

**SITE SAFETY AND HEALTH PLAN
PIPELINE INVESTIGATION
REMEDIAL INVESTIGATION
AT THE NIAGARA FALLS
STORAGE SITE
NIAGARA COUNTY, NEW YORK**

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Prepared For:

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LIST OF ACRONYMS/ABBREVIATIONS

ALARA	As Low As Reasonably Achievable
AMSL	Above Mean Sea Level
ARAR	Applicable, Relevant and Appropriate Requirements
BRA	Baseline Risk Assessment
CERCLA	Comprehensive Environmental Response Compensation and Liability Act
CFR	Code of Federal Regulations
CHMM	Certified Hazardous Materials Manager
COR	Contracting Officer Representative
CRZ	Contaminant Reduction Zone
DI	Deionized
DOD	Department of Defense
DOT	Department of Transportation
EZ	Exclusion Zone
FSP	Field Sampling Plan
FUSRAP	Formerly Used Sites Remedial Action Program
HNO ₃	Nitric Acid
HP	Health Physicist
HPLC	High Performance Liquid Chromatography
HTW	Hazardous and Toxic Waste
ICP	Inductively Coupled Plasma (Spectroscopy)
ICS	Interference Check Standard
ID	Identification
IDW	Investigation Derived Waste
mg/kg	milligrams per kilogram (ppm)
mg/L	milligrams per liter (ppm)
MSA	Method of Standard Additions
nCi/g	nano curries per gram
NFSS	Niagara Falls Storage Site
NYSDEC	New York State Department of Environmental Conservation
P.E.	Professional Engineer
PAH	Polynuclear Aromatic Hydrocarbon
PCBs	Polychlorinated Biphenyls
pCi/g	Picocuries Per Gram
pCi/L	Picocuries Per Liter
ppb	parts per billion
PPE	Personal Protective Equipment

LIST OF ACRONYMS/ABBREVIATIONS
(Continued)

ppm	parts per million
QA/QC	Quality Assurance/Quality Control
QAPP	Quality Assurance Project Plan
Ra	Radium
RAM	Radioactive Material
RCRA	Resource Conservation and Recovery Act
RI	Remedial Investigation
RSO	Radiation Safety Officer
SM	Site Manager
SOP	Standard Operating Procedure
SOW	Scope of Work
SSHO	Site Safety and Health Officer
SSHP	Site-Specific Safety and Health Plan
SW-846	Test Methods for Evaluating Solid Waste
SZ	Support Zone
TCE	Trichloroethene
TCL	Target Compound List (Organic-related)
TEDE	Total Effective Dose Equivalent
Th	Thorium
TWA	Time Weight Average
U	Uranium
Fg/L	micrograms per liter (ppb)
Fg/kg	micrograms per kilogram (ppb)
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
USGS	United States Geological Survey
VOC	Volatile Organic Compound

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SECTION 1

1 1.0 INTRODUCTION

1.1 Project Description

This Site Safety and Health Plan Addendum (SSHPA) was prepared for the United States Army Corps of Engineers (USACE), for additional investigative tasks which will be performed during in order to perform Sampling to Characterize the Piping Network Contents at the Niagara Falls Storage Site (NFSS) located in the Township of Lewiston, Niagara County, New York. The location of the NFSS is shown in Figure 1-1 of the original SSHP.

The purpose of this SSHPA is to summarize the project organization and responsibilities related to safety; identify hazards; specify personal protective equipment (PPE) to be used at the site; identify personnel health and safety training requirements; summarize continuous monitoring techniques to be used; establish emergency procedures; describe medical surveillance programs in effect; ensure that appropriate first aid equipment is available; and provide for accident record keeping and safety inspections.

This Addendum and the original SSHP are in compliance with the U.S. Army Corps of Engineers Safety and Health Requirements Manual (EM 385-1-1, revised 1996), the U.S. Army Corps of Engineers Safety and Occupational Health Requirements for Hazardous Waste Site Remedial Actions (ER-385-1-92), the Occupational Safety and Health Administration (OSHA) requirements (29 CFR 1910 and 1926, specifically 29 CFR 1910.120, Hazardous Waste Operations and Emergency Response), and the U.S. Environmental Protection Agency's (USEPA) hazardous waste requirements (40 CFR 260-270).

This SSHPA has been prepared to address additional activities, which will be performed under Contract DACW49-97-D-0001, Work Order No. 0012.

1.1 Site Background Information/Setting

There are no changes to this section of the original SSHP.

SECTION 2

2.0 AREAS OF STUDY

The activities addressed by this Plan include the collection of sediment and water samples from selected manholes, pipes and sumps which are located on the NFSS.

2.1 Summary of Investigation Tasks

2.1.1 Manhole Samples

Water and sediment/sludge samples will be collected from selected manholes as identified in Section 4.0 of Field Sampling Plan (FSP) for the Pipeline Investigation prepared by Maxim Technologies Inc. Samples will be collected from twenty-three manholes that contained sufficient water and sediment/sludge as identified during the November 2000 site reconnaissance.

2.1.2 Pipe and Sump Samples

2.1.2.1 **Pipe Samples** - Water and sediment/sludge samples will be collected from locations as Identified in Section 4 of the FSP. Two water samples and eleven sediment/sludge samples will be collected from pipe sampling locations. Sample collection from selected pipe locations will require excavation to exposed buried pipes to facilitate sample collection.

2.1.2.2 **Sump Samples** – Water and sediment/sludge samples will be collected from locations as Identified in Section 4 of the FSP. One water sample will be collected from a sump that had adequate water for sample collection during the November 2000 reconnaissance. Eight sediment/sludge samples will be collected from selected sump as described in Section 4.0 of the FSP.

SECTION 3

3.0 HAZARD IDENTIFICATION AND RISK ANALYSIS

3.1 Preliminary Evaluation

A preliminary evaluation of each task, the overall site characteristics, and hazards associated with investigative tasks was performed by the Site Manager and the Project Health and Safety Officer during the preparation of this document. This preliminary evaluation has resulted in the identification of potentially hazardous conditions and will aid in the selection of appropriate employee protection methodologies and PPE. Evaluation of work site characteristics and hazards is an on-going process and will continue throughout the duration of the project.

The primary physical hazards during this project are hazards associated excavations and excavating equipment, operation of sediment sampling equipment, slip/trip/fall on the uneven terrain, and electrical hazards associated with the use of electrical equipment in the outdoor situations.

Chemical and radiological contamination may be encountered in the area of study during water and sediment/sludge sample collection.

Hazards associated with the tasks described in Section 2.0, are identified and addressed in the following sections.

3.2 Hazard Identification

Hazards or conditions that may pose hazards are identified so site workers may be adequately protected. Emphasis is placed on identifying conditions that may cause death or serious harm and the protective measure implemented to avoid such hazards. All site workers must be diligent in identifying hazards in the work place and should bring them to the attention of supervisory personnel.

Physical hazards known to be encountered in conducting field operations at this site are: unsure footing; trip, slip, and fall; weather; open excavations, excavating equipment operations; and biological hazards.

Chemical hazards will include those associated with, or resulting from, contact with the water and sediments in the manholes and pipelines at the NFSS. Material Safety Data Sheets (MSDS) for potential contaminants of concern are found in Appendix C of the original SSHP.

A list of possible chemical hazards that may be encountered during this investigation is presented in Table 3- 1. Information presented in this table includes: chemical name, Threshold Limit Value (TLV) and Permissible Exposure Limits (PEL) (if available), symptoms of exposure, route of exposure, media, action levels and work practice controls.

3.3 Risk Analysis – Pipeline and Manhole Sampling

The hazards that have been identified in the following sections have the potential to cause death or serious injury. Sampling operations are potentially dangerous and require strict adherence to safe practices and safety procedures. If additional hazards not addressed in the following sections are identified, protective measures will be implemented.

It is anticipated that the field operations associated with this project will commence in the spring of 2001.

Site Activity Hazard Analysis has been performed and is presented in Table 3-2 of this document.

3.3.1 Physical Hazards

The following sections detail physical hazards which have been identified that could result in injury to on-site workers during this activity.

3.3.1.1 Electrical Hazards

3.3.1.1.1 Aboveground Utilities

Aboveground utilities are not expected to be located near the manhole sampling locations.

3.3.1.1.2 Underground Utilities

Underground utilities may be present near sampling locations.

3.3.1.1.3 Electrical Equipment

Electrical powered equipment which will be used during this task will be limited to 12 volt DC powered pumps which may be used during the collection water samples from the manholes.

3.3.1.2 Fire Hazards - The use of vehicles equipped with catalytic converters in overgrown areas may increase the potential of fire.

3.3.1.3 Trip/Slip/Fall - Personnel engaged in manhole sampling will be working in some areas with rubble piles, debris and dense stands of trees and underbrush. These areas may also be wet and the conditions muddy thereby increasing the risk of this exposure of on-site workers to these hazards. Manholes that are opened to allow sample collection also subject personnel to the additional hazard of stepping into an open manhole.

3.3.1.4 Noise/Hearing Protection – The use of excavating equipment to access pipelines may produce noise in excess of the 85dB action level.

