health Officer shall be present for each shift.

Have authority to verify site compliance with specified safety and health requirements, Federal, state and OSHA regulations and all aspects of the site-specific safety and health plan including, but not limited to, activity hazard analyses, air monitoring, use of PPE, decontamination, site control, standard operating procedures used to minimize hazards, safe use of engineering controls, the emergency response plan, confined space entry procedures, spill containment program, and preparation of records by performing a daily safety and health inspection and documenting results on the Daily Safety Inspection Log.

Have the authority to stop work if unacceptable health or safety conditions exist, and take necessary action to re-establish and maintain safe working conditions.

Coordinate any modifications to the site-specific safety and health plan.

Conduct accident investigations and prepare accident reports.

Document safety and health findings into the Daily Safety Inspection Log.

In coordination with site management and the Safety and Health Manager, recommend corrective actions for identified deficiencies and oversee the corrective actions.

The SSHO will also function as the Radiation Safety Officer.

David Fleming is the SSHO and reports to the Jacobs Health and Safety Manager.

3.2.5 Occupational Physician

Dr. Zavon is an Occupational Physician certified in occupational medicine by the American Board of Preventive Medicine.

Responsible for the determination of medical surveillance protocols and for review of examination/test results performed in compliance with 29 CFR 1910 and 1926.

Mitch Zavon, PhD is the Jacobs Occupational Physician.

3.2.6 Persons Certified in First Aid and CPR

At least two persons currently certified in first aid and CPR by the American Red Cross shall be on-site at all times during site operations. They shall be trained in universal precautions and the use of PPE as described in the Bloodborne Pathogens standard.

Leo Mann - PM and David Fleming - SSHO are certified in first aid and CPR.

3.2.7 Competent Person

Work in areas with asbestos containing materials will be completed under the supervision of a competent person as defined in 29 CFR 1926, Sections .32, .1101, as appropriate. The competent person is qualified and trained in the identification, abatement procedures, monitoring requirements, safety, respiratory protection, PPE requirements, and materials handling and disposal requirements of asbestos containing materials.

The competent person is Leo Mann.

3.2.8 Subcontractors

The asbestos abatement contractor and the environmental air monitoring contractor will comply with this SHP. Both contractors will report to the Jacobs Project Manager.

4.0 TRAINING

4.1 HAZARDOUS WASTE OPERATIONS TRAINING

Prior to arrival on-site, Jacobs will verify that their employees and those of all subcontractors meet the requirements of pre-assignment training. The following are the training requirements for hazardous waste work at NFSS:

- 40-Hour Hazardous Waste Training
- Three days actual field experience under the direct supervision of a trained, experienced supervisor
- 8-Hour Hazardous Waste Annual Refresher Training
- 8-Hour Hazardous Waste Supervisor Training for all on-site supervisors covering the employer's safety and health program, personal protective equipment program, spill containment program, health hazard monitoring procedures and techniques
- Current Medical Surveillance Certificate
- Respirator Fit Test Certificate
- Current First Aid / CPR Certificate (at least two people per site)

4.2 SITE SPECIFIC TRAINING

Site-specific training covering site hazards, procedures, and the approved SHP shall be conducted by the SSHO for all on-site employees prior to the commencement of work, including those assigned only to the support zone, for visitors prior to entering the site, and on an ongoing basis.

Employees potentially working with radiological materials will be trained to safely perform their tasks. The training will include:

- Radiation Worker training will include appropriate requirements of 10 CFR 19.12 , EM-385-1-80 Chapter 3, and (to comply with ER-385-1-92 C-3.c.(1)) additional appropriate topics found in Department of Energy (DOE) Radiological Worker II training.
  In addition to meeting Radiation Worker training requirements, Health Physics technicians will be also be trained to the specific procedures for radiological instrumentation operation and use, contamination survey requirements for material & equipment monitoring, personnel & equipment decontamination methods, airborne radioactivity sampling collection and analysis, and Sampling & Analysis Plan (SAP) requirements for MARSSIM surface activity surveys.
- Site-specific procedures for handling and storing radioactive materials
- Health and safety hazards associated with exposure to radioactive material that could be handled and the purpose and function of personal protection equipment used to minimize exposures
- Elements of the SHP and Jacobs specific procedures to provide protection from radiation exposure
- The worker responsibility to report any unsafe acts or procedures which might result in exposure to ionizing radiation

- Appropriate worker response procedures to on-site events and occurrences that may result in worker exposure
- The worker rights and responsibilities with respect to radiation exposure

Safety and health training documents including training and medical surveillance certificates, employee's name, training duration, contents and date of training will be maintained on-site with this SHP.

5.0 PERSONAL PROTECTIVE EQUIPMENT

This section describes the requirements of the Levels of Protection (A through D), and the specific levels of protection required at NFSS during asbestos assessment and abatement activities. The Jacobs respiratory protection program and personal protection equipment program are located in the Jacobs Corporate Health and Safety Procedures Manual located on-site and are provided as appendices to this SHP.

5.1 LEVELS OF PROTECTION

Personnel must wear protective equipment when activities involve known or suspected atmospheric contamination, when hazardous vapor, gases, or particulate may be generated by site activities, or when direct skin contact with hazardous substances may occur. Full face-piece respirators protect lungs, gastrointestinal tract, and eyes against airborne contaminants. Chemical-resistant clothing protects the skin from contact with hazardous contaminants. Appendix I presents the Jacobs policy in regard to Personal Protective Equipment (PPE).

The specific levels of protection and necessary components for each have been divided into the following four categories according to the degrees of protection afforded:

Level A: Should be worn when the highest level of respiratory, skin, and eye protection is needed.

Level B: Should be worn when the highest level of respiratory protection is needed, but a lesser level of skin protection.

Level C: Should be worn when the criteria for using air-purifying respirators are met, and a lesser level of skin protection is needed.

Level D: Should be worn only as a work uniform and not in any area with respiratory or skin hazards. It provides minimal protection against chemical hazards.

Modifications of these levels are permitted, and routinely employed during site work activities to maximize efficiency. For example, Level C respiratory protection and Level D skin protection may be required for a given task. Likewise the type of chemical protective clothing will depend upon contaminants and degrees of contact.

The level of protection selected for a specific task is based upon the following:

- Type and measured concentration of the chemical substance in the ambient atmosphere and its toxicity
- Potential for exposure to substances in air, liquid splashes, or other direct contact with material due to work being done
- Knowledge of chemicals on-site along with properties such as toxicity, route of exposure, and contaminant concentration

5.2 COMPONENTS OF LEVELS OF PROTECTION

Two Levels of Protection will be utilized during field activities: Levels C and D. All on-site personnel will be required to comply with the personal protective levels of protection. Level C shall be the minimum required level of PPE within Building 401.

Level C:
- Full face air purifying respirator, NIOSH listed
- Appropriate respirator filters (P100 filters, organic vapor filters if required)
- Disposable full body coverall
- Disposable nitrile gloves or equivalent (cotton or leather for cold)
- Disposable nitrile inner gloves or equivalent
- Chemically-resistant steel toe and shank boots
- Disposable or reusable boot covers or equivalent
- Head protection
- Eye protection
- Hearing protection in areas noise exceeds 85 dBA

Level D:
- Chemically-resistant steel toe and shank boots
- Disposable or reusable boot covers or equivalent
- Head protection
- Eye protection

Level D (Modified): As above, but with the addition of a disposable coverall and disposable or reusable boot covers or equivalent.

5.3 MINIMUM LEVELS OF PERSONAL PROTECTIVE EQUIPMENT

This section will include a description of the initial minimum levels of protection for each task and criteria to be used for modifying these levels of protection based on site-specific conditions and monitoring. Levels of protection are based on the hazards at NFSS.

5.4 MINIMUM LEVELS FOR ASBESTOS ASSESSMENT AND ASBESTOS ABATEMENT WORK

The minimum level of protection for asbestos assessments and abatement is Level C with full facepiece air purifying respirator with P100 filters and full body disposable particulate coverall, hand, feet and head protection. Level D is the minimum level of protection for support zone work.

5.5 SITE-SPECIFIC PROCEDURES TO INSPECT PPE

Each specific component of PPE is identified below. Procedures for assurance that the equipment is providing the appropriate level of protection are also identified.

Clothing

Before use:

- Determine that clothing material is correct for the specified task at hand
- Visually inspect for imperfect seams, non-uniform coatings, tears, and malfunctioning closures
- Hold up to light and check for pinholes
- Flex the product and observe for cracks, and observe for other signs of deterioration
- If the product has been used previously, inspect inside and out for signs of chemical attack, discoloration, swelling, or stiffness

During the work task, periodically inspect for:

- Evidence of chemical attack such as discoloration, swelling, stiffening, and softening
- Chemical permeation can occur without any visible effects
- Closure failure
- Tears
- Punctures
- Seam Discontinuities

Gloves

Before use:

- Visually inspect for imperfect seams, tears, abrasions, and non-uniform coating
- Pressurize glove with air, listen for pin-hole leaks

Respirator

While donning the respirator:

- Verify facepiece is clean, no cracks, in good condition
- Inhalation and exhalation valves are operative
- Straps are in good condition
- NIOSH listed cartridges are used

6.0 MEDICAL SURVEILLANCE PROGRAM

The Jacobs medical surveillance program is designed to survey baseline conditions prior to potential exposures and monitor physical conditions on a regular basis. The medical surveillance program reviewed by Mitch Zavon, PhD, Board Certified in Occupational Medicine. When possible, a physician Board Certified in Occupational Medicine performs the each baseline and annual examination. All examination results are then reviewed by Dr. Zavon to determine whether the employee is fit for duty, can perform their assignments on a hazardous waste site and can wear the PPE and respiratory protection designed for the site. A Physician's Written Opinion Report is then completed by the physician indicating fitness for duty and any limitations. The Physician's Written Opinion Report is a certification the employee is participating in a medical surveillance program. This certification includes the employee name, date of the examination, and name of the reviewing occupational physician. The Jacobs medical surveillance program includes examination protocol for hazardous waste activities to comply with 29 CFR 1910.120 and 29 CFR 1926.65, respiratory protection protocol to comply with 29 CFR 1910.134 and 29 CFR 1926.103, asbestos protocol to comply with 29 CFR 1910.1001 and 29 CFR 1926.1101, and 10 CFR 20.

All subcontractor employees will be required to furnish evidence of participation in a medical surveillance program of similar and equal content prior to entry into Building 401.

6.1 FREQUENCY OF EXAMINATIONS

Baseline or annual physical examinations will be completed by all Jacobs employees prior to hazardous waste work at NFSS. If the employee develops signs or symptoms of illness related to workplace exposures or if the physician determines examinations should be conducted more often than once per year or when the employee develops a lost time injury or illness during the contract period, the frequency of the examination will be increased to comply with the recommendation of the Board Certified Physician.

6.2 CONTENT OF EXAMINATION

The following medical surveillance elements, in consultation with Dr. Zavon, are included in the Jacobs medical surveillance program:

- Complete medical and occupational history
- General physical examination of the major organ systems
- Pulmonary function testing including FVC and FEV1.0
- CBC with differential
- Blood chemistry screening profile
- Urinalysis with microscopic examination
- Audiometric testing
- Visual acuity
- Chest x-ray
- Baseline electrocardiogram
- Serum lead

- Zinc protoporphyrin
- Bioassay Ra-226 and Th-232

6.3 INFORMATION PROVIDED TO THE OCCUPATIONAL PHYSICIAN

The following information has been supplied to the Jacobs Occupational Physician:

- Job site description and contaminant characterization
- Information on the employee's anticipated or measured exposure
- A description of any PPE used or to be used
- A description of the employee's duties as they relate to the employee's exposure
- A copy of 29 CFR 1910 Section .120 or 29 CFR 1926 Section .65
- Information from previous examinations
- A copy of NIOSH Publication No. 85-125, Section 5.0
- Respiratory protection information from 29 CFR 1910 Section .134

6.4 PHYSICIAN'S WRITTEN OPINION

A Physician's Written Opinion report is provided to the employee, Health and Safety Manager, and Project Manager prior to work on a hazardous waste site. The opinion includes:

- The employee's name
- The date of the medical examination
- The name of the reviewing physician
- The physician's recommended limitations upon the employee's assigned work and/or PPE usage
- The physician's opinion about increased risk to the employee's health resulting from work
- A statement that the employee has been informed and advised about the results of the examination

6.5 MEDICAL RECORDS

The records maintained at the NFSS job site will include the Physician's Written Opinion Report. The medical records are being maintained for employment plus thirty years to comply with 29 CFR 1910.120 and 29 CFR 1926.65.

All Jacobs subcontractor employees medical records will be maintained by the subcontractor for their employment plus thirty years to comply with 29 CFR 1910.120 and 29 CFR 1926.65.

7.0 RADIATION DOSIMETRY AND OTHER RADIOLOGICAL REQUIREMENTS

Work will be performed in accordance with the site Radiological Control and Contingency Plan. The following is a summary of the requirements from this plan. See this Plan for specific details.

The Tier 3 project-specific dose goals given in Chapter 9.a (3) of USACE ER-385-1-80 will be used (i.e. an administrative occupational dose action level of 100 mrem). Should this goal be exceeded additional engineering controls will be implemented to minimize further occupational dose to affected workers.

Employee exposure to external radiation will be documented. Jacobs will review each employee's radiation exposure history per 10 CFR 20.2104. If the employee has no exposure history, the employee shall provide a signed written statement to that effect.

Based upon the scope of work for asbestos abatement of building 401, the primary radiological contaminants are Ra-226, Th-232, and their associated decay products. The radiological contamination is fixed with total alpha activity up to 2,900 dpm/100 cm^2, and total beta-gamma activity up to 240,000 dpm/100 cm^2. Those areas exceeding NRC Regulatory Guide 1.86 surface contamination criteria will be posted "Caution, Radioactive Material" in accordance with USACE EM-385-1-80 Chapter 6-1 requirements. Radiation worker training in accordance with 10 CFR 19.12 will be required for entry into these areas. The reported levels of fixed surface contamination will not result in the existence of radiation areas, however personnel routinely working in radioactive material areas will be assigned thermoluminescent dosimeters (TLDs) for external beta/gamma radiation monitoring. The TLD vendor will be NVLAP accredited. Work area monitoring will be performed as necessary to evaluate the magnitude and extent of contamination levels, however work area external beta/gamma radiation monitoring will not be performed due to the limited nature and extent of contamination.

Health physics technicians will monitor material and equipment leaving radioactive material areas for surface contamination using alpha scintillation detectors and Geiger-Mueller (GM) detectors. Items exceeding NRC Reg. Guide 1.86 criteria will not be removed from radioactive material areas. Workers leaving radioactive material areas will monitor themselves for radioactive contamination using GM detectors. They will be instructed in GM detector use, health physics technicians will further investigate any areas exceeding twice background detected on worker's skin or personal items.

Air monitoring for long-lived alpha activity will be performed during asbestos abatement using both personal and area air samplers. Personal air monitoring will be used initially versus general work area monitoring because of the likelihood of work groups being widely dispersed within the building. In such cases it can be difficult for general work area air monitoring to be representative of the air inhaled by the various work groups. However work area air monitoring may be performed when work groups are confined to a local area within the building. Also, personal air monitoring will be reduced or eliminated should initial air monitoring results during abatement confirm that airborne radioactivity levels are low (i.e. less than 2% DAC). Results will be compared to the Th-232 Class W DAC, and will be used to determine whether work practices and engineering controls are effective at minimizing airborne radioactivity. Given the

reported levels of fixed contamination present, it is unlikely that airborne radioactivity levels will exceed the 10 CFR 20.1003 definition of an airborne radioactivity area.

Personal breathing zone air sampling will be used extensively along with DAC-hour tracking to estimate worker internal exposures during asbestos abatement. Given the reported levels of fixed contamination present and the respiratory protection requirements for asbestos assessment and abatement, it is unlikely that any worker will exceed a committed effective dose equivalent (CEDE) of 100 mrem during performance of this work.

Records of radiological monitoring results, air sampling results, and worker internal dose assessment will be kept in accordance with the requirements of 10 CFR 20 Subpart L. Reports of radiation exposure reports will be provided to workers in accordance with the requirements of 10 CFR 19.13. Reports of exposure to ionizing radiation will be furnished to each employee annually, upon termination, within 30 days of any personal request and to the Radiation Safety Officer (SSHO) as soon as available.

Radiological monitoring for surface contamination will be performed by the health physics technician immediately prior to asbestos assessment and asbestos abatement work. Any bulk asbestos sample or debris exceeding NRC Reg. Guide 1.86 criteria will be segregated and placed in a USACE identified restricted area. The NRC Reg Guide 1.86 Table I acceptable surface contamination levels for Ra-226 and Th-232 are (dpm is disintegrations per minute):

Nuclide	**Average[1] (dpm/100 cm^2)**	**Maximum[2] (dpm/100 cm^2)**	**Removable (dpm/100 cm^2)**
Ra-226	100	300	20
Th-232	1,000	3,000	200

Notes 1: For total contamination. Will not be averaged over more than 1 square meter.
2: For total contamination. Maximum applies to areas not more than 100 cm^2

All decontamination water and shower water will be filtered, collected, and monitored for gross alpha activity. Only water which meets the requirements of 10 CFR 20.2003 will be released for sewer disposal.

8.0 EXPOSURE MONITORING / AIR SAMPLING PROGRAM

8.1 EXPOSURE MONITORING/AIR SAMPLING

Jacobs will perform integrated personal air monitoring at NFSS to characterize potential exposure to asbestos, and airborne radioactivity. The basis of the sampling strategy is to characterize each task and verify the correct level of PPE has been chosen via review of the integrated monitoring data. SKC personal air samplers or equivalent will be used to perform integrated monitoring for asbestos and airborne radioactivity. The SSHO will perform personal task-specific air monitoring. This integrated sampling strategy will characterize concentrations in the employee's breathing zone.

The National Institute for Occupational Safety and Health (NIOSH) method 7400 will be used as the sampling and analytical method for asbestos. EMSL Analytical Inc., an American Industrial Hygiene Association accredited laboratory will be used to analyze the asbestos air samples. This personal monitoring data will be used to determine the effectiveness of engineering controls and verify the appropriate level of protection is being worn.

Personal air samples collected for airborne radioactivity monitoring will be analyzed on site for long-lived gross alpha activity. Interference from naturally-occurring short-lived radon daughters will be accounted for by either allowing adequate time for radon daughter decay prior to analysis or by applying appropriate mathematical decay correction factors after multiple counts. Long-lived gross alpha results will be compared to the Th-232 Class W DAC, in conjunction with urinalysis for Th-232 and Ra-226 will be used to assess worker internal dose (CEDE). Samples may also be composited and sent off site for radium and thorium isotopic analysis in order to obtain a lower detection limit, and worker internal dose assessments will subsequently be adjusted to reflect the actual isotopic air concentrations. Concentrations, type of instrument and calibration data will be maintained on-site. All monitoring/sampling results will be evaluated by the CIH to characterize each task, verify the correct level of PPE has been chosen, and implement appropriate engineering controls. All personal exposure monitoring records shall be maintained on-site and in accordance with 29 CFR 1910.20.

Personnel routinely working in radioactive material areas will be assigned thermoluminescent dosimeters (TLDs) for external beta/gamma radiation monitoring.

Equipment for alpha and beta surface contamination monitoring of personnel and material/equipment can include:

- Gas proportional detectors for alpha & beta surface activity (Ludlum Model 43-68 or equivalent)
- Dual phosphor scintillation detectors for alpha & beta surface activity (Ludlum Model 43-89 or equivalent)
- Geiger-Mueller (GM) detectors for personnel contamination monitoring (Ludlum Model 44-9 or equivalent)
- Alpha/beta sample probe for removable contamination and airborne radioactivity sampling analysis (Ludlum Model 43-10-1 or equivalent)

- Scaler/ratemeters compatible with above detectors

Environmental airborne radioactivity monitoring will be performed immediately outside Building 401 downwind during asbestos abatement activities utilizing F&J Specialty Products LV-134 Standard Low Volume Air Sampler or H8400 Standard High Volume Air Sampler or equivalents. Standard engineering controls normally employed during asbestos abatement will be sufficient to eliminate airborne radioactivity emissions to outside the building. The environmental airborne radioactivity monitoring immediately outside the building will be sufficient to confirm this, and no site perimeter airborne radioactivity sampling will be required.

Two additional site monitoring tasks will be performed at the Building 401 site: meteorological and noise. Representative meteorological data will be evaluated in determining site layout and perimeter monitoring. Noise monitoring will be performed with a type B sound level meter to characterize noise exposure during asbestos assessment and abatement activities. Integrated noise sampling will be performed if the instantaneous noise sampling indicates a noise exposure exceeding 85 dBA-TWA.

SAMPLING STRATEGY SUMMARY

Contaminant	Equipment	Sampling Strategy
Asbestos	SKC personal air sampler with 25 mm MCE filters	Integrated
Airborne Radioactivity	VSS Basic-12 Super High Flow Sample Pump or equivalent with 37 mm MCE filters LV-134 Standard Low Volume Sampler or H8400 Standard High Volume Air Sampler	Integrated

9.0 HEAT / COLD STRESS MONITORING

Stress denotes the physical (gravity, mechanical force, heat, cold, pathogen, injury) and psychological (fear, anxiety, crises, joy) forces that individuals experience. The body's response to stress occurs in three stages:

- Alarm Reaction - in which the body recognizes the stressor and the pituitary-adreno-cortical system responds by increasing the heart rate and blood sugar level, decreasing digestive activity and dilating the pupils
- Adaptive State - in which the body compensates for the stimulation and the stress symptoms disappear
- Exhaustion State - in which the body can no longer adapt to stress and the individual may develop emotional disturbances, and cardiovascular and renal diseases

Common types of stress that affect field personnel are heat stress and cold stress. Heat and cold stress, which may result from wearing personal protective equipment, may be the most serious hazard to workers during site assessment and remediation activities.

9.1 HEAT STRESS

Heat stress can result when protective clothing decreases natural body ventilation, although it may occur at any time work is being performed at elevated temperatures. If the body's physiological processes fail to maintain a normal body temperature because of excessive heat, a number of physical reactions can occur ranging from mild (such as fatigue, irritability, anxiety, and decreased concentration, dexterity, or movement) to fatal. Because heat stress is one of the most common and potentially serious illnesses that is present at remediation sites, regular monitoring and other preventative measures are vital.

Site workers must learn to recognize and treat the various forms of heat stress. The best approach is preventative heat stress management. In general:

- Have workers drink 16 ounces of water before beginning work, such as in the morning or after lunch. Provide disposable, 4 ounce cups, and water that is maintained at 50-60 degree F. Urge workers to drink 1 - 2 cups of water every 20-minutes, for a total of 1 - 2 gallons per day.

- Provide a cool, preferably air conditioned area for rest breaks. Discourage the use of alcohol in non-working hours, and discourage the intake of coffee during working hours. Monitor for signs of heat stress in accordance with the following Section titled Heat Stress Monitoring and Work Cycle Management of this plan.

- Acclimate workers to site work conditions by slowly increasing workloads, i.e., do not begin site work activities with extremely demanding activities.

- Provide cooling devices to aid natural body ventilation. These devices, however, add weight, and their use should be balanced against worker efficiency. An example of a cooling aid is

long cotton underwear that acts as a wick to help absorb moisture and protect the skin from direct contact with heat-absorbing protective clothing.

- In hot weather, conduct field activities in the early morning or evening.

- Provide adequate shelter to protect personnel against heat, as well as cold, rain, snow, etc., which can decrease physical efficiency and increase the probability of both heat and cold stress. If possible, set up the shelter in the shade.

- Rotate shifts of workers wearing impervious clothing.

- Practice good hygienic standards must be maintained by frequent changes of clothing and showering.

- Allow clothing to dry during rest periods. Persons who notice skin problems should immediately consult medical personnel.

9.2 HEAT STROKE

Heat stroke is an acute and dangerous reaction to heat stress caused by a failure of heat regulating mechanisms of the body. The individual's temperature control system that causes sweating stops working correctly. Body temperature rises so high that brain damage and death will result if the person is not cooled quickly.

Symptoms: Red, hot, dry skin, although the person may have been sweating earlier; nausea; dizziness; confusion; extremely high body temperature, rapid respiratory and pulse rate; unconsciousness or coma.

Treatment: Cool the victim quickly. If the body temperature is not brought down fast, permanent brain damage or death will result. Soak the victim in cool but not cold water, sponge the body with cool water, or pour water on the body to reduce the temperature to a safe level (100.4 degree F). Observe the victim and obtain medical help. Do not give coffee, tea or alcoholic beverages.

9.3 HEAT EXHAUSTION

Heat exhaustion is a state of very definite weakness or exhaustion caused by the loss of fluids from the body. This condition is much less dangerous than heat stroke, but it nonetheless must be treated.

Symptoms: Pale, clammy, moist skin, profuse perspiration and extreme weakness. Body temperature is normal, pulse is weak and rapid, breathing is shallow. The person may have a headache, may vomit, and may be dizzy.

Treatment: Remove the person to a cool, air conditioned place, loosen clothing, place in a head-low position, and provide bed rest. Consult a physician, especially in severe cases. The

normal thirst mechanism is not sensitive enough to maintain body fluid replacement. Have the person drink 1 - 2 cups of water immediately, and every 20-minutes thereafter, until symptoms subside. Total water consumption should be about 1 to 2 gallons per day.

9.4 HEAT CRAMPS

Heat cramps are caused by perspiration that is not balanced by adequate fluid intake. Heat cramps are often the first sign of a condition that can lead to heat stroke.

Symptoms: Acute painful spasms of voluntary muscles; e.g., abdomen and extremities.

