N00236.001543
ALAMEDA POINT
SSIC NO. 5090.3

SITE WORK PLAN
Phase III & IV

SITE HEALTH & SAFETY PLAN
Phases III & IV

SITE QUALITY ASSURANCE PLAN
Phases III & IV

STORM WATER DRAIN EXCAVATION, CLEANING, REMOVAL, AND REPLACEMENT AT BUILDINGS 5 and 400 ALAMEDA POINT, ALAMEDA, CALIFORNIA (FORMERLY NAVAL AIR STATION, ALAMEDA, CALIFORNIA)

Project No. USN 97-032

Submitted to:

U.S. Army Industrial Operations Command
Attn: AMSIO-DMW (Mr. David Horton)
Rock Island, IL 61299-6000
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Submitted by:

New World Technology
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Revision 2

July 1998

N00236.001543
ALAMEDA POINT
SSIC NO. 5090.3

REVISION 1

PHASE III SITE WORK PLAN
FOR THE STORM WATER DRAIN EXCAVATION,
CLEANING, REMOVAL AND REPLACEMENT AT
BUILDINGS 5 AND 400

DATED 01 APRIL 1998

IS ENTERED IN THE DATABASE AND FILED AT
ADMINISTRATIVE RECORD NO. **N00236.001512**

REVISION 1

PHASE III SITE QUALITY ASSURANCE PLAN
FOR THE STORM WATER DRAIN EXCAVATION,
CLEANING, REMOVAL AND REPLACEMENT AT
BUILDINGS 5 AND 400

DATED 01 APRIL 1998

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REVISION 1

PHASE III SITE HEALTH AND SAFETY PLAN FOR THE STORM WATER DRAIN EXCAVATION, CLEANING, REMOVAL AND REPLACEMENT AT BUILDINGS 5 AND 400

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SITE WORK PLAN

STORM WATER DRAIN EXCAVATION, CLEANING, REMOVAL, AND REPLACEMENT AT BUILDINGS 5 and 400 ALAMEDA POINT, ALAMEDA, CALIFORNIA

(FORMERLY NAVAL AIR STATION, ALAMEDA, CALIFORNIA)

Project No. USN 97-032
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SITE WORK PLAN APPROVALS

STORM WATER DRAIN EXCAVATION, CLEANING, REMOVAL, AND REPLACEMENT AT BUILDINGS 5 and 400 ALAMEDA POINT, ALAMEDA, CALIFORNIA

Revision 2
July 1998

Submitted by: ______________________ Date: 7/28/98
Mark Divoky, REA
NWT Health and Safety Manager

Approved by: ______________________ Date: 7/28/98
Donald Wadsworth MSHP
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Approved by: ______________________ Date: 7/27/98
William Haney
NWT Program Director/Project Manager

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List of Acronyms

ANSI	American National Standards Institute
°C	Degrees Celsius
CCR	California Code of Regulations
CFR	Code of Federal Regulations
CRZ	Contamination Reduction Zone
Daily Logs	Daily Log
dpm	disintigrations per minute
DOT	Department of Transportation
EPA	Environmental Protection Agency
EZ	Exclusion Zone
°F	Degrees Fahrenheit
GFCI	Ground Fault Circuit Interrupter
HAZWOPER	Hazardous Waste Operations and Emergency Response
HS	Health and Safety
IOC	Industrial Operations Command
IR	Installation Restoration Site
LEL	Lower Explosive Limit
µCi	Micro Curies
MSDS	Material Safety Data Sheet
NWT	New World Technology
OSHA	Occupational Safety and Health Administration
PEL	Permissible Exposure Limit
PID	Photo ionization Detector
PM	Project Manager
PPE	Personal Protective Equipment
PS	Project Supervisor
Ra	Radium
ROICC	Resident Officer In Charge Of Construction
SHSO	Site Health and Safety Officer
SHASP	Site Health and Safety Plan
TBE	To Be Established
TSM	Tailgate Safety Meeting
USA	Underground Services Alert
USCOE	U.S. Army Corps of Engineers
USN	U.S. Navy
UST	Underground Storage Tank

Title

New World Technology (NWT) Project Work Plan for Alameda Point, Radium Contaminated Sewer Line Removal Project, US IOC contract number USN 97-032, Phase III.

1.0 Introduction

This project involves the removal of approximately 1,000 linear feet of sewer line located at two locations on the site formerly known and operated as the Naval Air Station, Alameda, in Alameda, California. (Refer to the Drawings and Contract Documents for exact locations and quantities of materials expected to be removed during this contract.)

800 linear feet of the pipeline is located in Building 400 and 200 linear feet of the pipeline is located in Building 5. The pipelines are of various sizes with the majority measuring 24-inches (ID), the maximum and minimum sizes are 6-inches (ID) and 48-inches (ID), respectively. The pipeline to be removed begins within the interior of the structures and will be removed and replaced out to the first terminator (manhole) on the exterior of the buildings. Additional lines, not physically connected to the sewer line, run parallel to the pipeline to be replaced and consist of gas service, water and additional sewer/storm drains. Work shall include the blinding and removal of various piping at the terminal point, complete removal and cleaning of the subject pipeline prior to disposal, and the removal and disposal of incidental contaminated soils or ground waters encountered during the removal operations.

Finally, all areas disturbed during the removal portion of the contract shall be restored to their former condition prior to demobilization from the project site.

2.0 Purpose

This plan describes the work methodology, hazardous material and occupational safety requirements, and the safeguarding of protected waterways near San Francisco Bay.

Additionally, this plan describes the activities applicable to the pipeline exhumation including, the identification, packaging, transportation and shipment for disposal of any radium contaminated materials. Methodologies concerning the decontamination and segregation of the wastes is also included in this document. Work procedures for the installation of the replacement line will be included as an appendix to this document. The hazardous material and occupational requirements of this plan are based on a preliminary assessment of potential hazards and may be reevaluated and modified with the concurrence of the NWT Corporate Health and Safety Manager, Operations Technical Support, and the Project Manager, US Industrial Operations Command.

3.0 References

1. Andrews, Lori P. Worker Protection During Hazardous Waste Remediation. The Center for Labor Education and Research
2. Keith, Lawrence H. Environmental Sampling and Analysis. Lewis Publishers
3. US EPA, 1988. A Compendium of Superfund Field Operations Methods
4. US EPA, 1992. Guidance for Data Usability in Site Assessment
5. US EPA, 1986. Test Methods for Evaluating Solid Waste, 3rd Edition, Volume II
6. NIOSH, NIOSH Manual of Analytical Methods, 4th Edition
7. CCR Title 8, Division 1, Chapter 4, Subchapter 4. General Industry Safety Orders
8. CCR Title 22, Division 4. Environmental Protection.
9. CFR 10. Energy
10. CFR 29. Labor
11. CFR 40. Protection of the Environment.
12. CFR 49. Transportation
13. US COE, 1996. Safety and Health Requirements Manual (EM385-1-1).
14. BAAQMD, 1997. Rules and Regulations 1 through 13
15. U.S. NRC, NUREG 5849
16. U. S. NRC Reg Guide 1.86

4.0 Scope of Work

4.1 Pre-construction Meetings

Pre-Construction Meetings - Prior to any on-site activities the NWT project team will meet with the IOC representatives, the Facility representatives, and any regulatory agency representatives to insure that all aspects of the Project Work Plan (PWP) meet all of the requirements for the project as specified.

4.2 Health and Safety Plan

OSHA Site Health & Safety Plan (29 CFR 1910.120(b)(1)) - This plan addresses the possibility of discovering materials identified and not identified in the Scope of Work and any physical hazards that may be encountered during the performance of the contract. All personnel at the work site shall have successfully completed the 40-hour HazWOPER Course, and refreshers as necessary.

Additionally supervisory personnel shall have the 8-hour supervisory training as mandated by 29 CFR 1920.120. The plan will require all personnel to provide evidence of current OSHA training (29 CFR 1910.120(e)(6)) and medical certification (29 CFR 1910.120(f)).

4.3 Project Schedules

The project schedule currently requires thirteen weeks of on site effort which includes two weeks of obstruction removal in Building 5 with a reduced crew and eleven weeks of pipe removal and replacement. For the purpose of this project schedule, Day 1 will be the first day that personnel are on site at Alameda Point.

The work to be performed under this specification is detailed under Section 6.0 of this document and includes all items previously discussed.

5.0 Radioactive Material Control Program

5.0.1 NWT and any other personnel assigned to or visiting the site shall attend a project Safety briefing provided by the Project Manager/SHSO or designee and documented prior to performance of the work. This briefing shall include hazardous/radiological material awareness training, occupational health and safety, and provide details of the work scope to be performed.

5.0.2 Documented Regulatory, OSHA, and Industrial Safety briefings will be held in accordance with the references and the SHASP prior to and at mobilization to the site.

5.0.3 A barrier shall be erected around all excavation areas and all work areas shall be properly posted for both hazardous/radiological material control and industrial safety considerations. Additional signs and postings will be as specified in the Project Health and Safety Plan and NWT field operations procedures.

5.0.4 Cognizant Facility authorities (i.e., Facility Security, Facility Safety Office etc.) shall be kept apprised of the project status during all phases of operation. The Project Manager/SHSO shall document these verbal or written reports in the daily logbook.

5.0.5 All aboveground storage of hazardous/radiological material shall be contained in approved transport containers. For any pipe decontamination efforts, ground cover shall extend at least 5 feet in all directions beyond the materials. Covering shall overlap at least three feet and all edges weighted to prevent loss of the cover. The area shall be posted as required in accordance with references.

5.0.6 All soil excavated from the site shall be segregated into discreet and identifiable containers and stored on-site in the designated storage area(s).

5.0.7 All material excavated shall be segregated until sampling has been performed and approval is obtained from the IOC or RASO as to the disposition of the material.

5.0.8 Release surveys of equipment will be performed after a complete decontamination, (see Site Specific Health and Safety Plan for details of decontamination requirements). All surveys shall be documented in accordance with NWT field operations procedures.