3.3.1.5 Thermal Stress - During the time of year the field sampling will be performed, the weather conditions in the study area may range from below freezing to daily highs

well above 70 degrees Fahrenheit. This range in temperatures can subject site workers to an increased potential for hypothermia and/or heat stress/stroke during performance of on-site activities. The use of personal protective equipment during the sampling activities will likely increase the potential for heat stress/stroke. Activities associated with the performance of this task will likely occur during the Spring of 2001.

3.3.1.5.1 Heat Stress/Stroke - The potential for heat stress at the site will be variable depending upon the temperature at the time this task is being performed. Daytime high temperatures exceeding 70° F, increase the potential for heat related illnesses to occur. Sampling personnel will be wearing Tyvek® coveralls, overboots and gloves which limit the body's ability to dissipate heat.

3.3.1.5.2 Cold Stress/Hypothermia - The potential for cold stress/hypothermia will be variable depending upon the temperature at the time this task is being performed. The potential for hypothermia also increases with increasing wind speed.

3.3.1.6 Flying Debris – The use of excavating equipment may cause pieces of debris, soil or other objects to be mobilized and expose workers to this hazard.

3.3.1.7 Pinch/Puncture/Shear - These hazards are present on excavating equipment, vehicles and sediment sampling equipment used during this task. The Eckman dredge is a spring-loaded sampling dredge that closes forcefully when the release mechanism is activated. The dredge closes with sufficient force to cause substantial injury to fingers and hands. These hazards will also be present during the removal of the manhole lids in preparation of sample collection and the replacement of the lids following completion of sample collection.

3.3.1.8 Confined Spaces- Excavations to access pipeline will not exceed four feet in depth. Manholes present on the facility meet the OSHA definition of a confined space. Many are in deteriorated condition, exceed 10 feet in depth and contain considerable volumes of water.

3.3.2 Chemical Hazards

The potential chemical hazards that could be encountered during on-site activities are presented in Table 3-1 of the original SSHP. During manhole sampling, volatile organic compounds, nitroaromatics, heavy metals, petroleum derivatives and radiological contaminants such as thorium, radium and radon gas could be encountered. Chemical hazards include those associated with or resulting from contacts with water and/or the sediments/sludge collected from the manholes.

3.3.3 Biological Hazards

The personnel involved in activities at the site may be exposed to threats from biological hazards such as mosquitoes, ticks, spiders, rodents, and snakes and pathogens which may be present in water and sediments in sewers on the NFSS. Infections of the West Nile Virus were found in birds collected from Niagara County in the year 2000. Mosquitoes, which have feed on infected birds, could potentially transmit the virus to human beings.

Irritant plants such as poison ivy, poison oak, poison sumac, and greenbriar, are also present on the NFSS. Table 3-3 of the original SSHP lists poisonous spiders and other animals indigenous to the work area.

3.3.4 Unexploded Ordnance (UXO/Ordnance Explosive Waste (OEW))

Unexploded ordnance is not expected at the site. There is no history of use or disposal of UXO at the facility. Low levels of nitroaromatic compounds may be present in manholes in the Acidification Area sewers. Previous sampling has not indicated the presence of nitroaromatic compound concentrations in concentrations sufficient to cause an explosive hazard.

3.3.5 Radiation Hazards

The historic use of the facility and the storage of radiological waste materials at the facility are described in Section 2 of the original SSHP. Soils in areas of the site which are outside of the Waste Containment Structure have been previously released by the DOE using 5/15 pCi/g criteria (40CFR192) with a U-238 concentration limit of 75 pCi/g. Radiological hazards for any individuals are not anticipated to exceed 100 mrem total effective dose equivalent (TEDE) (USACE ALARA) during this investigation. The Radiation Protection Plan Addendum is present in Appendix A of this document.

3.4 Action Levels and Hazard Mitigation/ Pipeline and Manhole Sampling

This section identifies action levels and mitigation methods to be employed during the previously identified investigative activities. The action levels identify situations where specific protective equipment or engineering controls will be employed to reduce worker exposure and risk to specific hazards during this task. These action levels and mitigation methods are presented in Table 3-1. Site Activity Hazard Analysis has been performed and is presented in Table 3-2.

3.4.1 Physical Hazards

The following sections detail physical hazards, which have been identified that could result in injury to on-site workers during this activity.

3.4.1.1 Electrical Hazards

3.4.1.1.1 Aboveground Utilities

Utilities of this type will not be encountered in the study area; therefore no action levels or hazard mitigation methods are required.

3.4.1.1.2 Underground Utilities

Maxim Site Manager will contact the New York one-call utility locator service (1-800-892-7962 and non-subscriber utilities a minimum of seven days in advance of the anticipated sampling date so that utilities will be clearly marked prior to the initiation of excavating activities. Available plant drawings will be consulted to determine if utility lines may be present near these sampling locations.

3.4.1.2.3 Electrical Equipment

12-volt batteries will power the electrical equipment, which will be used. Care should be exercised to when the electrical connections to the battery are made to ensure that personnel do not come in direct contact with the battery terminals.

3.4.1.2 Fire Hazards – Caution will be used when driving vehicles in tall, dry grasses and when operating any diesel or gasoline-powered equipment in areas of the site where dry grass or woody vegetation is present. A fire extinguisher will be kept in all vehicles used on-site.

3.4.1.3 Trip/Slip/Fall – Each worker should be aware of local conditions that would contribute to an increase risk of this hazard and immediately correct any such situation. On-site workers should exercise care when walking in areas of overgrown vegetation, debris, rubble piles, wet grass or mud. Worker should remain vigilant when working around open manholes during sample collection. No open manholes will be left unattended unless completely identified using hazard warning tape.

3.4.1.4 Noise/Hearing Protection – No noise-producing equipment will be used during sampling activities; therefore, no action levels or mitigation methods are required.

3.4.1.5 Thermal Stress - During the time of year the field sampling will be performed, the weather conditions in the study area may range from below freezing to daily highs well above 70 degrees Fahrenheit. This range in temperatures can subject site workers to an increased potential for hypothermia and/or heat stress/stroke during performance of on-site activities. The use of personal protective equipment during the sampling activities will likely increase the potential for heat stress/stroke. Activities

associated with the performance of this task will likely occur during the spring of 2001.

3.4.1.5.1 Heat Stress/Stroke - Mitigation controls, monitoring protocols and action levels to prevent injury to site workers from heat stress are presented in SOP 14 presented in Appendix B of the original SSHP.

3.4.1.5.2 Cold Stress/Hypothermia - Mitigation controls, monitoring protocols and action levels to prevent injury to site workers from cold stress/hypothermia are presented in SOP 14 presented in Appendix B of the original SSHP.

3.4.1.6 Flying Debris – All on-site personnel will be required to wear ANSI-approved safety glasses equipped with side shields at all times while on the NFSS. The only areas of the site where wearing of safety glasses is not mandatory are the job/office trailer located at the site, and while personnel are completely inside a vehicle.

3.4.1.7 Pinch/Puncture/Shear – All on-site workers are required to wear steel-toed boots during all on-site activities. Care should be exercised when exiting vehicles used during this task. When opening and closing manholes, workers should avoid placing their fingers, hands or feet under the edge of the manhole lid. A manhole lifter should be used to aid in the manhole lid removal. Blocking will be placed beneath the manhole lids prior to the lifting of the manhole lids. Leather gloves should be worn during manhole lid removal. Workers using the Eckman dredge should exercise care when cocking the jaw mechanism prior to sample collection. Hands and fingers shall be kept clear of the jaws while the sample is being removed from the opened sampler. A stainless steel spoon or similar utensil should be used to remove sediment which may be clinging to the inside of the sampler. At no time should a worker insert his or her hands or fingers inside an opened Eckman dredge unless the spring mechanism has been deactivated.

3.4.2 Chemical Hazards

Material Safety Data Sheets (MSDSs) for potential contaminants of concern are found in Appendix C of the original SSHP.

All sediment sample collection will be performed in Modified Level D, modified by the inclusion of poly-coated Tyvek® coveralls, nitrile gloves (inner and outer), steel toed chemically resistant boots and safety glasses w/side shields. On-site workers involved in this task should be alert to the potential of the presence of any chemical odors or visible signs of chemical contamination while sediment samples are being collected. The atmosphere in the work zone will be monitored during these operations with a photo-ionization detector (PID) equipped with a 10.2 eV lamp and a toxic gas meter capable of monitoring % O₂, LEL, CO, and (H₂S). Respirators equipped with organic vapor/acid gas/P100 cartridges (OV/AG/P100) will be available for use in the event that monitoring of the work zone indicates that the action levels presented in Table 3-1 will be exceeded and that an upgrade to levels C is required. This is most likely to occur once sediment/sludge samples have been removed from the sampling device and composting and container filling is occurring. If an upgrade to a level of protection above level C (Levels A or B) is required, the Site Safety and Health Officer (SSHO), in consultation with the Maxim Certified Industrial Hygienist (CIH), the Maxim Project Manager (PM) and the USACE

Contracting Officer Representative (COR), will determine the appropriate protective measures which will be employed to adequately protect on-site workers.

3.4.3 Biological Hazards

Mosquitoes and biting insects may be prevalent during the time of the year this task will be performed. Birds with confirmed West Nile Virus infections were documented in Niagara County in the year 2000. Workers involved in this task will be required to wear protective Tyvek or spunbound polyethylene coveralls which will reduce the occurrence of insect bites. Insect repellents used in combination with headnets will also contribute to a reduction of exposure to this hazard. High boots and heavy gloves can also help to minimize exposure to many of these biological hazards. Onsite workers will be required to wash their hands with an antibacterial soap or antibacterial gel prior to eating or drinking.