Treatment: Remove the person to a cool area and loosen clothing. Have the person drink 1 to 2 cups of water immediately, and every 20-minutes thereafter, until symptoms subside. Total water consumption should be 1 to 2 gallons per day. Consult with a physician.

9.5 HEAT RASH

Heat rash is caused by continuous exposure to heat and humidity and aggravated by chafing clothes. The condition decreases ability to tolerate heat.

Symptoms: Mild red rash, especially in areas of the body in contact with protective equipment.

Treatment: Decrease amount of time in protective equipment, and provide powder to help absorb moisture and decrease chafing.

9.6 HEAT STRESS MONITORING AND WORK CYCLE MANAGEMENT

Personal and area heat stress monitors will be used to monitor and evaluate heat exposure. A Questemp 10 area heat stress monitor will be used to monitor the working environment. A Questemp I or II personal temperature monitor with an ear sensor will be used to characterize the body core temperature. The American Conference of Governmental Industrial Hygienists Permissible Heat Exposure Threshold Limit Values will be used as a guide. Workers will discontinue their work when their deep body temperature exceeds 38 degrees C (100.4 degrees F). Heat stress monitoring will begin at 70 degrees F.

A Wet Bulb Globe Temperature Index (WBGT) will be used to measure the environmental factors including natural wet bulb temperature, dry bulb temperature and globe temperature. The dry bulb thermometer will be shielded from the sun and other radiant surfaces without restricting the airflow around the bulb. The wick of the natural wet bulb thermometer will be kept wet with distilled water for at least 30 minutes before the temperature reading is made. The wick will be wetted by direct application of water from a syringe. The wick will extend over the bulb of the thermometer, covering the stem about one additional bulb length. The globe thermometer will be exposed at least 25 minutes before it is read.
The American Conference of Governmental Industrial Hygienists (ACGIH) suggest a guideline relating light, moderate and heavy work load activities with a work-rest regime. The permissible heat exposure values are given in degrees Centigrade Wet Bulb-Globe Temperature Index

(WBGT). This index relates natural wet bulb temperature, dry bulb temperature and globe thermometer readings.

The WBGT index was developed to provide a convenient method to assess conditions that pose a threat of thermal strain. WBGT is computed by weighting the Vernon Globe, dry bulb, and natural wet bulb temperatures. The natural wet bulb is depressed below air temperature by evaporation resulting only from the natural motion of the ambient air. The Wet Bulb Globe Temperature Index (WBGT) is calculated by the equation (outdoors with solar load): WBGT = 0.7 NWB + 0.2 GT + 0.1 DB where NWB = Natural Wet Bulb Temperature, DB = Dry-Bulb Temperature, GT = Globe Temperature

The following Permissible Heat Exposure Threshold Limit Values, as recommended by the ACGIH, will be used as a guideline to protect employees from heat stress.

Heat Exposure Threshold Values

Work-Rest Regimen	Work Load Light	Moderate	Heavy
Continuous Work	30.0 (86)*	26.7 (80)	25.0 (77)
75% Work 25% Rest	30.6 (87)	28.0 (82)	25.9 (78)
50% Work 50% Rest	31.4 (89)	29.4 (85)	27.9 (82)
25% Work 75% Rest	32.2 (90)	31.1 (88)	30.0 (86)

*Values are given in ^{o}C and (^{o}F) WBGT

The ACGIH permissible heat exposure values are valid for light summer clothing worn when working under hot environmental conditions. When clothing is heavier, or impedes sweat evaporation, or has higher insulation value, worker heat tolerance is reduced. For personal protective equipment usage, correct the Wet Bulb-Globe Temperature value by subtracting 5 to 10.

9.7 COLD STRESS

Persons working both indoors and outdoors in low temperatures, especially at or below freezing are subject to cold stress. Exposure to extreme cold for a short time causes severe injury to the surface of the body, or results in profound generalized cooling, causing death. Areas of the body, which have high surface area-to-volume ratio such as fingers, toes, and ears, are the most susceptible. Protective clothing generally does not afford protection against cold stress. In many instances, it increases susceptibility.

Two factors influence the development of a cold injury: ambient temperature and wind velocity. Wind chill is used to describe the chilling effect of moving air in combination with low temperature. As a general rule, the greatest incremental increase in wind chill occurs when a wind of 5 mph increases to 10 mph. Additionally, water conducts heat 240 times faster than air. Thus, the body cools suddenly when chemical-protective equipment is removed if the clothing underneath is soaked with perspiration.

Water will be used as an engineering control to minimize airborne asbestos during asbestos abatement. The air temperature in Building 401 will be above 32 degrees F for abatement work. If needed to maintain the asbestos containment inside temperature above 32 degrees F, portable electric heaters designed for industrial environments will be placed at the entrance to the containment to provide warm air to the containment. Workers who become wet shall be provided a clean and dry coverall change to prevent hypothermia. Thermally protective gloves, either cotton or leather, will be worn to protect hands. If windchill is a factor inside Building 401, the cooling effect of the wind shall be reduced by shielding the work area or providing employees thermal garments. Extremities, ears, toes and nose shall be protected from the cold. Asbestos assessment and abatement coveralls will be kept dry and ventilated to minimize sweat accumulation.

At air temperatures below 45 degrees F, the air temperature will be monitored. Abatement work will not be performed when the wind chill is less than 30 degree F.

10.0 STANDARD OPERATING SAFETY PROCEDURES, ENGINEERING CONTROLS, AND WORK PRACTICES

10.1 GENERAL SITE RULES / PROHIBITIONS

The general site rules are summarized as:

- All on-site personnel shall wear the level of protection identified for the specific task.

- The buddy system will be observed at all times, where a minimum of two people work together within eye-sight or not greater than 100 ft of each other. Entry and exit into exclusion zones and contamination reduction zones will be permitted only through designated access points, except during an emergency or as authorized by the SSHO. Personnel entering the exclusion zone must be wearing the required minimum protective clothing and they must exit these areas at the decontamination station.

- No eating, drinking, smoking, or any other activity involving hand-to-mouth contact will be allowed by personnel within exclusion zones or prior to completion of proper personnel decontamination sequence.

- Facial hair will not be allowed where the respirator seal contacts the face.

- Never enter a confined space until you check with your supervisor. Confined space entry permits are required for all confined space entries.

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10.2. WORK PERMIT REQUIREMENTS

An EPA/ State of New York National Emission Standard for Hazardous Air Pollutant Asbestos work permit will be obtained prior to abatement.

10.3 MATERIAL HANDLING PROCEDURES

Asbestos debris will be wetted, bagged, placed in temporary storage containers prior to transport to an approved and licensed landfill for friable and nonfriable asbestos. If the asbestos bulk sample or asbestos debris radiological contamination is above background, the sample and debris will be segregated and stored on-site at a location identified by the USACE.

Whenever heavy or bulky material is to be moved, the material handling needs shall be evaluated in terms of weight, size, and distance and path of move. The following hierarchy shall be followed in selecting a means for material handling:

- Elimination of material handling by engineering
- Movement by mechanical device (e.g., crane, conveyor, fork lift)
- Movement by manual means with handling aid (e.g., dolly or cart)
- Movement by manual means with protective equipment (e.g., lifting belt)

Lifting techniques to reduce strain have been identified and will be implemented. Lifting objects can put great strain on the back. For example, lifting a 25-pound box from the floor requires 700 pounds of back muscle force. Since lifting objects during this field investigation is unavoidable, good lifting techniques must be used. There are a number of factors which govern how much can be lifted safely. These factors include:

- Weight of load
- Size of load
- Distance from load
- Number of times lifted
- Stability of load
- Adequacy of grip
- Nature of lift (floor to waist, waist to shoulder, shoulder to overhead)
- Obstacles in path
- Space constraints
- Rest time between lifts
- Distance to be moved

The following procedure will be followed when lifting:

- Try out the load first. If it is too bulky or heavy, get help.
- Keep the back straight and lift with the legs.
- Lift slowly and carefully and do not jerk the load.
- Keep the load as close to the body as possible.
- Do not twist or turn the spine while lifting or carrying the load.
- Remember that lowering the load can be more stressful than lifting it.

Materials will not be suspended above or moved over personnel unless positive precautions have been taken to protect the personnel from falling objects. Where the movement of materials may be hazardous to personnel, taglines or other devices will be used to control the loads being handled by hoisting equipment.

10.4 DRUM/CONTAINER HANDLING PROCEDURES AND PRECAUTIONS

Decontamination water and asbestos abatement shower water will be filtered, then collected in drums or tank. The water will then be radiologically screened, and if not contaminated, released to the municipal sewer system. If the water is contaminated, the water will remain on-site.

10.5 CONFINED SPACE ENTRY PROCEDURES

Permit required confined space entry is not anticipated as part of the asbestos assessment and abatement in building 401. A summary of the Jacobs procedure is discussed below should the need for implementation occur.

Jacobs has defined the following control procedures to prevent unauthorized entry into permit required confined spaces. The control includes identifying the permit required spaces and posting "DANGER PERMIT REQUIRED CONFINED SPACE, DO NOT ENTER" on the permit required space access point.

Jacobs evaluates the hazards associated with each permit required confined space. The physical and chemical hazards include falls, burns, electrical shock, caught in points of operation, noise, limited visibility due to low illumination levels, potential for oxygen deficiency, exceeding a lower explosive limit, inhalation of organic vapor or skin contact with water treatment chemicals. The hazards and controls are addressed on the permit required confined space entry form.

Jacobs has identified and implemented the procedures and practices for a safe permit space entry. These practices include:

- The confined space will be adequately illuminated to perform the assigned entry task. Fall protection using a body harness, lifeline and tripod will be used to prevent falls. Electrical power, and points of operation will be locked and tagged out. The oxygen concentration in the space will be between 19.5% and 23.5% oxygen. The lower explosive limit will be less than 10% of LEL. No chemical concentration will exceed any applicable permissible exposure limit.

- The permit will be isolated by lockout and blanking to prevent materials or product entering the space.

- Liquid transfer lines and tanks will be flushed with water, manholes and leachate collection vaults will be purged with air to eliminate atmospheric hazards.

- The permit space will be safeguarded with barrier tape, barricades or fencing to protect the entrants from adjacent printing operations.

- The permit space entry supervisor will verify the physical and chemical conditions in the permit space are acceptable for entry throughout the duration of the authorized entry. The physical hazards will be safeguarded and the chemical hazards will be controlled.

The following equipment will be supplied and used as applicable during the permit space entry:

- Testing and monitoring equipment. Jacobs is using Industrial Scientific, or equivalent, oxygen and lower explosive limit portable detector to monitor the confined space atmosphere. A photo ionization or flame ionization detector is used to identify other gases and vapor.

- Ventilating equipment to obtain acceptable entry conditions. Equipment includes an air blower to move air into the confined space or exhaust air from the space.

- Communication equipment to provide continuous communication between the entrants and entry supervisor. Close proximity between the entrants, attendant and supervisors affords visual and verbal communication.

- Personal protective equipment includes ear and eye protection, gloves, and skin protection. If atmospheric hazards are identified, the space will be ventilated to eliminate the atmospheric hazard. Respiratory equipment will be worn when ventilation has not completely controlled the atmospheric hazard. Lighting equipment is provided by using portable lights on extension cords to enable employees to see well enough to work safely and to exit the space quickly in an emergency.

- Barrier and shields including warning tags or fencing is used to warn and limit access to the confined space.

- Fiberglass step or extension ladders are to be used for safe ingress or egress by authorized entrants.

- The local fire department can provide the personnel and equipment for emergency rescue. The fire department will regularly inspect the job site and become familiar with the site conditions. The fire department is notified prior to each permit required confined space entry.

Each permit must evaluate the space conditions by testing the permit space before each entry and then continuously during the entry. For atmospheric hazards, test first for oxygen then combustible gas and vapor, then toxic gas and vapor. At least one (1) attendant will be positioned outside the permit space for the duration of entry operations. In the event an entrant becomes disabled or cannot leave the permit space, the attendant will contact his supervisor immediately. The attendant will then attempt to extract the entrant from the permit space without entering the permit space. Then the attendant or supervisor will contact the fire department for emergency rescue.

A permit required confined space entry form has been assembled and will be completed by the Supervisor prior to any permit space entry. The permit is applicable for one shift and for only those employees identified on the permit. After the permit space entry is completed or expired, the permit will be given to the appropriate Supervisor for review and permit space entry revision if necessary. The canceled permits will be retained for one (1) year after each entry.

Jacobs may opt to perform a single annual review covering all entries performed during a twelve month period. If no entry is performed during a twelve month period, no review will be performed.

The following are the permit required confined space procedural steps.

- Obtain a confined space entry permit from the Jacobs health and safety procedures manual or site specific health and safety plan. See the next page for the permit form.

- Read the permit required confined space program.
- Complete the confined space entry permit.
- Call the fire department rescue team to inform them you will be working in the confined space. Tell them where the confined space is and how long it will take to do the work.
- Obtain the necessary safety equipment needed to do the job.
- Obtain the necessary test equipment to check the confined space for hazards common to the confined space.
- Supervisor, entrant and attendant fill out and sign the confined entry space permit.
- Supervisor or attendant monitor test equipment during the entry and log the readings.
- Return all test and safety equipment to their proper storage areas.
- Call the fire department rescue team and inform them the work is completed.

CONFINED SPACE ENTRY PERMIT

Client/Space/Purpose

Client:		
Location:		
Space to Be Entered:		
Purpose of Entry		
Date:	Issue Time:	Expiration Time:

Personnel

Entry Supervisor:	Authorized Entrants:	Stand-by Attendants:

Hazards

Hazards of the Space:
Means used to isolate energy sources:
Means used to isolate chemical/process hazards:
Means used to isolate other hazards: (specify)
Other Permits required:

Atmospheric Conditions

Type	Acceptable Limit	Testing Conducted Test Result	Time Test Done	Person Conducting Test
Oxygen	19.5-23.5%			
Comb. Gas	0%			

Equipment Required

Personal Protective Equipment Required For Entry:
Rescue Equipment Required:
Rescue Summoned By:

All potential hazards of the confined space entry must be identified on permit.
All hazards identified must be effectively isolated and means listed on permit.
All atmospheric tests required must be conducted and levels meet acceptable limits.
All equipment specified must be available and worn when applicable.
Any additional permits required for the work must be obtained.

Issuance/Acceptance

Permit Issued By:

(Print Name) (Signature)

Permit Accepted By:

(Print Name) (Signature)

Job Completed

Entry Complete:	Date:	Time:
Description of Incidents:		
Entry Supervisor Signature:		

10.6 HOT WORK (Not Applicable)

Based upon the identified scope of work, Jacobs does not expect hot work to be included in the abatement work. This procedure is presented for reference should it become required during the execution of the project.

The purpose of this procedure is by using special precautions, all equipment shall be made safe for employees who may be required to perform all work involving welding, cutting, use of open flame or in areas containing a potential ignition source. The permit serves as a method of formalizing agreed upon procedures and also a check to verify that all potential hazards are considered, evaluated, and correct protective measures have been taken. The permit shall be written to accurately and completely describe the area where work is to be performed.

General Information

Jacobs is responsible for initiation of the work, monitoring the conditions while the work is in progress, and verifying that safe operating conditions are maintained until the work is completed. The work is not complete until the permit is signed and returned to the Project Manager.

The Project Manager is responsible for knowing what conditions are required for the safe completion of the work and reviewing the safe work practices and procedures during the execution of the remediation activities.

The Health and Safety Manager will provide health and safety support and provide an independent safety auditing function.

Types of Work Covered by Permit

Hot work in operating areas should be avoided, where practicable, by relocating the work to unrestricted areas. This procedure recognizes that certain work with identifiable risk exists and must be performed inside operating areas.

Burning and Welding Permits are required for all work, which may result in producing, sparks, or work which requires generating an arc or flame. When this work requires personnel to enter a confined space or any other area where there is poor ventilation or where gases may accumulate, a Confined Space Entry Permit is also required. To be valid, a Burning and Welding Permit, must be signed by the Project Manager, or SSHO. An exception is when such work is performed in designed areas that have a posted blanket permit.

A Burning and Welding Permit is required before starting the types of work described below:

- Flame-producing tasks include activities such as gas welding, gas torches, melting pots, lead burning, metalizing, electric welding, or other flame or arc applications. A specific Hot Work or Entry Permit is required when welding, burning, etc., is to be performed on closed equipment (pumps, vessels, etc.) whether or not such equipment has been in service.
- Work involving flame or spark producing tasks where personnel must enter a confined space.

- A permit required confined space means an enclosed space which 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 (some examples are tanks, vessels, silos, storage bins, hoppers, vaults, pits, and diked areas); is not designed for continuous employee occupancy; and has one or more of the following characteristics:

    - Contains or has a known potential to contain a hazardous atmosphere
    - Contains a material with the potential for engulfment of an entrant
    - Has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls, or a floor which slopes downward and tapers to a smaller cross-section or
    - Contains any other recognized serious safety or health hazard

- Spark-producing tasks such as grinding, sandblasting, abrasive blasting, explosive anchorage devices

- Welding on tanks, vessels, pipelines, pumps, or other closed equipment

- Employees required to go on the roof of a floating roof tank. The only exception will be for operating personnel who are specifically covered by other procedures.

Procedures for Issuing Burning and Welding Permits

Burning and welding permits are required for all hot work. The Burning and Welding Permit Form shall be handled as follows:

- The Project Manager will retain the original form until the completion of work.

- A copy is attached to welding or burning machine or posted in the area.

- At the end of each shift or when work is completed, the copy will be returned to Project Manager, or SSHO for Final Check-off.

- Project Manager, or SSHO will inspect all areas prior to issuance of each permit. When work is completed, Project Manager, or SSHO will inspect the area.

Initiating Permit Procedure

The Project Manager, or SSHO responsible for the work will issue the permits on a daily basis or as required. Job inspections will be made for each required area during each work day or shift to review permits that have been issued.

In order to implement the burning or welding procedures in an orderly manner, it is essential that jobs be properly planned. The individual initiating the permit procedure will inform the Project Manager, or SSHO of a need for Burning and Welding Permit as early as practicable so safe work conditions are achieved in advance of the actual need for the permit.

Permit Validation

A Burning and Welding Permit is valid only for the time duration noted on the form. A separate permit will be issued each day or for each shift after an inspection is completed. All permits must be returned to Project Manager, or SSHO by the end of each shift or work day. The Project Manager, or SSHO will be responsible for collecting "missing" permits. No burning or welding will be allowed without a valid permit.

Maintaining Conditions of Permit

The worker performing burning or welding is responsible for maintaining the conditions of the permit from the time it is originally signed throughout the duration of the job. Where specific special protective equipment is required to deal with hazards, this should be listed on the permit and fully understood by the worker and Supervisor. The Project Manager, or SSHO shall make audits of jobs in progress, as appropriate.

Completion of the Work

When the work has been completed, the worker will notify the Project Manager, or SSHO and arrange for inspection of the area. If acceptable, the Project Manager, or SSHO will sign the Final Check-Off area of the permit. Copies of the permit will be retained in the project files.

Training

Periodic training and review are also important parts of the permit process. All supervisory personnel shall be trained on the aspects of proper permit activities. The Health and Safety Manager will review these procedures during the safety audits.

10.7 ASBSTOS CONTAINING MATERIALS

All employees engaged in operations or activities where asbestos containing materials may be encountered shall receive the proper procedures, training, and equipment necessary to protect themselves from harmful exposure to these materials.

The Jacobs procedure has been assembled to protect the health and safety of employees who may encounter asbestos containing materials in their work environment and who may be required to work with or around these materials.

This procedure applies to this project where the presence of asbestos containing materials is known or suspected and where employees may encounter these substances as part of their work activities.

Definitions

Amended Water (Wetting Agent) – Water to which a surfactant has been added to increase the ability of the liquid to coat, penetrate and stick to ACM.

Asbestos – Includes chrysotile, amosite, crocidolite, tremolite asbestos, anthophyllite asbestos, actinolite asbestos and any of these minerals that has been chemically treated and/or altered. For purposes of this policy, "asbestos" includes PACM listed below.

Asbestos Containing Material (ACM) – any material containing more than 1% asbestos.

Asbestos Work – Any work with ACM as defined/covered by Asbestos Work Classes I through IV below.

Asbestos Work Classes – OSHA divides ACM work into four classes as follows:

Class I – Activities involving the removal of thermal system insulation (TSI) and surfacing asbestos containing materials or presumed asbestos-containing materials (PACM).

Class II – Activities involving removal of asbestos-containing material that is not thermal system insulation or surfacing material. This includes, but is not limited to, the removal of asbestos containing wall board, floor tile, and sheeting, roofing and siding shingles, construction mastics, gaskets and leak sealant materials.

Class III – Repair and maintenance operations where ACM including thermal system insulation and surfacing material is likely to be disturbed.

Class IV – Maintenance and custodial activities during which employees contact ACM and PACM and activities to clean-up waste and debris.

Bulk Sample – A process of collecting samples of materials to be sent to a laboratory for analysis to determine whether or not the material contains asbestos, and if so, what types and percentages.

Competent Person – One who is capable of identifying existing asbestos hazards in the workplace and selecting the appropriate control strategy for asbestos exposure, and who has the authority to take prompt corrective measures.

Excursion Limit – 1.0 fibers per cubic centimeter (1.0 f/cc) averaged over a 30 minute period. This is the maximum concentration of airborne asbestos an employee may be exposed to during any 30 minute period during a work shift without the use of protective measures such as respirators or protective clothing.

Exposure Assessment – Air monitoring done to determine employee exposure to airborne asbestos, which is compared to the PEL and Excursion Limit.

High Efficiency Particulate Air (HEPA) Filter – A filter capable of trapping and retaining at least 99.97 of all single dispensed particles of 0.3 micrometers in diameter.

Negative Exposure Assessment – A demonstration by the employer that employee exposure during an activity is expected to be consistently below the PEL.

Permissible Exposure Limit (PEL) – 0.1 fibers per cubic centimeter (0.1 f/cc) Time weighted average (TWA) for an eight hour period. The maximum concentration of airborne asbestos an employee may be exposed to during an 8 hour work shift without the use of protective measures such as respirators or protective clothing.

Presumed Asbestos Containing Material (PACM) – Materials suspected of containing asbestos that have not been positively identified as not containing asbestos. These are normally sprayed or troweled on materials in buildings and facilities constructed prior to 1980. These materials must be treated as asbestos containing material until they are determined to not contain asbestos.

Regulated Area – an area established to demarcate areas where Class I, II, and III asbestos work is conducted, and any adjoining area where debris and waste from such asbestos work

accumulates; and any work area which exceeds, or where there is a reasonable possibility to exceed the Permissible Exposure Limit.
Surfacing Materials – asbestos containing material sprayed or troweled on surfaces (walls, ceilings, structural members) for acoustical, decorative or fireproofing purposes.
Thermal System Insulation (TSI) – Insulation used to inhibit heat transfer or prevent condensation on pipes, boilers, tanks, ducts, and various other components of hot. This includes pipe lagging, pipe wrap, block, batt and blanket insulation, cements and "muds" and a variety of other products.
Wetting Agent – See "Amended Water" in this Section

Responsibilities

Site Management is responsible for ensuring compliance with this procedure and that all site specific asbestos hazards have been properly addressed and effectively communicated to all employees assigned to the site.

Supervisors responsible for employees performing work covered by the Jacobs Asbestos Exposure Protection procedure must:

- Verify employees are properly trained on the applicable contents of this procedure and any site/client specific asbestos programs
- Verify employees are trained in the recognition of asbestos containing materials and the method and means to protect themselves from these hazards
- Continuously monitor the work to verify compliance with this procedure and any site/client asbestos program requirements
- Confirm each job is properly prepared and that Employees are aware of any asbestos hazards that may be encountered as part of their work or as a result of someone else's work in the area
- Verify a specific Safe Plan of Action (SPA) is completed prior to starting any asbestos job

Site Safety and Health Officer

The SSHO shall assist Project Manager and SSHO in compliance with this procedure. The SSHO is also responsible for maintaining site documentation required by this procedure including training records, respirator fit-test records, etc.

Employees

Employees must know the hazards associated with their work with asbestos, and verify these hazards are properly addressed according to training received. Employees are responsible for implementing the safe work procedures contained in this procedure.

Health and Safety Personnel

The Health and Safety personnel will assist the Project Manager, and SSHO in the development and management of any site asbestos policies and with the interpretation of this procedure. The

Health and Safety personnel will also assist in identifying and designating a Competent Person(s) capable of performing specifically required functions of this procedure and OSHA regulations.

Competent Person

A Competent Person will be assigned to supervise all asbestos work. The Competent Person will verify the job is conducted in compliance with this procedure and applicable OSHA regulations 29 CFR 1910.1001 and 29 CFR 1926.1101. At a minimum, the Competent Person must review the job for compliance issues, and assist site management in developing site specific asbestos plans/procedures, perform exposure assessments and perform jobsite inspections.

Training

Training is required prior to initial assignment and annually thereafter for employees engaged in asbestos work activity, or who may encounter asbestos containing materials as part of their routine work activities.

Initial training for asbestos workers will consist of an EPA accredited course appropriate for the class of work being performed. Records of all training and copies of medical examination results must be maintained as part of the Employee's file.

Regulated Areas

All Class I, Class II, Class III, and any work which exceeds the Permissible Exposure Limit (PEL) shall be conducted within Regulated Areas. Barricades and warning signs (posted in all approach directions) will be erected at a sufficient distance to permit a person to read them and take appropriate precautions well in advance of any potential exposure. Signs must read Danger Asbestos Cancer and Lung Disease Hazard Authorized Personnel Only Respirators and Protective Clothing Are Required in this Area.