5.0.9 The Project Manager/SHSO, for all job tasks involving entry into a confined space shall initiate a Confined Space Work Permit (CSWP). The

CSWP will detail all hazardous/radiological material and safety requirements for a particular task. Specific details and requirements of the confined space entry procedures are detailed in the Project Health and Safety Plan along with samples of the forms required.

5.0.10 Respiratory protection is may be required, therefore all on-site personnel shall be qualified and have a documented fit-test as required in accordance with the references. Respiratory protection is anticipated as a contingency only. Air monitoring in accordance with the Project Health and Safety Plan will be used during all operations.

5.0.11 The following instruments, at a minimum, (or equivalent) will be calibrated and maintained in accordance with the manufacturers recommendations and shall be on-site for use during the project:

Manufacturer	Inst./Probe	Type	Quantity
Thermo Inst.	580 B	PID	1
Gastech	GT 302	4 Gas Meter	1
Ludlum	M3/44-9	β/γ Meter	2
Ludlum	2929	Counter	1
Ludlum	M19	Dose Rate	1
F&M	HV-1	Air Sampler	2
F&M	LV-1	Air Sampler	1

5.0.12 Only qualified personnel in accordance with the references will perform shipments of hazardous/radiological materials and/or waste.

5.0.13 Certifications of Decontaminated Equipment will be acquired from all rental venders used.

6.0 Detailed Procedure

The project work will be divided into four phases. Phase I will include initial mobilization and the identification and delineation of all work areas and removal of obstructions from the line areas in Building 5. Phase II will involve the initial excavation and preparation of the pipeline for removal. Phase III will be the exhumation, removal, decontamination and packaging of the waste materials for disposal. Phase III will include the performance of surveys and soil sample analysis of the excavation areas to ensure all radiological materials are removed to the limits specified. Phase IV will be replacement of the sewer lines, shipment of wastes and final demobilization.

ALL WORK WILL BE PERFORMED IN A SAFE AND CONSCIENTIOUS MANNER. THE WORK INSTRUCTIONS AND REQUIREMENTS OF THE NWT HEALTH AND SAFETY PLAN AND PROJECT WORK PLAN FOR THIS PROJECT WILL BE REVIEWED WITH THE WORK FORCE PRIOR TO THE START OF WORK AND SHALL BE ADHERED TO AT ALL TIMES WHILE ON THE WORK SITE.

NOTE: THE PHYSICAL CONDITION OF PIPELINES IS NOT KNOWN. CAUTION WILL BE UTILIZED DURING THE EXCAVATION AND REMOVAL PROCESSES TO PREVENT RELEASES TO THE ENVIRONMENT. SHOULD PHYSICAL DETERIORATION BE OBSERVED, WORK SHALL STOP AND THE CONDITION OF THE PIPELINES EVALUATED TO DETERMINE IF THE PLANNED REMOVAL METHODS ARE APPROPRIATE.

NOTE: RADIUM, ITS DAUGHTER PRODUCTS, AND/OR HYDROGEN SULFIDE ARE THE SIGNIFICANT HAZARDOUS MATERIALS ANTICIPATED HOWEVER, OTHER MATERIALS MAY BE PRESENT. GOOD HAZARDOUS MATERIAL / HAZARDOUS WASTE WORK PRACTICES SHALL BE EMPLOYED AT ALL TIMES.

NOTE: DURING EXCAVATION, SOIL SAMPLES SHALL BE COLLECTED ON INCREMENTS AS DIRECTED IN THE SPECIFICATIONS AND THE APPROVED WORKPLAN TO DETERMINE THE PRESENCE OR ABSENCE OF RADIOLOGICAL CONTAMINATION IN THE SURROUNDING SOILS.

6.1 Mobilization on Site

6.1.1 Travel to site.

6.1.2 Set up on-site facilities (office, supply trailer, etc.)

6.1.3 Train personnel in site-specific hazardous/radiological material control procedures, industrial safety and procedural controls. Training to be given by the Project Manager/SHSO.

6.1.4 Remove the physical obstructions from Building 5.

6.1.5 Verify all personnel records required by the project specifications.

6.1.6 Obtain Facility excavation permit.

6.1.7 Contact Underground Service Alert for excavation approval number.

6.1.8 Coordinate with local Hospital for emergency services.

6.1.9 Coordinate with Facility Security to obtain personnel I.D.'s and vehicle passes where necessary.

6.2 Identification of Work Areas

6.2.1 Using hand held magnetometers (Schonstedt 72 CV) survey the areas surrounding the pipelines to be removed. Note any possible crossing lines that may interfere with excavation activities.

6.2.2 Barricade and post the designated work area as "Radiological Material Area", "RWP Required for Entry" and "Authorized Personnel Only".

6.2.3 Perform Lock Out / Tag Out Procedures on any electrical/flow regulatory service that may be associated with the pipeline scheduled for removal.

6.2.4 Perform and document a survey to determine background readings throughout the planned work area. This survey will be utilized to verify that contaminated materials are not left at the conclusion of the project.

6.2.5 A prefabricated trench box will be installed in all excavations to prevent trench collapse. This box shall be moved as the excavation lengthens and backfilling is performed in other sections of the trench.

6.2.6 Work areas shall be fenced as a barricade against inadvertent entry of unauthorized personnel.

6.3 Initial Excavation of the Contaminated Pipelines

6.3.1 All surfacing materials are to be considered clean for the purposes of this work plan. All asphaltic and concrete debris will be segregated, stockpiled, and disposed of as construction debris at the appropriate Class III disposal facility. If recycling of the asphaltic materials is determined to be logistically possible, this waste stream will be diverted to the appropriate recycling facility.

6.3.2 Soils removed to the upper surface of all sewer pipelines (overburden) will also be considered clean for the purposes of this work plan. Confirmatory samples will be taken as a precautionary measure, once every 20 linear feet of pipeline or every 10 cubic yards of material removed, whichever is less. The total estimated volume of soils and pipe to be removed is approximately 1000 cubic yards, with 200 yards assumed to be contaminated with radium exceeding the release concentration.

6.3.3 All soils removed will be stockpiled in pre-positioned transport containers (25 cubic yard roll off containers) to prevent the spread on contamination to the surrounding environment.

6.3.4 Initial excavation of the pipeline shall be performed in stages, exposing the entire upper portion of the pipeline in one operation, and then proceeding to excavate below the upper portion of each successive portion of pipeline to be removed. This process will enable the work crew to identify any failed sections of lines, possible interferences, or other situations that may require a modification to the work plans.

6.3.5 All materials removed from below the upper surface of the pipeline will be considered potentially contaminated, until soils testing confirms the presence or absence of radium or other hazardous material contamination. These materials will be segregated and stored separately from the materials removed from above the pipeline (overburden). These containers will be clearly marked and under radiological controls until clearance sampling has been performed and the Project HP determines that there is no Radium contamination above the project limits.

6.3.6 An engineered trench box will be positioned as each section of pipeline is excavated and prepared for removal. This will allow trench entry, contingent on satisfactory completion of the CSWP where required, for pipeline plugging, sampling and line inspection, as needed. The engineered trench box will be moved down the trench as each successive section of pipeline is exposed and removed.

6.4 Removal of Contaminated Pipelines

NOTE: DURING ANY LINE ENTRIES, PRECAUTIONS WILL BE TAKEN TO ENSURE THAT UNAUTHORIZED RELEASES OF RADIOACTIVE MATERIALS ARE PREVENTED. SPILL PREVENTION PRACTICES AS OUTLINED IN THE NWT HEALTH AND SAFETY PLAN AND FIELD OPERATIONS PROCEDURES WILL BE USED AT ALL TIMES

6.4.1 Locate and identify the location of the line section to be removed. Locate other utility or service lines that cross (or potentially cross) the section being removed.

6.4.2 Mark the surface material (concrete/asphalt) using paint along the centerline of the pipe.

6.4.3 Based on the diameter of the pipe section being removed, use a chalk line to mark the edges of the trench. The edge of the trench will be measured from the centerline of the pipe and the distance will be calculated by adding the radius of the pipe plus one-foot.

6.4.4 The pipe section will be isolated at a designated manhole or end section of above grade pipe upstream of the section to be removed utilizing an inflatable pipe plug. The downstream section will be plugged at the first manhole from the section (or sections) to be removed to prevent back flow due to tidal actions.

6.4.5 Temporary piping will be routed from either the manhole upstream or the cut end of the above grade pipe to the first available downstream manhole from the section to be removed. A submersible pump will be utilized for effluent transport if the upstream termination point is in an existing manhole.

6.4.6 The surface material will be saw cut along the trench chalk line. Manholes will be saw cut two feet greater than the perimeter of the manhole.

6.4.7 Once the surface has been cut, a hydraulic breaker, mounted on a backhoe or excavator, will be used to break the concrete into manageable pieces. Concrete pieces or asphalt will be removed with the backhoe or excavator and loaded directly into dump trucks for transport to a concrete/asphalt recycling facility for recycle as engineered fill.

6.4.8 Soils will be excavated using the backhoe/excavator and loaded into dump trucks for transport to a staging area for analysis prior to disposal. Side walls of the trench will be protected using trench shoring boxes and/or hydraulic jacks. Areas of the trench containing crossing utility lines will be excavated by hand to expose the crossing utilities prior to excavating with the backhoe/excavator.

6.4.9 Once the top of the pipe is uncovered, extreme care shall be used not to break or disrupt the existing integrity of the pipe. Periodic inverts will be taken to identify the existing elevations of the pipe. One foot of soil will be excavated along each side of the pipe to completely expose the pipe.

6.4.10 Piping will be inspected for integrity, and the ends sealed with plastic. Upon initial lift, the pipe will be contained in a plastic wrap prior to removal from the trench area.

6.4.11 The removed sections of piping will be evaluated for decontamination or volume reduction efforts once removed from the trench. Should decontamination appear feasible, a decontamination area will be established in a facility-designated location.