3.3.4 Unexploded Ordnance (UXO/Ordnance Explosive Waste (OEW)

Unexploded ordnance is not expected at the site. There is no history of use or disposal of UXO at the facility. Low levels of nitroaromatic compounds may be present in manholes in the Acidification Area sewers. Previous sampling has not indicated the presence of nitroaromatic compound concentrations in concentrations sufficient to cause an explosive hazard.

3.4.5 Radiation Hazards

All sampling activities will be monitored by an HP Technician to ensure that radiological hazards, should they be encountered, do not pose a threat to on-site personnel. Radiation exposures to workers and the public will be kept below regulatory limits and As Low As Reasonably Achievable (ALARA). Worker training requirements are detailed in specified in Section 5.0 of this document. Dosimetry for monitoring radiological exposures is specified in Section 8.0 of this Addendum. Specific monitoring requirements are specified in the RPP Addendum presented in Appendix A.

Section 4

4.0 STAFF ORGANIZATION, QUALIFICATIONS, AND RESPONSIBILITIES

4.1 Project Organization

A project organizational chart, which identifies responsibilities related to health and safety, is presented in Figure 2-1 of the original QAPP. The responsibilities are outlined in Section 4-2 of the original SSHP.

4.2 Identification of Responsibilities

There are no changes or modification to this section of the original SSHP.

Section 5

5.0 TRAINING

All training related to the performance of on-site activities will be completed in accordance with Maxim's SOP 3.0 "Accident Prevention, Training and Medical Surveillance" presented in Appendix C of the original SSHP.

5.1 Comprehensive Health and Safety Indoctrination

At the onset of on-site activities, the project personnel (including subcontractors) will be required to have read the Site Safety and Health Plan and this SSHPA and sign the Statement of Understanding (Exhibit 5-1) attesting that they have read and understand the SSHP and this SSHPA

Prior to the initiation of each phase of the field operations, the Site Manager will review the plan with all site personnel. They will be verbally informed of the known and possible hazards of working on this site and instructed on the proper safety procedures which they will be required to practice. All personnel will be instructed and trained in the proper use of all safety equipment and their limitations. All field personnel will be informed of relevant safety procedures and will be furnished with emergency telephone numbers. All on-site personnel and visitors will be briefed on the potential physical and chemical hazards before they are allowed on site. These briefings will be documented in the site log, listing name, date, and subject.

5.2 Specialized Training - Maxim Personnel

All Maxim field personnel and supervisors have attended an OSHA required (29 CFR 1910.120) 40-hour training course for safety at hazardous materials sites, and are American Red Cross certified to administer First Aid and CPR. Maxim supervisory personnel have received OSHA required 8 hour training for "Hazardous Waste Site Supervision." In addition, all personnel have been trained in the use and limitations of respirators, and the use of personal protective equipment. Qualitative respirator fit testing is performed for all personnel prior to commencement of field activities. A summary of the health and safety training acquired by Maxim personnel is provided in Table 5-1.

Copies of updated training certificates are presented in Appendix B.

5.3 Specialized Training - Subcontractors

There are no changes to this section of the SSHP.

5.4 Site-Specific Training

There are no changes to this section of the SSHP.

5.5 Radworker Training

All Maxim and subcontractor personnel will be required to have completed a minimum of 4 hours of instruction in radiation safety or annual updates as appropriate. This training will be provided at the NFSS prior to the initiation of any on-site sampling activities. This training must include the following elements: health effects of ionizing radiation; exposure limits (including those for pregnant workers); use of dosimetry and instruments; effects of radiation on the embryo/fetus; employee rights and responsibilities; site contaminants and probability of exposure; required monitoring; and exposure control methodologies.

Section 6

6.0 PERSONAL PROTECTIVE EQUIPMENT (PPE)

The normal work uniform for this site will be Level D.

During all sediment sampling operations, Modified Level D PPE consisting of poly-coated Tyvek® or spun-bound polyethylene coveralls, steel-toed boots, rubber overboots and nitrile gloves (inner and outer) and safety glasses with side shields will be required for all sampling personnel. Full-faced air purifying respirators equipped with organic vapor/P100 filters will be on-hand in the event an up-grade to Level C is required. If a hazardous situation or the possibility of exposure is encountered or anticipated at sampling locations, the Site Manager will evaluate the situation and upgrade the level of PPE as needed. If conditions are encountered that require a higher level of PPE than Level C, operations will cease and the USACE COR and the Maxim program manager will be advised.

All PPE will be kept in weather-proof containers. Prior to use, each piece of PPE will be inspected.

All Maxim personnel have been fit-tested for their assigned respirator. Upon donning the respirator, the individual will perform a positive and negative pressure fit check. At the end of each day, respirators will be cleaned, dried, and placed in weather-proof container. Respirator cartridges will be replaced as needed. Visitors will be required to have fit-test documentation available for review and have a respirator of the brand and size with which they were fit-tested with available for use on-site.

A list of personal protective equipment is in Table 6-1 of the original SSHP.

6.1 Levels of Protection

Various levels of protection are described in SOP 8.0 “Personal Protective Equipment.” Levels of protection to be worn on-site will vary. Level D protection is necessary to enter the site. Modified Level D protection will be worn during all sampling activities. Levels of protection required during this investigation will be as follows:

Activity

1.1.1.1.1 Level of Protection

Manhole Sampling

Modified D: Modified by the inclusion of nitrile gloves (inner and outer) and Steel-toed boots chemically resistant poly-coated Tyvek® or spun bound polyethylene coveralls steel-toed boots and rubber overboots. Leather gloves will be worn while manhole lids are being opened.

Pipeline Sampling

Modified D: Modified by the inclusion of hard hat during excavation activities, hearing protection during excavation activities, chemically resistant poly-coated Tyvek® or spun bound polyethylene coveralls, nitrile gloves, steel-toed boots, and rubber overboots.

Section 7

7.0 MEDICAL SURVEILLANCE

Bioassay analysis will not be performed unless work area sampling indicates the presence of airborne concentration of radionuclides.

Table 5-1 presents the dates of the employees' most recent annual medical exam. Copies of the most recent Fit-for Duty Statements are included in Appendix C. Exposure of personnel above the OSHA PEL to any of the hazardous substances listed in Table 3-1 will require a physician examination.

Section 8

8.0 DOSIMETRY

Maxim will utilize Personal Monitoring Devices (PMD) to maintain a permanent dose record of each for each on-site worker. Maxim and subcontractor personnel will be required to wear a Thermoluminescent Dosimeter (TLD) for monitoring exposure to non-alpha radiation while on the NFSS. TLD badges have a nominal detection range of 0.1 to 10,000 rads. The dosimetry program will be administered in accordance with the Radiation Protection Plan Addendum presented in Appendix A of this document. Each site worker and visitor subject to this site safety and health plan will wear a film badge while on-site, except in health physics designated office and assembly areas. All dosimetry, including the control badge will be collected and evaluated at the end of the field phase of these activities or a quarterly basis.

The Radiation Safety Officer (RSO) will be responsible for management of the on-site dosimetry program. Each on-site employee will be required to wear his or her film badge when he or she is present on the NFSS site. The TLD badge will remain at the work site when personnel are off-site.

Records of dosimetry will be maintained by the RSO while personnel are on the project site. Maxim will maintain the employee records at the Maxim St. Louis Office.

Section 9

9.0 EXPOSURE MONITORING DURING SAMPLE COLLECTION

9.1 Environmental Exposure Monitoring

There are no changes to this section of the SSHP.

Section 10

10.0 STANDARD OPERATING PROCEDURES (SOPs), ENGINEERING CONTROLS AND WORK PRACTICES

There are no changes to this section of the SSHP.

Section 11

11.0 SITE ACCESS AND WORK ZONES

There are no changes to this section of the SSHP.

Section 12

12.0 PERSONAL HYGIENE AND DECONTAMINATION

12.1 Personal Hygiene

Portable toilets will be provided at the project office and at a central location near the work zones.

Waterless hand soap and antiseptic waterless gel will be provided for hand and face washing in the project office, portable toilets and support zones.

12.2 Decontamination

There are no changes to this section of the SSHP.

Section 13

13.0 EQUIPMENT DECONTAMINATION

There are no changes to this section of the SSHP.

Section 14

14.0 EMERGENCY AND SITE EQUIPMENT

Maxim will provide all emergency equipment, which includes the following items:

Fire Extinguisher - Maxim will provide a 2A:10:BC extinguisher for every vehicle.

First Aid Kit - Maxim will provide a physician-approved first aid kit in each on-site vehicle and the office trailer.

Eye Wash Station - Maxim will provide each Maxim field team member with a portable eye wash bottle that will be located as close as possible to work hazards. All personnel will be trained in its operation.

All emergency equipment will be kept in the support vessel as close to each operation as possible.

Section 15

15.0 EMERGENCY RESPONSE AND CONTINGENCY PROCEDURE

There are no changes to this section of the SSHP.