Access to Regulated Areas is limited to persons trained and qualified in all phases of this procedure. All entrants must don and wear the prescribed PPE in the Regulated Area. No person will be allowed to eat, drink, smoke, chew tobacco or gum, apply cosmetics or bring related materials in the Regulated Area. Persons will be logged in and out and when unattended, the Regulated Area must be made secure from unauthorized entry.

Bulk Sampling

To positively identify the existence of asbestos in any material is by bulk sampling, followed by laboratory analysis. All bulk sampling of PACM or ACM shall be performed by a designated Competent Person and licensed asbestos inspector using established EPA sampling protocol and documentation. Bulk sample results must be reviewed during the planning stages for any removal operation. The laboratory performing the analysis must participate in the EPA bulk asbestos identification quality assurance program as a minimum requirement. Amosite asbestos requires special encapsulating removal agents in lieu of normal wetting agents (amended water).

A visual inspection of the ACM should also be performed prior to removal to determine friability (hardness) and accessibility. Both of these determinations which will determine the appropriate work practices and, along with bulk sampling results, can help anticipate fiber count prior to the initial personal monitoring results.

Exposure Assessments and Permissible Exposure Limits

Each workplace or job task with asbestos work must perform exposure assessments (air monitoring) to accurately determine airborne concentrations of asbestos to which employees are exposed. A designated Competent Person will perform the initial and subsequent daily monitoring as required by OSHA 29 CFR 1926.11011, and Appendix A. Representative exposure assessments of each employee shall be made. The results of exposure assessments shall be made on the basis of representative 8 hour time weighted averaging (TWA).

The results of exposure assessments shall be maintained with the employees medical records for retention purposes. All employees who participated in personal exposure assessment monitoring will be notified of the results upon receipt, regardless of the fiber count.

OSHA 29 CFR 1926.1101 establishes two exposure limits for employees whose work involves asbestos containing materials:

- Permissible Exposure Limit (PEL): fibers per cubic centimeter (0.1 f/cc) averaged over and eight (8) hour day. This is the maximum concentration of airborne asbestos an employee may be exposed to during and 8 hour work shift without the use of protective measures such as respirators or protective clothing.
- Excursion limit (EL): 1.0 f/cc averaged over a 30 minute period. This is the maximum concentration of airborne asbestos an employee may be exposed to during any 30 minute period during a work shift without the use of protective measures such as respirators or protective clothing.

A documented assessment of the expected level of asbestos exposure must be conducted by a Competent Person for each asbestos job to be undertaken. This would include even short duration jobs such as the removal of an intact asbestos gasket.

Negative Exposure Assessment

A Negative Exposure Assessment means that for any one asbestos job, under the worst conditions, the levels of airborne asbestos fibers will not exceed the PEL or Excursion Limit. The Competent Person must use one of the following methods to establish a Negative Exposure Assessment:

- Basing the exposure determination on data collected from prior jobs conducted under similar conditions and with similar materials which demonstrates that these job activities cannot release asbestos fibers in concentrations exceeding the PEL or Excursion Limit.
- By exposure assessment data collected in the last 12 months of similar jobs under similar conditions with similar materials, which indicates that employee exposures will not exceed the PEL or Excursion Limit.

- By initially monitoring the job being undertaken and determining that the level of asbestos exposure is below the PEL and Excursion Limit.

Until a Negative Exposure Assessment has been completed, all asbestos related work activities and tasks must be conducted under the assumption that airborne asbestos levels might exceed the PEL and adequate protective measures to protect employees from possible harmful exposures must be provided, i.e. respirators and protective clothing. Upon establishment of a Negative Exposure Assessment, the use of these protective measures (respirators and protective clothing) may not be required as determined by the Competent Person.

Work Practices

All asbestos removal activity shall be performed using wet methods/wetting agents, unless this wetting activity creates greater hazards, such as electric shock or slip/fall hazards such as on roofs. Impermeable drop cloths will be placed below all removal activity.

There must be prompt clean-up and disposal of any ACM or PACM waste and debris in leak tight containers. Dry clean-up of ACM/PACM is prohibited; which includes dry sweeping and shoveling. Compressed air is prohibited to remove ACM/PACM or clean-up debris. It is preferred to vacuum dust, materials and small debris. All vacuums must be equipped with High Efficiency Particulate (HEPA) filters. High speed abrasive disc equipment not equipped with HEPA dust collection features is also prohibited.

Medical Surveillance

Medical surveillance examinations are required for all employees performing asbestos work on 30 or more days per year, or who may be exposed to asbestos in excess of the PEL or Excursion Limit on one or more days per year. Medical surveillance examinations must be conducted by, or under the direction of a licensed physician and must be repeated annually.

The following information must be provided to the physician:
- Employees asbestos job duties
- Expected/representative employee exposures
- Expected PPE to be worn by the employee
- Information from previous employee medical exams if needed by the physician
- A copy of the asbestos regulation; OSHA 29 CFR 1926.1101 and applicable appendices, if needed by the physician

After completion of the examination, the physician will inform the employee of the result of the examination and issue a written opinion to the company and employee regarding the employee's fitness for asbestos work activities.

Respiratory Protection

Prior to being assigned tasks requiring the use of respiratory protection equipment, the employee must have received respiratory training and a physicians approval as part of the medical

examination criteria. Respirator selection must be made by a Competent Person familiar with respiratory equipment, the type of work to be performed and the hazards expected to be encountered. Fit testing for respirators must be conducted by a Competent Person familiar with asbestos fit testing requirements. A summary of each employee's fit tests conducted must be maintained as part of the employee's file.

Protective Clothing

Approved protective clothing and equipment must be worn when performing activities where the possibility for exposure to asbestos exists. Protective clothing might consist of coveralls or similar full body suit, head and foot coverings, gloves. Street clothing will not be worn under disposable protective coveralls. Each worker must use a new coverall with hood and boot coverings each time he/she exits and re-enters the work area. Eye protection, as required by the safety plan and the situation, will be worn. All disposable protective clothing will be disposed of as asbestos waste when exiting the Regulated Area.

Clean-Up / Disposal

There must be prompt clean-up of asbestos waste and disposal of debris in sealed leak-tight containers. All asbestos waste containers (bags/drums) must be properly labeled. Labels must be visible, and read: Danger Contains Asbestos Fibers Avoid Creating Dust Cancer and Lung Disease Hazard. Any broken/damaged bags must be re-bagged as soon as possible and prior to being removed from the Regulated Area. The polyethylene floor/ground and wall cover will be treated as asbestos waste. It should be vacuumed and removed a layer at a time with employees still fully protected. All asbestos waste materials must be properly disposed of, in accordance with federal and state environmental regulations. Do not mix asbestos waste with any other refuse materials.

ASBESTOS CHECKLIST		
Project:	**Date:**	**Checklist Completed By:**
Work Location/Description:		

Yes	No		Yes	No	
☐	☐	**Licensed Asbestos Contractor**	☐	☐	**Drop Cloths Beneath Removal Activity**
☐	☐	**Proper Permits Issued**	☐	☐	**Critical Barriers Established**
☐	☐	**Client Permits/Approvals Obtained**	☐	☐	**Respiratory Protection Program Established**
☐	☐	**Detailed Work Plan/HASAP Developed**	☐	☐	**Medical Surveillance Program Established**
☐	☐	**Documentation of Employee Training**	☐	☐	**Wet Removal Methods Used**
☐	☐	**Trained Competent Person On-Site**	☐	☐	**HEPA Vacuums Available and In Use**
☐	☐	**Exposure Assessment Conducted**	☐	☐	**Work Area Remains Clean and Orderly**
☐	☐	**Regulated Work Area Established**	☐	☐	**HEPA Ventilation System In Use**
☐	☐	**Asbestos Work Area Signs Posted**	☐	☐	**Daily Inspections Documented**
☐	☐	**Other Workers/Contractors in the Area Notified**	☐	☐	**Material Removed Intact (if possible)**
☐	☐	**Decontamination Plan Established/Followed**	☐	☐	**Material Bagged Wrapped as Removed**
☐	☐	**Proper Personal Protective Equipment/Clothing In Use**	☐	☐	**Proper Lockout/Tagout Procedures Implemented**
☐	☐	**Monitoring Program**	☐	☐	**Heat Stress Plan Implemented**

10.8 EXCAVATION AND TRENCHING SAFETY (Not Applicable)

A Standard Operating Procedure for excavation and trenching is not applicable to this project. Should the scope of work be modified to include excavation or trenching, an addendum to this plan will be prepared.

10.9 GUARDING MACHINERY AND EQUIPMENT (Not Applicable)

A Standard Operating Procedure for guarding machinery and equipment is not applicable to this project. Should the scope of work be modified to include guarding machinery and equipment, an addendum to this plan will be prepared.

10.10 LOCKOUT / TAGOUT (Not Applicable)

A Standard Operating Procedure for lockout / tagout is not applicable to this project. No electrical power to any machinery exists in Building 401. Should the scope of work be modified to include lockout / tagout, an addendum to this plan will be prepared.

10.11 FALL PROTECTION

Anytime employees are working from an unprotected elevation of six (6) feet or more above the ground or next lower level, fall protection must be used. Working means while traveling, stationary, or at anytime exposed to a fall from a surface not protected by a standard guardrail or other approved fall prevention device. The purpose of this procedure is to establish minimum requirements for the use of fall protection and prevention equipment / devices, to protect employees exposed to fall hazards.

Definitions

Anchorage – a secure point of attachment to which the fall protection system is ultimately connected.
Competent Person – one who is capable of identifying hazardous and dangerous conditions regarding fall protection equipment; and is knowledgeable in the application and use of the equipment, and has the authority to take prompt corrective actions.
Deceleration Device (Shock Absorber) – any device which serves to dissipate a substantial amount of the energy during fall arrest or otherwise limits the energy imposed on the body during fall arrest.
Designated Area – A fall prevention system composed of a warning line and stanchions erected 6 feet or more from a fall hazard (unprotected roof edge).
"D" Ring – An attachment point on the full body harness for attaching a lanyard or other fall protection device.
Fall Prevention – installation of barriers or use or restraining devices that physically prevent a person from being exposed to a fall hazard.
Fall Protection – the use of passive equipment designed to stop and/or control the free fall once a fall has been initiated.

Free Fall – distance the D-ring travels from the onset of a fall to the time when the fall arrest system is activated (excludes deceleration distance and any system elongation).
Full Body Harness – A personal fall protection device which is secured around the body, and a lanyard/device attached. It is designed to distribute fall arresting forces primarily over the buttocks and thighs.
Lanyard – a flexible strap connected to the full body harness at one end and an anchorage or anchorage connector at the other.
Lifeline – a flexible line for connection to an anchorage at one end to hang vertically (vertical lifeline), or for connection at both ends to stretch horizontally (horizontal lifeline) and to which other elements of a fall arrest system are attached.
Low Sloped Roof – a roof having a slope of less than or equal to 4 on 12 (vertical to horizontal).
Qualified Person – one with a recognized degree or professional certificate and extensive knowledge in the fall protection field, who is capable of design, analysis, evaluation and specification of fall protection equipment.
Restraint Line – A line from a fixed anchorage to which an employee is secured in such a way as to prevent the employee from reaching an identified fall hazard.
Self Retracting Lifeline – A fall protection device which extends up and down automatically as the worker moves eliminating slack. These units have a locking/braking mechanism which senses and arrests free fall.
Snap Hook – A self closing, self locking connector used for connecting lanyards/devices to the full body harness D-ring and to the anchorage.

Responsibilities

Site Management

Site Management is responsible for verifying the overall implementation of and compliance with Jacobs fall protection policy and procedures. The Project Manager, and SSHO must be familiar with the fall protection policy and utilize the expertise at their disposal to verify employees are protected from fall hazards.

Project Manager

Supervisors responsible for employees performing work covered by this fall protection policy must:

- Monitor the work to verify compliance with this procedure
- Confirm each job has been properly evaluated for fall hazards and that these hazards have been properly eliminated or controlled
- Verify employees are aware of any hazards associated with their work
- Verify employees have received proper training on fall hazard recognition and use of fall protection/prevention equipment
- Verify employees adhere to all requirements of the fall protection policy

Employees

Employees performing work tasks covered by this procedure must:

- Be aware of fall hazards associated with their work and ensure these hazards are properly addressed prior to the work beginning
- Know the uses and limitations of fall protection equipment
- Inspect fall protection equipment prior to each use and remove any defective equipment from service
- Report any fall to supervision and remove from service any fall protection equipment subjected to a fall

Health and Safety Personnel

The Health and Safety personnel will assist the Project Manager, and SSHO in the implementation, training, monitoring and documentation associated with the fall protection program. It will also be a responsibility of the Health and Safety personnel to provide the expertise and guidance necessary to help verify employees are adequately protected from fall hazards.

Competent Persons

Competent Persons will be responsible for verifying that thorough, documented in-depth inspections of fall protection equipment have been performed and fall protection equipment is used in compliance with this procedure and all manufacturers and regulatory requirements.

Training

Employees must be trained on the proper use, care, and limitations of fall protection equipment prior to being allowed to use the equipment. Training must at a minimum address the following areas:

- Fall Protection Policy and Procedure
- Evaluating Fall Hazards
- Fall Prevention
- Equipment Use, Care and Limitations
- Proper Fitting and Wearing of Fall Protection Equipment
- Requirements and Proper Use of Anchor Points
- Inspection

All fall protection training must be documented, signed and dated by the employee and instructor, and maintained in the employees safety training file. Re-training is required if a lack of proficiency is observed, or when new equipment is introduced.

Inspection and Storage

Fall protection equipment must be stored in a clean dry location away from exposure to abrasive or cutting tools, equipment or materials, excessive heat, and chemicals. Full body harnesses

should be hung by the D-ring for storage. All fall protection equipment must be inspected by the employee / user prior to each use.

Inspections shall consist of the evaluation of the following equipment including harnesses, lanyards and lifelines, stitching, frayed / broken strands, rivets, burns, buckles, cuts, buckle, tabs, tears, "d" rings, snap hooks, rust and abrasion, connectors, burns, cuts, tears, and corrosion. Equipment found to be defective must be immediately removed from service, tagged as defective and repaired, or destroyed and replaced.

In-Depth Inspections

Competent Persons designated by Site Management must conduct in-depth inspections of all jobsite fall protection equipment periodically. These in-depth fall protection inspections must be documented. The Competent Person shall utilize the specific fall protection equipment manufacturer's inspection instructions to perform the in-depth inspections.

Fall protection equipment that has satisfactorily completed the in-depth inspection shall be marked/color coded with colored vinyl tape or some other secure means according to the following annual inspection schedule: 1997-Red, 1998-Orange, 1999-Green, 2000-White, with a repetition of colors after 2000.

If a quarterly in-depth inspection is implemented, the following scheduled markings will be added adjacent to the annual markings. January, February, March-White, April, May, June-Green, July, August, September-Red, October, November, December-Orange. Care should be used not to cover any equipment feature/component vital to inspection or performance with the tape or marking means, such as stitching, grommets, adjusting mechanisms, labels, etc.

Some types of fall protection equipment (such as self-retracting lifelines) require periodic recertification by the manufacturer at scheduled intervals. The Competent Person must be familiar with these requirements and have a documented recertification performed as required. Fall protection equipment subjected to fall forces, must be immediately removed from service destroyed and replaced, or recertified by the manufacturer.

Fall Hazards

In order to protect against falls, the key factor is the recognition of the hazard. Falls are generally a result of inadequate planning, poor work practices, poor work conditions, or a combination of these. Fall prevention planning begins prior to the start a project or task and should consist of:

- Layout and arrangement of tools and equipment
- Identifying aisles, passageways, entrances, exits, and ensuring these are maintained free of obstructions and tripping hazards
- Verifying proper illumination
- Addressing inclement weather conditions (rain, sleet, snow, ice, mud)
- Use of personnel hoisting equipment (aerial lifts, personnel baskets, etc.)

- Site Management must determine whether walking and working surfaces are structurally capable of supporting workers safely
- Employees on the edge of excavations deeper than 6 feet must be protected from falling by guardrails, fences, or barricades when the excavations are not easily visible
- Employees working from elevated positions with less than a 6 foot fall hazard, but above dangerous equipment or conditions, must be protected from falling onto the hazard by fall prevention, fall protection or equipment guards

Same Level Fall Hazards

Good housekeeping is the key to the prevention of same level falls. Usable and waste material must be stored in designated areas out of passageways and shall not be allowed to accumulate in the work area or around work tables, desks, threading machines, etc. as to cause a hazard. Surfaces must be kept free of slipping hazards (grease, oil, chemicals, metal shavings, etc.). Floor holes and openings shall be covered and secured as not to create a tripping hazard. Attempts must be made to maintain even floor surfaces. Floor protrusions will be clearly marked with warning tape and florescent paint. Electrical cords, welding leads, hoses, etc. must be elevated or so positioned as to not cause a tripping hazard.

Falls From Elevation

A momentary loss of balance resulting from a slip or trip can often lead to an elevated fall. Grabbing on to something to catch oneself after balance is accidentally lost is rare. Fall prevention or protection is required to protect employees from injuries due to falls from elevation. The objective of fall prevention is the elimination of the potential for exposure to a fall. The objective of elevated fall protection is to stop or control the free fall once a fall has been initiated, therefore reducing the potential for injury. Fall hazard distance begins and is measured from the level of a workstation on which an employee must initially step and where a fall hazard exists. It ends with the greatest distance of possible continuous fall, including steps, openings, projections, roofs, and direction of fall (interior or exterior).

Fall Prevention

Fall prevention eliminates the potential for exposure to a fall. For this reason, it is preferred over fall protection devices and should be the first choice for eliminating exposure to fall hazards. Examples of fall prevention devices include:

- Guardrails
- Approved guardrails are used to form a barrier at a fall exposure and consist of a toprail, midrail, and a toeboard
- Hole or floor opening covers that are strong enough to support at least twice the maximum intended load and must be installed and secured in a manner which prevents their accidental displacement or removal
- Hole or floor opening covers must also be clearly marked “Danger – Hole Cover – Do Not Remove” or “Hole” or “Cover”

- Restraint lines that are designed to limit travel so that no fall hazard area is reachable in any direction of movement. Restraint lines and their anchorage points must be capable of supporting at least 3,000 lbs. tensile load.

Standard protection against falls shall be the assurance that adequate guardrails, handrails, midrails and toeboards are installed on all work surfaces including platforms, scaffolds. Etc. Attempts must be made to either install permanent guardrails or install temporary guardrails on or around surfaces that are four feet above the floor level. Scaffolds, ladders, aerial lifts, or other work platforms must be used in compliance with all company, manufacturer and regulatory requirements.

Fall Protection

Only approved fall protection equipment is allowed. All fall protection equipment must be inspected prior to each use and must be maintained in good working order at all times. Equipment or components found to be defective must be immediately removed from service and replaced or repaired by qualified repair personnel. Fall protection equipment is for fall protection use only and is not to be used for any other purpose such as positioning. All components of personal protection; i.e. harnesses, lanyards, anchorage, lifelines and connectors must have a minimum break strength of 5000 pounds. Any equipment which is used as part of a fall protection system, but could also be used for other activities (such as slings, chokers, caribiners, etc.) must be tagged, identified, or otherwise controlled and used only as part of a fall protection system. Equipment manufactured for uses other than fall protection, must be evaluated and approved by a qualified person prior to incorporating them as part of a fall protection system. All fall protection equipment must be designed, purchased and used in accordance with this procedure and all applicable manufacturer and regulatory requirements.

Distance Requirements

A fall protection system must not allow for more than a 6 feet free fall. The fall protection system must be used and secured in a fashion so that the user cannot contact the next lower level should a fall occur. Factors to consider in a fall protection system include free fall distance, system elongation, deceleration device/shock absorbers, and employee height. Site Management shall make provisions for prompt rescue of employees in the event of a fall.

Use of Fall Protection Equipment

Full Body Harness

An approved full body harness must be used as protection against falls to a lower level when guardrails or other approved fall prevention means cannot be utilized. Full body harnesses must also be worn and properly anchored when employees are working from aerial lifts, scissor lifts, personnel baskets, and similar equipment. Full body harnesses must fit and be worn properly with the straps tucked so as not to get caught on equipment or otherwise cause a hazard. Chest straps must be worn between the chest and collar bone, with the rear D-ring being worn between the shoulder blades. Full body harnesses used on Jacobs projects must, at a minimum, be

equipped with a "D"-ring located in the center of the back. Additionally, some harnesses come equipped with various "D"-rings whose use is based on their location:

- Back – general fall protection use
- Front – used with climbing systems
- Side – positioning devices only, not to be used as fall protection
- Shoulder – rescue line attachment

Snaphooks

Only self-closing, self-locking snaphooks are allowed for fall protection use on Jacobs projects. Snaphooks must open and close properly, and be fully closed around their anchorage point.

Anchorage Points

Anchorage points must be capable of supporting at least a 5,000 lb. Load per person, or a safety factor of 2 designed by a qualified person. They should be independent of the work surface when possible. The anchorage point should be at least as high as the harness "D"-ring and preferably higher to minimize free fall distance. Keep in mind, there can be no more than a six feet free fall.

Deceleration Devices (Shock Absorbers)

Shock absorbers are required as part of an overall fall protection system. At a minimum, shock absorbers are required as part of fall protection lanyards.

Lanyards

The shortest length lanyard possible should always be used. Lanyards must have a maximum length to provide for a free fall distance of no more than six feet. Lanyards must be used in conjunction with a shock absorber or shock absorbing system. Lanyards must be maintained free of knots. Employees may not be attached to the same lanyard. Dual or "Y" lanyards may be required to achieve 100% fall protection in some work situations. When not in use, the lanyard must be secured in a fashion as to not cause a tripping hazard or become entangled in equipment. Flexible steel cable lanyards shall not be used by personnel performing work on or in close proximity to electrical equipment. A non-conductive lanyard must be used.

Retractable Devices

Retractable devices are designed to arrest a fall within 2 feet. Tag lines must be used to prevent the uncontrolled retracting of these devices. Retractable devices must be used with the wearer at less than a 45 degree angle from the device to prevent the hazards of a swing fall. Only retractable devices bearing current manufacturers certification shall be used.

Vertical Lifelines

Vertical lifelines may only be used by one employee at a time. Separate vertical lifelines are required for each employee when multiple use is required. Vertical lifelines must be equipped with a formed eye termination at one end for suspension from the anchorage point and must extend below the lowest level of travel. The lower end must be either attached to a second anchor point or weighted down to provide stability. Grab devices must be compatible with the type and size of rope or cable used and should remain above the shoulders of the user. Manufacturer's will specify maximum lanyard length for use on their vertical life lines (usually nine inches). Standard six feet lanyards are normally not permitted.

Horizontal Lifelines

Horizontal lifelines must be either designed by a qualified person with a safety factor of at least 2, or manufactured components erected by competent persons and used in compliance with all manufacturers requirements and safety factors.

Safety Nets

Only nets designed by the manufacturer as fall protection nets may be used. These must be installed in accordance with all manufacturers requirements, as close to the work level as possible and extend outward from the surface. (See OSHA 29 CFR 1926.502 for distances). Nets may have maximum 6" by 6" openings and must be either certified by a qualified person or pass a 400 lb. Drop test: prior to use, whenever relocated, after repair and every 6 months if left in place. Nets in use must be inspected by a competent person at least weekly for wear, damage, and deterioration. Inspections must be documented.

Work on Rooftop Equipment

When performing work on equipment located on low sloped rooftops, fall prevention or fall protection is required only if the work demands that the employee be within 6 feet of the roof edge, not including access to and egress from the roof. Fall prevention or fall protection is required at all times when performing work on equipment located on any roof other than a low sloped roof.

Roofing Work

Persons involved in roofing work must be protected by either a fall prevention or fall protection system. A designated area is acceptable for work on low sloped roofs (4 on 12 vertical to horizontal) as long as employees are not required to be within 6 feet of the edge. If this is required, then guardrails, restraint lines, or fall protection must be provided when within 6 feet of the edge. A designated area is not acceptable fall prevention for work on steep roofs.

10.12 HAZARD COMMUNICATION

A Hazard Communication Program has been developed for Jacobs employees to communicate the chemical hazards and identify control measures to protect your health and safety. A safe operation depends on being aware and informed of the hazards associated with chemical

products. Where hazards are known and recognized, injuries and illnesses are less likely to occur.

Our Hazard Communication Program consist of three major components:

- Labels – To identify the materials and warn of their hazards

- Material Safety Data Sheets (MSDS's) – Explain in detail the hazardous properties of the chemical products along with control measures recommended for safe use, and

- Training and Information – Explains where hazardous chemicals are present in the work areas, the methods and observations that may be used to detect the presence of a hazardous chemical, the health hazards of the chemical, and measures employees can take to protect themselves from these hazards.

Labels

Each container of hazardous chemical must be labeled, tagged, or marked with the following information:

- Identity of the hazardous chemical
- Appropriate hazard warning
- Name and address of the chemical manufacturer, importer, or other responsible party

Signs, placards, process sheets, batch tickets, operating procedures, or other written materials may be used in lieu of labels to individual stationary process containers, as long as the method identifies the hazard.

Material Safety Data Sheets (MSDS's)

The MSDS is a written document which contains detailed information concerning the hazardous properties of the chemical which make up a product, including their identity, the health effects from exposure, emergency and first aid procedures, and precautions for safe use.

MSDS's are provided to Jacobs by our material suppliers. The manufacturer or distributor of these chemical products has evaluated the product for their hazards. Jacobs has compiled MSDS's for those materials determined to be hazardous. MSDS's can be found at a central location in your work area or are accessible through your supervisor.