6.4.12 After the pipe section has been removed from the trench, remove an additional foot of soil.

6.4.13 Perform a survey using a count rate instrument with a 2" X 2" NaI detector. Note any areas exceeding the pre-determined background count rate. Any areas clearly indicating residual radium contamination will require further soil removal. Direct approval of the Project Manager is required for any additional soil removal, following notification of the IOC Project Manager and RASO. Photograph the trench at the conclusion of the removal operation and during subsequent backfill and replacement operations.

6.4.14 When ground water is encountered in the excavation, the water will be pumped to a temporary, 20,000 gallon holding tank. The water will be treated by filtration with particulate filters followed by an activated carbon bed filtration. Following sampling and analysis, the water will be utilized for irrigation of Area 1 at a rate which does not produce saturation of the soils.

6.4.15 Obtain composite soils samples from the trench area at a rate of two per ten feet of excavation. The samples will be analyzed for residual radium. If the analysis indicates that concentrations exceed the release limit, additional soil removal will be required. Direct approval by the Project Manager is required prior to any additional soil removal, following notification of the IOC Project Manager and RASO. See Section 6.6 below. Final radiological release of the soils will be performed by TTEMI as oversight contractor.

6.4.16 Once the trench is verified radiologically clean, backfill will be placed and compacted as specified in the technical specification, with clean approved fill material to within six inches of the bottom elevation of the new pipe. Six inches of bedding sand will be placed and compacted. Elevations will be verified by laser level. See Section 6.7 below.

6.4.17 Following any corrections in elevation, install the new pipe and verify invert elevations.

6.4.18 Perform a survey of the designated work area to verify that no inadvertent spread of contamination has occurred. Any area indicating levels of loose surface contamination exceeding 300 dpm/100 cm2 beta gamma, or 20 dpm/100 cm2 of alpha activity will require decontamination.

6.4.19 Repeat the above until all identified piping has been removed and replaced.

6.4.20 Pre-cast manholes will be used to replace existing manholes. The bottom elevation will be verified prior to placing the manhole base. Sections will be installed in accordance with the technical specification.

6.4.21 Following installation of all pipe and manholes, the system will be tested, inspected and approved prior to backfilling. Additional dewatering may be required during this operation. Upon acceptance, the backfilling will be completed and the surface finished to match existing adjacent surfaces.

6.5 Cleaning and Storage of the Contaminated Pipeline

6.5.1 Samples of the material in the interior of the pipeline shall be taken when the pipeline is initially brought to the cleaning and storage area. All materials from the interior of the pipeline will be considered contaminated until proven otherwise.

6.5.2 Photographs of the pipeline shall be taken for project archives.

6.5.3 Each section of line shall be sequentially numbed for identification and reporting.

6.5.4 The pipeline will be washed using pressure washers and all rinsate and materials collected and stored as contaminated materials pending sample analysis. The pipeline will then be moved to a temporary survey area, and a surface survey for the presence of residual Radium contamination will be performed.

6.5.5 If further cleaning is required, the pipeline will be pressure washed one additional time. If subsequent surveys indicate that the pipeline is still contaminated, more aggressive removal techniques will be employed including, surface scabling, chipping, and breaking. If the contamination is found to extend throughout the pipeline, the decision will be made to dispose of the pipeline whole.

6.5.6 Air monitoring will be performed whenever aggressive surface removal techniques are employed in the decontamination of the pipelines.

6.5.7 Surface wetting will be the primary engineering control during these operations to prevent the release of airborne contaminates.

6.5.8 It is not anticipated that surfactants or other additives will be used in the cleaning process. If these types of materials are to be used, a MSDS shall be forwarded to the SHSO prior to the delivery of the materials

6.5.9 During all cleaning activities utilizing pressure washers, personnel possibly exposed to the spray will be outfitted in the appropriate personal protective equipment (PPE) as outlined in the SHASP. This equipment will include, but is not limited to, respiratory protection, rain suits, gloves, boots, and leg and metatarsal guards.

6.5.10 When a section of pipeline is determined to be below the release limits set in the contract the pipeline will be moved to a clean disposal storage area, and broken up for easier transport and disposal.

6.5.11 Every section of pipeline shall be tracked using the identification number issued when the pipeline section was first brought to the cleaning and storage area.

6.5.12 A logbook detailing the progress of the pipeline sections shall be maintained and available for inspection at the pipeline cleaning and storage area.

6.5.13 Photographs of the cleaning and survey operations will be taken for the project archives.

6.6 Over-excavation of Potentially Contaminated Soils

6.6.1 Areas below the removed pipeline shall be surveyed, as required, prior to the installation of the new pipeline.

6.6.2 Surveys will be performed both remotely or after successfully completing a CSWP, and entering the trench. These surveys will include the use of hand held direct reading instruments, and as directed the recovery of suspect soils for more detailed analysis.

6.6.3 Over-excavation of contaminated soils will only be performed after receiving written permission to proceed from the US IOC representative.

6.6.4 The written authorization to proceed should include a not to exceed quantity on the amount of soil to be removed.

6.6.5 Soils removed during overexcavation activities will be considered contaminated, and will be segregated, transported, and stored as such pending the results of the soil analysis.

6.6.6 At no time will overexcavation be allowed that might undermine the foundation of a structure or nearby pipeline.

6.6.7 After completing the overexcavation, more samples will be collected to determine if additional soils need to be removed to achieve the project objectives.

6.6.8 A third party contractor will perform confirmatory sampling. Notification of a sampling requirement will be made at least 2 hours prior to the required sampling time.

6.7 Filling of Trenches and Excavations.

NO FILLING OPERATIONS WILL BE UNDERTAKEN PRIOR TO THE RECEIPT OF WRITTEN PERMISSION RECEIVED FROM BOTH THE IOC AND THE COUNTY OF ALAMEDA OR OTHER RESPONCIBLE AGENCY.

6.7.1 All filling operations shall be accomplished using clean, debris free materials. Wherever possible the native materials previously removed shall be used as backfill for the trenches and excavations.

6.7.2 Where there is insufficient and/or unsatisfactory materials available for filling operations, clean import materials shall be obtained and placed by the work crews.

6.7.3 Materials shall be placed in the trenches/excavations in 18 inch lifts when replacing all areas, and compacted using either a "Sheep's Foot" attachment for the excavator or a hand operated, gas powered tamper. Compaction will be determined using field density tests to insure conformance with the project specifications, however significant ground water intrusion will degrade this compaction efficiency. If ground water is impacting the excavation, bridging materials will be used to form a suitable base for the compaction of the soils. Dewatering may be required during backfill activities.

6.7.4 At no time will personnel enter an excavation greater than 4 feet deep in order to compact soils. In a trench/excavation greater than 4 feet deep only remote compaction methods will be used.

6.7.5 In areas that will require the placement of asphalt and/or concrete as the final layer of backfill materials will be compacted to the percentage as specified in the contract drawings. Compaction in all areas will be as specified in the project specifications and technical drawings.

6.7.6 All areas disturbed during operations shall be returned to the pre-existing grade using the methods of filling mentioned above.

6.8 Concrete and Asphalt Removal and Replacement.

6.8.1 All removal operations will follow the project specifications and drawings for cut back and angle of cut. NWT personnel will supervise and assist the subcontractor in locating, cutting, and removing the affected areas as needed during the project. Materials removed shall be stockpiled and sorted by type for disposal.

6.8.2 All concrete/asphalt removal operations shall be accomplished at one time, as will the replacement operations.

6.8.3 All replacement materials shall meet or exceed the requirements of the project specifications of ABC and asphalt. Certifications for the materials as well as test results will be supplied to the Facility prior to the installation of the materials.

6.8.4 All concrete and asphaltic debris resulting from the removal operations shall be disposed of at an approved Class III landfill.

6.9 Shipment of Waste.

6.9.1 All wastes generated during the performance of this contract, except those listed below shall be disposed of at Envirocare of Clive, Utah.

6.9.2 Wastes not destined for Envirocare;

1. Clean soils, unsuitable for reuse as backfill
2. Clean concrete and asphaltic debris
3. Pipeline rubble and debris found to be below release limits

6.9.3 All radioactive waste shipments shall be accompanied by a Uniform Hazardous Waste Manifest signed by the ALAMEDA POINT Facility Manager or his designated replacement as the generator.

6.9.4 Other wastes to be shipped to the Envirocare facility include any contaminated soils, piping, the materials removed from the interior of the pipeline, as well as any rinsate and contaminated PPE.

6.10 Demobilization.

6.10.1 Decontaminate all equipment and remaining supplies for unrestricted use.

6.10.2 Remove all postings and signs related to the project.

6.10.3 Clear any debris or scrap materials remaining on the project site.

6.10.4 Insure that all waste streams have been transported to the appropriate disposal sites.

6.10.5 Perform a final inspection and photographic tour of the project site with the US IOC representatives, County of Alameda representatives, and Facility representatives.

6.10.6 Remove and transport all equipment from the project site.

7.0 Reports and Records

During the execution of this project the following reports will be submitted;

1. Daily Quality Control Reports
2. Survey Summaries (including quantity calculations)
3. Manifests for California Designated Waste Disposal
4. Quality Control Reports of Geotechnical and Materials Testing
5. Documentation of Disposal
6. Safety reports
7. Coordinating Documentation with the regulating agencies
8. Air Sampling Results
9. Daily Safety Inspection Logs
10. Site Specific Training Logs
11. Site Control Logs
12. Accident Reports
13. Incident Reports

Within 30 days of the completion of the demobilization portion of the project, a final report will be issued to the US IOC Contracting Officer. All activities on site will be documented in narrative with photographic support. This final report will include the following sections;

- A cover letter signed by the Project Manager certifying compliance with the project specifications.