Section 16

16.0 ACCIDENT PREVENTION

There are no changes to this section of the SSHP.

Section 17

17.0 LOGS, REPORTS, AND RECORDKEEPING

There are no changes to this section of the SSHP.

TABLES

TABLE 3-1
NIAGARA FALLS STORAGE SITE
POTENTIAL CONTAMINANTS OF CONCERN
AND
ASSOCIATED HAZARDS

Contaminant	Exposure Limits	Characteristics	Diagnostic Signs and Symptoms	Routes of Exposure	Media	Action Levels	Work Practice Controls
Aldrin	PEL-TWA = 0.25 mg/m ³ (skin) TLV-TWA = 0.25 mg/m ³ (skin) REL-TWA* = 0.25 mg/m ³ (skin) (*Lowest feasible recommended) IDLH = 25 mg/m ³	Colorless to dark brown crystalline solid with a mild chemical odor.	Head, dizzy; nausea, vomit, malaise, myoclonic jerks of limbs, clonic, tonic convulsions; coma, hematuria, azotemia; carcinogen.	Inhalation, Absorption, Ingestion, Contact	1	² NA	Use prescribed PPE, Nitrile gloves inner and outer, poly coated Tyvek coveralls, overboots
Aluminum	PEL-TWA = 10 mg/m ³ (total); 5.0 mg/m ³ (resp) TLV-TWA = 10 mg/m ³ (total) REL-TWA = 10 mg/m ³ (total); 5.0 mg/m ³ (resp) IDLH = N.D. ¹	Silvery-white, malleable, ductile, odorless metal.	Irritant to eyes, skin, and respiratory system.	Inhalation, Ingestion, Contact	1	² NA	Use prescribed PPE, Nitrile gloves inner and outer, poly coated Tyvek coveralls, overboots
Antimony	PEL-TWA = 0.5 mg/m ³ TLL-TWA = 0.5 mg/m ³ REL-TWA = 0.5 mg/m ³ IDLH = 50 mg/m ³	Silver-white, lustrous, hard, brittle solid, scale-like crystals; or a dark-gray, lustrous powder.	Irritant to eyes, skin, nose, throat, mouth; cough; dizziness; head; nausea, vomit, diarrhea stomach cramps; insomnia; anorexia; unable to smell properly.	Inhalation, Ingestion, Contact	1	² NA	Use prescribed PPE, Nitrile gloves inner and outer, poly coated Tyvek coveralls, overboots
Arsenic	PEL-TWA = 0.010 mg/m ³ TLV-TWA = 0.010 mg/m ³ REL-Ceiling* = 0.002 mg/m ³ (*Lowest feasible recommended) IDLH = 5 mg/m ³	Silver-gray or tin-white, brittle, odorless solid.	Ulceration of nasal septum, dermatitis, gastrointestinal disturbances, peripheral neuropathy, respiratory irritation, hyperpigmentation of skin, carcinogen.	Absorption, Ingestion, Contact	1	² NA	Use prescribed PPE, Nitrile gloves inner and outer, poly coated Tyvek coveralls, overboots

TABLE 3-1
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POTENTIAL CONTAMINANTS OF CONCERN
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Contaminant	Exposure Limits	Characteristics	Diagnostic Signs and Symptoms	Routes of Exposure	Media	Action Levels	Work Practice Controls
Benzene	PEL-TWA = 1.0 ppm PEL-STEL = 5.0 ppm TLV-TWA = 0.5 ppm TLV-STEL = 2.5 ppm REL-TWA = 0.1 ppm REL-STEL = 1 ppm (Lowest feasible recommended) IDLH = 500 ppm	Colorless liquid with aromatic odor. IP = 9.24 eV FIP = 12 degrees F	Irritant to eyes, nose, and respiratory system, giddy, headache, nausea, staggered gait, fatigue, anorexia lassitude, dermatitis, bone marrow depression, abdominal pain. Carcinogen (Ca)	Absorption, Ingestion, Inhalation Contact	1	TOV > 1 ppm Benzene > 0.5 ppm Benzene > 10 ppm TOV > 100 ppm	1) PID Monitoring and/or colorimetric indicator tubes. 2) If PID readings > 1 ppm, detector tubes will be used to determine compound (Benzene, Napthalene, Carbon Tetrachloride, Tetrachlorethylene, and Trichloroethylene) 3) If Benzene > 0.5 ppm then, evacuate EZ don respirators. 4) Evacuate site at > 100 ppm TOV and or Benzene > 10 ppm. 5) Wear prescribed PPE
Beryllium	PEL-TWA = 0.002 mg/m ³ PEL-Ceiling = 0.005 mg/m ³ TLV-TWA = 0.002 mg/m ³ TLV-STEL = 0.01 mg/m ³ REL-Ceiling = 0.0005 mg/m ³ (Lowest feasible recommended) IDLH = 4.0 mg/m ³	Metal: a hard, brittle, gray-white solid.	Berylliosis (chronic exposure): anorexia, weight loss, weak, chest pain, cough, clubbing of fingers, cyanosis, pulmonary insufficiency,; irritant of eyes, dermatitis. (Ca)	Contact, Inhalation	1	² NA	Use prescribed PPE, Nitrile gloves inner and outer, poly coated Tyvek coveralls, overboots
Cadmium (dust)	PEL-TWA = 0.005 mg/m ³ TLV-TWA = 0.01 mg/m ³ (total) 0.002 mg/m ³ (resp) REL - Low as feasibly possible IDLH = 9 mg/m ³	Metal: Silver-white, blue-tinged, lustrous, odorless solid.	pulmonary edema, dyspnea, cough, chest tight, substernal pain; head; chills, muscle aches; nausea, vomit, diarrhea; anosmia (loss of sense of smell), emphysema, proteinuria, mild anemia; Carcinogen.	Inhalation, Ingestion	1	² NA	Use prescribed PPE, Nitrile gloves inner and outer, poly coated Tyvek coveralls, overboots

TABLE 3-1
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Contaminant	Exposure Limits	Characteristics	Diagnostic Signs and Symptoms	Routes of Exposure	Media	Action Levels	Work Practice Controls
Chromium (metal)	PEL-TWA = 0.5 mg/m ³ TLV-TWA = 0.5 mg/m ³ REL-TWA = 0.5 mg/m ³ IDLH = 250 mg/m ³	Blue-white to steel-gray, lustrous, brittle, hard, odorless solid	Irritant eyes, skin; lung fibrosis (histologic).	Inhalation, Ingestion, Contact	1	² NA	Use prescribed PPE, Nitrile gloves inner and outer, poly coated Tyvek coveralls, overboots
Cobalt	*PEL-TWA = 0.1 mg/m ³ TLV-TWA = 0.02 mg/m ³ REL-TWA = 0.05 mg/m ³ *OSHA lowered the PEL to 0.05 mg/m ³ , however, this limit was vacated back to 0.1 mg/m ³ in a court ruling in 1993 IDLH = 20 mg/m ³	Odorless, silver-gray to black solid.	Cough, dyspnea (breathing difficulty), wheezing, decrease pulmonary function, weight-loss, dermatitis, diffuse nodular fibrosis, respiratory hypersensitivity, asthma.	Ingestion, Contact, Inhalation	1	² NA	Use prescribed PPE, Nitrile gloves inner and outer, poly coated Tyvek coveralls, overboots
Copper (metal dust)	PEL-TWA = 1 mg/m ³ TLV-TWA = 1 mg/m ³ REL-TWA = 1 mg/m ³ IDLH = 100 mg/m ³	Reddish, lustrous, malleable, odorless solid.	Irritant of eyes, nose, pharynx; nasal perforation; metallic taste; dermatitis.	Inhalation, Ingestion, Contact	1	² NA	Use prescribed PPE, Nitrile gloves inner and outer, poly coated Tyvek coveralls, overboots
Dieldrin	PEL-TWA = 0.25 mg/m ³ (skin) TLV-TWA = 0.25 mg/m ³ (skin) *REL-TWA = 0.25 mg/m ³ (skin) (*Lowest feasible recommended) IDLH = 50 mg/m ³	Colorless to light-tan crystals with a mild, chemical odor.	Head, dizziness; nausea, vomit, malaise, sweat; myoclonic limb jerks; clonic, tonic, convulsions; coma; Carcinogen.	Inhalation, Absorption, Ingestion, Contact	1	² NA	Use prescribed PPE, Nitrile gloves inner and outer, poly coated Tyvek coveralls, overboots
Endosulfan	PEL-TWA = None* TLV-TWA = 0.1 mg/m ³ (skin) REL-TWA = 0.1 mg/m ³ (skin) *OSHA established a PEL of 0.1 mg/m ³ , however, this limit was vacated in a court ruling in 1993 IDLH = N.D. ¹	Brown crystals with a slight, sulphur dioxide odor.	Irritant of skin; nausea, confusion, agitation, flushing, dry mouth, tremor, convulsions, head.	Absorption, Ingestion, Contact	1	² NA	Use prescribed PPE, Nitrile gloves inner and outer, poly coated Tyvek coveralls, overboots