Material Safety Data Sheet Components

Section I – Identification

This section identifies the chemical name or trade name and synonyms, the manufacturer's name and address, emergency telephone number, telephone number for additional information, and the date the Material Safety Data Sheet was prepared.

Section II – Hazardous Ingredients

A hazardous ingredient is a hazardous material in a mixture in sufficient concentration to produce enough flammable vapor or gas to ignite or to produce acute or chronic adverse effects in doses which could result from normal use or predictable misuse of the mixture. The hazardous ingredient must be listed with the associated Permissible Exposure Limit (PEL), or Threshold Limit Value (TLV), or other recommended limit and the percentage of each hazardous ingredient. Hazardous ingredients are listed when they comprise 1% or greater of the composition or 0.1% as a carcinogen. Hazardous ingredients are carcinogens or potential carcinogens when listed by 29 CFR Part 1910, Subpart Z, National Toxicology Program, or International Agency for Research on Cancer.

Section III – Physical/Chemical Characteristic Definitions

Boiling Point – Refers to the temperature at which the liquid boils, in degrees Fahrenheit, at a pressure of 760 mm Hg. Materials with low boiling points tend to evaporate quickly and may dissipate toxic or flammable components.

Vapor Pressure – Refers to the pressure of saturated vapor above the liquid in mm of Hg at 20 degrees Centigrade. Materials with high vapor pressure evaporate rapidly and may dissipate toxic or flammable components.

Vapor Density – Refers to the relative density or weight of a vapor or gas compared with an equal volume of air. Materials with vapor densities greater than one will tend to accumulate on the floor, while those with vapor densities less than one will rise.

Solubility in Water – The amount of a chemical that can be dissolved in water.

Specific Gravity – Refers to the ratio of the weight of a volume of material to the weight of an equal volume of water. A material with a specific gravity less than one will float on water, while those with specific gravities greater than one are heavier than water and will sink.

Melting Point – The temperature at which a solid changes into a liquid.

Evaporation Rate – Refers to the time for a liquid to be converted into its vapor at a given temperature, relative to ether or butyl acetate.

Appearance and Odor – Refer to a physical description.

Section IV – Fire and Explosion Hazard Definitions

Flash Point – Refers to the temperature in degrees Fahrenheit, at which a liquid will give off enough flammable vapor to ignite.

Flammable or Explosive Limits – Refers to the range of gas or vapor concentrations, percent by volume in air, which will burn or explode if an ignition source is present.

Lower Explosive Limit (LEL) – Refers to the concentration of a vapor in air below which ignition will not occur.

Upper Explosive Limit (UEL) – Refers to the concentration of vapor in air above which ignition will not occur.

Extinguishing Media – List the firefighting media suitable for use on the burning material.

Special Fire Fighting Procedures – If water is unsuitable, specifies the firefighting media to be used. Lists only necessary personal protective equipment.

Unusual Fire and Explosion Hazards – Specifies any unusual fire and explosion hazards and any special conditions that govern them.

Section V – Reactivity Data Definitions

Stability – Refers to whether the material is stable or unstable under reasonably foreseeable conditions of storage, use, or misuse. If unstable, list those conditions which may cause a dangerous reaction.

Incompatibility – Refers to materials and contaminants with which the product may reasonable come into contact to produce a reaction which would release energy.

Hazardous Decomposition Products – Refers to hazardous materials produced by burning, oxidation, or by heating.

Hazardous Polymerization – Refers to a reaction which takes place at a rate which releases energy. Lists those reasonably foreseeable storage conditions which would start polymerization.

Section VI – Health Hazard Data

This section describes how the material would be expected to enter the body, including inhalation, ingestion, or skin absorption. The section describes recognized health hazards and symptoms due to acute (short-term) and chronic (long-term) overexposure to the material. The section identifies know or suspected carcinogens used as an ingredient in concentrations greater than 0.1% of the material. Signs and symptoms of exposure are described. Any common medical condition an employee may have which would be aggravated by exposure to the material is described. Emergency and first aid procedures are described.

Section VII – Precautions for Safe Handling and Use

This section refers to the precautionary measures to be taken in the event of accidental spills, releases, or leaks. Appropriate cleanup and disposal are defined. Precautions include avoiding

breathing vapor or gas from a toxic material and removing sources of ignition when a flammable liquid is spilled. Handling and storage precautionary information is described.

Section VIII – Control Measures

This section describes the types of personal protective equipment, including clothing, respirators, eye protection, face shields, gloves and boots, and other controls including ventilation which are needed when working with the material. Since the conditions of use including contaminant, contaminant concentration, application method, and degree of confinement will vary from one work place to another, the control measures will also vary. Generally, the protective equipment and controls recommended by the manufacturer in the Material Safety Data Sheet usually apply to the most hazardous conditions of use. Contact your supervisor concerning the control measures for your job.

Training and Information

Before your work with hazardous materials, you will be provided with training to safely use these materials. The training will include:

The methods and observations that may be used to detect the presence or release of a hazardous chemical in the work area. These methods and observations include:

- monitoring conducted by the employees, continuous monitoring devices, visual appearance or odor of hazardous chemical when being released
- the physical and health hazards of the chemicals in the work area
- the measures employees can take to protect themselves from these hazards, including specific procedures the employer has implemented to protect employees from exposure to hazardous chemicals, such as appropriate work practices, emergency procedures, and personal protective equipment to be used
- the details of the hazard communication program including an exploration of the labeling system and the material safety data sheet, and how employees can obtain and use the appropriate hazard information

10.13 ILLUMINATION

The Jacobs health and safety program has established a standard to educate workers concerning illumination requirements. This program is designed to meet or exceed all requirements of the Occupational Safety and Health Administration (OSHA) Specification for illumination Standard (29 CFR 1910.120 and 29 CFR 1926.56) and USACE Safety and Health Requirements Manual, EM 385-1-1, September 1996.

Application

All employees at all job sites.

Illumination Intensities

Areas accessible to employees will be lighted to not less than the minimum illumination intensities listed:

FOOT – CANDLES	AREAS OR OPERATIONS
5	General site areas.
3	Excavation and waste areas, access ways active storage areas, loading platforms, refueling, and field maintenance areas.
5	Indoors: Warehouses, corridors, hallways, and exit ways.
5	Tunnels, shafts, and general underground work areas. (Exception: minimum of 10 foot-candles is required at tunnel and shaft heading during drilling, mucking, and scaling. Mine Safety and Health Administration approved cap lights shall be acceptable for use in the tunnel heading.)
10	General shops (e.g. mechanical and electrical equipment rooms, active storerooms, barracks or living quarters, locker or dressing rooms, dining areas, and indoor toilets and work rooms.)
30	First aid stations, infirmaries, and offices.

Should temporary illumination be required, the following vertical clearances will be observed for circuits carrying less than 600 volts:

- 3 m (10 ft) above finished grade, sidewalks or from any platform
- 3.6 m (12 ft) over areas subject to vehicular traffic other than truck traffic
- 5.4 m (18 ft) over public streets, alleys, roads, and driveways
- 4.5 m(15 ft) over areas other than public streets, alleys, roads, and driveways that are subject to truck traffic

10.14 SANITATION

Drinking Water

An adequate supply of drinking water will be provided in all places of employment. Cool water shall be provided during hot weather. Drinking water shall be supplied from approved sources. Only approved potable water systems shall be used for the distribution of drinking water. Drinking water shall be dispensed by means that prevents contamination between the source and consumer. Portable drinking water dispensers shall be designed, constructed, and serviced to ensure sanitary conditions, shall be capable of being closed, and shall have a tap. Containers shall be clearly marked as to their contents and shall not be used for other purposes. Water shall not be dipped from containers. Fountain dispensers shall have a guard orifice. Use of a common cup is prohibited. Employees shall use cups when drinking from portable water coolers/containers. Unused cups shall be kept in sanitary containers and a waste receptacle shall be provided for used cups.

Outlets dispensing nonpotable water will be conspicuously posted **"Caution-Water Unfit for Drinking, Washing, or Cooking".** Cross connection between a system furnishing potable water and a system furnishing nonpotable water is prohibited.

Toilets

When sanitary sewers are not available, one of the following facilities will be provided: chemical toilets, recirculating toilets, combustion toilets, or other toilet systems. Each toilet facility shall have a toilet seat and toilet seat cover. Toilet facilities shall be constructed that the occupants shall be protected against weather and falling objects, all cracks shall be sealed and the door shall be tight-fitting, self closing, and capable of being latched. Adequate ventilation shall be provided and all windows and vents screened, seat boxes shall be vented to the outside. Toilet facilities shall be constructed so that the interior is lighted. Toilets at construction job sites shall be provided according to the following:

Number of employees	Minimum facilities (per sex)
20 or less	One
21-199	One toilet seat and one urinal for every 40 workers
200 or more	One toilet seat and one urinal for every 50 workers

Where toilet rooms may be occupied by no more than one person at a time, can be locked from the inside, and contain at least one toilet seat, separate toilet rooms for each sex need not be provided. Under temporary field conditions, provisions shall be made to verify that at least one toilet facility is available. When toilet room may be occupied by no more than one person at a time, can be locked from the inside, and contain at least one toilet seat, toilet rooms for each sex need not be provided. Provisions for routinely servicing and cleaning all toilets and disposing of the sewage shall be established before placing toilet facilities into operation.

Washing Facilities

Washing facilities shall be provided to maintain healthful and sanitary conditions. Washing facilities for persons engaged in the application of paints, coatings, herbicides, insecticides, or other operations where contaminants may be harmful shall be at or near the work site and shall be adequate for the removal of the harmful substance. Each washing facility shall be maintained in a sanitary condition and provided with water, soap, and individual means of drying.

Whenever employees are required to shower, showers shall be provided in accordance with the following:

- One shower shall be provided for every ten employees of each sex who are required to shower during the same shift
- Body soap or other cleansing agent convenient to the shower shall be provided
- Showers shall have hot and cold running water feeding a common discharge line
- Employees using showers shall be provided with individual clean towels

Whenever employees are required to wear protective clothing, change rooms with storage facilities for street clothes and separate storage facilities for protective clothing shall be provided. Whenever working clothes are provided by an employer and become wet or are washed between shifts, provisions shall be made to verify the clothing is dry before reuse.

Waste Disposal

Receptacles used for waste materials shall be constructed to prevent leakage and to allow thorough cleaning and sanitary maintenance. These receptacles shall be equipped with a solid tight-fitting cover, unless it can be maintained in sanitary condition without a cover. Solid and liquid waste shall be removed in a way that avoids creating a menace to health and as often as necessary to maintain a sanitary environment.

10.15 ENGINEERING CONTROLS

Jacobs has assembled a procedure to control exposures to hazardous substances, agents, and environments.

Application

Engineering controls such as local and general ventilation shall be used to limit exposure to hazardous substances, agents, and environments within acceptable limits. When engineering controls are not feasible or are not sufficient to limit exposure to hazardous substances, agents, and environments within acceptable limits, work practice controls like wetting shall be instituted. When engineering or work practice controls are not feasible or are not sufficient to limit exposure to hazardous substances, agents, and environments within acceptable limits, personal protective equipment programs like respirators and gloves shall be instituted.

10.16 PROCESS SAFETY MANAGEMENT (Not Applicable)

A Standard Operating Procedure for process safety management is not applicable to this project. Should the scope of work be modified to include process safety management, an addendum to this plan will be prepared.

10.17 SIGNS AND LABELS

The Jacobs safety signs and tags program was established to educate employees concerning hazard signs and warning tags. This program is designed to meet or exceed all requirements of the Occupational Safety and Health Administration (OSHA) Specification for accident prevention signs and tags Standard (29 CFR 1910.145 and 29 CFR 1926.52), USACE Safety and Health Requirements Manual, EM 385-1-1, September 1996, and USACE Radiation Protection Manual, EM-385-1-80, May 1997. The program includes signs, tags, labels and signal systems.

Application

All employees who work in areas where hazards exist.

Sign Components

Sign components apply to the design, application, and use of signs or symbols, intended to indicate and define specific hazards of a nature such that failure to designate them may lead to injury of a worker or public. The sign components are meant as safety signs. Signs for streets, roads, highways or marine use are not discussed here. The signs, tags or labels will be visible at all times the hazard exists. If the hazard is removed, the signs will also be removed or covered. Should signs be required, workers will be informed as to their meaning and actions required when the sign is present. Signs are classified as follows:

- Danger Signs: Danger signs will indicate immediate danger and that special precautions are necessary. The colors red, black and white will be opaque glossy type specified in Table 1 of the Fundamental Specification of Safety Colors for CIE Standard Source "C", American National Standard (ANS) Z53.1-1967 design.

- Caution Signs: Caution signs will warn against potential hazards or caution against unsafe practices. Background color will be yellow and the panel black with yellow lettering. Color type is specified in Table 1 of the Fundamental Specification of Safety Colors for CIE Standard Source "C", American National Standard (ANS) Z53.1-1967 design.

- Safety Instruction Signs: Safety instruction signs will be used to post general instructions and suggestions relative to safety measures. Signs will have a white background and the panel, green with white letters or black letters against a white background. Color type is specified in Table 1 of the Fundamental Specification of Safety Colors for CIE Standard Source "C", American National Standard (ANS) Z53.1-1967 design.

- Slow Moving Vehicle Emblem: The emblem is intended as a unique identification for, and it will be used only on vehicles design to move 25 mph or slower on public roads. The emblem is not a clearance marker for wide machinery or intended to replace required lighting or marking of slow moving vehicles. The emblem will be mounted as per the American Society of Agricultural Engineers Emblem for Identifying Slow Moving Vehicles, ASAE R276, 1967 or ASAE S276.2 (ANSI B114.1-1971). Design of the emblem will meet the requirements of OSHA 29 CFR 1910.145 (d) (10).

- Biological Hazard Sign: The biological hazard sign signifies the actual or potential presence of a biohazard and to identify equipment, containers, rooms, materials, experimental animals, or combinations which contain or are contaminated with viable hazardous agents (infectious agents posing a risk or potential risk to the well-being of man).

- Radiological signs: Radiological signs include the standard radiation trefoil in magenta on a yellow background. Wording is in magenta or black. Signs for radioactive material areas are worded "CAUTION, RADIOACTIVE MATERIAL". Signs for airborne radioactivity areas are worded "CAUTION, AIRBORNE RADIOACTIVITY AREA".

Tag Components

Accident prevention tags provide a message to employees with respect to hazardous conditions. Tags will be used until the identified hazard is removed or the hazardous operation is completed. If signs, guarding or other positive means of protection are present, tags are not required.

Tags will contain a signal word and a major message. A major message means that portion of a tag's inscription is more specific than the signal word and indicates the hazardous condition or the instruction, such as "Do Not Start". The signal word will be one of the following: Danger, Caution, Biological Hazard, BIOHAZARD, or the biological hazard symbol. The tag's major message will be readable from a distance of five feet or greater and presented as either text or a pictograph. All workers will be educated as to the meaning of tags.

The tags will be attached as close as safely possible to the hazard by a string, wire or tape, so as removal will not accidentally occur.

Specific tag types are used in the following situations:

- Danger Tags: Danger tags mark major hazard situations where an immediate hazard presents a threat of death or serious injury to employees.
- Caution Tags: Caution tags mark minor hazards where a non-immediate or potential hazard or unsafe practice presents a lesser threat of injury.
- Warning Tags: Warning tags indicate a hazard situation between Danger and Caution.
- Biological Tags: Biological tags indicate the actual or potential presence of a biological hazard and to indicate equipment, containers, rooms, experimental animals, or combinations.

11.0 SITE CONTROL MEASURES

This section defines site control measures and procedures to limit the spread of contamination from contaminated areas. Work zones are defined and a procedure is identified to implement the procedure. Refer to Appendix I for the Vicinity Map, Locality Map and Site Plan.

Before visitors are permitted to enter the contamination reduction zone or the exclusion zone they will provide proof of current training, medical surveillance and respirator fit testing and will complete the Certificate of Worker or Visitor Acknowledgement.

11.1 WORK ZONES

The three work zones established at NFSS are the Exclusion Zone, Contamination Reduction Zone, and Support Zone. Tape, cones or other easily visible warning barriers will be placed to identify the Exclusion Zones, Contamination Reduction Zones and Support Zones. A site map showing work zone boundaries and locations of decontamination facilities will be posted in the on-site office.

Exclusion Zone (EZ): Work areas where contamination exists. The interior of building 401 is the EZ. The EZ will encompass all contaminated areas until the air monitoring and site sampling indicates no contamination or exposure exists. No smoking, eating, or drinking is permitted in this zone. No matches or lighters are permitted in this zone. Check-in upon entrance to this zone. The level of protection in this zone during asbestos assessment and abatement is Level C as defined in this SHP.

Contamination Reduction Zone (CRZ): The corridor between the EZ and the SZ where personal decontamination will take place. Appropriate PPE will be donned in the CRZ prior to entry into an EZ. PPE that has been used in an EZ will be removed in the CRZ prior to entry to the Support Zone (SZ). No eating, smoking, or other tobacco products are permitted in this zone. No matches or lighters are permitted in this zone. The level of protection in this zone during asbestos assessment and abatement is level C as defined in this SHP.

Support Zone (SZ): Areas where site administrative activities are conducted. These areas are uncontaminated and where no exposure is anticipated. The SZ is a staging area for equipment and personnel. It is within this zone that a log will be kept of all personnel entering and leaving the site. Access of personnel and equipment into the EZ will be controlled through this zone. Level D PPE will be worn in the SZ.

Restricted Area (RA): Building 401 and areas adjacent to Building 401 have areas which exceed radiological guidelines. A Health Physics technician will screen areas before bulk samples are collected, screen bulk samples after collection and screen debris after abatement has occurred. Radiologically contaminated samples and debris will be stored in a segregated area on site.

11.2 SITE CONTROL LOG

A log of personnel visiting, entering, or working on the site will be maintained in the site office. The log will include the following: date, name, agency or company, time entering and exiting the site, time entering and leaving the exclusion zone, and PPE utilized.

11.3 SITE COMMUNICATIONS

Successful communications between all personnel on site is essential. An air horn signaling system will be used to communicate an emergency evacuation condition. Two blasts on the air horn will indicate an emergency condition exists and the need to evacuate to the site office. A cellular telephone will be used by the Project Manger for communication off site.

The following hand signals will be used by employees in levels of protection.

Signal	Definition
Hands on top of head	Need assistance
Thumbs up	OK/I'm alright/I understand
Thumbs down	No/negative
Arms waving upright	Send backup support
Grip partners wrist	Exit area immediately

11.4 SITE SECURITY

Access to Work Areas

All work inside Building 401 will be accessed through an authorized building access point only. Employees will not have uncontrolled access to Building 401 and adjacent areas.

Controlled Work Area Security

Tape, cones or other easily visible warning barriers and signs will be placed to identify the Exclusion Zones, Contamination Reduction Zones, Support Zones and Restricted Areas. Controls will be provided at the entrances to the restricted areas to prevent unauthorized entry.

12.0 PERSONAL HYGIENE AND DECONTAMINATION

Personnel entering the Exclusion Zone, Contamination Reduction Zone or areas where contamination may occur shall decontaminate before leaving the contaminated areas. Decontamination will be performed in the Contamination Reduction Zone before entry into the Support Zone.

12.1 PERSONNEL DECONTAMINATION

A personnel decontamination facility will be provided in the Contamination Reduction Zone. The contaminants, contaminant concentration and the extent of contamination will determine the type of decontamination facility needed. For the asbestos assessment, a polyethylene sheet will be placed on the floor, personal protective equipment will be removed and placed in asbestos labeled 6 mil disposal bags. Wipes will be used to wash face, hands and respirator.

During asbestos abatement, a three stage decontamination unit with hot and cold running water will be constructed. The decontamination unit will include a dirty room, a shower room and a clean room. Decontamination water will be filtered, collected, radiological screened and if not contaminated, placed in the sewer system.

12.2 PROCEDURES

Practices that will be observed while in contaminated areas will include:

- Do not walk through areas of obvious or known contamination
- Do not handle or touch contaminated materials directly
- Verify all PPE is free of cuts and tears prior to donning
- Limit the amount of contamination that contacts personnel and equipment

Steps in decontamination will include:

- Wash work gloves, boots, and outer protective coverall (if water resistant and reusable)
- Rinse work gloves, boots, and coveralls
- Remove boots
- Remove outer suit (also gloves, hard hat, boot covers)
- Remove respirator
- Remove nitrile gloves or equivalent
- Wash and rinse respirator
- Monitor for radiation contamination

Non-reusable personal protective equipment will be collected in bags and disposed of as asbestos containing waste. Respirators will be rinsed with potable water in the field after each use and will be cleaned at the end of each day using a soap and water wash followed by a potable water rinse. Respirators will be inspected daily for damage, missing parts, and proper function. At a minimum, all employees who handle contaminated or potentially contaminated material must

thoroughly wash their arms, hands, and face prior to leaving the site at the end of the day or prior to eating or smoking.

13.0 EQUIPMENT DECONTAMINATION

Equipment used in the Exclusion Zone will be decontaminated in the Contamination Reduction Zone prior to leaving the site.

13.1 DECONTAMINATION FACILITY

Equipment decontamination will be performed to limit the migration of contaminants outside the asbestos abatement enclosure. All equipment and other tools will be cleaned prior to site entry to remove dirt, debris, or other materials. An inspection of the equipment will be made by the Project Manager or SSHO prior to approving equipment for use on-site.

All equipment will be cleaned, wet washed, and bagged inside the enclosure dirty room. Bagged equipment will be wet wiped before removal from the asbestos decontamination unit. A Health Physics technician will radiological screen all bulk samples and all asbestos debris to verify the materials can be safely removed from Building 401. Materials radioactively contaminated with be segregated on-site. The Project manager or SSHO will be responsible for inspecting all equipment leaving the abatement enclosure for adequacy of decontamination.

13.2 PROCEDURES

Steps in decontamination will include:

- Place equipment in the dirty room of the asbestos abatement enclosure
- HEPA vacuum and wet wipe the equipment
- Inspect equipment for visible contamination and perform radiological screen
- Collect and screen decontamination water

13.3 DISPOSITION OF DECONTAMINATION WASTES

PPE wastes will be collected in asbestos bags. Decontamination water will be filtered, collected, analyzed and properly disposed.

14.0 EMERGENCY RESPONSE AND CONTINGENCY PROCEDURES

An Emergency Response Plan has been assembled to respond to emergencies, alert all on-site employees, alert the Contracting Officer's Representative, and take action to minimize the emergency. The emergency and other than emergency telephone number are to be communicated to all site personnel.

TELEPHONE NUMBERS

Organization	Contact	Telephone
Mount St. Mary's Hospital 5300 Military Road		716-297-4800
Lewiston Police Department 145 North 4th Street	Emergency Number : 911	
	Non-Emergency Number : 716-754-8477	
Lewiston Fire Department 145 North 6th Street	Emergency Number : 911	
	Non-Emergency Number : 716-754-8177	
Ambulance Service		911
New York Department of Labor		518-457-7201
RCRA/Superfund (M-F 8:30 am - 7:30 pm EST)		800-424-9346
SARA Title III Community Right to Know (For questions about regulatory issues)		800-535-0202
National Response Center		800-424-8802
Center for Disease Control (CDC), Atlanta, Georgia		404-639-2888
Poison Control Center		800-722-5725
CDC – Emergency Response (Chemical spills)		404-639-0615
National Institute for Occupational Safety and Health (NIOSH), Cincinnati, Ohio		800-356-4674
CHEMTREC (24 hour emergency no.)		800-424-9300
USACE Project Manager	Judy Leithner	716-879-4234
USACE Industrial Hygienist	Tony Cappella	716-879-4173
USACE Contract Administrator	Brian Moore	716-879-4234
Jacobs Program Manager	Virgil Jansen	314-770-4025
Jacobs Regional Manager Health and Safety	Brian Knaus	314-770-4513
Jacobs Project Manager	Leo Mann	314-770-4270
Jacobs Site Safety and Health Officer	David Fleming	636-441-8086

Directions to Mount St. Mary's Hospital: From NFSS, 1397 Pletcher Road, Lewiston, New York 14092, west on Pletcher Road to Creek Road. South on Creek Road to Military Road. East and south on Military Road to Mount St. Mary's Hospital, 5300 Military Road, on the right (west). The hospital is at the NW corner of Military Road and Upper Mountain Road.

14.1 PRE-EMERGENCY PLANNING

During the site health and safety briefing with each employee, the provisions of the Emergency Response Plan will be reviewed.

14.2 EMERGENCY RECOGNITION AND PREVENTION

All incidents resulting in a fatality, emergency response, lost work time, medical treatment or property damage will be reported immediately by the employee to the employee's supervisor who will then immediately contact the Jacobs Project Manager or SSHO. The Jacobs Project Manager will contact the Jacobs Regional Manager Health and Safety, and the Program Manager, who will initiate contact with OSHA, state, and local agencies as required. The Project Manager will contact Brian Moore, the Contracting Officer's Representative immediately. The Jacobs accident investigation report and witness statement will be completed the same day as the incident. Drug and alcohol screening are mandatory for all Jacobs employees and subcontractors injured as the result of an incident or involved in property damage. Within twenty four hours of any reportable incident, an Accident Report (ENG Form 3394) will be completed in accordance with AR 385-40 and Supplement 1, and forwarded to the Contracting Officer's Representative.

Upon receiving a report of an incident on the site, the SSHO will investigate the circumstances surrounding the incident. The USACE Occupational Safety and Health Office may be requested to participate in the investigation of serious incidents.