- On site activities narrative in chronological order. To include the following;

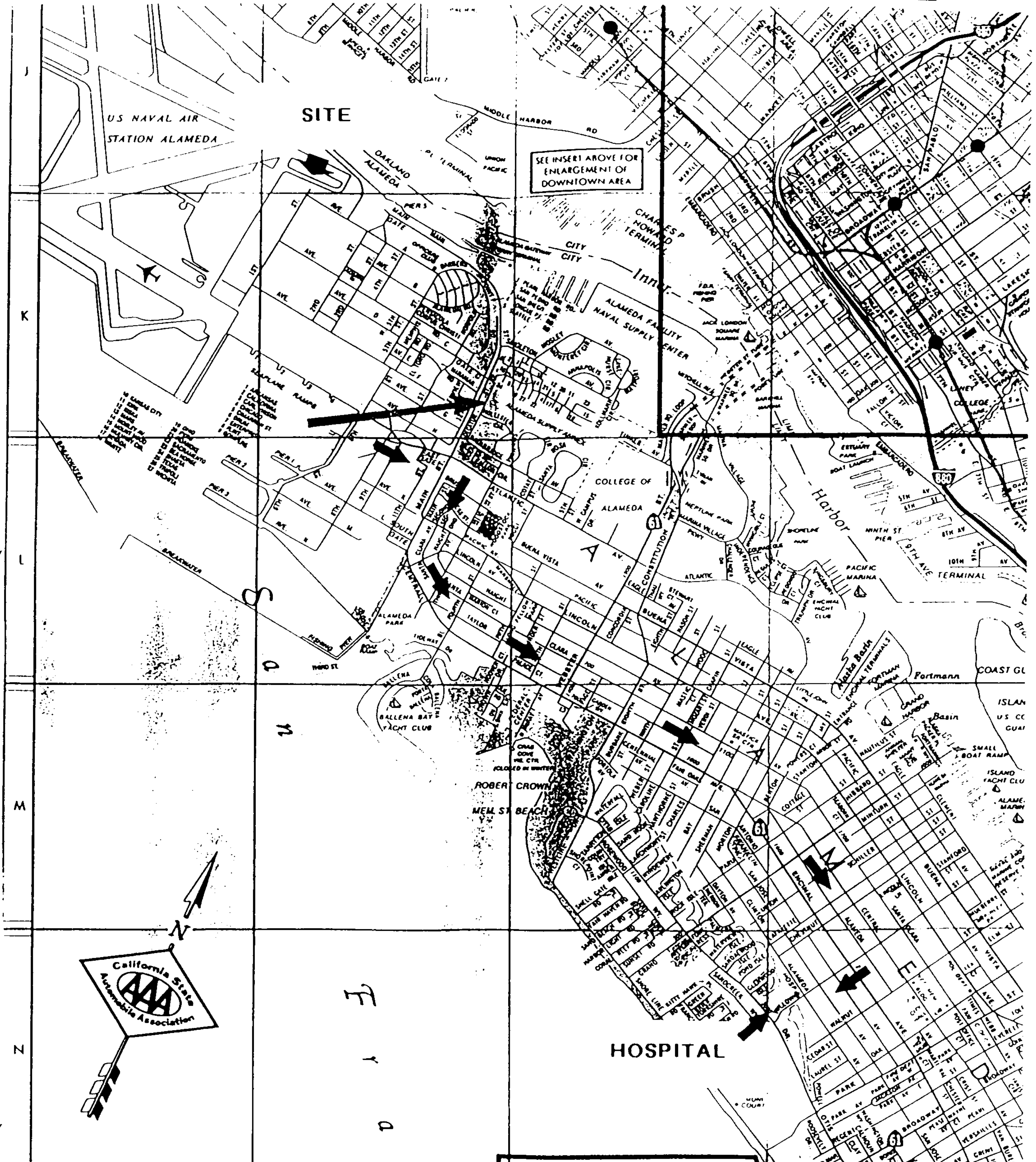
    1. Condition and contents of all sewer pipeline components.
    2. Photographic documentation of all activities.
    3. Sample results, with supporting field data, for all analyses performed on the contract.
    4. Backfilling methods and materials.
    5. Depth of groundwater, if any was encountered.
    6. Copies of all waste analyses, profiles and manifests.
    7. Transporter and Disposal Site certifications.
    8. Copies of all Logbooks maintained on the project site.
    9. Disposal certificates (as available) for all hazardous/radiological disposal.

At project completion, the NWT Project Manager/SHSO or designee is responsible for the development and submittal of the Final Report. The Final Report will be reviewed and approved by the Program Director prior to submittal to the Government. The Final Report will include all radiological material and Health & Safety survey documentation, a detailed narrative of the project with photographs, and shipping and disposal documentation.

Appendix A

Site Location Map

New World Technology *Bringing you the Technology of the New World*



1236 Concannon Blvd., Livermore, CA 94550

SITE WORK PLAN

STORM WATER DRAIN PIPING EXCAVATION, CLEANING, REMOVAL, AND REPLACEMENT ALAMEDA POINT, ALAMEDA, CALIFORNIA

(FORMERLY NAVAL AIR STATION, ALAMEDA, CALIFORNIA)

Project No. USN 97-032
Phase IV

Submitted to:

U.S. Army Industrial Operations Command

Rock Island, IL 61299-6000

Submitted by:

New World Technology
1236 Concannon Blvd.
Livermore, CA 94550
(925) 443-7967

Revision 0

August 1998

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SITE WORK PLAN APPROVALS

STORM WATER DRAIN PIPING EXCAVATION, CLEANING, REMOVAL, AND REPLACEMENT
ALAMEDA POINT, ALAMEDA, CALIFORNIA

Revision 0
August 1998

Submitted by: W. S. Lee, Jr. for   Date: 8/19/98
Mark Divoky, REA
NWT Health and Safety Manager

Approved by: [signature]   Date: 8/19/98
Donald Wadsworth MSHP
NWT Corporate Radiation Safety Officer

Approved by: [signature]   Date: 8/19/98
William Haney
NWT Program Director/Project Manager

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List of Appendices

List of Acronyms

ANSI	American National Standards Institute
°C	Degrees Celsius
CCR	California Code of Regulations
CFR	Code of Federal Regulations
CRZ	Contamination Reduction Zone
CSWP	Confined Space Work Permit
DL	Daily Log
dpm	disintigrations per minute
DOT	Department of Transportation
EPA	Environmental Protection Agency
EZ	Exclusion Zone
°F	Degrees Fahrenheit
GFCI	Ground Fault Circuit Interrupter
HAZWOPER	Hazardous Waste Operations and Emergency Response
HS	Health and Safety
IOC	Industrial Operations Command
IR	Installation Restoration Site
LEL	Lower Explosive Limit
μCi	Micro Curies
MSDS	Material Safety Data Sheet
NWT	New World Technology
OSHA	Occupational Safety and Health Administration
PEL	Permissible Exposure Limit
PID	Photo ionization Detector
PM	Project Manager
PPE	Personal Protective Equipment
PS	Project Supervisor
Ra	Radium
RMA	Radioactive Materials Area
ROICC	Resident Officer In Charge Of Construction
SHSO	Site Health and Safety Officer
SHASP	Site Health and Safety Plan
TBE	To Be Established
TSM	Tailgate Safety Meeting
TT	Tetra Tech
USA	Underground Services Alert
USCOE	U.S. Army Corps of Engineers
USN	U.S. Navy
UST	Underground Storage Tank

Title

New World Technology (NWT) Project Work Plan for Alameda Point, Radium Contaminated Sewer Line Removal Project, IOC contract number USN 97-032, Phase IV.

1.0 Introduction

This project involves the removal of approximately 4,510 linear feet of sewer line from where they exit Building 5 (Manhole 6F-2) to Outfall F and small sections from outside Building 400 to the main line to Out-fall F. All work will be performed within the site formerly known and operated as the Naval Air Station, Alameda, in Alameda, California. (Refer to the Drawings and Contract Documents for exact locations and quantities of materials expected to be removed during this contract.)

Work will be performed around the exteriors of Buildings 5 and 400, where additional work, under a previous delivery order, is to be performed simultaneously. The pipelines to be removed are contaminated with Radium-226 and will be removed as indicated in the Scope of Work. Work shall include the blinding and removal of various piping at the terminal points, complete removal and cleaning of the subject pipeline prior to disposal where possible, and the removal and disposal of incidental contaminated soils or ground waters encountered during the removal and decontamination operations. During the course of the removal, a drain diversion system will be established to insure continued service to any of the impacted residents or tenants of the facilities. All materials removed will be surveys and disposed of, as appropriate, based upon the results of the analytical profiling to be performed. At the conclusion of the removal phase of the project, replacement lines will be installed in all areas. This installation will occur after a third party Quality Assurance contractor, Tetratech, Inc., performs confirmatory sampling on all excavations to insure that contaminate levels are below the regulatory limit for free release of the areas.

Refer to Attachment 1 for a map of the site diagrams of the pipelines to be removed.

Finally, all areas disturbed during the removal portion of the contract shall be restored to their former condition prior to demobilization from the project site.

2.0 Purpose

This plan describes the work methodology, hazardous material and occupational safety requirements, and the safeguarding of protected waterways near San Francisco Bay.

Additionally, this plan describes the activities applicable to the pipeline exhumation including, the identification, packaging, transportation and shipment for disposal of any radium contaminated materials. Methodologies concerning the decontamination and segregation of the wastes is also included in this document. Work procedures for the installation of the replacement line will be included as an appendix to this document. The hazardous material and occupational requirements of this plan are based on a preliminary assessment of potential hazards and may be reevaluated and modified with the concurrence of the NWT Corporate Health and Safety Manager, Operations Technical Support, and the Project Manager, US Industrial Operations Command (IOC).