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Contaminant	Exposure Limits	Characteristics	Diagnostic Signs and Symptoms	Routes of Exposure	Media	Action Levels	Work Practice Controls
Ethyl Benzene	PEL-TWA = 100 ppm TLV-TWA = 100 ppm TLV-STEL = 125 ppm REL-TWA = 100 ppm REL-STEL = 125 ppm STEL = 125 ppm (545 mg/m ³) IDLH = 800 ppm (10% LEL)	Colorless liquid with an aromatic odor. IP = 8.76 eV FIP = 55 degrees F	Irritant of eyes, skin, mucous membrane; head; dermatitis; narcosis, coma.	Inhalation, Ingestion, Contact	1	TOV > 1 ppm TOV > 100 ppm	1) PID Monitoring and/or colorimetric indicator tubes. 2) If PID readings > 1 ppm, detector tubes will be used to determine compound (Benzene, Napthalene, Carbon Tetrachloride, Tetrachlorethylene, and Trichloroethylene) 3) Evacuate site at > 100 ppm TOV 4) Wear prescribed PPE
Lead	PEL-TWA = 0.05 mg/m ³ TLV-TWA = 0.05 mg/m ³ REL-TWA (10 hr) = 0.100 mg/m ³ IDLH = 100 mg/m ³	A heavy, ductile, soft, gray solid.	Weak, lassitude, insomnia; facial pallor; pal eye, anorexia, weight loss, malnutrition; constipation, abdominal pain, colic; anemia; gingival lead line; tremor; paralysis of wrist, ankles; encephalopathy; kidney disease; irritant of eyes; hypotension.	Inhalation, Ingestion, Contact	1	² NA	Use prescribed PPE, Nitrile gloves inner and outer, poly coated Tyvek coveralls, overboots
Lindane	PEL-TWA = 0.5 mg/m ³ (skin) TLV-TWA = 0.5 mg/m ³ (skin) REL-TWA = 0.5 mg/m ³ (skin) IDLH = 50 mg/m ³	White to yellow, crystalline powder with a slight, musty odor. (pesticide)		Inhalation, Absorption, Ingestion, Contact	1	² NA	Use prescribed PPE, Nitrile gloves inner and outer, poly coated Tyvek coveralls, overboots

TABLE 3-1
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Contaminant	Exposure Limits	Characteristics	Diagnostic Signs and Symptoms	Routes of Exposure	Media	Action Levels	Work Practice Controls
Manganese	PEL-Ceiling = 5 mg/m ³ TLV-TWA = 0.2 mg/m ³ REL-TWA = 1 mg/m ³ REL-STEL = 3 mg/m ³ IDLH = 500 mg/m ³	Metal: a lustrous, brittle, silvery solid.	Parkinson's; asthenia, insomnia, mental confusion; metal fume fever: dry throat, cough, chest tight, dyspnea (difficult breathing), rales, flu-like fever, low-back pain; vomit; malaise; fatigue; kidney damage.	Inhalation, Ingestion	1	² NA	Use prescribed PPE, Nitrile gloves inner and outer, poly coated Tyvek coveralls, overboots
Mercury	*PEL-TWA = 0.1 mg/m ³ TLV-TWA = 0.025 mg/m ³ REL-TWA = 0.05 mg/m ³ (vapor) 0.1 mg/m ³ (other) (skin) *OSHA changed the PEL to 0.05 mg/m ³ , (vapor) and a Ceiling of 0.1 mg/m ³ (other), both with a skin notation, however, this limit was vacated back to 0.1 mg/m ³ in a court ruling in 1993. IDLH = 10 mg/m ³	Metal: Silver-white, heavy, odorless liquid.	Irritant of eyes, skin; cough, chest pain, dyspnea, bronchitis pneumonitis; tremor, insomnia, irritation, indecision, head, fatigue, weak; stomatitis, salivation; gastrointestinal disturbance, anorexia, weight loss; proteinuria.	Inhalation, Absorption, Ingestion, Contact	1	² NA	Use prescribed PPE, Nitrile gloves inner and outer, poly coated Tyvek coveralls, overboots
Molybdenum	*PEL-TWA = 15 mg/m ³ TLV-TWA = 5 mg/m ³ (soluble) and 10 mg/m ³ (metal / insoluble) REL-TWA = none established *OSHA lowered the PEL to 10 mg/m ³ however, this limit was vacated back to 15 mg/m ³ in a court ruling in 1993. IDLH = 5000 mg/m ³	Dark gray or black powder with a metallic luster.	In animals: irritant of eyes, nose, throat; anorexia, diarrhea, weight loss, listlessness; liver, kidney damage.	Inhalation, Ingestion, Contact	1	² NA	Use prescribed PPE, Nitrile gloves inner and outer, poly coated Tyvek coveralls, overboots

**TABLE 3-1
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Contaminant	Exposure Limits	Characteristics	Diagnostic Signs and Symptoms	Routes of Exposure	Media	Action Levels	Work Practice Controls
Naphthalene	*PEL-TWA = 10 ppm TLV-TWA = 10 ppm (skin) TLV-STEL = 15 ppm (skin) REL-TWA = 10 ppm REL-STEL = 15 ppm *OSHA added a STEL of 15 ppm however, this limit was vacated back after a court ruling in 1993. IDLH = 250 ppm	Colorless to brown solid with an odor of mothballs. IP = 8.12 eV FIP = 174 degrees F	Irritant of eyes; head, confusion, excitement, malaise; nausea, vomit, abdominal pain; irritant of bladder; profuse sweat; jaundice; hematuria, hemoglobinuria, renal shutdown; dermatitis; optical neuritis, corneal damage.	Absorption, Ingestion, Contact, Inhalation	1	TOV > 1 ppm Napthalene > 5 ppm Napthalene > 100 ppm TOV > 100 ppm	1) PID Monitoring and/or colorimetric indicator tubes. 2) If PID readings > 1 ppm, detector tubes will be used to determine compound (Benzene, Napthalene, Carbon Tetrachloride, Tetrachlorethylene, and Trichloroethylene) 3) If Napthalene > 5 ppm then evacuate EZ don respirators, re-enter EZ. 4) Evacuate site at > 100 ppm TOV and or Napthalene > 100 ppm. 5) Wear prescribed PPE
Nickel	*PEL-TWA = 1 mg/m ³ TLV-TWA = 1.5 mg/m ³ (metal) TLV-TWA = 0.1 mg/m ³ (soluble) TLV-TWA = 0.2 mg/m ³ (insol) Note all TLV's are for the inhalable portion REL-TWA = 0.015 mg/m ³ (Lowest feasible recommended) *OSHA changed the PEL to 1 mg/m ³ (metal / insol) and 0.1 mg/m ³ (soluble) however, this limit was vacated back after a court ruling in 1993. IDLH = 10 mg/m ³	Metal: Lustrous, silvery, odorless solid.	Sensitization dermatitis, allergic asthma, pneuitis; Carcinogen.	Inhalation, Ingestion, Contact	1	² NA	Use prescribed PPE, Nitrile gloves inner and outer, poly coated Tyvek coveralls, overboots

TABLE 3-1
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Contaminant	Exposure Limits	Characteristics	Diagnostic Signs and Symptoms	Routes of Exposure	Media	Action Levels	Work Practice Controls
Phenol	PEL-TWA = 5 ppm (skin) TLV-TWA = 5 ppm (skin) REL-TWA = 5 ppm (skin) REL-Ceiling = 15.6 ppm (skin) IDLH = 250 ppm	Colorless to light-pink, crystalline solid with a sweet, acrid odor. IP = 8.50 eV FIP = 175 degrees F	Irritant of eyes, nose, throat; anorexia, weight loss; weak, muscle ache, pain; dark urine; cyanosis; liver, kidney damage; skin burns; dermatitis; ochronosis; tremor convulsions, twitch.	Inhalation, Absorption, Ingestion, Contact	1	² NA	Use prescribed PPE, Nitrile gloves inner and outer, poly coated Tyvek coveralls, overboots
Selenium	PEL-TWA = 0.2 mg/m ³ TLV-TWA = 0.2 mg/m ³ REL-TWA = 0.2 mg/m ³ IDLH = 1 mg/m ³	Amorphous or crystalline, red to gray solid.	Irritant of eyes, skin, nose, throat; visual disturbance; head; chills, fever; dyspnea, bronchitis, metallic taste, garlic breath, gastrointestinal disturbance; dermatitis; eye, skin burns; in animals: anemia; liver necrosis, cirrhosis; kidney, spleen damage.	Inhalation, Ingestion, Contact	1	² NA	Use prescribed PPE, Nitrile gloves inner and outer, poly coated Tyvek coveralls, overboots
Silver	PEL-TWA = 0.01 mg/m ³ TLV-TWA = 0.1 mg/m ³ (metal) TLV-TWA = 0.01 mg/m ³ (soluble) REL-TWA = 0.01 mg/m ³ IDLH = 10 mg/m ³	Metal: White, lustrous solid.	Blue-gray eyes, nasal septum, throat, skin; irritant, ulceration skin; gastrointestinal disturbance.	Inhalation, Ingestion, Contact	1	² NA	Use prescribed PPE, Nitrile gloves inner and outer, poly coated Tyvek coveralls, overboots
Sodium hydroxide	PEL-TWA = 2.0 mg/m ³ TLV-Ceiling 2.0 mg/m ³ REL-Ceiling 2.0 mg/m ³ IDLH = 10 mg/m ³	Colorless to white, odorless solid (flakes, beads, granular form).	Irritant of eyes, skin, mucous membrane; pneuitis; eye, skin burns; temporary loss of hair.	Inhalation, Ingestion, Contact	1	NA	Use prescribed PPE, Nitrile gloves inner and outer, poly coated Tyvek coveralls, overboots