Fire

In the event of a fire or explosion, the Lewiston Fire Department will be summoned immediately. Upon their arrival, the Project Manager or SSHO will advise the fire commander of the location, nature, and identification of the hazardous materials on-site. If it is safe to do so, site personnel may use fire fighting equipment available on-site to control or extinguish the fire and remove or isolate flammable or other hazardous materials which may contribute to the fire.

Spill

The procedures defined in this section comprise the spill contaminant program in place for activities at NFSS:

- All drums and containers used during the clean-up shall meet the appropriate DOT, OSHA, and EPA regulations for the waste that they will contain
- Drums and containers shall be inspected and their integrity verified prior to being moved

- Drums or containers that cannot be inspected before being moved because of storage conditions, shall be positioned in an accessible location and inspected prior to further handling
- Operations on-site will be organized so as to minimize the amount of drum or container movement
- Employees involved in the drum or container operations shall be trained concerning the hazards associated with the containers
- Where spills, leaks, or ruptures may occur, adequate quantities of spill containment equipment (absorbent, etc.) will be stationed in the immediate area. The spill containment program must be sufficient to contain and isolate the entire volume of hazardous substances being transferred
- Drums or containers that cannot be moved without failure, shall be emptied into a sound container. It is anticipated mops, buckets, cloth wipes and 6 mil plastic bags will be used for asbestos containing spills

Thunderstorms and Tornadoes

Meteorological conditions shall be closely watched, especially in the spring, when severe thunderstorms and tornadoes are most likely to occur. Thunderstorms and tornadoes often occur late in the afternoon on hot spring days, but can occur at any time of the day in any season of the year. Tornadoes are usually preceded by severe thunderstorms with frequent lightning, heavy rainfall, and strong winds.

A severe thunderstorm watch or a tornado watch announcement on radio or television indicates that a severe thunderstorm or tornado is possible. Work may continue at the work site during severe thunderstorm watches or tornado watches if conditions allow. A severe thunderstorm warning or a tornado warning signifies that a severe thunderstorm or a tornado has been sighted or detected by radar and may be approaching. All work on site shall cease during a thunderstorm, severe thunderstorm warning, or a tornado warning.

Personnel on site during a tornado shall take the following steps:

- Evacuate office trailers or vehicles
- If outdoors, lie flat in a nearby ditch
- Stay away from power poles, electrical appliances, and metal objects
- Do not try to outrun a tornado

Adverse Weather

In the event of adverse weather, the Project Manager or SSHO will determine if work can continue without compromising the health and safety of site personnel. Some of the items to be considered prior to determining if work should continue are:

- Heavy rainfall
- Potential for heat stress
- Tornadoes

- Limited visibility
- Electrical storms
- Potential for accidents
- Malfunctioning of monitoring equipment

In the event of an evacuation, the Project Manager or SSHO will verbally alert on-site employees to stop assessment or abatement work activities, decontaminate personnel, and report to the Jacobs job site office trailer for further instruction.

Before exiting the asbestos abatement enclosure, all abatement employees will decontaminate. In an emergency, remove contaminated coveralls and personal protective equipment and shower if possible.

14.3 EMERGENCY EQUIPMENT AND FIRST AID REQUIREMENTS

The following emergency and first aid equipment will be available on-site:

- First aid kit equipment and supplies approved by the consulting physician
- Full facepiece air purifying respirators for asbestos assessment and abatement
- Mops, buckets, cloth wipe, and asbestos 6 mil plastic bags will be used for spill control
- Fire extinguishers with a minimum rating 2A10BC for each 3000 ft^2 of floor area and in each area where there are combustible materials

15.0 ACCIDENT PREVENTION

This Safety and Health Plan (SHP), and the Jacobs Health and Safety Procedures serve as the Accident Prevention Plan.

Primary aspects of the Accident Prevention Plan are:

- The Site Safety and Health Officer (SSHO) has administrative responsibilities for effecting the site accident prevention plan
- The Project Manager will coordinate daily with those performing investigation and abatement work
- The SSHO will hold daily safety meetings
- The Project Manager or SSHO will verify that no unauthorized personnel enter the site
- The Project Manager or SSHO will inspect the work areas for infractions of the SHP
- The SSHO will investigate all accidents and complete an Accident Investigation Report (ENGForm 3394)
- The Project Manager or SSHO will notify the Contracting Officer's Representative and report all accidents
- If there is an incident involving radiation, the Army Corps of Engineers will be notified

16.0 LOGS, REPORTS, AND RECORDKEEPING

The following reports will be assembled by the Project Manager or SSHO:

- Training logs
- Daily safety inspection log
- Equipment maintenance log
- Employee/visitor register
- Environmental and personal exposure monitoring/sampling results
- Records of radiation surveys, monitoring and disposal per 10 CFR 20 subpart L
- Radiological reports per 10 CFR 20 subpart M
- Reports to individuals of occupational radiation exposure per 10 CFR 19.13

17.0 APPROVAL

Virgil W Jansen — 10/10/01
(Signature) (Date)

Jacobs Program Manager
Virgil Jansen PE

Leo M Mann — 10-03-01
(Signature) (Date)

Jacobs Project Manager
Leo Mann

Brian Knaus — 10-03-01
(Signature) (Date)

Jacobs Certified Industrial Hygienist
Brian Knaus CIH, CSP

Steven Green, CHP — 10-5-2001
(Signature) (Date)

Jacobs Certified Health Physicist
Steve Green CHP

David Fleming — 10-10-01
(Signature) (Date)

Jacobs Site Safety and Health Officer
David Fleming

APPENDICES

APPENDIX I
VICINITY MAP, LOCALITY MAP, AND SITE PLAN

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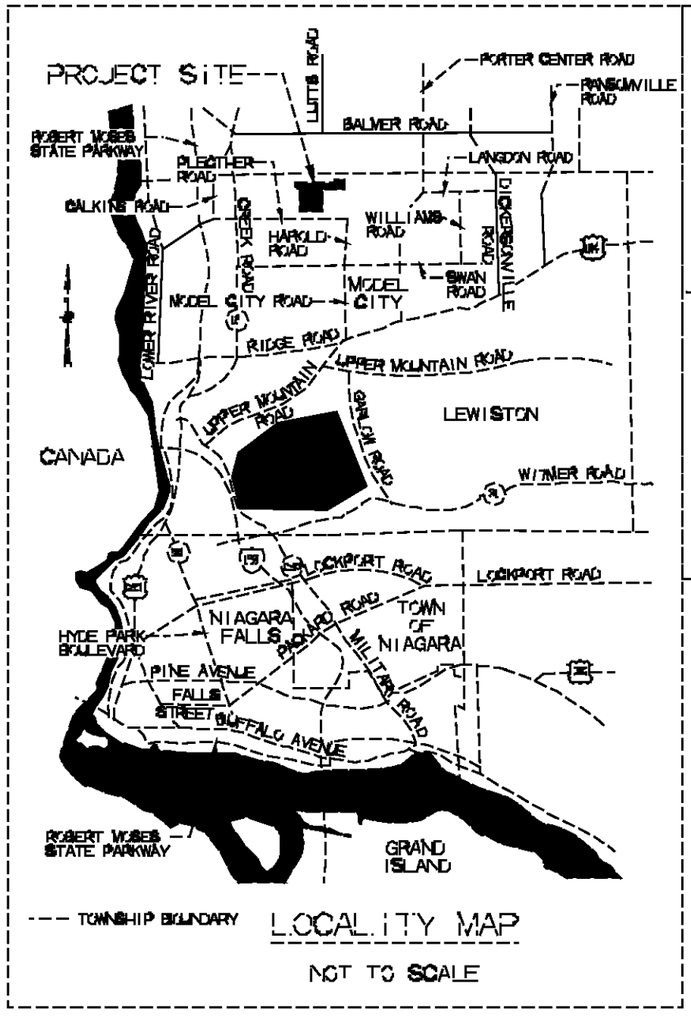

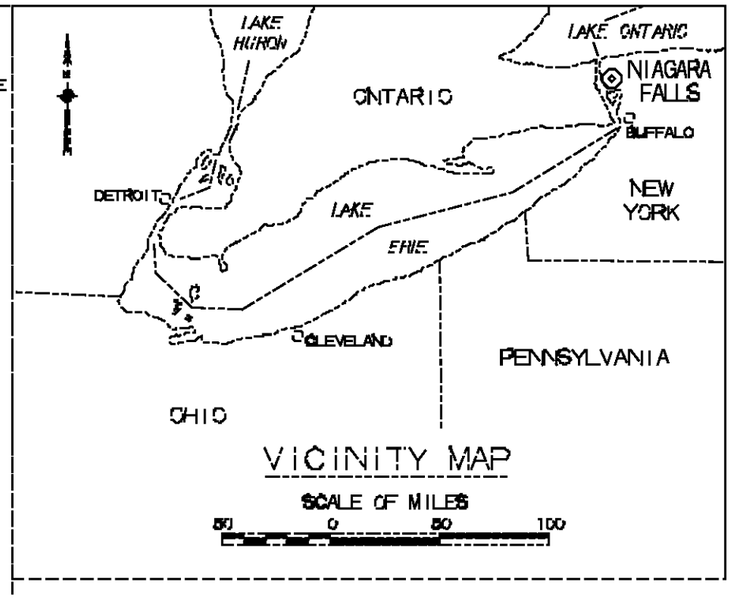

NIAGARA FALLS STORAGE SITE
NIAGARA FALLS, NEW YORK

LOCALITY AND VICINITY MAPS

U.S. ARMY ENGINEER DISTRICT BUFFALO
MAY 2000

PLATE 2

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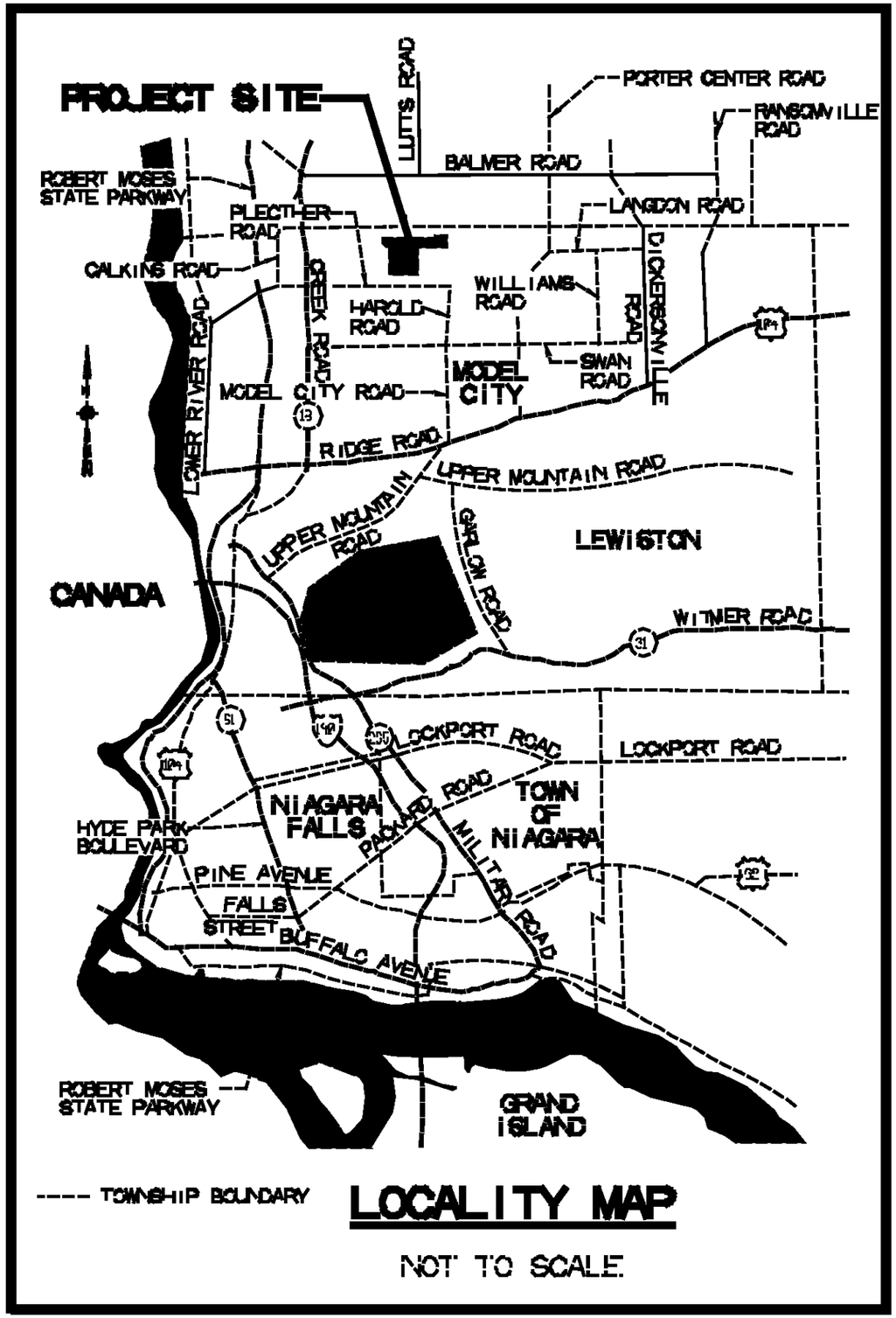

LOCALITY MAP

NOT TO SCALE

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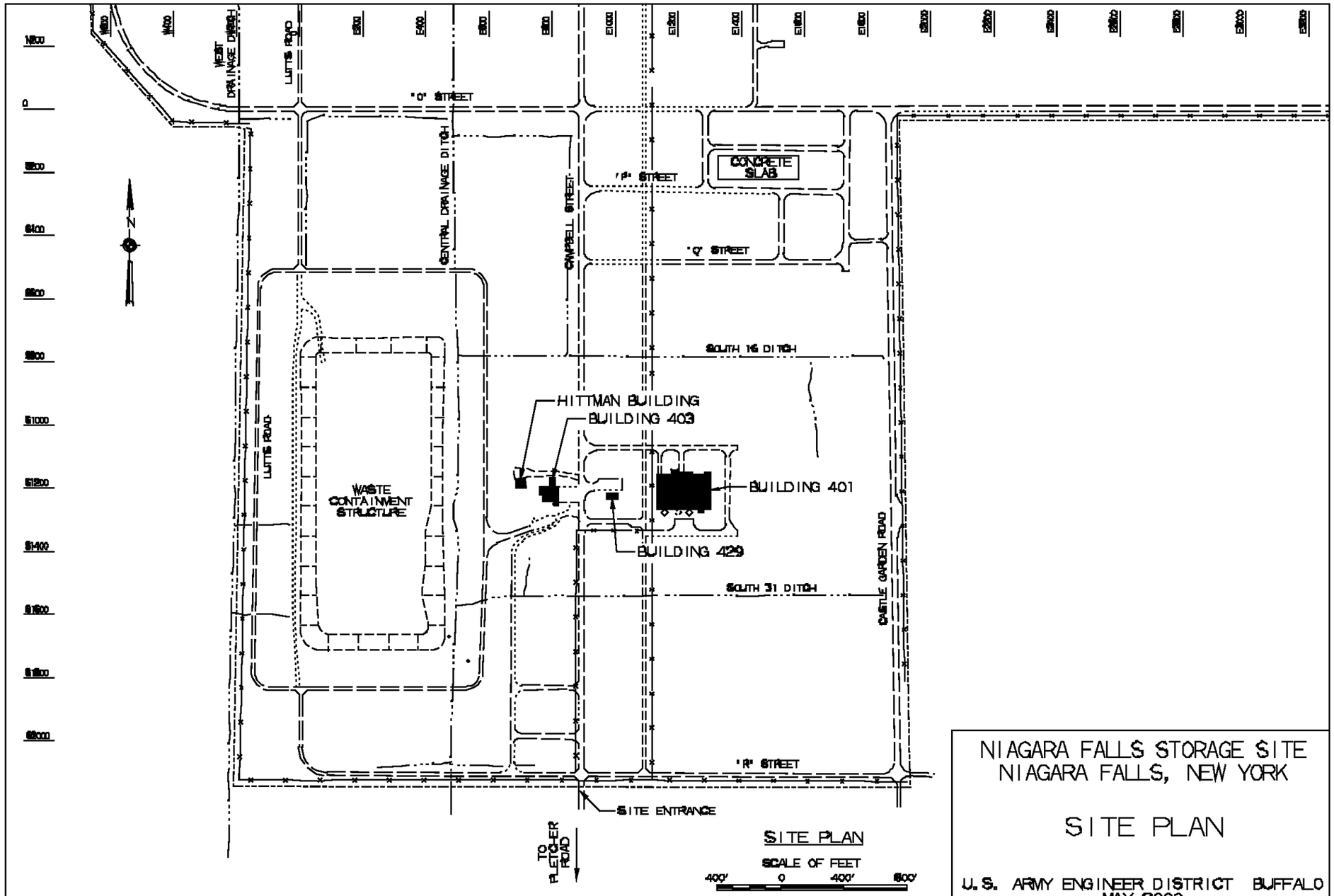

NIAGARA FALLS STORAGE SITE
NIAGARA FALLS, NEW YORK

SITE PLAN

U.S. ARMY ENGINEER DISTRICT BUFFALO
MAY 2000

PLATE 1

APPENDIX II
PERSONAL PROTECTIVE EQUIPMENT PROGRAM

This plan applies to personal protective equipment (PPE) for eyes, face, head, and extremities, protective clothing, respiratory devices, and protective shields and barriers. The objectives of the PPE program is to protect the wearer from safety and health hazards, and to prevent injury to the wearer from incorrect use and/or malfunction of the PPE. Chemical exposures during field activities are site specific, therefore chemical hazards are not discussed here. Chemical hazards are addressed in the project specific Safety and Health Plan.

This plan is intended to provide guidance for PPE selection. The requirements of this program are based upon, Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities, prepared by NIOSH, OSHA, USCG and EPA, DHHS (NIOSH) Publication No. 85-115, October 1985; OSHA regulations 29 CFR parts 1910 and 1926. USACE projects will also meet the requirements of USACE Safety and Health Requirements Manual, EM 385-1-1, September 1996.

Hazard Assessment and Equipment Selection

Prior to the start-up of field operations, a site walk-through will be conducted and historical records will be reviewed to identify the hazards. Physical and chemical hazards can include:

- Impact - motion such as machinery or processes with moving tools
- Penetration
- Compression (roll-over)
- Chemical exposure
- Heat - high temperatures resulting in burns, eye injury or ignition of protective equipment.
- Dust, mists, fume, vapor, gases and particulate.
- Nonionizating radiation - such as welding, brazing, cutting and high intensity lights
- Ionizing radiation
- Sources of falling objects or potential for dropping objects.
- Sources of sharp objects which might pierce the feet or cut the hands.

Organize the data and information for use in the hazards assessment. The objective is to prepare a hazard analysis to verify proper selection of protective equipment. Typical hazard analysis activity are presented in the following Table. Selection of protective equipment will be determined by the Health and Safety Manager.

TABLE ACTIVITY HAZARD ANALYSIS		
WORK ACTIVITY	**SAFETY HAZARD**	**PRECAUTIONARY ACTION**
Drum Staging	Back strain from manual lifting	1. When practical, mechanical devices shall be used to lift drums. 2. Instruct personnel to use lifting equipment or get assistance for heavy loads.
	Lifting	1. Exercise proper lifting techniques. 2. Do not lift in excess of 35 lbs. without assistance. 3. Utilize mechanical device to assist in moving heavy objects.
	Back strain from moving drums	1. Hand operated drum carts shall be used to move drums. 2. Drums will remain at the sampling locations, and thus will not need to be lifted.
	Contamination may accumulate on the drum exteriors	1. Care shall be taken when filling drums to avoid contaminating the outside surface. 2. PPE shall be worn to eliminate the exposure.
	Physical hazard from the moving parts of the machinery	1. Inspect equipment for machine guards required by manufacturer's specifications. 2. Inspect trenching equipment for malfunctioning and mechanical problems. 3. Personnel not involved in actual boring stay clear of equipment whenever possible.

After hazards are evaluated, engineering controls are implemented to eliminate exposure, when engineering controls are not effective, PPE is selected. Table 24-2 is a listing of OSHA standards for PPE use. The following sections will discuss respiratory, protective clothing and accessories PPE .

TABLE OSHA STANDARDS FOR USE OF PPE		
Type of Protection	**Regulation**	**Source**
General	29 CFR Part 1910.132	41 CFR Part 50-204.7 General Requirements for PPE
	29 CFR Part 1910.1000	41 CFR Part 50-204.50, except for Table Z-2, the source of which is American National Standards Institute, Z37 series
	29 CFR Part 1910.1001-1045	OSHA Rule making
Eye and Face	29 CFR Part 1910.133(a)	ANZI Z87.1-1968 Eye and Face Protection
Noise Exposure	29 CFR Part 1910.95	41 CFR Part 50-204.10 and OSHA Rule making
Respiratory	29 CFR Part 1910.134	ANSI Z88.2-1969 Standard Practice for Respiratory Protection
Head	29 CFR Part 1910.135	ANSI Z89.1-1069 Safety Requirements for Industrial Head Protection
Foot	29 CFR Part 1910.136	ANSI Z41.1-1967 Men=s Safety Toe Footwear
Electrical Protective Devices	29 CFR Part 1910.137	ANSI Z9.4-1968 Ventilation and Safe Practices of Abrasive Blasting Operations

Selection of Respiratory Equipment

Because inhalation is a major route of exposure for chemical toxicants, respiratory protection is of primary importance. Respirators consist of a facepiece connected to either an air source or an air-purifying device. Air source respirators are either self-contained breathing apparatuses (SCBAs) or supplied-air respirators (SARs). Air purifying respirators are negative pressure respirators which utilize ambient air which is pulled through a filtering element prior to inhalation.

Supplied air respirators are also differentiated by the type of air flow supplied to the facepiece. Positive-pressure respirators are a positive pressure air flow during inhalation and exhalation. Positive-pressure respirators are either demand, pressure-demand or continuous flow.

Respirators facepieces can be a full, half and one quarter facepiece.

Respirator type is selected based upon the contaminants and contaminant concentration. The respirator=s protection factor is determined by measuring the ratio of the challenge concentration

outside the facepiece to inside the facepiece. For example, a full-face air-purifying respirator protection factor is 50. Therefore, workers in a full-face air-purifying respirator would be protected in atmospheres containing chemicals at concentrations that are up to 50 times higher than the appropriate limits.

Selection of the correct respirator filtration is also important. The Table lists OSHA approved canister color assignments.

TABLE
RESPIRATORY CANISTER COLOR CODES

Atmosphere Contaminants to Be Protected Against	Colors Assigned
Acid gas	White
Hydrocyanic acid gas	White with 2 inch green stripe completely around the canister near the bottom.
Chlorine gas	White with 2 inch yellow stripe completely around the canister near the bottom.
Organic vapors	Black
Ammonia Gas	Green
Acid gases and ammonia gas	Green with 2 inch white stripe completely around the canister near the bottom.
Carbon monoxide	Blue
Acid gases and organic vapors	Yellow
Hydrocyanic acid gas and chloropicrin vapor	Yellow with 2 inch blue stripe completely around the canister near the bottom.
Acid gases, organic vapors, and ammonia gases	Brown
Radioactive materials, excepting tritium and noble gases	Purple (magenta)
Particulates (dusts, fumes, mists, fogs, or smokes) in combination with any of the above gases or vapors	Canister color for contaminant, as designated above, with 2 inch gray stripe completely around the canister near the top.
All of the above atmospheric contaminants	Red with 2 inch gray stripe completely around the canister near the top.

Selection of Protective Clothing and Accessories

Protective clothing offers skin and/or body protection. The clothing includes:

- Disposable coveralls
- Fully encapsulating suits
- Non encapsulating suits
- Aprons, leggings, and sleeve protections
- Gloves
- Firefighters protective clothing
- Proximity or approach garments
- Blast and fragmentation suits
- Cooling garments
- Radiation protective suits

Each piece of clothing has a purpose and affords a level of protection dependent on the fabric of construction. Selection of the appropriate protection starts with the hazards identified at the site. For example, protection from fire or heat hazards would require the selection of fire proof and/or insulated protection. Protection from chemical hazards depends on the chemicals and chemicals concentration present and the task to be accomplished. The appropriate protection will resist permeation, degradation, and penetration by the site chemicals. Permeation is the mechanism by which a chemical dissolves in and/or moves through a protective clothing material on a molecular level. Degradation is the change or loss of a fabric=s chemical resistance or physical properties due to exposure of chemicals, use, or ambient conditions. Penetration is the movement of chemicals through seams, zippers or imperfections of protective clothing. Permeation, degradation and penetration of chemicals through protective clothing has been researched extensively and reported in ASTM=s F739-91, Test Method for Resistance of Protective Clothing Material to Permeation by Liquids or Gases Under Conditions of Continuous Contact standard.

The following steps should be taken when selecting the appropriate protective clothing:

- Type and measured concentration of the chemical substance in the ambient atmosphere and its toxicity.
- Potential for exposure to substances in air, liquid splashes, or other direct contact with material due to work being done.
- Knowledge of chemicals on-site along with properties such as toxicity, route of exposure, and contaminant concentration.
- Identify site chemicals and CAS number.
- Look up chemical(s) in Chemical Protective Clothing, Vols. I and II, by J.S. Johnson and K,J, Anderson, 1990, American Industrial Hygiene Association, Fairfax, VA or Guidelines for the Selection of Chemical Protective Clothing, A. Schwope, et at. American Conference of Governmental Industrial Hygienists, Cincinnati, OH.
- Select appropriate materials based on chemical concentration and task requirements.
- Review selection with Director of Safety and Health.