3.0 References

1. Andrews, Lori P. Worker Protection During Hazardous Waste Remediation. The Center for Labor Education and Research
2. Keith, Lawrence H. Environmental Sampling and Analysis. Lewis Publishers
3. US EPA, 1988. A Compendium of Superfund Field Operations Methods
4. US EPA, 1992. Guidance for Data Usability in Site Assessment
5. US EPA, 1986. Test Methods for Evaluating Solid Waste, 3rd Edition, Volume II
6. NIOSH, NIOSH Manual of Analytical Methods, 4th Edition
7. CCR Title 8, Division 1, Chapter 4, Subchapter 4. General Industry Safety Orders
8. CCR Title 22, Division 4. Environmental Protection.
9. CFR 10. Energy
10. CFR 29. Labor
11. CFR 40. Protection of the Environment.
12. CFR 49. Transportation
13. US COE, 1996. Safety and Health Requirements Manual (EM385-1-1).
14. BAAQMD, 1997. Rules and Regulations 1 through 13
15. U.S. NRC, NUREG 5849
16. U.S. NRC, Reg. Guide 1.86

4.0 Scope of Work

4.1 Pre-construction Meetings

Prior to any on-site activities the NWT project team will meet with the IOC representatives, the Facility representatives, and any regulatory agency representatives to insure that all aspects of the Project Work Plan (PWP) meet all of the requirements for the project as specified.

4.2 Health and Safety Plan

OSHA Site Health & Safety Plan (8 CCR 5192 (b)(1)(B)) - This plan addresses the possibility of discovering materials identified and not identified in the Scope of Work and any physical hazards that may be encountered during the performance of the contract. All personnel at the work site shall have successfully completed the 40-hour HazWOPER Course, and refreshers as necessary.

Additionally supervisory personnel shall have the 8-hour supervisory training as mandated by 8 CCR 5192(e)(4). The plan will require all personnel to provide evidence of current OSHA training (8 CCR 5192(e)(3)(A)) and medical certification (8 CCR 5192(f)).

4.3 Project Schedules

The project schedule currently requires ten weeks of on site effort, which will run concurrent to efforts relating to previous DO's (Phase III.) This effort (Phase IV) will start approximately four weeks after the commencement of operations at Buildings 5 and 400 (Phase III operations). For the purpose of this project schedule, Day 1 will be the first day that personnel begin work on segments of the pipelines detailed for Phase IV.

The work to be performed under this delivery order is detailed under Section 6.0 of this document and includes all items previously discussed.

5.0 Radioactive Material Control Program

1. NWT and any other personnel assigned to or visiting the site shall attend a project Safety briefing provided by the Project Manager/SHSO or designee and documented prior to performance of the work or visit. This briefing shall include hazardous/radiological material awareness training, occupational health and safety, and provide details of the work scope to be performed.

2. Documented Regulatory, OSHA, and Industrial Safety briefings will be held in accordance with the references and the SHASP prior to and at mobilization to the site.

3. A barrier shall be erected around all excavation areas and all work areas shall be properly posted for both hazardous/radiological material control and industrial safety considerations. Additional signs and postings will be as specified in the Project Health and Safety Plan and NWT field operations procedures.

4. Cognizant Facility authorities (i.e., Facility Security, Facility Safety Office etc.) shall be kept apprised of the project status during all phases of operation. The Project Manager/SHSO shall document these verbal or written reports in the daily logbook.

5. All aboveground storage of hazardous/radiological material shall be contained in approved transport containers. For any pipe decontamination efforts, ground cover shall extend at least 5 feet in all directions beyond the materials. Covering shall overlap at least three feet and all edges weighted to prevent loss of the cover. The area shall be posted as required in accordance with references.

6. All soil excavated from the site that is suspected of, or confirmed as containing radioactive or hazardous components, shall be segregated into discreet and identifiable containers and stored on-site in the designated storage area(s).

7. All material excavated shall be segregated until sampling has been performed and approval is obtained from the IOC or RASO as to the disposition of the material.

8. Release surveys of equipment will be performed after a complete decontamination, (see Site Specific Health and Safety Plan for details of decontamination requirements). All surveys shall be documented in accordance with NWT field operations procedures.

9. The Project Manager/SHSO, for all job tasks involving entry into a confined space shall initiate a Confined Space Work Permit (CSWP). The CSWP will detail all hazardous/radiological material and safety requirements for a particular task. Specific details and requirements of the confined space entry procedures are

detailed in the Project Health and Safety Plan along with samples of the forms required.

10. Respiratory protection may be required; therefore all on-site personnel shall have medical qualification and have a documented fit-test as required in accordance with the references. Respiratory protection is anticipated as a contingency only. Air monitoring in accordance with the Project Health and Safety Plan will be used during all operations.

11. The following instruments, at a minimum, (or equivalent) will be calibrated and maintained in accordance with the manufacturers recommendations and shall be on-site for use during the project:

Manufacturer	Inst./Probe	Type	Quantity
Thermo Inst.	580 B	PID	1
Gastech	GT 302	4 Gas Meter	1
Ludlum	M3/44-9	β/γ Meter	2
Ludlum	2929	Counter	1
Ludlum	M19	Dose Rate	1
F&M	HV-1	Air Sampler	2
F&M	LV-1	Air Sampler	1

12. Only qualified personnel in accordance with the references will perform shipments of hazardous/radiological materials and/or waste.

13. Certifications of Decontaminated Equipment will be acquired from all rental venders used.

6.0 Detailed Procedure

NOTE: MANY OF THE DETAILED PROCEDURES ARE SIMILAR TO THOSE IN PHASE III, AND WILL RUN CONCURRENT TO THOSE OF PHASE III. WHEREEVER POSSIBLE, OPERATIONS WILL BE COMBINED TO PREVENT DUPLICATION OF EFFORT AND TO REDUCE THE OVERALL PROJECT TIMELINE.

1. The project work will be divided into four tasks. Task I will include initial mobilization and the identification and delineation of all work areas and removal of obstructions from above the line. Task II will involve the initial excavation, preparation of the pipeline for removal, and installation of a temporary diversion system. Task III will be the exhumation, removal, decontamination and packaging of the waste materials for disposal. Task III will also include the performance of surveys and soil sampling and analysis of the excavation areas to ensure all radiological materials are removed to the limits specified. Task IV will be replacement of the sewer lines, shipment of wastes and final demobilization.

2. All work will be performed in a safe and conscientious manner. The work instructions and requirements of the NWT Site Health and Safety Plan (SHASP) and Project Work Plan (PWP) for this project will be reviewed with the work force prior to the start of work and shall be adhered to at all times while on the work site.

NOTE: THE PHYSICAL CONDITION OF PIPELINES IS NOT KNOWN. CAUTION WILL BE UTILIZED DURING THE EXCAVATION AND REMOVAL PROCESSES TO PREVENT RELEASES TO THE ENVIRONMENT. SHOULD PHYSICAL DETERIORATION BE OBSERVED, WORK SHALL STOP AND THE CONDITION OF THE PIPELINES EVALUATED TO DETERMINE IF THE PLANNED REMOVAL METHODS ARE APPROPRIATE.

NOTE: RADIUM, ITS DAUGHTER PRODUCTS, AND/OR HYDROGEN SULFIDE ARE THE SIGNIFICANT HAZARDOUS MATERIALS ANTICIPATED. HOWEVER, OTHER MATERIALS MAY BE PRESENT. GOOD HAZARDOUS MATERIAL / HAZARDOUS WASTE WORK PRACTICES SHALL BE EMPLOYED AT ALL TIMES.

NOTE: DURING EXCAVATION, SOIL SAMPLES SHALL BE COLLECTED ON INCREMENTS AS DIRECTED IN THE SPECIFICATIONS AND THE APPROVED WORKPLAN TO DETERMINE THE PRESENCE OR ABSENCE OF RADIOLOGICAL CONTAMINATION IN THE SURROUNDING SOILS.

6.1 Mobilization

a. Travel to site.

b. Set up on-site facilities (office, supply trailer, etc.) as required beyond Phase III.

c. Train personnel in site-specific hazardous/radiological material control procedures, industrial safety and procedural controls. Training to be given by the Project Manager/SHSO.

d. Remove the physical obstructions from above pipelines.

e. Verify all personnel records required by the project specifications.

f. Obtain Facility excavation permit.

g. Contact Underground Service Alert for excavation approval number.

h. Coordinate with local Hospital for emergency services.

i. Coordinate with Facility Security to obtain personnel I.D.'s and vehicle passes where necessary.

6.2 Identification of Work Areas

1. Using hand held magnetometers (Schonstedt 72 CV) survey the areas surrounding the pipelines to be removed. Note any possible crossing lines that may interfere with excavation activities. Utility surveys shall be coordinated with appropriate facility personnel. Drawings of the planned excavation areas shall be reviewed prior to actual excavation to ensure crossing lines or utilities are not present.

2. Barricade and post the designated work area as "Radioactive Material Area", "RWP Required for Entry" and "Authorized Personnel Only".

3. Perform Lock Out / Tag Out Procedures on any electrical/flow regulatory service that may be associated with the pipeline scheduled for removal.

4. Perform and document a survey to determine background conditions throughout the planned work area. This survey will be utilized to verify that contaminated materials are not left at the conclusion of the project.

5. A prefabricated trench box will be installed in all excavations to prevent trench collapse. This box shall be moved as the excavation lengthens and backfilling is performed in other sections of the trench.

6. Work areas shall be fenced and posted as a barricade against inadvertent entry of unauthorized personnel.

6.3 Initial Excavation of the Contaminated Pipelines

1. All surfacing materials are to be considered clean for the purposes of this work plan. All asphaltic and concrete debris will be segregated, stockpiled, and disposed of as construction debris at the appropriate Class III disposal facility. If recycling of the asphaltic materials is determined to be logistically possible, this waste stream will be diverted to the appropriate recycling facility.

2. Soils removed to the upper surface of all sewer pipelines (overburden) will also be considered clean for the purposes of this work plan. Confirmatory samples will be taken as a precautionary measure once every 20 linear feet of pipeline or every 10 cubic yards of material removed, whichever is less, or if significant breaks are noted in the lines. The total estimated volume of soils and pipe to be removed is approximately 4000 cubic yards, with 1000 yards being assumed contaminated with radium exceeding the release concentration.

3. All overburden soils removed will be stockpiled on plastic sheeting adjacent to the excavations, covered and bermed, to prevent wind and rain erosion pending backfilling operations.