TABLE 3-1
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Contaminant	Exposure Limits	Characteristics	Diagnostic Signs and Symptoms	Routes of Exposure	Media	Action Levels	Work Practice Controls
Sulfuric acid	PEL-TWA = 1 mg/m ³ TLV-TWA = 1 mg/m ³ TLV-STEL = 3 mg/m ³ REL-TWA = 1 mg/m ³ IDLH = 15 mg/m ³	Colorless to dark-brown, oily, odorless liquid.	Irritant of eyes, skin, nose, throat; pulmonary edema, bronchitis; emphysema; conjunctivitis; stomatis; dental erosion; tracheobronchitis; eye, skin burns; dermatitis.	Ingestion, Contact, Inhalation	2	NA	Use prescribed PPE, Nitrile gloves inner and outer, poly coated Tyvek coveralls, overboots , used eye and face protection when preserving rinsate samples.
Tetrachloroethene	*PEL-TWA = 100 ppm PEL-Ceiling = 200 ppm TLV-TWA = 25 ppm TLV-STEL = 100 ppm REL - Minimize exposures and limit number of workers exposed *OSHA lowered the PEL to 25 ppm and eliminated the ceiling, however, this limit was vacated back after a court ruling in 1993. IDLH = [150 ppm]	Colorless liquid with a mild, chloroform-like odor.	Irritant of eyes, nose, throat; nausea; flush face, neck; vertigo, dizziness, incoordination; head, somnolence; skin erythema (skin redness); liver damage; Carcinogen.	Absorption, Ingestion, Contact, Inhalation	1	TOV > 1 ppm Tetrachloro ethylene > 15 ppm Tetrachloro ethylene > 250 ppm TOV > 100 ppm	1) PID Monitoring and/or colorimetric indicator tubes. 2) If PID readings > 1 ppm, detector tubes will be used to determine compound (Benzene, Napthalene, Carbon Tetrachloride, Tetrachloroethylene, and Trichloroethylene) 3) If Tetrachloroethylene > 15 ppm, evacuate EZ, don respirators, re-enter exclusion zone. 4) Evacuate site at > 100 ppm TOV (Tetrachloroethylene evacuation would be required at > 250 ppm.) 5) Wear prescribed PPE

**TABLE 3-1
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POTENTIAL CONTAMINANTS OF CONCERN
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Contaminant	Exposure Limits	Characteristics	Diagnostic Signs and Symptoms	Routes of Exposure	Media	Action Levels	Work Practice Controls
Thallium	PEL-TWA = 0.1 mg/m ³ [skin] TLV-TWA = 0.1 mg/m ³ [skin] REL-TWA = 0.1 mg/m ³ [skin] IDLH = 15 mg/m ³	Appearance and odor vary depending upon the specific soluble thallium compound.	Nausea, diarrhea, abdominal pain, vomit; ptosis, strabismus; peri neuritis, tremor; reater tight, chest pain, pulmonary edema; seizure, chorea, psychosis; liver, kidney damage; alopecia; paresthesia legs.	Inhalation, Absorption, Ingestion, Contact	1	² NA	
Tin (metal)	PEL-TWA = 2 mg/m ³ TLV-TWA = 2 mg/m ³ REL-TWA = 2 mg/m ³ IDLH = 100 mg/m ³ (as Sn)	Gray to almost silver-white, ductile, malleable, lustrous solid.	Irritant of eyes, skin, respiratory system; In animals: vomit, diarrhea, paralysis with muscle twitch	Inhalation, Contact	1	² NA	
Toluene	*PEL-TWA = 200 ppm *PEL-STEEL = 300 ppm TLV-TWA = 150 ppm (skin) REL-TWA = 100 ppm REL-STEEL = 150 ppm *OSHA lowered the PEL-TWA to 100 ppm and the STEEL to 150 ppm, however, this limit was vacated back after a court ruling in 1993. IDLH = 500 ppm	Colorless liquid with a sweet, pungent, benzene-like odor. IP = 8.82 eV FIP = 40 degrees F	Irritant of eyes, nose; fatigue, weak, confusion, euphoria, dizziness, head; dilated pupils, lacrimation (discharge of tears); nervousness, muscle fatigue, insomnia; paresthesia, dermatitis; liver, kidney damage.	Inhalation, Absorption, Ingestion, Contact	1	TOV > 1 ppm TOV > 100 ppm	1) PID Monitoring and/or colorimetric indicator tubes. 2) If PID readings > 1 ppm, detector tubes will be used to determine compound (Benzene, Napthalene, Carbon Tetrachloride, Tetrachlorethylene, and Trichloroethylene) 3) Evacuate site at > 100 ppm TOV 4) Wear prescribed PPE

**TABLE 3-1
NIAGARA FALLS STORAGE SITE
POTENTIAL CONTAMINANTS OF CONCERN
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Contaminant	Exposure Limits	Characteristics	Diagnostic Signs and Symptoms	Routes of Exposure	Media	Action Levels	Work Practice Controls
Total Xylenes	*PEL-TWA = 100 ppm TLV-TWA = 100 ppm TLV-STEL = 150 ppm REL-TWA = 100 ppm REL-STEL = 150 ppm *OSHA added a STEL of 150 ppm, however, this limit was vacated back after a court ruling in 1993. IDLH = 900 ppm	Colorless liquid with an aromatic odor. IP = 8.44 to 8.56 depending on isomer FIP = 81-90 degrees F depending on isomer	Irritant of eyes, skin, nose, throat; dizziness, incoordination, staggering gait; corn vacuolization; anorexia, nausea, vomit, abdominal pain, dermatitis.	Inhalation, Absorption, Ingestion, Contact	1	TOV > 1 ppm TOV > 100 ppm	1) PID Monitoring and/or colorimetric indicator tubes. 2) If PID readings > 1 ppm, detector tubes will be used to determine compound (Benzene, Napthalene, Carbon Tetrachloride, Tetrachlorethylene, and Trichloroethylene) 3) Evacuate site at > 100 ppm TOV 4) Wear prescribed PPE
Carbon Tetrachloride	*PEL-TWA = 10 ppm *PEL-Ceiling = 25 ppm TLV-TWA = 5 ppm TLV-STEL = 10 ppm REL-STEL = 2 ppm Lowest feasible recommended *OSHA lowered the PEL-TWA to 2 ppm and eliminated the STEL, however, this limit was vacated back after a court ruling in 1993. IDLH = 300 ppm	Colorless liquid with an ether-like odor IP = 11.47 eV	CNS depressant, nausea, vomiting, liver and kidney damage, skin irritant, carcinogen.	Inhalation, Absorption, Ingestion, Contact	1,2,3	TOV > 1 ppm Carbon Tetrachloride > 2 ppm Carbon Tetrachloride > 50 ppm TOV > 100 ppm	1) PID Monitoring and/or colorimetric indicator tubes. 2) If PID readings > 1 ppm, detector tubes will be used to determine compound (Benzene, Napthalene, Carbon Tetrachloride, Tetrachlorethylene, and Trichloroethylene) 3) If Carbon Tetrachloride > 2 ppm then don respirators. 4) Evacuate site at > 100 ppm TOV and or Carbon Tetrachloride > 50 ppm. 5) Wear prescribed PPE

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Contaminant	Exposure Limits	Characteristics	Diagnostic Signs and Symptoms	Routes of Exposure	Media	Action Levels	Work Practice Controls
Trichloroethene	*PEL-TWA = 100 ppm *PEL-Ceiling = 200 ppm TLV-TWA = 50 ppm TLV-STEL = 100 ppm REL- Lowest feasible recommended *OSHA changed the PEL-TWA to 50 ppm and the Ceiling to a STEL of 200ppm, However, this limit was vacated back after a court ruling in 1993. IDLH = 1,000 ppm (Carcinogen)	Colorless liquid with a sweet odor-like chloroform IP = 9.45 eV	Headache, vertigo, visual distortions, tremors, somnolence, nausea, vomiting, irritant to eyes, dermatitis, paraesthesia, cardiac arrhythmias	Inhalation, Absorption, Ingestion, Contact	1,2,3	TOV > 1 ppm Trichloroethylene > 25 ppm Trichloroethylene > 250 ppm TOV > 100 ppm	1) PID Monitoring and/or colorimetric indicator tubes. 2) If PID readings > 1 ppm, detector tubes will be used to determine compound (Benzene, Naphthalene, Carbon Tetrachloride, Tetrachloroethylene, and Trichloroethylene) 3) If Trichloroethylene > 25 ppm then evacuate EZ don respirators, re-enter EZ. 4) Evacuate site at > 100 ppm TOV (Trichloroethylene evacuation would be required at > 250 ppm. 5) Wear prescribed PPE
<u>Polychlorinated Biphenyls</u> Archlor 1242 Archlor 1254	PEL-TWA = 1 mg/m ³ (skin) TLV-TWA = 1 mg/m ³ (skin) REL-TWA = 0.001 mg/m ³ Lowest feasible recommended IDLH = 5 mg/m ³ PEL-TWA = 0.5 mg/m ³ (skin) TLV-TWA = 0.5 mg/m ³ (skin) REL-TWA = 0.001 mg/m ³ Lowest feasible recommended PEL = 0.5 mg/m ³ (skin) IDLH = 5 mg/m ³	Colorless to light colored liquid with hydrocarbon odor Colorless to pale liquid with hydrocarbon odor	Eye irritant, chloracne, liver damage, carcinogen Eye and skin irritant, chloracne, carcinogen	Inhalation, Absorption, Ingestion, Contact Inhalation, Absorption, Ingestion, Contact	1,2 1,2	NA NA	Use of nitrile gloves, Saranex, boots Use of nitrile gloves, Saranex, boots