After selection of PPE based on hazard requirement, other considerations should be taken into account for PPE selection. Other considerations include:

- Durability of PPE
- Flexibility - Will the PPE inhibit workers?
- Temperature effects - Will the material stand up to heat or cold extremes?
- Ease of decontamination - Should disposable clothing be used?
- Compatibility with other equipment - Can head protection be worn with the PPE?
- Duration of use - Can the task be accomplished before breakthrough occurs or material degrades?

Selection of Ensembles

Individual components of clothing and equipment will be assembled into a full protective ensemble that protects and minimizes exposure. The EPA Levels of Protection: Level A,B, C, and D will be used as a starting point for assembling PPE. Each ensemble will be tailored to the site specific hazards. The specific levels of protection and necessary components for each have been divided into four categories according to the degrees of protection afforded:

Level A: Worn when the highest level of respiratory, skin, and eye protection is needed. Equipment includes:

Self contained breathing apparatus
Fully encapsulating chemical resistant suit
Inner chemical resistant gloves
Chemically-resistant steel toe and shank boots
Head protection

Level B: Worn when the highest level of respiratory protection is needed, but a lesser level of skin protection. Equipment includes:

Self contained breathing apparatus or air supplied respirator
Fully encapsulating chemical resistant suit or lesser skin protection
Inner chemical resistant gloves
Chemically-resistant steel toe and shank boots
Head protection

Level C: Worn when the criteria for using air-purifying respirators are met, and a lesser level of skin protection is needed. Equipment includes:

Air purifying respirator
Disposable coverall
Disposable inner and outer gloves
Chemically-resistant steel toe and shank boots
Disposable or reusable boot covers
Eye protection
Head protection

Level D: Worn only as a work uniform and not in any area with respiratory or skin hazards. It provides minimal protection against chemical hazards. Equipment includes:

Disposable gloves
Chemically-resistant steel toe and shank boots
Eye protection
Head protection

Level D (Modified): As above, but with the addition of a disposable coverall.

Modifications of these levels are permitted, and routinely employed during site work activities to maximize efficiency. For example, Level C respiratory protection and Level D skin protection may be required for a given task. Likewise the type of chemical protective clothing will depend upon contaminants, contaminant concentration and degrees of contact.

Donning and Doffing an Ensemble

An established routine will be practiced for donning PPE. The following section will list sample procedures for donning and doffing PPE in Levels A, B, C, and D. Procedures may be modified to meet the needs and special requirements of a job with the approval of the Director of Safety and Health. These procedures assume the wearer has previous training with the use and decontamination/disposal of PPE.

Level A and B

Donning Procedures:

1. Inspect clothing and respiratory equipment prior to donning.
2. Check and adjust head protection to fit user's head.
3. Open back closure.
4. Step into the legs of the suit; check foot placement in suit; gather the suit around the waist. This can be accomplished safely by standing or sitting.
5. Don chemical-resistant safety boots over the feet of the suit. Tape leg cuff over the tops of the boots. If the one piece suit has heavy-soled protective feet, wear short, chemical-resistant safety boots inside the suit.
6. Don SCBA. Don the facepiece and adjust it to be secure and comfortable. Open valve on air tank, but do not connect the breathing hose at this time.
7. Perform negative and positive respirator facepiece seal test.

   Negative-pressure test procedure includes closing the inlet part with the palm of the hand or squeeze the breathing tube so it does not pass air, gently inhale for about 10 seconds. Inward rushing air indicates an improper fit. Leaking facepiece may be drawn securely to the face to form a better seal.

   Positive-pressure test procedure includes gently exhaling while covering the exhalation valve to build pressure in the facepiece. Failure of the positive-pressure test indicates leakage. Refit the face piece and perform test again.
8. Depending on suit type, don long sleeved inner gloves. Secure gloves to sleeves, for suits with detachable gloves. Additional over gloves may be worn.

9. Put sleeves of suit over arms as assistant pulls suit up and over the SCBA. Have assistant adjust suite around SCBA and shoulders to verify unrestricted motion.
10. Don head protection.
11. Raise hood over head carefully so as not to disrupt face seal of SCBA facepiece. Adjust hood for comfort.
12. Secure suit by closing all fasteners on openings until there is only adequate room to connect the breathing hose. Secure all belts, adjustable leg, head and waistbands.
13. Connect the breathing hose while opening the valve.
14. Have assistant verify the wearer is breathing properly and then close suit.
15. Have assistant check ALL closures.
16. Assistant will observe worker to verify wearer comfort, psychologically stable, and the equipment is functioning properly.

Standard Doffing Procedures:

1. Leave the work area with enough air to complete a through decontamination.
2. Remove disposable clothing, boot covers, outer gloves, and tape.
3. Have assistant loosen and remove worker=s safety shoes or boots.
4. Open the suit. Lift the hood over the head of the worker and rest on top of the SCBA tank.
5. Remove arms, one at a time, from the suit. Assistant will lift the suit up and away from the SCBA when the arms are free. Avoid contact between the outside surface of the suit and the worker. Lay suit flat behind the worker. Leave internal gloves in place. While sitting, remove legs from suit.
6. Loosen facepiece straps. Remove facepiece. Close valve on air tank and disconnect breathing hose.
7. Internal gloves may be removed after suit has been removed.
8. Shower thoroughly.

Should the low-pressure warning alarm sound, the following procedure will be followed.

1. Remove disposable clothing.
2. Quickly scrub and hose off. Special attention should be paid to the entrance/exit zipper.
3. Open zipper to allow access to regulator and breathing hose.
4. Attach an appropriate air tank to the breathing hose or attach an air line.
5. Follow the standard doffing procedures.
7. Shower thoroughly.

Level C

Donning Procedures:

1. Inspect clothing and respiratory equipment prior to donning.
2. Check and adjust head protection.

3. Step into the legs of the suit; check foot placement in suit; gather the suit around the waist. This can be accomplished safely by standing or sitting.
4. Don boots over the feet of the suit. Tape leg cuff over the tops of the boots.
5. Don respirator. Don the facepiece and adjust it to be secure and comfortable.
6. Perform negative and positive respirator facepiece fit check.

   Negative-pressure test procedure includes closing the inlet part with the palm of the hand or squeeze the breathing tube so it does not pass air, gently inhale for about 10 seconds. Inward rushing air indicates an improper fit. Leaking facepiece may be drawn securely to the face to form a better seal.

   Positive-pressure test procedure includes gently exhaling while covering the exhalation valve to build pressure in the facepiece. Failure of the positive-pressure test indicates leakage. Refit the face piece and perform test again.
7. Put sleeves of suit over arms and verify unrestricted motion.
8. Don head protection.
9. If the suit is equipped with a hood, raise hood over head carefully so as not to disrupt face seal of respirator. Adjust hood for comfort.

Standard Doffing Procedures:

1. Wash work gloves (outer), boots, and outer protective coverall (if reusable);
2. Rinse work gloves (outer), boots, and coveralls;
3. Remove boots;
4. Remove tape at wrists, ankles;
5. Remove outer suit from the inside out (also outer gloves, head protection, boot covers);
6. Remove respirator;
7. Wash and rinse respirator;
8. Remove inner gloves.

Non-reusable equipment will be collected in plastic trash bags. Personal and equipment decontamination is necessary when personnel or equipment exit the work area.

Level D and Modified Level D

Donning Procedures:

1. Inspect clothing prior to donning.
2. Check and adjust head protection.
3. For Modified Level D, step into the legs of the suit; check foot placement in suit; gather the suit around the waist. This can be accomplished safely by standing or sitting.
4. Don boots over the feet of the suit. Tape leg. cuff over the tops of the boots.
5. Don head protection.

Standard Doffing Procedures:

1. Wash work gloves (outer), boots, and outer protective coverall (if reusable);
2. Rinse work gloves (outer), boots, and coveralls;
3. Remove PVC or rubber boots;
4. Remove tape at wrists, ankles;
5. Remove outer suit from the inside out (also outer gloves, hard hat, boot covers);
6. Remove respirator (if required);
7. Wash and rinse respirator(if required);
8. Remove inner gloves.

Personnel decontamination will be performed to minimize removing contamination from the site, and will consist primarily of soap and water washings and water rinsing of reusable exterior protective equipment, followed by removal of the Sverdrup equipment. The extent of washing required and modifications to the sequence, may be specified by the SSHO.

The following general practices will be observed while in contaminated areas:

- Do not handle or touch contaminated sample materials directly without personal protective equipment.
- Limit the amount of contamination that contacts sampling equipment.
- Keep excavated soils and samples contained.

Respirators shall be rinsed with potable water in the field after each use and shall be cleaned at the end of each day using a soap and water wash followed by a potable water rinse. Respirators shall be inspected daily for damage, missing parts, and proper function. A personnel decontamination station shall be established at the main decontamination area. At a minimum, all employees who handle contaminated or potentially contaminated sample material must thoroughly wash their arms, hands, and face prior to leaving the site at the end of the day or prior to eating. A hand and face wash station shall be used for personal decontamination.

Sample PPE Inspection Checklist

Clothing

Before use:

- Determine that clothing material is correct for the specified task at hand
- Visually inspect for imperfect seams, non-uniform coatings, tears, malfunctioning closures
- Hold up to light and check for pinholes
- Flex the product and observe for cracks, observe for other signs of deterioration
- If the product has been used previously, inspect inside and out for the following signs of chemical attack, discoloration, swelling, stiffness

During the work task, periodically inspect for:

- Evidence of chemical attack such as discoloration, swelling, stiffening, and softening

Keep in mind, however, that chemical permeation can occur without any visible effects
- Closure failure
- Tears
- Punctures
- Seam Discontinuities

Gloves

Before use visually inspect for imperfect seams, tears, abrasions, non-uniform coating. Pressurize glove with air and listen for pin-hole leaks.

Respirators

A respiratory protection program has been established to comply with 29 CFR 1910.134.

Air Purifying Respirators

- Inspect daily, when in use, at least monthly when in storage, every time they are cleaned
- Inspect prior to each use for cracks, kinks, cuts, frays, and weak areas
- Check for proper operation, according to manufacturer's recommendations
- Check all connections for tightness
- Check material conditions for signs of pliability, signs of deterioration, signs of distortion
- Check faceshields and lenses for cracks, crazing, fogginess

Storage

- Clothing and respirators must be stored properly to prevent damage or malfunction due to exposure to dust, moisture, sunlight, damaging chemicals, extreme temperatures, and impact.
- Potentially contaminated clothing must be stored in an area separate from personal clothing.
- Potentially contaminated clothing should be stored in a well-ventilated area with good air flow around each item.
- Different materials and types of clothing and gloves should be stored separately to prevent issuing the wrong material by mistake.
- Protective clothing should be folded or hung to comply with manufacturer's recommendations.

APPENDIX III
RESPIRATORY PROTECTION PROGRAM

SITE-SPECIFIC RESPIRATORY PROTECTION PROGRAM

This site-specific Respiratory Protection Program has been developed to define work site-specific procedures and elements for required respirator use at this site. This Program establishes acceptable safety standards and procedures to be used when respiratory protection is required. This plan has been developed in accordance with the provisions of OSHA 29 CFR 1910.134 and 29 CFR 1926.103. Applicable sections of the Company's Corporate Health and Safety Procedure (CHSP) No. 13.9, "Respiratory Protection", shall also be followed at this project.

1.0 Program Administration

The Program Administrator for the Company is Terry Briggs, Ph.D. and CIH, who is located in the Denver, CO office. He is responsible for the overall administration of this Program and to conduct required evaluations of the Program's effectiveness. Because the Company operates multiple project locations in various states, the Program Administrator has selected the Corporate Safety Managers as "Program Coordinators" to assist him in the execution of these responsibilities.

The Program Coordinator shall be responsible for Program implementation, and conducting routine observations related to:

- Procedures for selecting respirators for use in the workplace,
- Medical evaluations of employees required to use respirators,
- Fit testing procedures for tight fitting respirators,
- Procedures for proper use of respirators in routine and reasonable foreseeable emergency situations,
- Procedures and schedules for cleaning, disinfecting, storing, inspecting, repairing, discarding and maintaining respirators,
- Procedures to verify adequate air quality, quantity, and flow of breathing air for atmosphere supplying respirators,
- Training of employees in the respiratory hazards to which they are potentially exposed during routine and emergency situations.

Observations shall be documented through the use of Safety Observation Reports, (SORs) and other similar documents. The Program Coordinator shall ensure that noted deficiencies are corrected as soon as possible.

FORM 1-1 SITE PROGRAM OVERVIEW

Medical Evaluations	Medical evaluations will be performed by: _____ Medical evaluations will be scheduled by the following person: _____ Phone: _____
Respirator Selection	List specific types of respiratory equipment available on this project: Type Model Size _____ _____ _____ _____ _____ _____ _____ Respirators will be selected using Form 3-1, by the following person: _____ Respirators will be issued by the following person or organization: _____ Phone: _____
Fit Testing	The following person/organization will perform fit testing: Name: _____ Phone: _____ ❑ Qualitative fit testing: ❍ Bitrex™ ❍ Saccharin solution ❍ Isoamyl acetate (Banana Oil) ❍ Irritant smoke ❑ Quantitative fit testing: Protocol: _____
Training	The following person/organization will perform respirator training: Name:_____ Phone: _____
Respirator Use	Entry into the following areas routinely require respirator use: Area Respirator _____ _____ _____ _____ _____ _____ _____ _____

FORM 1-1 (con't)

Respirator Use (con't)	Store respirators in the following location(s): _____ _____ _____ _____
	Dispose of used respirator cartridges and canisters at the following location(s): _____ _____ _____ _____ The following person/organization is authorized to perform respirator maintenance and repair: Name: _____ Phone: _____ Equipment: _____ Name: _____ Phone: _____ Equipment: _____ Manufacturer specific instructions for respirators used at this site are included in Section 7.
Record Keeping	The following person/organization will maintain specified records as required:

	Name	Location
Medical Questionnaires	_____	_____
Medical Ability to Wear a Respirator	_____	_____
Respirator Selection	_____	_____
Fit Test Records	_____	_____
Training Records	_____	_____
Program Evaluation, and		
Contact Person	_____	_____

2.0 Medical Evaluation

A medical evaluation and/or a medical examination will be completed 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. A medical examination shall include any medical tests, consultations, or diagnostic procedures that the PLHCP deems necessary to make final determination on the employee's ability to use a respirator.

2.1 Medical Evaluation Procedures

2.1.1 A physician or other licensed health care professional (PLHCP) performs all respirator user medical evaluations. Each employee shall complete the Medical Questionnaire for Respirator Users (Appendix A), which is forwarded to the Jacobs doctor for a written determination of the employee's ability to use the selected respirator, under the defined working conditions.

2.1.2 All respirator users will answer questions 1 through 15 on the questionnaire.

2.1.3 Every employee who will be using an SCBA and has a positive response to any item in questions 10 through 15 of Part A, section 2 will be provided a medical examination.

2.1.4 If a pre-employment or annual physical is required and conducted, it may be used to meet the requirements of this section if it includes the same information as the OSHA Respirator Medical Evaluation Questionnaire.

2.1.5 The medical questionnaire and examinations are administered confidentially during the employee's normal working hours or at a time and place convenient to the employee. The medical questionnaire is also administered in a manner that ensures that the employee understands its content.

2.1.6 The employee is also provided an opportunity to discuss the questionnaire and examination results with the PLHCP.

2.1.7 Any employee who refuses to be medically evaluated for respirator use will not be allowed to use a respirator.

2.2 Follow-up Medical Examination

2.2.1 A follow-up medical examination is provided for any employee who gives a positive response to any of Questions 1 through 8 in Section 2 Part A of the Questionnaire, or whose initial medical examination demonstrates the need for a follow-up medical examination.

2.3 Supplemental Information for the PLHCP

2.3.1 Supplemental information concerning the specific type(s) of respirator to be used and the anticipated working conditions is provided to the PLHCP, with each Respirator Medical Evaluation Questionnaire, before the PLHCP makes a recommendation concerning an employee's ability to use a respirator. (See Form 2-1)

2.3.2 A copy of the OSHA Respiratory Protection standard and a copy of this site-specific written program have also been provided to the PLHCP.

2.4 Medical Determination

2.4.1 Following the evaluation and/or examination a written recommendation regarding the employee's ability to use the respirator must be provided by the PLHCP. The recommendation shall provide 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.

2.4.2 For negative pressure respirator work, if the PLHCP finds a medical condition that may place the employee's health at increased risk, a powered air-purifying respirator (PAPR), or equivalent, can be provided with restrictions.

2.4.3 If an employee is wearing a PAPR because of medical restrictions and if a subsequent medical evaluation finds that the employee is medically able to use a negative pressure respirator, then there is no longer a requirement to provide a PAPR.

2.5 Additional Medical Evaluations / Examinations

2.5.1 An additional medical evaluation and/or examination shall be made if:

- An employee reports medical signs or symptoms that are related to ability to use a respirator;
- A PLHCP, supervisor, Program Coordinator, or the respirator Program Administrator determines that an employee needs to be reevaluated;
- Information from the respiratory protection program, including observations made during fit testing and program evaluation, indicates a need for employee reevaluation; or

- A change occurs in workplace conditions (e.g., physical work effort, protective clothing, temperature) that may result in a substantial increase in the physiological burden placed on an employee.

FORM 2-1 SUPPLEMENTAL RESPIRATORY INFORMATION

Dr. _____, please provide a written recommendation regarding this employee's ability to use a respirator, as defined below.

Employee Name:_____ SSN_____
Company: _____ Project Name: _____ Job No. _____

1) **Type respirator:** _____ (Circle one) Half Facepiece, Full Facepiece, Helmet, Hood (Circle all that apply) Particulate Filter, Gas/Vapor Cartridge, Air Supplied

2) **Weight of respirator:** _____

3) **Duration and Frequency of Use:** (Circle "Yes" for best definition of employee's use)

1) Emergency rescue only	Yes
2) Less than 5 hours per week	Yes
3) Less than 2 hours per day	Yes
4) 2 to 4 hours per day	Yes
5) Over 4 hours per day	Yes

4) **Expected physical work effort:**

Light (less than 200 kcal/hour)

*Examples of **Light** work include: sitting while typing, writing, drafting, or performing light assembly work, or standing while operating a drill press or controlling machines.

Moderate (200 to 350 kcal/hour)

*Examples of **Moderate** work include: Sitting while nailing or filing, driving a truck or bus, standing while drilling, nailing, assembly work, manual lifting (about 35 lbs.) at waist level, pushing a wheelbarrow with a heavy load (about 100 lbs.) on a level surface.

Heavy (above 350 kcal/hour)

*Examples of **Heavy** work include: lifting a heavy load (about 50 lbs.) from floor to waist or shoulder, shoveling, standing while bricklaying or chipping, walking up an 8 degree grade, climbing stairs carrying a heavy load (about 50 lbs.)

5) **Additional PPE to be worn :** _____

6) **Will you be working under hot conditions (above 77 F)? Yes / No**

7) **Will you be working under humid conditions? Yes / No**

- A copy of the site-specific Respirator Program and OSHA standard 1910.134 have also been provided to the physician, along with the information contained on this document.

Reply to _____, Fax (___) _____, Phone (___) _____

3.0 Respirator Selection

This section presents the types of respirators available on-site, and the criteria and procedure to be used to determine respiratory protection needed for specific tasks.

3.1 Respirators Available

Respirator selection documentation (Form 3-1 or equivalent) will be completed by the Respiratory Protection Program Coordinator and include information relative to respirator selection. Completed Respirator Selection forms are maintained as part of this Program and are updated as necessary. Available respirator types, models and sizes are presented in Form 1-1.

3.2 Criteria for respirator selection

Respirator selection for routine tasks have been determined through application of existing (i.e., our Safety Dept. or Engineering Dept., Client, Manufacturer) data.

Form 3-1 (or equivalent) must be completed by the Respiratory Protection Program Coordinator for all work tasks requiring the use of a respirator. For job sites with few tasks requiring the use of a respirator, all respiratory protection tasks can be shown on one page. For more complex sites, individual pages should be used for each plant area or process unit.

Information required for each respiratory protection task includes:

- A definition of task hazard exposure potential. This includes: (1) an evaluation of whether the exposure is routine or only incident related. This means, are releases of the hazardous material anticipated throughout the duration of the work task or only due to upset conditions, i.e., failure of a control system such as a block valve or due to incomplete process system cleanout in preparation for maintenance work and (2) is there potential for exceeding the IDLH (immediately dangerous to life and health) concentration of the hazardous materials.

- Identification of the main airborne hazardous constituents associated with the work task.

- List of the occupational exposure limit for each listed hazardous material. Normally this is the OSHA PEL, ACGIH TLV, NIOSH REL or when these are not available, the client or trade association exposure limit. Their limits are based on full 8-hour shift or short-term (normally 15 min. – STEL). If the task is short time duration, the STEL, if it exists, is normally preferred.

- Estimated exposure concentration is required for those tasks listed as Routine under Exposure Potential but no for IDLH potential. The estimated concentration should be based on actual personal or area exposure monitoring data, exposure data from a

similar operation or an engineering estimate from our staff or our client's staff. Also for those high hazard tasks with routine exposure and greater than IDLH exposure potential, a similar exposure estimate should be made.

- For each listed respiratory protection task, the respirator manufacturer and model must be listed. For tasks with IDLH exposure potential, the respirator must be a full facepiece supplied air respirator in positive pressure mode, manifold to an egress bottle.

- Also, note that for particulate exposures, the particulate cartridge Types N, R, and P refer to standard performance designations established by NIOSH. N refers to no oil exposure and 95%, 99% or 100% (99.97%) filter efficiency. R refers to some oil up to eight hours and 95%, 99%, or 100% (99.97%) filter efficiency. P refers to can be used with oil exposure with no time restriction and 95%, 99% or 100% (99.97%) filter efficiency. Individual manufactures may have different designations. To aid in decision-making on the appropriate type of respirator, individual manufacturer literature will also be used.

- For each task involving the use of a cartridge respirator, a respirator cartridge change schedule must be shown. For those respirator cartridge jobs involving vapor or gas exposures, the change out schedule must be based on cartridge ESLI (end of service life indicator on the cartridge) or the manufacturers software program calculation for the task operating conditions. When the software calculations are used, a copy of the calculation printout must be attached as an Appendix to the Respiratory Protection Procedure. The 3M cartridge change schedule is located http://csrv.3m.com/CSRV/SilverStream/Pages/pgHome.html. The MSA cartridge life expectancy calculator is www.msanet.com/safetyproducts/cartlife/msa.html. There are ESLIs for mercury vapor cartridges, and carbon monoxide, chlorine, ethylene oxide, and hydrogen sulfide canisters. There are also OSHA contaminant specific cartridge and canister change schedules for benzene, acrylonitrile, formaldehyde, methylenedianiline and 1,3 butadine. Refer to the contaminant specific regulation.

3.3 Immediately dangerous to life or health atmospheres (IDLH)

3.3.1 Employees are not permitted to work in oxygen deficient (<19.5%) atmospheres or in areas with chemical concentrations potentially above IDLH levels unless prior approval is obtained from the Program Coordinator and the Project Manager. Examples of jobs that are or could become IDLH:

- Breaking into flare lines
- Initial opening of all H_2S or CO equipment vessels, lines
- Working near reactors/vessels having used catalyst
- Confined space entry work where inert gas may be present

- Working in certain process or sanitary sewers

3.3.2 When work tasks are to be performed in IDLH atmospheres a full facepiece pressure demand SCBA, rated for a minimum service life of 30 minutes or a supplied air-line respirator with egress bottle is required.

3.3.3 Trained rescue standby person(s) located outside the IDLH area, are posted and equipped with an SCBA or air-line on separate supply. This includes work in confined spaces that require air-line respiratory protection (for other than nuisance odor or nuisance dust.)

3.3.4 Stand-by persons will be equipped with the following:

- Pressure demand or other positive pressure SCBA or a pressure demand or other positive pressure supplied-air respirator with an auxiliary egress bottle and

- Appropriate retrieval equipment (harnesses, wristlets, anklets) for removing an employee who enters the hazardous atmosphere.

3.3.5 Retrieval equipment must be used unless it would increase the overall risk of rescue. Situations may exist in which retrieval line would pose an entanglement problem, especially if air lines and electrical cords are present. Verify visual or signal line communication is maintained between the employee(s) in the IDLH atmosphere and the employee(s) located outside the IDLH atmosphere.

3.3.6 The designated Rescue Team is notified before the employee(s) located outside the IDLH atmosphere enter the IDLH atmosphere to provide emergency rescue.

3.3.7 Standby personnel will notify the Project Manager or SSHO in case of emergency and/or rescue is necessary.

FORM 3-1 RESPIRATORY HAZARD / RESPIRATORY SELECTION

	Exposure Potential		Major		Estimated	Respirator		Change
Task	Routine (Yes/No)*	IDLH (Yes/No)	Contaminants	PEL	Concentration*	Mfg.	Model	Schedule**
ACM Assessment	No	No	Asbestos	0.1 f/cc	< o.1 f/cc	3M	7800	P100 weekly
ACM Abatement	No	No	Asbestos	0.1 f/cc	< o.1 f/cc	3M	7800	P100 weekly

Notes:
*If Exposure is shown as Routine, enter estimated concentration and show source of data under *Notes*.
**For tasks with exposures shown as Routine and Non-IDLH potential, change schedule and calculation attached.

4.0 Fit Testing Requirements

Respirator fit testing is performed in accordance with OSHA accepted fit test protocols and procedures.