4. Initial excavation of the pipeline shall be performed in stages, exposing the entire upper portion of the pipeline in one operation, and then proceeding to excavate below the upper portion of each successive portion of pipeline to be removed. This process will enable the work crew to identify any failed sections of lines, possible interferences, or other situations that may require a modification to the work plans.

5. All materials removed from below the upper surface of the pipeline will be considered potentially contaminated, until soils testing confirms the presence or absence of radium or other hazardous material contamination. These materials will be segregated and stored separately from the materials removed from above the pipeline (overburden). These containers will be clearly marked and under radiological controls until clearance sampling has been performed and the Project HP determines that there is no radium contamination above the project limits.

6. An engineered trench box will be positioned as each section of pipeline is excavated and prepared for removal. This will allow trench entry, contingent on satisfactory completion of the CSWP where required, for pipeline plugging, sampling and line inspection, as needed. The engineered trench box will be moved down the trench as each successive section of pipeline is exposed and removed.

6.4 Removal of Contaminated Pipelines

NOTE: DURING ANY LINE ENTRIES, PRECAUTIONS WILL BE TAKEN TO ENSURE THAT UNAUTHORIZED RELEASES OF RADIOACTIVE MATERIALS ARE PREVENTED. SPILL PREVENTION PRACTICES AS OUTLINED IN THE NWT SITE HEALTH AND SAFETY PLAN AND FIELD OPERATIONS PROCEDURES WILL BE USED AT ALL TIMES.

1. Locate and identify the location of the line section to be removed. Locate other utility or service lines that cross (or potentially cross) the section being removed.

2. Mark the surface material (concrete/asphalt) using paint along the centerline of the pipe.

3. Based on the diameter of the pipe section being removed, use a chalk line to mark the edges of the trench. The edge of the trench will be measured from the centerline of the pipe and the distance will be calculated by adding the radius of the pipe plus one-foot.

4. The pipe section will be isolated at a designated manhole or end section of above grade pipe upstream of the section to be removed utilizing an inflatable pipe plug. The downstream section will be plugged at the first manhole from the section (or sections) to be removed to prevent back flow due to tidal actions.

5. Temporary piping will be routed from either the manhole upstream or the cut end of the above grade pipe to the first available downstream manhole from the section to be removed. A submersible pump will be utilized for effluent transport if the upstream termination point is in an existing manhole.

6. The surface material will be saw cut along the trench chalk line. Manholes will be saw cut two feet greater than the diameter of the manhole.

7. Once the surface has been cut, a hydraulic breaker, mounted on a backhoe or excavator, will be used to break the concrete into manageable pieces. Concrete pieces or asphalt will be removed with the backhoe or excavator and loaded directly into dump trucks for transport to a concrete/asphalt recycling facility for recycle as engineered fill.

8. Soils will be excavated using the backhoe/excavator and loaded into dump trucks for transport to a staging area for analysis prior to disposal. Side-walls of the trench will be protected using trench shoring boxes and/or hydraulic jacks. Areas of the trench containing crossing utility lines will be excavated by hand to expose the crossing utilities prior to excavating with the backhoe/excavator.

9. Once the top of the pipe is uncovered, extreme care shall be used not to break or disrupt the existing integrity of the pipe. Periodic inverts will be taken to identify the existing elevations of the pipe. One foot of soil will be excavated along each side of the pipe to completely expose the pipe.

10. Piping will be inspected for integrity, and the ends sealed with plastic. Upon initial lift, the pipe will be contained in a plastic wrap prior to removal from the trench area.

11. The removed sections of piping will be evaluated for decontamination or volume reduction efforts once removed from the trench. Should decontamination appear feasible, a decontamination area will be established in a facility-designated location.

12. After the pipe section has been removed from the trench, remove an additional foot of soil.

13. Perform a survey using a count rate instrument with a 2" X 2" NaI detector. Note any areas exceeding the pre-determined background count rate. Any areas clearly indicating residual radium contamination will require further soil removal. Direct approval of the Project Manager is required for any additional soil removal, following notification of the IOC Project Manager and RASO. Photograph the trench at the conclusion of the removal operation and during subsequent backfill and replacement operations.

14. If ground water is encountered in the excavation, the water will be pumped to a temporary, 20,000 gallon holding tank. The water will be treated by filtration with particulate filters followed by an activated carbon bed filtration. Following sampling and analysis, the water will be utilized for irrigation of Area 1 at a rate that does not produce saturation of the soils.

15. Obtain composite soils samples from the trench area at a rate of two per ten feet of excavation. The samples will be analyzed for residual radium. If the analysis indicates that concentrations exceed the release limit, additional soil removal will be required. Direct approval by the Project Manager is required prior to any additional soil removal, following notification of the IOC Project Manager and RASO. See Section 6.6 below. Final radiological release of the soils will be performed by TTEMI as oversight contractor.

16. Once the trench is verified radiologically clean, backfill will be placed and compacted as specified in the technical specification, with clean approved fill material to within six inches of the bottom elevation of the new pipe. Six inches of bedding sand will be placed and compacted. Elevations will be verified by laser level. See Section 6.7 below.

17. Following any corrections in elevation, install the new pipe and verify invert elevations.

18. Perform a survey of the designated work area to verify that no inadvertent spread of contamination has occurred. Any area indicating levels of loose surface contamination exceeding 300 dpm/100 cm^2 beta gamma, or 20 dpm/100 cm^2 of alpha activity will require decontamination.

19. Repeat the above until all identified piping has been removed and replaced.

20. Pre-cast manholes will be used to replace existing manholes. The bottom elevation will be verified prior to placing the manhole base. Sections will be installed in accordance with the technical specification.

21. Following installation of all pipe and manholes, the system will be tested, inspected and approved prior to backfilling. Additional de-watering may be required during this operation. Upon acceptance, the backfilling will be completed and the surface finished to match existing adjacent surfaces.

6.5 Cleaning and Storage of the Contaminated Pipeline

1. Samples of the material in the interior of the pipeline shall be taken when the pipeline is initially brought to the cleaning and storage area. All materials from the interior of the pipeline will be considered contaminated until proven otherwise.

2. Photographs of the pipeline shall be taken for project archives.

3. Each section of line shall be sequentially numbered for identification and reporting.

4. The pipeline will be washed using pressure washers and all rinsate and materials collected and stored as contaminated materials, pending sample analysis. The pipeline will then be moved to a temporary survey area, and a surface survey for the presence of residual radium contamination will be performed.

5. If further cleaning is required, the pipeline will be pressure washed one additional time. If subsequent surveys indicate that the pipeline is still contaminated, more aggressive removal techniques will be employed including, surface scabling, chipping, and breaking. If the contamination is found to extend throughout the pipeline, the decision will be made to dispose of the pipeline whole.

6. Personnel and area air monitoring will be performed whenever aggressive surface removal techniques are employed in the decontamination of the pipelines.

7. Surface wetting will be the primary engineering control during these operations to prevent the release of airborne contaminates.

8. It is not anticipated that surfactants or other additives will be used in the cleaning process. If these types of materials are to be used, a MSDS shall be forwarded to the SHSO prior to the delivery of the materials.

9. During all cleaning activities utilizing pressure washers, personnel possibly exposed to the spray will be outfitted in the appropriate personal protective equipment (PPE) as outlined in the SHASP. This equipment will include, but is not limited to, respiratory protection, rain suits, gloves, boots, and leg and metatarsal guards.

10. When a section of pipeline is determined to be below the release limits set in the contract the pipeline will be moved to a clean disposal storage area, and broken up for easier transport and disposal.

11. Every section of pipeline shall be tracked using the identification number issued when the pipeline section was first brought to the cleaning and storage area.

12. A logbook detailing the progress of the pipeline sections shall be maintained and available for inspection at the pipeline cleaning and storage area.

13. Photographs of the cleaning and survey operations will be taken for the project archives.

6.6 Over-excavation of Potentially Contaminated Soils

1. Areas immediately below the removed pipeline shall be surveyed, as required, prior to the installation of the new pipeline.

2. Surveys will be performed both remotely or after successfully completing a CSWP, and entering the trench. These surveys will include the use of hand held direct reading instruments, and as directed the recovery of suspect soils for more detailed analysis.

3. Over-excavation of contaminated soils will only be performed after receiving written permission to proceed from the IOC representative.

4. The written authorization to proceed should include a not to exceed quantity on the amount of soil to be removed.

5. Soils removed during overexcavation activities will be considered contaminated, and will be segregated, transported, and stored as such pending the results of the soil analysis.

6. At no time will overexcavation be allowed that might undermine the foundation of a structure or nearby pipeline.

7. After completing the overexcavation, additional samples will be collected to determine if additional soils need to be removed to achieve the project objectives.

8. A third party contractor will perform confirmatory sampling. Notification of a sampling requirement will be made at least 2 hours prior to the required sampling time.

6.7 Filling of Trenches and Excavations.

NOTE: NO FILLING OPERATIONS WILL BE UNDERTAKEN PRIOR TO THE RECEIPT OF WRITTEN PERMISSION RECEIVED FROM BOTH THE IOC AND THE COUNTY OF ALAMEDA OR OTHER RESPONCIBLE AGENCY.

1. All filling operations shall be accomplished using clean, debris free materials. Wherever possible the native materials previously removed shall be used as backfill for the trenches and excavations.

2. Where there is insufficient and/or unsatisfactory materials available for filling operations, clean import materials shall be obtained and placed by the work crews.

3. Materials shall be placed in the trenches/excavations in 18 inch lifts when replacing all areas, and compacted using either a "Sheep's Foot" attachment for the excavator or a hand operated, gas powered tamper. Compaction will be determined using field density tests to insure conformance with the project specifications, however significant ground water intrusion will degrade this compaction efficiency. If ground water is impacting the excavation, bridging materials will be used to form a suitable base for the compaction of the soils. De-watering may be required during backfill activities.

4. At no time will personnel enter an excavation greater than 4 feet deep in order to compact soils. In a trench/excavation greater than 4 feet deep only remote compaction methods will be used.