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Contaminant	Exposure Limits	Characteristics	Diagnostic Signs and Symptoms	Routes of Exposure	Media	Action Levels	Work Practice Controls
Radioactive Contaminants	2 mrem/hour (20 uSv/hour)	None	None	Inhalation, Absorption, Ingestion	1,2,3,4	2 mrem/hr ³	1) Continual monitoring. 2) Restriction of areas if contain contaminants above action levels. 3) See radiation protection plan, Appendix B.
<u>Nitroaromatics</u> 2,4,6-Trinitrotoluene	*PEL-TWA = 1.5 mg/m ³ (skin) TLV-TWA = 0.1 mg/m ³ (skin) REL-TWA = 0.5 mg/m ³ (skin) *OSHA lowered the PEL-TWA to 0.5 mg/m ³ (skin), however, this limit was vacated back after a court ruling in 1993. IDLH = 500 mg/m ³	Colorless to pale yellow, odorless solid Explosive Chemical IP = 10.59 eV	Irritation of eyes, throat, and nose. If inhaled, can cause sneezing, coughing, or ingestion which can cause liver damage, kidney damage, muscle pain, dermatitis, anemia, jaundice, or cyanosis.	Inhalation, Absorption, Ingestion, Contact	1,2,3	NA	1) Use of nitrile, gloves, Saranex, boots. 2) Precautions outlined in Section 2.8.3. 3) Respiratory protection if conditions are dry, windy, and dusty at where solid TNT is present or suspected or severely strained, and/or denuded soil is present. 4) Personal monitoring if recommended by CIH.

**TABLE 3-1
NIAGARA FALLS STORAGE SITE
POTENTIAL CONTAMINANTS OF CONCERN
AND
ASSOCIATED HAZARDS**

Contaminant	Exposure Limits	Characteristics	Diagnostic Signs and Symptoms	Routes of Exposure	Media	Action Levels	Work Practice Controls
Dinitrotoluene	PEL-TWA = 1.5 mg/m ³ (skin) TLV-TWA = 0.2 mg/m ³ (skin) REL-TWA = 1.5 mg/m ³ (skin) IDLH = 50 mg/m ³	Orange-yellow solid characteristic odor Explosive Chemical FIP = 404 degrees F	Can be inhaled or absorbed by ingestion or contact. Excessive absorption or inhalation can cause anoxia, cyanosis, anemia, or jaundice. Carcinogen	Inhalation, Absorption, Ingestion, Contact	1,2,3	NA	See 2,4,6- Trinitrotoluene
Trinitrobenzene	Not established	Yellow crystals Explosive Chemical	Similar to TNT. Causes reduction of oxygen carrying power of blood.	Inhalation, Absorption, Ingestion, Contact	1,2,3	NA	See 2,4,6- Trinitrotoluene
Dinitrobenzene	PEL-TWA = 1 mg/m ³ (skin) TLV-TWA = 0.15 ppm (skin) REL-TWA = 1 mg/m ³ (skin) IDLH = 200 mg/m ³	Pale white or yellow solid Explosive Chemical IP = 10.43 to 10.71 eV depending on isomer FIP = 303 degrees F	Anoxia, cyanosis, central scotomas, burning mouth, anemia, liver damage.	Inhalation, Absorption, Ingestion, Contact	1,2,3	NA	See 2,4,6- Trinitrotoluene
Nitrobenzene	PEL-TWA = 1 ppm (skin) TLV-TWA = 1 ppm (skin) REL-TWA = 1 ppm (skin) IDLH = 200 ppm	Yellow oily liquid with odor-like shoe polish. Explosive Chemical IP = 9.92 eV FIP = 190 degrees F	Eye irritant, anoxia, anemia, liver damage (in animals)	Inhalation, Absorption, Ingestion, Contact	1,2,3	NA	See 2,4,6- Trinitrotoluene
PAHs	Varies depending on the particular PAH compound	Pungent odor for some. May not have odor for others.	Skin rash, slight irritation to eyes and nose.	Inhalation, Absorption, Ingestion, Contact	1,2	NA	Level D with nitrile gloves - inner and outer.

TABLE 3-1
NIAGARA FALLS STORAGE SITE
POTENTIAL CONTAMINANTS OF CONCERN
AND
ASSOCIATED HAZARDS

Contaminant	Exposure Limits	Characteristics	Diagnostic Signs and Symptoms	Routes of Exposure	Media	Action Levels	Work Practice Controls
TPH (Various)	Varies depending on the type used - refer to MSDS for specific components. May contain benzene.	Colorless to dark oily liquid with aromatic or pungent odor.	Irritant to eyes and nose, skin rash.	Inhalation, Absorption, Ingestion, Contact	1,2	5 ppm	If PID readings > 5 ppm, vapor detector tubes to ID if not identifiable with detector tubes. Upgrade to Level C.
Nitric Acid	*TWA-PEL = 2 ppm TLV-TWA = 2 ppm TLV-STEL = 4 ppm REL-TWA = 2 ppm REL-STEL = 4 ppm *OSHA added a STEL of 4 ppm, however, this limit was vacated back after a court ruling in 1993. IDLH = 100 ppm	Colorless, yellow or red fuming liquid with acrid odor.	Eye irritant, edema, bronchitis, dermal burns.	Inhalation, Ingestion, Contact	2	NA	Use of nitrile glove, Saranex, boots.
Asbestos	PEL-TWA = 0.1 fiber/cc PEL-STEL = 1 fiber/cc Note: Fibers are defined as greater than 5 mm in length with a length to width ratio at least 3 to 1. TLV-TWA = 0.1 fiber/cc REL-TWA = 0.1 fiber/cc Lowest feasible recommended	White or greenish-blue or gray-green fibrous odorless solid.	Asbestosis (chronic exposure) restricted pulmonary function, dyspnea, interstitial fibrousus.	Inhalation, Ingestion, Contact	4,5	NA	Use prescribed PPE.
Methanol	PEL-TWA = 200 ppm (NIOSH and OSHA) IDLH = 6000 ppm	Colorless liquid with a harviteristic pungent odor	Irritant to eyes, skin, respiratory system, drowsiness, vertigo, optic nerve damage	Inhalation, Ingestion, Contact, Absorption	1	NA (preservative)	Use of nitrile glove, Saranex, boots.

TABLE 3-1
NIAGARA FALLS STORAGE SITE
POTENTIAL CONTAMINANTS OF CONCERN
AND
ASSOCIATED HAZARDS

Contaminant	Exposure Limits	Characteristics	Diagnostic Signs and Symptoms	Routes of Exposure	Media	Action Levels	Work Practice Controls
Sodium Busulfate	No specific information found on exposure limits; No LD50/LC50 information found related to normal routes of occupational exposure	Inorganic corrosive colorless crystal solid which is acidic; will be a liquid solution in the field and used in limited quantities as a preservative	Irritation of nose and throat and labored breathing; sore throat; vomiting; diarrhea; lung irritation; coughing	Inhalation, Ingestion, Contact	1	NA	Use prescribed PPE identified in MSDS.

PEL = Permissible Exposure Limit (OSHA)

TLV = Threshold Limit Value (American Conference of Governmental Industrial Hygienist)

REL = Recommended Exposure Limit (NIOSH)

TWA = Time Weighted Average

STEL = Short Term Exposure

IDLH = Immediately Dangerous to Life or Health

¹ N.D. = an IDLH has not as yet been determined.

² NA = The material may contain these compounds and/or chemicals at trace levels in the sediment. "Action Levels" and "Types of Detection" are not applicable in the laboratory environment.