4.1 Persons performing Qualitative Fit Tests and/or Quantitative Fit Tests must be qualified to perform the tests correctly, to verify accuracy and designated by the Company to do so.

4.2 The following fit testing requirements shall be met:

- Each respirator wearer shall be fit-tested on each specific (model, size) respirator worn prior to initial use, and annually thereafter.
- Spectacles (glasses), goggles, faceshields, or welding helmets shall be worn in a manner that does not interfere with the facepiece seal of the respirator.
- Contact lenses (soft and gas permeable only) may be worn with a full facepiece respirators, according to the OSHA standard. (however, some clients have policies, which prohibit their use on their sites.)
- Employees shall be clean shaven. Facial hair shall not interfere with the sealing surface of the facepiece and the face or interfere with valve function.
- User seal checks are performed each time the respirator is donned.

Program Coordinator's Note: Fit testing shall be conducted utilizing the procedures found in OSHA 29CFR 1910.134 and 1926.103. Documentation of all employee fit tests shall be made and retained until the next fit test is administered. Forms 4-1 and 4-2, for Qualitative and Quantitative fit tests respectively, may be used for this purpose.

4.3 The employee shall be allowed to pick the most acceptable respirator from a sufficient number of respirator models and sizes so that the respirator is acceptable to, and correctly fits, the user.

4.4 Prior to the selection process, the employee 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 employee in evaluating the fit and positioning of the respirator. This instruction may not constitute the employee's formal training on respirator use, because it is only a review.

4.5 The employee 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.

4.6 The employee shall be instructed to hold each chosen facepiece up to the face and eliminate those that obviously do not give an acceptable fit.

4.7 The more acceptable facepieces are noted in case the one selected proves unacceptable; the most comfortable facepiece is donned and worn at least five minutes to assess comfort. If the employee is not familiar with using a particular respirator, then he/she shall be directed to don the facepiece several times and to adjust the straps each time to become adept at setting proper tension on the straps.

4.8 Assessment of comfort shall include a review of the following points with the employee and allowing adequate time to determine the comfort of the respirator:

- Position of the respirator on the nose
- Room for eye protection
- Room to talk
- Position of respirator on face and cheeks

4.9 The following criteria shall be used to help determine 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.

4.10 The employee shall conduct a user seal check, either the negative and positive pressure seal checks described or those recommended by the respirator manufacturer which provide equivalent protection. Before conducting the negative and positive pressure checks, the subject shall be told to seat the respirator on the face by moving the head from side-to-side and up and down slowly while taking in a few slow deep breaths. Another facepiece shall be selected and retested if the test subject fails the user seal check.

4.11 The test shall not be conducted if there is any hair growth between the skin and the facepiece sealing surface, such as stubble beard growth, beard, mustache or sideburns which cross the respirator sealing surface. Any type of apparel, which interferes with a satisfactory fit, shall be altered or removed.

4.12 If the employee exhibits difficulty in breathing during the tests, he or she shall be referred to a physician or other licensed health care professional (PLHCP), as appropriate, for a medical re-evaluation to determine whether they can wear a respirator while performing their duties.

4.13 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.

4.14 A tight fitting PAPR can be fit tested by not turning the fan motor on.

Exercise regimen

Prior to the commencement of the fit test, the employee shall be given a description of the fit test and the employee'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.

Test Exercises.

The following test exercises are performed for all fit testing methods prescribed in this procedure, except for the Control Negative Pressure (CNP) method. A separate fit testing exercise regimen is contained in the CNP protocol. The employee shall perform exercises, in the test environment, in the following manner:

(1) Normal breathing. In a normal standing position, without talking, the employee shall breathe normally.

(2) Deep breathing. In a normal standing position, the employee shall breathe slowly and deeply, taking caution so as not to hyperventilate.

(3) Turning head side to side. Standing in place, employee 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.

(4) Moving head up and down. Standing in place, the employee 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).

(5) Talking. The employee shall talk out loud slowly and loud enough so as to be heard clearly by the test conductor. The subject can read from a prepared text such as the Rainbow Passage, count backward from 100, or recite a memorized poem or song.
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.

(6) Grimace. The employee shall grimace by smiling or frowning. (This applies only to QNFT testing; it is not performed for QLFT)

(7) Bending over. The employee shall bend at the waist as if he/she were to touch his/her toes. Jogging in place shall be substituted for this exercise in those test environments such as shroud type QNFT or QLFT units that do not permit bending over at the waist.

(8) Normal breathing. Same as exercise (1).

Each test exercise shall be performed for one minute except for the grimace exercise, which shall be performed for 15 seconds. The employee 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. The respirator shall not be adjusted once the fit test exercises begin. Any adjustment voids the test, and the fit test must be repeated.

4.2 QUALITATIVE FIT TEST REQUIREMENTS (QLFT)

4.2.1 Negative-pressure air purifying respirators that will be worn in concentrations that are equal to or less than 10 times the PEL may be fit tested using QLFT.

4.2.2 The individual and/or 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.

4.2.3 The QLFT equipment is to be kept clean and well maintained so as to operate within the parameters for which it was designed.

Program Coordinator's Note: See OSHA 1910.134, Appendix A, to select appropriate site specific methods.

4.3 Quantitative fit test requirements (QNFI) (IF APPLICABLE)

The following quantitative fit testing procedures have been demonstrated to be acceptable: Quantitative fit testing using a non- hazardous test aerosol (such as corn oil, polyethylene glycol 400 [PEG 400], di-2-ethyl hexyl sebacate [DEHS], or sodium chloride) generated in a test chamber, and employing instrumentation to quantify the fit of the respirator; Quantitative fit testing using ambient aerosol as the test agent and appropriate instrumentation (condensation nuclei counter) to quantify the respirator fit; Quantitative fit testing using controlled negative pressure and appropriate instrumentation to measure the volumetric leak rate of a facepiece to quantify the respirator fit.

4.3.1 The person and/or persons administering QNFT must be 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.

4.3.2 The QNFT equipment must be 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.

4.3.3 Once a respirator has been modified or altered with a fit test probe, the facepiece will only be used for fit testing. When the facepiece is returned to the original NIOSH tested and certified configuration, the facepiece may be returned to service.

Program Coordinator's Note: See OSHA 1910.134, Appendix A, to select appropriate site specific methods.

FORM 4-1 QUALITATIVE RESPIRATOR FIT-TEST RECORD

Name: _____ Social Security No.: _____

Date: _____ Project Location: _____

Personal Use Conditions/Limitations: The following personal use conditions may affect the prospective respirator wearer's ability to obtain a proper face-seal, properly wear the respirator in the work environment, or may be prohibited by CHSP 13.9: Respiratory Protection.

Check all that apply:

_____ None _____ Beard / Facial Hair _____ Dentures

_____ Prescription Eyeglasses _____ Contact Lenses

Scars/Other: Explain:_____

Fit-Test Record

Respirator (Make, Model and Size): _____

Qualitative Fit-Testing Agent:

_____ Bitrex™

_____ Isoamyl Acetate (Banana Oil)

_____ Irritant Smoke

_____ Saccharin solution

Fit-Test Results

_____ **PASS:** Fit-Test Agent Not Detected Inside the Facepiece by Fit-Test Subject (employee signature required)

I have been fit-tested to assure proper respirator size, as well as facepiece to face seal. I have been instructed in the proper use, care and limitations of the respirator listed above. I have demonstrated the proper donning of this equipment according to training received.

_____ **FAIL:** Fit-Test Agent Detected Inside the Facepiece by Fit-Test Subject.

Subject must not wear the respirator until a successful (passing) fit-test is obtained. This test is ended, **do not** have this form signed.

Competent Person Performing Fit-Test: _____

Employee Signature:_____

FORM 4-2 QUANTITATIVE RESPIRATOR FIT TESTING RECORD

ISSUANCE ❑ RETRAINING ❑ REFITTING ❑

Date: _____

Employee Name: _____

Social Security Number: _____

RESPIRATOR IDENTIFICATION

Make/Model: _____ Size: _____

TESTS PASSED

Portacount: ❑ Yes ❑ No

❑ Spectacles
❑ Contact Lenses
❑ No Corrective Lenses

Irritant Smoke: ❑Yes ❑ No

I certify that I have been instructed in the proper use and limitations of Air Purifying respirators and that I have been successfully fit tested and am authorized to wear the above listed respirator(s).

I understand that I am responsible for maintaining this respirator in proper working condition. I also understand that any problem with respirator fit or with respirator malfunction will be reported immediately to my supervisor. In order to ensure proper fit, I acknowledge that this respirator will be worn in the same manner as it was worn during testing and I will conduct a "user seal check" immediately before each use.

Signature of Employee: _____

Signature of Instructor: _____

5.0 Proper Respirator Use

5.1 General Requirements

5.1.1 All respirators, filters, cartridges, and components used at this site are certified by NIOSH. Respirators shall be worn where work is necessary in hazardous atmospheres and in accordance with all manufacturer's instructions.

5.1.2 Respirators shall be used only for the purpose intended and shall not be modified in any way.

5.1.3 Tight-fitting facepiece respirators are not be permitted to be worn by employees who have any condition that interferes with the face-to-facepiece seal or valve function (such as facial hair).

5.1.4 If an employee wears corrective glasses or goggles or other personal protective equipment, the Program Coordinator shall ensure that such equipment is worn in a manner that does not interfere with the seal of the facepiece to the face of the user.

5.1.5 For all tight-fitting respirators, a user seal check is conducted each time the respirator is donned. Respirators that cannot be seal checked are not acceptable for use.

5.1.6 Site management shall ensure that appropriate surveillance of work area conditions and degree of employee exposure or stress is maintained. When there is a change in work area conditions or degree of employee exposure or stress that may affect respirator effectiveness, the Program Coordinator shall reevaluate the continued effectiveness of the respirator.

5.1.7 The Program Coordinator and/or the employee's Supervisor will ensure that employees can leave work area:

- To wash their faces and respirator facepieces as necessary to prevent eye or skin irritation associated with respirator use; or
- If they detect vapor or gas breakthrough, changes in breathing resistance or leakage of the facepiece; or
- To replace the respirator or the filter, cartridge, or canister elements when vapor or gas breakthrough changes in breathing resistance, or leakage of the facepiece. The respirator must replaced or repaired before allowing the employee to return to the work area.

5.1.8 The following items are visually inspected, prior to use for all respirators:

- Tightness of connection
- Condition of facepiece
- Head straps
- Valves and connecting tube
- Cartridge/Canisters
- Elastic parts (for pliability)
- Respirator function

5.2 Disposable Type/Single-Use Respirators (Non-IDLH)

5.2.1 Limitations: This respirator provides protection against low levels of certain dusts/fumes but does not supply oxygen, and is not for use in an oxygen deficient atmosphere. Do not use in any atmosphere that is immediately hazardous to life or health. **These NIOSH approved respirators will not be used were airborne concentrations of dust/fumes equal or exceed 10 times the permissible exposure limit (PEL).**

5.2.2 Procedures for using the Respirator:

- Inspect the respirator before use to verify that all parts are present and in good working order.

- Some disposable single use respirators utilize elastic straps and adjustable buckles. The manufacture's instructions are followed when donning and adjusting the respirator straps.

Note: If detection of vapor inside the facepiece (by smell or otherwise) is experienced or difficult breathing is experienced, employees are trained to leave the area immediately, report the condition to their Supervisor and the Program Coordinator and discard the respirator.

5.3 Chemical Cartridge Respirator/ air purifying respirator (Non-IDLH)

5.3.1 These respirators provide protection against low levels of certain gases and vapors. Respirator canisters or cartridges shall be specifically selected for concentrations of gases/vapors, that may be encountered.

5.3.2 Limitations: This respirator does not supply oxygen and is not for use in an oxygen deficient atmosphere. These respirators can not be used in any atmosphere that is immediately hazardous to life or health. Employees are trained to leave the area immediately if an odor is detected inside the respirator.

5.3.3 Air purifying respirators (APRs) shall not be used for rescue or emergency work.

5.3.4 Procedures for using the respirator

- Respirators are inspected before each use to assure all parts are present and in good working order.
- Employees then don the respirator and adjust to obtain a snug but comfortable fit.
- Employees then perform a user seal check.

5.3.5 **Cartridges are replaced in accordance with Section 3 and Appendix B.** If employees can smell or otherwise detect vapors inside the facepiece, or if difficulty breathing is experienced, the cartridges will be changed.

5.4 Particulate Filter Respirator (Non-IDLH)

5.4.1 Limitations: Particulate Filter Respirators provide protection against low levels of certain dusts/fumes. This respirator does not supply oxygen, and is not for use in an oxygen deficient atmosphere. This type respirator shall not be used in any atmosphere that is immediately hazardous to life or health.

5.4.2 Procedures for using the respirator:

- The respirator is inspected by the employee before each use to assure that all parts are present and in good working order.
- Employees will then don the respirator and adjust it to obtain a snug but comfortable fit.
- Employees will then perform a user seal check.

5.5 Airline Respirator

5.5.1 Limitations: An airline respirator shall not be used in any atmosphere that is immediately hazardous to life or health, including an oxygen deficient atmosphere, unless equipped with a self-contained escape air bottle (5, 15, 30 minute).

5.5.2 Procedures for using the equipment:

- Employees shall inspect all equipment before each use to assure all parts are present and in good working order.

- If using an escape bottle, user will ensure that air supply is sufficient to permit safe escape from work area.

- The employee will then follow the manufacturer's instruction to select correct length of airline hose. Connect hose to regulator and air supply (maximum air pressure at the point of attachment of hose to air supply depends upon manufacturer's instructions). If using a compressor, the employee, their supervisor and/or the Program Coordinator will verify the inlet is in an uncontaminated area. Air-purifying filters and sorbents shall be used as needed. If the compressor is oil-lubricated, it shall be equipped with high temperature and carbon monoxide alarms.

- The employee will then don the respirator and adjust to obtain a snug but comfortable fit and perform a user fit test.

- Next the worker shall connect the respirator to the regulator and adjust the airflow in the facepiece.

Note: In case of malfunction, employees are trained to leave the area immediately, report the condition to their supervisor and the Program Coordinator.

5.5.3 An adequate supply of breathing air shall be ensured by the installation of an air pressure gauge in the air supply system.

5.6 Self-Contained Breathing Apparatus (SCBA)

5.6.1 SCBAs are provided primarily for use in emergency response when spills, leaks, or other circumstances present respiratory hazards. Grade D breathing air cylinders shall be maintained in a fully charged state and shall be recharged when the pressure falls to 90% of the manufacturer's recommended pressure level.

5.6.2 Limitations: Air supply is generally rated for 30 minutes. Note: heavy exertion and excitement will increase the breathing rate and deplete the air supply sooner. Employees are trained to leave the area when the alarm indicates low air supply.

5.6.3 Procedures for using the equipment:

- Employees shall inspect the unit before each use and ensure a sufficient air supply and that the regulator and low pressure (at or above 90%) warning devices function properly.

- The user will then open the cylinder air supply valve.

- Next, don unit so cylinder is on users back with the valve pointing down and engage harness and tighten.

- Then the employee will don the respirator and adjust to obtain a snug but comfortable fit and perform a user seal check.

- The employee will then connect the facepiece hose to regulator.

Note: Employees are trained to use the bypass only in the event of regulator failure and to leave area immediately, whenever the low-pressure alarm sounds.

5.6.4 Care and maintenance of SCBAs is performed by a designated Competent Person.

5.6.5 Bottles are refilled only with breathing air that meets the specifications for Grade D Breathing Air in Compressed Gas Association Commodity Specification G-7.1-1989. Grade D has an oxygen content v/v 19.5-23.5%, condensed hydrocarbon 5 mg/m^3 or less, carbon monoxide 10 ppm or less, carbon dioxide 1000 ppm or less and lack of noticeable odor.

5.6.6 SCBA emergency use respirators are kept accessible to the work area and stored in compartments or in covers that are clearly marked as containing emergency respirators.

5.6.7 All respirators maintained for use in emergency situations shall be inspected at least monthly and in accordance with the manufacturer's recommendations, and shall be checked for proper function before and after each use; and

5.6.8 Emergency escape-only respirators shall be inspected before being carried into the workplace for use.

5.6.9 For respirators maintained for emergency use, the Program Coordinator or Supervisor will certify the respirator by documenting the date the inspection was performed, the name (or signature) of the person who made the inspection, the findings, required remedial action, and a serial number or other means of identifying the inspected respirator.

5.6.10 This information is provided on a tag or label that is attached to the storage compartment for the respirator, is kept with the respirator, or is included in inspection reports stored as paper or electronic files. This information shall be maintained until replaced following a subsequent certification.

5.7 Breathing Air Quality

5.7.1 Air supply shall be free of harmful quantities of contaminants, and shall meet specification for Grade D Breathing Air as described in the Compressed Gas Association publication G-7 1988: Compressed Air for Human Respiration.

5.7.2 Compressed oxygen shall not be used in supplied- air respirators or in open circuit self-contained breathing apparatus. Oxygen must never be used with air-line respirators.

5.7.3 Breathing air may be supplied to respirators from cylinders or air compressors. Cylinders must have a dated label/sticker affixed to them indicating "Certified Breathing Air" or equivalent.

5.7.4 If used, a breathing air type compressor shall be situated so as to avoid entry of contaminated air into the system. An alarm shall also be installed to indicate imminent compressor failure and/or overheating. If an oil-lubricated compressor is used, it shall have a high-temperature or carbon monoxide alarm or automatic shutdown control feature.

5.7.5 Oil lubricated air compressors should have a continuous carbon monoxide (CO) monitor with both audible and visual alarms.

5.7.6 In-line air purifying sorbent filters with water and oil traps shall be installed between the compressor and user(s).

5.7.7 Employees are instructed to stop work immediately if they experience difficulty in breathing, smell any unusual odors, or experience an ill feeling such as a headache or upset stomach, etc. and report the situation to their Supervisor.

5.8 User Seal Checks

Employees shall test the seal of their respirator to their face prior to using by performing both negative and positive-pressure user seal checks according to the following guidelines.

5.8.1 Negative-Pressure Seal Check Procedure:

- Close off inlet openings of the respirator; canister(s), cartridge(s), or filter(s) by covering with palm of hands; by replacing the inlet seal on the canister(s); or by squeezing a breathing tube or blocking its inlet so as not to allow the passage of air.

- Inhale gently and holds breathe for ten (10) seconds.

- A satisfactory fit is achieved if the facepiece collapses slightly and no inward leakage of air into facepiece is detected.

If inward leakage is detected the respirator wearer will reposition the facepiece and/or straps and repeat this sequence until a satisfactory fit check is obtained.

5.8.2 Positive-Pressure Seal Check Procedure:

- Close off exhalation valve or breathing tube, or both.
- Then exhale gently.
- A satisfactory fit is achieved if a slight buildup of positive pressure is generated on the inside of the facepiece, without detection of outward leakage between the sealing surface and the face.
- If outward leakage is detected, the respirator wearer will reposition the facepiece and/or straps and repeat this sequence until a satisfactory seal check is obtained.

5.9 Manufacturer Specific Procedures

Program Coordinator's Note: Procedures relative to respirator use and care, as directed by the equipment manufacturer, are available as references and shall be attached to this program.

6.0 Training

Training is provided to all employees who are required to use respirators prior to requiring the employee to use the respirator in the workplace. The training is comprehensive, understandable, and done on an annual basis or more often, if necessary. (See PSM Training Program #709; "Respiratory Protection", for the complete training program used for employees who are assigned tasks that require the use of respirators.) At a minimum, the training includes the following topics:

- The nature of the hazard(s) including physical properties, odor characteristics, physiological effects on the body, and known concentration levels of toxic material or airborne radioactive level,
- How improper fit, usage, or maintenance can compromise the protective effect of the respirator.
- The physical characteristics, functional capabilities, and limitations of various types of respirators.
- How to use the respirator in emergency situations.
- How to inspect, don, doff, use and check the seal of the respirator.
- Procedures for maintenance and storage of the respirator.
- How to recognize the medical signs and symptoms that may limit or prevent the effective use of respirators.

6.1 Training Documentation

Training documentation is maintained for all employees who are assigned work that requires the use of a respirator. (Forms A-1, A-2, A-3, and A-4 may be used to document training and training exercise completion for air purifying respirators and supplied air respirators.)

If documentation which demonstrates that an employee has received training within the last 12 months is available and addresses the elements of this Program, and the employee can demonstrate knowledge of those elements, repeat training is not required. Previous training not repeated initially must be provided no later than 12 months from the date of the previous training.

Retraining is 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

- Situations arise in which retraining appears necessary to ensure safe respirator use.

7.0 Respirator Maintenance

7.1 Cleaning & Sanitization

The following provides guidelines for cleaning and sanitizing respirators. Recommendations provided by the equipment manufacturer may be used provided the procedures are as effective as those listed here.

7.1.1 Respirators will be cleaned and sanitized after each use. Commercially available mild detergents or cleaner/sanitizer recommended by the manufacturer are used.

7.1.2 Storage shall be in a convenient, clean and sanitary location. At a minimum respirators shall be stored in a protective bag.

7.1.3 Chemical Cartridges/Mechanical Filters shall be discarded and replaced as defined in section 3.0 of this Program.

7.1.4 Cleaning, disinfecting, and storage of respirators shall be performed as follows:

- Remove filters, cartridges, or canisters. Disassemble facepiece 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 (43 deg. C [110 deg. F] maximum) 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 (43 deg. C [110 deg. F] maximum), preferably running water. Drain.

- When the cleaner used does not contain a disinfecting agent, respirator components will be immersed for two minutes in one of the following:

    1. Hypochlorite solution (50 ppm of chlorine) made by adding approximately one milliliter of laundry bleach to one liter of water at 43 deg. C (110 deg. F); or,

    2. Aqueous solution of iodine (50 ppm iodine) made by adding approximately 0.8 milliliters of tincture of iodine (6-8 grams ammonium and/or potassium iodide/100 cc of 45% alcohol) to one liter of water at 43 deg. C (110 deg. F); or,

3. Other commercially available cleansers of equivalent disinfectant quality when used as directed, as recommended or approved by the respirator manufacturer.

- Rinse components thoroughly in clean, warm (43 deg. C [110 deg. F] maximum), preferably running water. Drain. The importance of thorough rinsing cannot be overemphasized. Detergents or disinfectants that dry on facepieces may result in dermatitis. In addition, some disinfectants may cause deterioration of rubber or corrosion of metal parts if not completely removed.

- Components are hand-dried with a clean lint-free cloth or air-dried.

- Reassemble facepiece, replacing filters, cartridges, and canisters where necessary.

- Test the respirator to verify all components work properly.

7.2 Inspecting & Storing

Respirators are stored to protect them from damage, contamination, dust, sunlight, extreme temperatures, excessive moisture, and damaging chemicals, and they shall be packed or stored to prevent deformation of the facepiece and exhalation valve. Inspection and replacement of respirator parts shall be performed according to the following:

7.2.1 All respirators must be inspected by the wearer prior to each use.

7.2.2 Self contained breathing apparatus (SCBAs) shall be inspected monthly and after each use by Competent Person(s). Employees shall self-inspect SCBAs prior to each use. SCBA inspections shall include checking cylinder pressure and units shall be brought to the rated pressure. Units shall be recharged after each use.

7.2.3 Air-line respirators: Complete systems are inspected before and after each use.

7.2.4 Replacement of parts shall be made only with those specifically designed for the respiratory device used. All maintenance and repair shall be performed only by appropriately trained persons and shall be documented. It should be noted that some respiratory equipment maintenance requires the manufacturer's certification of training (i.e. SCBAs).

7.3 Repairing, Discarding, and Maintaining Respirators

Defective equipment shall be immediately removed from service and repaired prior to use. Repairs shall be made only by an appropriately trained, designated Competent Person, and only utilizing the manufacturer's NIOSH approved replacement parts. Defective equipment

not repaired immediately shall be red tagged as noted: “Danger - Do Not Use – Defective”, and the specific defect(s) noted on the tag.

Users may self-perform repairs only if they have been appropriately trained and approved parts are available. Reducing and admission valves, regulators, and alarms for air supplied respirators shall only be repaired by the manufacturer or a technician trained by the manufacturer.

8.0 Voluntary Respirator Use Requirements

Employees shall not wear air purifying respirators with cartridges or canisters, or air supplied respirators unless a health hazard is present. Employees may voluntarily use a respirator, with the approval of both their Supervisor and the Program Coordinator. The Program Coordinator will evaluate requests for voluntary respirator use to determine if the employee can perform the activities safely and respirator use will not in itself create a hazard.

8.1 If it is determined that voluntary use will be permitted, a copy of Appendix B of this program shall be provided to the employee.

8.2 A medical evaluation and PLHCP's written determination will also be provided for all employees who are permitted to use respirators voluntarily, prior to their use of a respirator. (See section 2.0 of this Program).

8.3 Additionally, all requirements for cleaning, maintaining and storage of respirators contained in this Program shall also apply to employees permitted to use respirators voluntarily. (See section 8.0 of this Program).

8.4 Respirators worn on a voluntary basis do not require fit testing.

Exception: Employees whose only use of respirators involves the voluntary use of filtering facepieces (dust masks) are not covered by the requirements of this Program. They shall, however, be provided with a copy of Appendix B of this program.

9.0 RESPIRATOR PROGRAM EVALUATION

The effectiveness of this site-specific Respiratory Protection Program will be evaluated with routine observations and formal Program evaluations.

9.1 Routine Observations

The Program Coordinator shall be responsible for conducting routine observations related to the effective selection, use, maintenance, storage and other aspects of this Program. Observations shall be noted through the use of Safety Observation Reports (SORs) or equivalent documented routine safety inspections. Noted deficiencies shall be corrected as soon as possible.