5. In areas that will require the placement of asphalt and/or concrete as the final layer of backfill materials will be compacted to the percentage as specified in

the contract drawings or Technical Specification. Compaction in all areas will be as specified in the project specifications and technical drawings.

6. All areas disturbed during operations shall be returned to the pre-existing grade using the methods of filling detailed above.

6.8 Concrete and Asphalt Removal and Replacement.

1. All removal operations will follow the project specifications and drawings for cut back and angle of cut. NWT personnel will supervise and assist the subcontractor in locating, cutting, and removing the affected areas as needed during the project. Materials removed shall be stockpiled and sorted by type for disposal.

2. All concrete/asphalt removal operations shall be accomplished at one time, as will the replacement operations.

3. All replacement materials shall meet or exceed the requirements of the project specifications of ABC and asphalt. Certifications for the materials as well as test results will be supplied to the Facility prior to the installation of the materials.

4. All concrete and asphaltic debris resulting from the removal operations shall be disposed of at an approved Class III landfill.

6.9 Shipment of Waste.

1. All wastes generated during the performance of this contract, except those listed below shall be disposed of at Envirocare of Clive, Utah.

    a. Wastes not destined for Envirocare;
    b. Clean soils, unsuitable for reuse as backfill
    c. Clean concrete and asphaltic debris
    d. Pipeline rubble and debris found to be below release limits

2. All radioactive waste shipments shall be accompanied by a Uniform Hazardous Waste Manifest signed by the Alameda Point Facility Manager or his designated replacement as the generator.

3. Other wastes to be shipped to the Envirocare facility include any contaminated soils, piping, the materials removed from the interior of the pipeline, as well as any rinsate and contaminated PPE.

6.10 Demobilization.

1. Decontaminate all equipment and remaining supplies for unrestricted use.

2. Remove all postings and signs related to the project.

3. Clear any debris or scrap materials remaining on the project site.

4. Insure that all waste streams have been transported to the appropriate disposal sites.

5. Perform a final inspection and photographic tour of the project site with the IOC representatives, County of Alameda representatives, and Facility representatives.

6. Remove and transport all equipment from the project site.

7.0 Reports and Records

During the execution of this project the following reports will be submitted;

1. Daily Quality Control Reports
2. Survey Summaries (including quantity calculations)
3. Manifests for California Designated Waste Disposal
4. Quality Control Reports of Geotechnical and Materials Testing
5. Documentation of Disposal
6. Safety reports
7. Coordinating Documentation with the regulating agencies
8. Air Sampling Results
9. Daily Safety Inspection Logs
10. Site Specific Training Logs
11. Site Control Logs
12. Accident Reports
13. Incident Reports

Within 60 days of the completion of the demobilization portion of the project, a final report will be issued to the IOC Contracting Officer. All activities on site will be documented in narrative with photographic support. This final report will include the following sections;

- A cover letter signed by the Project Manager certifying compliance with the project specifications.

- On site activities narrative in chronological order. To include the following;

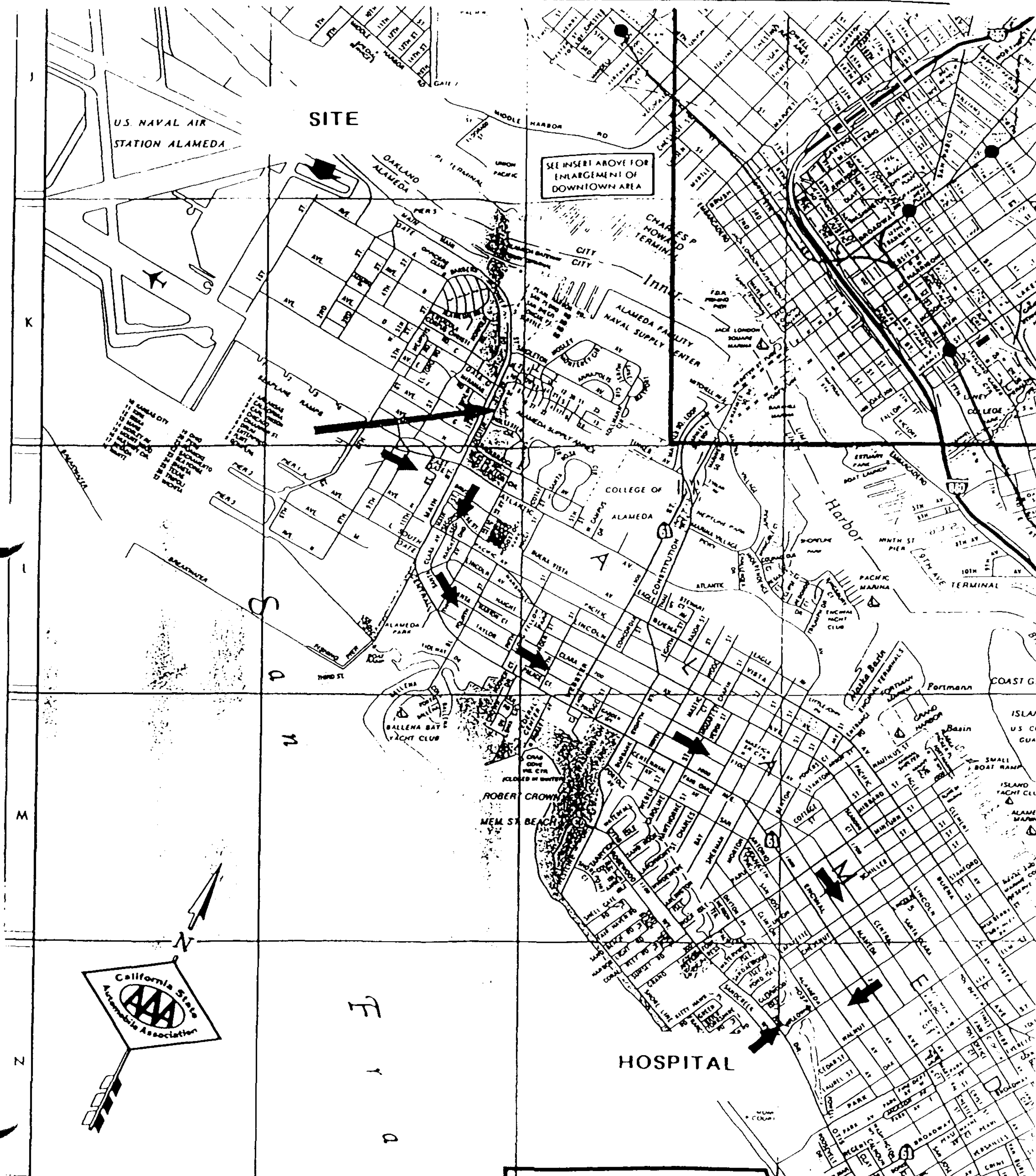
    1. Condition and contents of all sewer pipeline components.
    2. Photographic documentation of all activities.
    3. Sample results, with supporting field data, for all analyses performed on the contract.
    4. Backfilling methods and materials.
    5. Depth of groundwater, if any was encountered.
    6. Copies of all waste analyses, profiles and manifests.
    7. Transporter and Disposal Site certifications.
    8. Copies of all Logbooks maintained on the project site.
    9. Disposal certificates (as available) for all hazardous/radiological disposal.

At project completion, the NWT Project Manager/SHSO or designee is responsible for the development and submittal of the Final Report. The Final Report will be reviewed and approved by the Program Director prior to submittal to the Government. The Final Report will include all radiological material and Health & Safety survey documentation, a detailed narrative of the project with photographs, and shipping and disposal documentation.

Appendix A

Site Location Map

New World Technology *Bringing you the Technology of the New World*



SITE HEALTH AND SAFETY PLAN

STORM WATER DRAIN EXCAVATION, CLEANING, REMOVAL, AND REPLACEMENT AT BUILDINGS 5 and 400 ALAMEDA POINT, ALAMEDA, CALIFORNIA

(FORMERLY NAVAL AIR STATION, ALAMEDA, CALIFORNIA)

Project No. USN 97-032
Phase III & IV

Submitted to:

U.S. Army Industrial Operations Command
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Revision 2
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SITE HEALTH AND SAFETY PLAN APPROVALS
STORM WATER DRAIN EXCAVATION, CLEANING, REMOVAL, AND REPLACEMENT AT BUILDINGS 5 and 400
ALAMEDA POINT, ALAMEDA, CALIFORNIA

Revision 2
July 1998

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List of Acronyms

AIDS	Acquired Immune Deficiency Syndrome
AIHA	American Industrial Hygiene Association
ALI	Allowable Limit on Intake
ANSI	American National Standards Institute
ATSDR	Agency for Toxic Substances and Disease Registry
bpm	Beats Per Minute
BCSP	Board of Certified Safety Professionals
°C	Degrees Celsius
CCR	California Code of Regulations
CFR	Code of Federal Regulations
CO	Contracting Officer
cpm	Counts per minute
CPR	Cardiopulmonary Resuscitation
CRZ	Contamination Reduction Zone
DAC	Derived Air Concentration
dBA	Decibels, A-weighted
Daily Logs	Daily Log
DOT	Department of Transportation
dpm	Disintegrations per minute
DTSC	Department of Toxic Substances Control
EKG	Electrocardiogram
EPA	Environmental Protection Agency
EZ	Exclusion Zone
°F	Degrees Fahrenheit
FID	Flame Ionization Detector
FM	Factory Mutual
FR	Federal Register
GFCI	Ground Fault Circuit Interrupter
HAZWOPER	Hazardous Waste Operations and Emergency Response
HBV	Hepatitis B Virus
HEPA	High Efficiency Particulate Aerosol
HIV	Human Immunodeficiency Virus
HS	Health and Safety
IDLH	Immediately Dangerous to Life and Health
IIPP	Injury and Illness Prevention Plan
IR	Installation Restoration Site
LEL	Lower Explosive Limit

μCi	Micro Curies
MSDS	Material Safety Data Sheet
NIOSH	National Institute of Occupational Safety and Health
NRC	Nuclear Regulatory Commission
NRR	Noise Reduction Rating
NWT	New World Technology
OSHA	Occupational Safety and Health Administration
OVA	Organic Vapor Analyzer
PEL	Permissible Exposure Limit
PID	Photo ionization Detector
PM	Project Manager
PPE	Personal Protective Equipment
ppm	Parts per Million
PS	Project Supervisor
ROICC	Resident Officer In Charge Of Construction
SHSO	Site Health and Safety Officer
SHASP	Site Health and Safety Plan
SIR	Safety Inspection Report
TBA	To Be Announced
TSM	Tailgate Safety Meeting
UL	Underwriter's Laboratory
USA	Underground Services Alert
USCOE	U.S. Army Corps of Engineers
USN	U.S. Navy
UST	Underground Storage Tank
VOC	Volatile Organic Compound
WBGT	Wet Bulb Globe Temperature

Site Health and Safety Plan Acknowledgment

I understand and agree to abide by the provisions of this Site Health and Safety Plan (SHASP) for the activities described in the Project Work Plans. Failure to comply with these provisions may lead to disciplinary action, which may include dismissal from the work site, termination of employment or, for subcontractors, termination of the work contract.