IP = Ionization Potential

FIP = Flash Point

Media = 1) Soil 2) Water 3) Sediment 4) Building Surfaces

EZ = Exclusion Zone

TABLE 3-2
ACTIVITY HAZARD ANALYSIS

Contract No. DACW49-95-D-0001	Project: Manhole/Pipeline Sampling	Facility: Niagara Falls Storage Site
Date: February 23, 2000	Location: Lewiston, NY.	Estimated Start Date: March 2001
Phase of Work	Safety Hazard	Precautionary Actions
MANHOLE/PIPELINE SAMPLING	Hitting Buried Utilities	<ol style="list-style-type: none"> 1. Contact the New York One-Call System at least seven days prior to mobilization to the site. Contact non-subscriber utilities within the project area concerning the location of utilities at the project site at least seven days prior to mobilization to the site. 2. Coordinate with USACE concerning location of private and non-subscriber utilities which may be located on-site near the work areas. 3. Maintain employee alertness around trenching operations.
	Falling, tripping, or puncturing	<ol style="list-style-type: none"> 1. Maintain employee alertness around drilling operations. 2. Practice good housekeeping. 3. Always be on guard for pinch or shear points.
	Inhalation of vapors	<ol style="list-style-type: none"> 1. Monitor atmosphere with PID and Toxic Gas meter during trenching and sampling. 2. Maintain employee alertness of known or suspected area of possible vapor inhalation. 3. Clean shaven if Level C is required.
	Cold-related problems	<ol style="list-style-type: none"> 1. Pace your work. 2. Take frequent breaks (warm and dry rest area). 3. Wear layered clothing with wind breaking material on the outside. 4. Maintain hydration.
	Heat-related problems	<ol style="list-style-type: none"> 1. Pace your work 2. Force fluid intake. 3. Take frequent breaks in heated areas.
	Backing over workmen	<ol style="list-style-type: none"> 1. Before moving make sure all people are clear. 2. Slow down when backing up or when on ramps and curves. 3. Do not drive through dust clouds. 4. Allow for safe stepping distances. 5. Instruct employees never to walk in front or back of moving equipment. 6. Try to make eye contact with operators you are near.

TABLE 3-2
ACTIVITY HAZARD ANALYSIS

Contract No. DACW49-95-D-0001	Project: Manhole/Pipeline Sampling	Facility: Niagara Falls Storage Site
Date: February 23, 2000	Location: Lewiston, NY.	Estimated Start Date: March 2001
Phase of Work	Safety Hazard	Precautionary Actions
MANHOLE/PIPELINE SAMPLING (cont.)	Explosions/Fire	<ol style="list-style-type: none"> 1. Never use gasoline or any other combustible solvent as a cleaning agent. 2. Do not fuel or perform maintenance while generator is running. 3. When jumping batteries be sure of your connections. 4. Know where fire extinguishers are and how to use them. 5. Use non-sparking tools.
	Back injuries	<ol style="list-style-type: none"> 1. Instruct personnel how to lift materials. 2. Instruct personnel to get help and/or to use lifting equipment.
	Getting caught in moving machinery	<ol style="list-style-type: none"> 1. Do not wear loose clothing or jewelry around moving machinery. 2. Tie up long hair or place it under a net or cap. 3. Tuck overalls into boot tops or bind them at the ankle.
	Hearing loss	<ol style="list-style-type: none"> 1. Employees within 25 feet of operating excavating equipment <u>shall</u> wear hearing protection with minimum noise reduction rating of 29 dBA or greater.
	Direct Contact with unidentified wastes	<ol style="list-style-type: none"> 1. Maintain employee alertness in sampling areas. 2. Ensure that the specified PPE is use during sampling activities. 3. Ensure proper decontamination techniques are used. 4. Employees must ensure that radiological monitoring of personnel and equipment is performed.
	Weather	<ol style="list-style-type: none"> 1. Avoid working in conditions which could escalate potential site hazards such as rain, mud lightning, etc..
	Biological	<ol style="list-style-type: none"> 1. Use Permanone, DEET containing insect repellents, Tyvek coveralls and head nets to reduce employee exposure to mosquitoes, ticks and chiggers.
	Back injuries	<ol style="list-style-type: none"> 1. Instruct personnel how to lift materials. 2. Instruct personnel to get help and/or to use lifting equipment.

TABLE 5-1
TRAINING/MEDICAL SUMMARY

Personnel	40-Hour HAZWOPER	8-Hour Supervisor	8-Hour Refresher	Physical Exam	Respirator Fit Test	First Aid/CPR (expires)
Bessent, Bob	February 1988	October 1988	March 2001	April 2001	July 2001	Jan. 2002/Jan. 2002
Biggs, Tim	May 1992	October 1994	March 2001	March 2001	June 2001	Jan. 2002/Jan. 2002
Dawdy, Greg	November 1984	December 1990	March 2001	August 2001	July 2001	Jan. 2003/Jan. 2002
Dickens, Nancy	October 1989	March 1990	March 2001	August 2001	July 2001	Jan. 2003/Jan. 2002
Germeroth, Dave	February 1991	February 1996	March 2001	July 2001	July 2001	Jan. 2002/Jan. 2002
Gricevich, Max	November 1986	October 1988	March 2001	August 2000	June 2001	Jan. 2002/Jan. 2002
Lachajczyk, Tom	March 1988	October 1988	March 2001	April 2000	July 2001	Jan. 2003/Jan. 2002
Lindenbusch, Brad	August 1994	None	March 2001	February 2001	July 2001	Jan. 2003/Jan. 2002
McLean, Mike	November 1994	None	March 2001	December 2000	June 2001	March 2002/Jan. 2001
Mulhearn, Brian	March 1993	None	March 2001	January 2001	July 2001	July 2002/Jan. 2002
Richards, Jim	May 1993	May 1993	March 2001	May 2001	July 2001	July 2002/Jan. 2002
Shetley, Jim	August 1998	None	March 2001	May 2001	July 2001	Jan. 2002/Feb. 2001
Sievers, Mark	August 1993	May 1994	April 2001	May 2001	July 2001	Jan. 2003/Jan. 2002
Smith, Jennifer	July 2000	None	July 2001	July 2001	July 2001	July 2002/Jan.2002

EXHIBITS

EXHIBIT 5-1
STATEMENT OF UNDERSTANDING

My signature indicates that I have read, understood, and will comply with the guidelines and procedures set forth in the Site Safety and Health Plan and the Site Safety and Health Plan Addendum for the Additional Sampling to Characterize the Niagara Mohawk located in Lewiston New, York.

Printed of Typed Name

Signature

Date

APPENDIX A

RADIATION PROTECTION PLAN AMMENDMENT FOR PHASE PIPELINE INVESTIGATION OF THE MAXIM REMEDIAL INVESTIGATION AT THE NIAGARA FALLS STORAGE SITE

Date of Preparation: February 21, 2001

Revision: 0

Purpose

This document is a supplement to the Radiation Protection Plan implemented during Phase Two of the Maxim remedial investigation (RI), as amended from Phase One. Only revisions to the previous plan are noted.

Plan Revisions

Trenching will be required to access underground piping (in areas outside of the Interim Waste Containment Structure) during the Pipeline Investigation portion of the RI. From a radiological perspective, this is the only activity not accounted for in the existing Radiation Protection Plan. To address the trenching activity, an amended radiological activity hazard analysis is attached.

Trenching equipment will be comprehensively surveyed for total and removable surficial contamination upon arrival at the site, and prior to removal from the site.

Trenching personnel will receive radworker training (unless already current), and a TLD prior to work at the site. Work areas will be surveyed for gamma radiation with a Bicron Microrem dose rate meter, or equivalent.

At the completion of each trench, the trenching equipment bucket, and any areas covered with visible soil, will be surveyed for removable contamination. Any contaminated equipment, when compared with the existing surficial contamination limits, will be contained, transported to the decontamination pad, and decontaminated.

During trenching activities, the person most likely to inhale radioactive material, as determined by the job coverage health physics technician, will be monitored with a breathing zone air sample. All personnel in the immediate area will be assigned dose based on that air sample. All excavated soil, as well as the "floor" of the trench, will be surveyed with an NaI 2" X 2" detector coupled with a rate meter (Ludlum 2221/44-10 or equivalent). Soil exhibiting a (NaI 2" X 2") count rate of twice that of background will be sprayed with water during excavation to reduce potential airborne exposure.

Also, solid IDW will not be surveyed for surficial radiological contamination during Phase Three of the RI. All solid IDW will be containerized, labeled, stored, and disposed of as radioactive material.

PHASE THREE SUPPLEMENT- RADIOLOGICAL ACTIVITY HAZARD ANALYSIS

Safety and Health Hazards	Probability/Severity	Controls	Monitoring
TRENCHING SOIL			
Radiological surficial contamination	Very Low /Very Low	<p>No trenching is permitted in the fenced Waste Containment Structure Area.</p> <p>PPE (Level D modified with Tyvek suits, boots, and Nitrile or PVC gloves)</p> <p>Exclusion zone around trenching areas</p> <p>Medical clearance for HAZWOPER work</p> <p>Minimal contact, wash face and hands prior to taking anything by mouth.</p>	<p>Site entry and exit surficial contamination surveys of equipment.</p> <p>Surficial contamination surveys of the bucket and soil covered surfaces prior to moving trenching equipment to the next location.</p> <p>Personnel contamination surveys conducted prior to fenced area exit and periodically as determined by Health Physics.</p>
Radiological airborne exposure	Very Low /Very Low	<p>Removable contamination surveys will be performed on potentially contaminated equipment / soil. Engineering controls and/respiratory protection will be implemented if occupational air sampling indicates airborne concentrations exceeding 0.25 DAC-hrs/hr.</p>	<p>Occupational air sampling (breathing zone) on individual most likely to be exposed as determined by Health Physics.</p> <p>Survey soil with NaI detector prior to removal.</p> <p>Wet down soil with activity 2 times background with NaI detector prior to removal.</p>

PPE = personal protective equipment

APPENDIX B

Please refer to the Site Safety and Health Plan for Niagara Mohawk which contains the appropriate training certificates and fit-for-duty statements.

APPENDIX C

Please refer to the Site Safety and Health Plan for Niagara Mohawk which contains the appropriate training certificates and fit-for-duty statements.