9.2 Program Evaluations

Formal Program evaluations shall also be conducted on a periodic basis. A written evaluation shall be conducted to address the overall effectiveness of the Program. This evaluation may be incorporated into the Company's standard Safety Evaluation Report (SER) format, Environmental Project Audit format, or be conducted as an independent review.

9.3 Content of Program Evaluations

Program evaluations shall conform to the content requirements of the American National Standards Institute (ANSI Z88.2-1992) recommendations and those listed in 29CFR 1910.134/1926.103. The areas of evaluation include:

- Program administration and evaluation
- Training of workers in the proper use of respirators and the associated hazards
- Initial and periodic fit testing
- Medical evaluation
- Hazard classification and sampling
- Respirator selection
- Respirator use procedures including seal protection, evaluation of effectiveness, and IDLH procedures
- Cleaning, maintenance, storage, and inspection

- Breathing air supplies
- Emergency preparedness and procedures
- Special problems
- Voluntary use procedures
- Other applicable observations

FORM A-1 AIR SUPPLIED RESPIRATOR TRAINING

Employee Name: _____

Instructor(s): _____ Date: _____

I have been trained in and understand the following:	SCBA	Airline
Importance and need for respiratory protection		
Where/when to use the respirator, including emergencies		
Proper inspection, donning, doffing, and use of respirator		
Proper maintenance and storage of the respirator		
How to recognize medical signs and symptoms that may limit or prevent effective use of respirators		
Limitation and restriction of the respirator		
Requirements for a proper respirator fit		
Respirator check - normal atmosphere		
Respirator check - test atmosphere		

I wear corrective lenses: Yes No _____

I have been trained in, & worn (normal atmosphere), the following supplied air respirators:

Make: _____ Model: _____ Size: _____

Make: _____ Model: _____ Size: _____

I have been retrained in (normal atmosphere) the following respirators:

Air Supplied - Airline: Make: _____ Model: _____ Size: _____
Air Supplied - SCBA: Make: _____ Model: _____ Size: _____
Air Supplied - Egress: Make: _____ Model: _____ Size: _____

Instructor's Signature: _____ Employee's Signature: _____

FORM A-2 SUPPLIED AIR RESPIRATOR TRAINING EXERCISE

Name of Employee: _____

Instructor(s): _____ Date: _____

RESPIRATORY PROTECTION

DID THE EMPLOYEE:	SCBA
Properly don respirator	
Check respirator fit (positive and negative pressure checks)	
Describe minimum respirator entry requirement to unknown hazardous atmospheres	
Describe correct response to sound of low pressure warning device	
Conduct a high pressure check	
Conduct a low pressure check	
Properly inspect a manifold system and set up and airline	
Properly inspect cascade system and recharge an SCBA bottle	
Describe correct responses to respirator emergencies	

Instructor Signature:_____ Employee Signature:_____

FORM A-3 APR HEALTH HAZARDS & PERSONAL PROTECTION TRAINING

Print Name: _____

Instructor(s) Name: _____ Date: _____

I have been trained in and understand the following:	Full Face	Half Face
Importance and need for respiratory protection		
Where/when to use respirator, including emergencies		
Proper inspection, donning, and use of respirator		
Proper maintenance and storage of the respirator		
Limitation and restriction of the respirator		
Requirements for a proper respirator fit		
Respirator check - normal atmosphere		
Respirator check - test atmosphere		

I wear corrective lenses: Yes No

I have been trained in, & worn in a normal atmosphere, and been fit tested (with _____) for the following air purifying respirators:

Make: Model: Size:

Make: Model: Size:

I have been trained in, and worn in a normal atmosphere, and been fit tested with _____, the following air purifying respirators:

Make: Model: Size:

Name: Model: Size:

Instructor's Signature Employee's Signature

FORM A-4 APR TRAINING EXERCISE

Name of Employee: _____

Instructor(s): _____ Date: _____

Respirator Make: _____ Respirator Model: _____

Respirator Make: _____ Respirator Model: _____

DID THE EMPLOYEE:	**Half Face**	**Full Face**
Inspect the respirator (condition, cleanliness, straps, valves, etc.)?		
Check respirator fit (positive and negative pressure checks)		
Correctly describe the respirator limitations i.e., not for Immediately Dangerous to Life and Health (IDLH) or Oxygen Deficient Atmosphere (ODA) conditions, or concentrations greater than Assigned Protection Factor (APF) or Maximum Use Concentration (MUC)		
Correctly describe indications that cartridges require changing (i.e., breakthrough, increased resistance, length of service)?		
Correctly describe when to discontinue using a respirator, and what to do in cases of emergency?		

The student inspected and donned the respirator(s) in accordance with the manufacturer instructions, and correctly stated limitations for wearing APRs.

_____ _____

Instructor's Signature Date

APPENDIX A - MEDICAL QUESTIONNAIRE FOR RESPIRATOR USERS

(Appendix C, OSHA Respirator Medical Evaluation Questionnaire)

To the employer: Answers to questions in Section 1, and to question 9 in Section 2 of Part A, do not require a medical examination.

To the employee: Can you read (circle one): **Yes / No**

Your employer must allow you to answer this questionnaire during normal working hours, or at a time and place that is convenient to you. To maintain your confidentiality, your employer or supervisor must not look at or review your answers, and your employer must tell you how to deliver or send this questionnaire to the health care professional who will review it.

Part A. Section 1. (Mandatory) The following information must be provided by every employee who has been selected to use any type of respirator **(please print)**.

1. Today's date:_____
2. Your name:_____
3. Your age (to nearest year):_____

   S. S. No.:_____
4. Sex (circle one): Male/Female
5. Your height: _____ft. _____in.
6. Your weight: _____ lbs.
7. Your job title:_____
8. A phone number where you can be reached by the health care professional who reviews this questionnaire (include the Area Code):_____
9. The best time to phone you at this number: _____
10. Has your employer told you how to contact the health care professional who will review this questionnaire (circle one): **Yes / No**
11. Check the type of respirator you will use (you can check more than one category):

    a. _____Disposable respirator (filtering facepiece, non- cartridge type only).

    b. _____Other type (for example, half- or full-facepiece type, powered-air purifying, supplied-air, self-contained breathing apparatus).
12. Have you worn a respirator (circle one): **Yes / No**
    If "yes," what type(s):_____

Part A. Section 2. (Mandatory) Questions 1 through 15 below must be answered by every employee who has been selected to use any type of respirator (please circle "yes" or "no").

1. Do you currently smoke tobacco, or have you smoked tobacco in the last month: **Yes / No**

   If "yes", explain:_____

2. Have you ever had any of the following conditions?

   a. Seizures (fits): **Yes / No**

   b. Diabetes (sugar disease): **Yes / No**

   c. Allergic reactions that interfere with your breathing: **Yes / No**

   d. Claustrophobia (fear of closed-in places): **Yes / No**

   e. Trouble smelling odors: **Yes / No**

3. Have you ever had any of the following pulmonary or lung problems?

   a. Asbestosis: **Yes / No**

   b. Asthma: **Yes / No**

   c. Chronic bronchitis: **Yes / No**

   d. Emphysema: **Yes / No**

   e. Pneumonia: **Yes / No**

   f. Tuberculosis: **Yes / No**

   g. Silicosis: **Yes / No**

   h. Pneumothorax (collapsed lung): **Yes / No**

   i. Lung cancer: **Yes / No**

   j. Broken ribs: **Yes / No**

   k. Any chest injuries or surgeries: **Yes / No**

   l. Any other lung problem that you've been told about: **Yes / No**

   If "yes", explain:_____

4. Do you currently have any of the following symptoms of pulmonary or lung illness?

   a. Shortness of breath: **Yes / No**

   b. Shortness of breath when walking fast on level ground or walking up a slight hill or incline: **Yes / No**

   c. Shortness of breath when walking with other people at an ordinary pace on level ground: **Yes / No**

d. Have to stop for breath when walking at your own pace on level ground: **Yes / No**

e. Shortness of breath when washing or dressing yourself: **Yes / No**

f. Shortness of breath that interferes with your job: **Yes / No**

g. Coughing that produces phlegm (thick sputum): **Yes / No**

h. Coughing that wakes you early in the morning: **Yes / No**

i. Coughing that occurs mostly when you are lying down: **Yes / No**

j. Coughing up blood in the last month: **Yes / No**

k. Wheezing: **Yes / No**

I. Wheezing that interferes with your job: **Yes / No**

m. Chest pain when you breathe deeply: **Yes / No**

n. Any other symptoms that you think may be related to lung problems: **Yes / No**

If "yes", explain: _____

_____

5. Have you ever had any of the following cardiovascular or heart problems?

a. Heart attack: **Yes / No**

b. Stroke: **Yes / No**

c. Angina: **Yes / No**

d. Heart failure: **Yes / No**

e. Swelling in your legs or feet (not caused by walking): **Yes / No**

f. Heart arrhythmia (heart beating irregularly): **Yes / No**

g. High blood pressure: **Yes / No**

h. Any other heart problem that you've been told about: **Yes / No**

If "yes", explain: _____

_____

6. Have you ever had any of the following cardiovascular or heart symptoms?

a. Frequent pain or tightness in your chest: **Yes / No**

b. Pain or tightness in your chest during physical activity: **Yes / No**

c. Pain or tightness in your chest that interferes with your job: **Yes / No**

d. In the past two years, have you noticed your heart skipping or missing a beat: **Yes / No**

e. Heartburn or indigestion that is not related to eating: **Yes / No**

f. Any other symptoms that you think may be related to heart or circulation problems: **Yes / No**

If "yes", explain:_____

_____

7. Do you currently take medication for any of the following problems?

a. Breathing or lung problems: **Yes / No**

b. Heart trouble: **Yes / No**

c. Blood pressure: **Yes / No**

d. Seizures (fits): **Yes / No**

If "yes", explain:_____

_____

8. If you've used a respirator, have you ever had any of the following problems? If you've never used a respirator, check the following space and go to question 9. (___ Never used a respirator)

a. Eye irritation: **Yes / No**

b. Skin allergies or rashes: **Yes / No**

c. Anxiety: **Yes / No**

d. General weakness or fatigue: **Yes / No**

e. Any other problem that interferes with your use of a respirator: **Yes / No**

If "yes", explain:_____

_____

9. Would you like to talk to the health care professional who will review this questionnaire about your answers to this questionnaire: **Yes / No**

10. Have you ever lost vision in either eye (temporarily or permanently): **Yes / No**

If "yes", explain:_____

_____

11. Do you currently have any of the following vision problems?

a. Wear contact lenses: **Yes / No**

b. Wear glasses: **Yes / No**

c. Color blind: **Yes / No**

d. Any other eye or vision problem: **Yes / No**

12 Have you ever had an injury to your ears, including a broken ear drum: **Yes / No**

If "yes", explain:_____

_____

13. Do you currently have any of the following hearing problems?

a. Difficulty hearing: **Yes / No**

b. Wear a hearing aid: **Yes / No**

c. Any other hearing or ear problem: **Yes / No**

If "yes", explain:_____

_____

14. Have you ever had a back injury: **Yes / No**

If "yes", explain:_____

_____

15. Do you currently have any of the following musculoskeletal problems?

a. Weakness in any of your arms, hands, legs, or feet: **Yes / No**

b. Back pain: **Yes / No**

c. Difficulty fully moving your arms and legs: **Yes / No**

d. Pain or stiffness when you lean forward or backward at the waist: **Yes / No**

e. Difficulty fully moving your head up or down: **Yes / No**

f. Difficulty fully moving your head side to side: **Yes / No**

g. Difficulty bending at your knees: **Yes / No**

h. Difficulty squatting to the ground: **Yes / No**

i. Climbing a flight of stairs or a ladder carrying more than 25 lbs: **Yes / No**

j. Any other muscle or skeletal problem that interferes with using a respirator: **Yes / No**

If "yes", explain:_____

_____

APPENDIX B

Appendix D to Sec. 1910.134 (Non-Mandatory) Information for Employees Using Respirators When Not Required Under the Standard

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 workers. However, if a respirator is used improperly or not kept clean, the respirator itself can become a hazard to the worker. Sometimes, workers 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, or 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:

1. Read and heed all instructions provided by the manufacturer on use, maintenance, cleaning and care, and warnings regarding the respirators limitations.

2. Choose respirators certified for use to protect against the contaminant of concern. The National Institute for Occupational Safety and Health (NIOSH) certifies respirators. A label or statement of certification should appear on the respirator or respirator packaging. It will tell you what the respirator is tested and certified for and how much it will protect you.

3. 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.

4. Keep track of your respirator so that you do not mistakenly use someone else's respirator.

FORM A-5 RESPIRATORY PROTECTION PROGRAM CHECKLIST

FACILITY PROGRAM REVIEW CONTRACT
Contract:_____Location: _____
Respirator:_____Coordinator:_____
Reviewer:_____Date Reviewed: _____

1. WRITTEN PROGRAM REVIEWS:

Review the written respiratory protection programs:

Yes	No	
❑	❑	Form 1-1 completed.
❑	❑	Form 1-1 responsible persons and procedure current.
❑	❑	Are all program sections present and current.
❑	❑	If programs include emergency respirator use, are procedures in place.
❑	❑	The designated site program administrator is qualified to administer the program.
❑	❑	The written program is updated as necessary to account for changes in the workplace affecting respirator use.
❑	❑	Provided equipment, training, and medical evaluations at no cost to employees.

Comments:_____
_____

2. RESPIRATOR SELECTION

Yes	No	
❒	❒	The specific hazards for each respiratory protection task have been identified.
❒	❒	Respirators are NIOSH certified, and used under the conditions of the certification.
❒	❒	Respiratory job exposures characterized as routine or incident-related.
❒	❒	Respirator job exposures are evaluated for IDLH exposure potential.
❒	❒	Estimated exposure concentration is included for tasks with routine exposures.
❒	❒	Respirator manufacturer and model information are specified for each respirator job.
❒	❒	A sufficient number of respirator sizes and models are provided to be acceptable and correctly fit the users.
❒	❒	For IDLH jobs, full facepiece pressure demand SARs with escape bottle unit or full face piece pressure demand SCBAs, with a minimum service life of 30 minutes, are provided.
❒	❒	Respirators used for escape only are NIOSH certified for the atmosphere in which they will be used.
❒	❒	Oxygen deficient atmospheres are considered IDLH.
❒	❒	Respirators selected are appropriate for the chemical state and physical form of the contaminant.
❒	❒	Air-purifying respirators used for protection against gases and vapors are equipped with ESLls or a change schedule has been specified and implemented.

Yes	No	
❒	❒	Air-purifying respirators used for protection against particulate are equipped with NlOSH-certified HEPA filters or other filters certified by NIOSH for particulate under 42 CFR part 84.
❒	❒	Air-purifying respirators used for routine gas and vapor exposure protection have service life documentation using manufacturer software, attached to program.

Comments:_____
_____

3. MEDICAL EVALUATION

Yes	No	
❒	❒	All employees in respirator jobs have been evaluated to determine their ability to wear a respirator prior to respirator use.
❒	❒	A physician or other licensed health care professional (PLHCP) has been identified to perform the medical evaluations.
❒	❒	Employees are provided follow-up medical exams if they answer positively to any of questions 1 through 8 in the medical questionnaire for respiratory use in Appendix A, or if their initial medical evaluation reveals that a follow-up exam is needed.
❒	❒	Medical evaluations are administered confidentially during normal work hours, and in a manner that is understandable to employees.
❒	❒	Employees are provided the opportunity to discuss the medical evaluation results with the PLHCP.
❒	❒	Is the supplemental information provided in Form 2-1 to the PLHCP before he or she makes a decision about respirator use.
❒	❒	Written recommendations are obtained from the PLHCP regarding each employee's ability to wear a respirator, and the PLHCP has given the employee a copy of these recommendations.
❒	❒	Employees who are medically unable to wear a negative pressure respirator are provided with a powered air-purifying respirator (PAPR) if they are found by the PLHCP to be medically able to use a PAPR.
❒	❒	Employees are given additional medical evaluation when: • The employee reports symptoms related to his or her ability to use a respirator. • The PLHCP, respiratory protection program administrator, or supervisor determines that a medical reevaluation is necessary. • Information from the respiratory protection program suggests a need for reevaluation. • Workplace conditions have changed in a way that could potentially cause increased risk to the employee's health.

Comments:_____
_____

4. FIT TESTING

Yes	No	
❑	❑	All employees who are using tight fitting respirator facepieces have passed an appropriate fit test prior to being required to use a respirator.
❑	❑	Fit testing is conducted with the same make, model, and size of respirator that the employee will be expected to use at the worksite.
❑	❑	Fit tests are conducted annually and when different respirator facepieces are to be used.
❑	❑	Provisions are made to conduct additional fit tests in the event of physical changes in the employee that may affect respirator fit.
❑	❑	Employees are given the opportunity to select a different respirator facepiece, and be retested, if their respirator fit is unacceptable to them.
❑	❑	Fit tests are administered using OSHA-accepted QNFT or QLFT protocols.
❑	❑	QNFT is used in all situations where a negative pressure respirator is intended to protect workers from contaminant concentrations greater than 10 times the PEL.
❑	❑	For tight-fitting atmosphere-supplying respirators and powered air-purifying respirators: • All tests are conducted in the negative pressure mode. • QLFT is achieved by temporarily converting the facepiece-into a negative pressure respirator with appropriate filters, or by using an identical negative pressure APR.
❑	❑	QNFT is achieved by modifying the facepiece to allow for sampling inside the mask midway between the nose and mouth. The facepiece is restored to its NIOSH approved configuration before being used in the workplace.

Comments:_____
_____

5. PROPER USE OF RESPIRATORS

Yes	No	
❑	❑	Workers using tight-fitting respirators have no conditions, such as facial hair, that would interfere with a face-to-facepiece seal or valve function.
❑	❑	Workers wear corrective glasses, goggles, or other protective equipment in a manner that does not interfere with the face-to-facepiece seal or valve function.
❑	❑	Workers perform user seal checks prior to each use of a tight-fitting respirator.
❑	❑	Procedures are in place for conducting ongoing surveillance of the work area for conditions that affect respirator effectiveness, and when such conditions exist, you take steps to address those situations.
❑	❑	Employee are permitted to leave their work area to conduct respirator maintenance, such as washing the facepiece, or to replace respirator parts.
❑	❑	Employees do not return to their work area until their respirator has been repaired or replaced in the event of breakthrough, a leak in the facepiece, or a change in breathing resistance.

Yes **No**

- ❑ ❑ There are procedures for respirator use in IDLH atmospheres and during interior structural firefighting to ensure that the appropriate number of standby personnel are deployed; standby personnel and employees in the IDLH environment maintain communication; standby personnel are properly trained, equipped, and prepared; you will be notified when standby personnel enter an IDLH atmosphere; and you will respond to this notification.
- ❑ ❑ Standby personnel are equipped with a pressure demand or other positive pressure. SCBA, or a positive pressure supplied air respirator with an escape bottle, and appropriate retrieval equipment or other means for rescue.

Comments:_____
_____

6. RESPIRATOR MAINTENANCE AND CARE

Cleaning and Disinfecting

Yes **No**

- ❑ ❑ All employees who are using tight fitting respirator facepieces have passed an appropriate fit test prior to being required to use a respirator.
- ❑ ❑ Respirators are provided that are clean, sanitary, and in good working order.
- ❑ ❑ Respirators are cleaned and disinfected as often as necessary when issued for the exclusive use of one employee; before being worn by different individuals; after each use for emergency use respirators; and after each use for respirators used for fit testing. Commercially available mild detergents or cleaner/sanitizer recommended by the manufacturer are used.

Storage

Yes **No**

- ❑ ❑ Respirators are stored to protect them from damage from the elements, and from becoming deformed.
- ❑ ❑ Emergency respirators are stored, to be accessible to the work area, in compartments marked as such, and in accordance with manufacturer's recommendations.

Inspections

Yes **No**

- ❑ ❑ Routine-use respirators are inspected before each use and after cleaning.
- ❑ ❑ SCBAs and emergency respirators are inspected monthly and checked for proper function before and after each use.
- ❑ ❑ Emergency escape only respirators are inspected before being carried into the workplace for use.
- ❑ ❑ Inspections include: check of respirator function; tightness of connections; condition of the facepiece, head straps, valves, cartridges, and condition of elastomeric parts.
- ❑ ❑ For SCBAs, inspection includes checking that cylinders are fully charged, and that

regulators and warning devices function properly.

- ❑ ❑ Emergency use respirators are certified by documenting the inspection, and by tagging the information either to the respirator or its compartment, or storing it with inspection reports.

Repairs

Yes No

- ❑ ❑ Respirators that have failed inspection are taken out of service.
- ❑ ❑ Repairs are made only by trained personnel.
- ❑ ❑ Only NlOSH-approved parts are used.
- ❑ ❑ Reducing and admission valves, regulators and alarms are adjusted or repaired only by the manufacturer or a technician trained by the manufacturer.

Comments:_____
_____

7. BREATHING AIR QUALITY AND USE

General

Yes No

- ❑ ❑ Compressed breathing air meets the requirements for Grade D breathing air.
- ❑ ❑ Compressed oxygen is not used in respirators that have previously used compressed air.
- ❑ ❑ Oxygen concentrations greater that 23.5 percent are used only in equipment designed for oxygen service or distribution.
- ❑ ❑ Breathing air couplings are incompatible with outlets for other gas systems.
- ❑ ❑ Breathing gas containers are marked with appropriate NIOSH certification.

Breathing Air Cylinders

Yes No

- ❑ ❑ Breathing air cylinders are tested and maintained according to DOT 49 CFR Part 173 and 178.
- ❑ ❑ A certificate of analysis for breathing air has been obtained from the supplier.
- ❑ ❑ Moisture content in the cylinder breathing air does not exceed a dew point of -500° F at 1 atmosphere pressure.

Air Compressors

Yes No

- ❑ ❑ Are constructed and situated to prevent contaminated air from getting into the system and are set up to minimize the moisture content.

❑ ❑ Are equipped with in-line air-purifying sorbent beds and/or filters that are maintained or replaced following manufacturer's instructions and are tagged with information on the most recent change date of the filter and an authorizing signature.

❑ ❑ Carbon monoxide does not exceed 10 ppm in the breathing air from compressors that are oil-lubricated, and high-temperature and carbon monoxide alarms are used on oil-lubricated compressors, or the air is monitored often enough to verify that carbon monoxide does not exceed 10 ppm if only a high-temperature alarm is used.

Comments:_____
_____

8. TRAINING AND INFORMATION

Yes No

❑ ❑ Employees can demonstrate knowledge of the following:

- Why the respirator is necessary and the consequences of improper fit, use, or maintenance.
- Limitations and capabilities of the respirator.
- How to effectively use the respirator in emergency situations.
- How to inspect, don, doff, use, and check the seals of the respirator.
- Maintenance and storage procedures.
- The general requirements of the respirator standard.
- Training is understandable to employees.

❑ ❑ Training is provided prior to employee use of a respirator

❑ ❑ Retraining is provided:

- Annually.
- Upon changes in workplace conditions that affect respirator use.
- Whenever retraining appears necessary to verify safe respirator use.
- Respirator voluntary use requirements are provided to voluntary users.

Comments:_____
_____

9. PROGRAM EVALUATION

Yes No

❑ ❑ Workplace evaluations are being conducted as necessary to verify that the written respiratory protection program is being effectively implemented.

❑ ❑ Employees required to wear respirators are being regularly consulted to assess the employees' views and to identify problems with respirator fit, selection, use and maintenance.

❑ ❑ Any problems identified during assessments are corrected.

Comments:_____
_____

10. RECORDKEEPING

Yes	No	
❑	❑	Records of medical evaluations have been retained.
❑	❑	Fit testing records have been retained.
❑	❑	A copy of the current respiratory protection program has been retained onsite.
❑	❑	Access to these records is provided to affected employees.

Comments:_____
_____

CORRECTIVE ACTIONS REQUIRED:

APPENDIX IV
TRAINING AND MEDICAL SURVEILLANCE DOCUMENTS

Contractor Name: Jacobs Engineering Group, Inc.												
Employee Name	**Haz 40 hr**	**Haz 8 hr**	**Haz Sup**	**Medical**	**First Aid**	**CPR**	**Fit Test**	**ACM I,MP,CS,D**		**Pb I,RA**		**Rad**
Everson, Aaron	01/07/94	12/12/00		07/26/01			05/15/01	I	03/03/00	I	10/20/99	
								CS	02/18/00	RA	10/22/99	
								D	06/07/00			
Fleming, David	05/27/88	12/07/00	06/29/95	03/15/00			07/18/00					12/07/00
Jansen, Virgil	07/10/92	11/15/00	12/27/94	01/30/01			11/15/00					
Knaus, Brian	04/22/88	01/17/01		11/16/00			12/12/00	I	02/07/01			
								MP	02/07/01			
								CS	02/10/01			
								D	02/26/01			
Mann, Leo	01/24/92	11/15/00		07/12/01			11/15/00	I	11/11/01	I	10/25/00	
								CS	01/17/01	CS	04/13/95	
								D	01/04/00	RA	10/22/98	
Neumann, Jeff	05/29/98	12/22/00		11/21/00			03/22/01	I	11/08/00	I	12/20/00	
								CS	11/17/00	RA	12/22/00	
Cape Environmental												
Hernandez, Juan	06/27/99						06/11/01	I	03/22/01			
								MP	03/22/01			
								D	03/22/01			
Kitt, Herman								I	09/19/01			
								MP	09/19/01			
								CS	12/18/00			
Uriostegui, Jesse				04/11/01	Resp Phy			CS	08/18/01			