Printed Name	Company	Signature	Date

Disclaimer

The enclosed Site Health and Safety Plan (SHASP) has been designed for the methods presently contemplated by New World Technology (NWT) for execution of the proposed work. Therefore, the SHASP may not be appropriate if the work is not performed by or using the methods presently contemplated by NWT.

In addition, as the work is performed, conditions different from those anticipated might be encountered and the SHASP may have to be modified. Therefore, NWT makes no representations or warranties as to the adequacy of the SHASP, except for warranties specifically stated in the SHASP itself.

1.0 Introduction

1.1 Objective

The objective of this Site Health and Safety Plan (SHASP) is to ensure that safe working conditions exist during the work activities at the Alameda Point, formerly Naval Air Station, Alameda, California (NAS, Alameda) project. The safety procedures outlined have been established based on preliminary analysis of potential hazards within the site. This SHASP describes the health and safety requirements and procedures to be used while conducting fieldwork and includes:

- Responsibilities of persons on site;
- Training Program;
- Specific Work Procedures;
- Medical Surveillance Program;
- Hazard Control Program;
- Decontamination Procedures;
- Emergency Response Plan;
- Monitoring Program;
- Activity Hazard Analysis;

This document, in combination with NWT's Corporate Health and Safety Manual, also serves as the company's Injury and Illness Prevention Plan (IIPP).

1.2 Site and Facility Description

Alameda Point, formerly known as Naval Air Station (NAS), Alameda is located in the city of Alameda, California adjacent to the San Francisco Bay. The project will occur at two locations at the base, Installation Restoration (IR) Site 5 consisting of Building 5 and IR Site 10 consisting of Building 400. This section describes each of the buildings and structures of concern and summarizes the information relating to the levels of radiological contamination and any other hazards that may be encountered during the proposed operations. Appendix A contains a copy of the hospital route map and the site map with the two buildings and immediate surrounding structures located at the facility (Figures 1-1 and 1-2, respectively).

1.2.1 Building 5

Building 5 was originally used for the painting of radium dials and for other dial refurbishing related radiological work. Initial surveys of the structure in 1995 revealed the possibility of radiological contamination in drains and related structures within the building. Subsequent to the closure of the facility, in 1996 additional surveys of the storm sewers were performed that confirmed radiological contamination in the sewer piping both inside the structure and continuing down stream outside the structure.

1.2.2 Building 400

Building 400 was originally used for missile rework operations prior to the relocation of all Building 5 operations to this location. Surveys of the structure, performed in 1996, revealed radiological contamination in various spaces and in the drain system in the building. Further surveys of the exterior piping revealed one area of possible contamination in the industrial waste piping beyond the building perimeter.

1.2.3 Summary of Contaminates

The following materials are suspected of being present in the work area:

- Radium 226 – Contaminate
- Hydrogen Sulfide - Evolved gas
- Diesel Exhaust - Heavy equipment
- Gasoline Exhaust – Heavy equipment, support equipment and vehicles
- Benzene - Fuel Component, heavy equipment
- Toluene - Fuel Component, heavy equipment
- Ethyl Benzene - Fuel Component, heavy equipment
- Xylene - Fuel Component, heavy equipment
- Nuisance Dust – Result of work activities

1.3 Policy Statement

It is the policy of New World Technology (NWT) to provide a safe and healthful work environment for all its employees, subcontractors and clients. NWT considers no phase of the operation or administration to be of greater importance than the prevention of injury or illness. Safety takes precedence over expediency or shortcuts, and every reasonable step to reduce the possibility of injury, illness, or accident will be taken.

This SHASP prescribes the procedures that must be followed during fieldwork associated with the NAS, Alameda project. Operational changes which could affect the health or safety of personnel, the community, or the environment will not be made without the prior approval of the NWT Project Manager (PM), and the Health and Safety Manager.

The provisions of this SHASP are mandatory for all NWT personnel and subcontractors assigned to the project. NWT requires all visitors to the work site to abide by the requirements of this SHASP. The Health and Safety Manager will provide written addenda to this SHASP when changes warrant. No changes to the plan will be implemented without prior approval of the Health and Safety Manager or his authorized representative, and acceptance by the Resident Officer in Charge of Construction (ROICC) assigned to the project.

1.4 References

This SHASP complies with Federal Occupational Safety and Health Administration (OSHA), California Department of Occupational Safety and Health (CalOSHA or Cal DOSH), United States Environmental Protection Agency (EPA), and certain U.S. Army Corps of Engineer (USCOE) regulations. This SHASP follows the guidelines established in the following documents:

- <u>Standard Operating Safety Guidelines</u> (EPA, June 1992);
- <u>Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities</u>; Department of Health and Human Services (DHHS), National Institute of Occupational Health and Safety (NIOSH), Environmental Protection Agency (EPA), and U.S. Coast Guard (USCG) Publication No. 86-116;
- Title 10 of the Code of Federal Regulations (CFR), Parts 10 and 20;
- Title 29 of the Code of Federal Regulations (CFR), Parts 1910 and 1926;
- Title 8, Division 1, Chapter 4, Subchapter 7 of the California Code of Regulations (CCR), General Industry Safety Orders (GISO)
- Title 22, Division 4, Division 4.5 of the California Code of Regulations (CCR), Environmental Health Standards for the Management of Hazardous Waste
- U.S. Navy, Naval Facilities Engineering Command Guide Specification (NFGS-0152C, 30 September 1997);
- U.S. Army Corps of Engineers Safety and Health Requirements Manual (USCOE 385-1-1, September 1996);
- NWT Corporate Health and Safety Manual.

The contents of this SHASP are consistent with, or supplement, the NWT Corporate Health and Safety Manual. All applicable provisions of the manual will also be followed during this project. A copy of the Corporate Health and Safety Manual will be maintained at the job site by the Site

Health and Safety Officer (SHSO). All NWT employees and subcontractors must follow the facilities' fire, safety, and traffic regulations, all applicable federal, state, and local regulations, as well as the US Army Corps of Engineers (USCOE) Safety and Health Requirements Manual (EM385-1-1).

2.0 Responsibilities

2.1 All Personnel

Each person is ultimately responsible for their own health and safety, for completing tasks in a safe manner and for reporting any unsafe acts or conditions to his/her line supervisor and the Project Supervisor (PS). All persons on-site are responsible for continuous adherence to health and safety procedures during the performance of any project work. In no case may work be performed in a manner that conflicts with the intent of, or the inherent safety precautions expressed in, this SHASP. After due warning, persons who violate procedure and work rules may be dismissed from the site, terminated, or have their contract revoked. Blatant disregard or repeated infractions of health and safety policies are grounds for disciplinary action up to, and including, dismissal, and/or removal from the work area.

All NWT and subcontractor personnel are required to read and acknowledge their understanding of this SHASP. All project personnel are expected to abide by the requirements of this SHASP and cooperate with project management in ensuring a safe and healthful work site. Site personnel are required to immediately report any of the following to the PS:

- Accidents and injuries, no matter how minor;
- Unexpected or uncontrolled release of chemical substances;
- Any signs or symptoms of chemical exposure;
- Any unsafe or malfunctioning equipment; and
- Any changes in site conditions that may affect the health and safety of project personnel.

In addition to reporting these situations, any employee may halt an activity that, in their judgement, constitutes an Immediately Dangerous to Life and Health (IDLH) situation.

2.2 Project Manager

The Project Manager (PM) has overall responsibility for the health and safety of all personnel on the project. The PM's responsibility with regard to health and safety is to maintain company policy and resolve health and safety issues with the assistance and guidance of the Health and Safety Manager. The PM will provide the Health and Safety Manager with the company name and representatives of those contractors being considered for hire, as well as those hired, to allow required preliminary information to be collected in a timely manner.

The PM is responsible to:

- Notify the Health and Safety Manager when field operations begin so that field support can be scheduled;

- Insure that the SHASP is read and signed by all field personnel on the project, including subcontractors. The Health and Safety Manager and the PM must also sign the SHASP;

- Ensure that all provisions of the SHASP are followed. Contact the Health and Safety Manager for any variances or modifications desired;

- Demonstrate a personal commitment to safety on the project;

- Ensure that tailgate safety meetings are conducted daily, signed by all field workers and reviewed by the PS and the PM;

- Ensure that Daily Log (DL) forms are completed for each day of operations, signed and dated by the author, and that all persons listed have signed the SHASP and tailgate safety meeting forms;

- Have supervisors inspect the project at least weekly, with inspections and corrective actions documented on Daily Logs forms;

- Ensure correction of any reported or observed safety hazard;

- Ensure employees are trained on the hazards of any hazardous substances used. MSDSs must be on-hand for all hazardous materials (other than wastes) and containers must be properly labeled;

- Ensure that project safety equipment is inspected regularly (monthly for fire extinguishers);

- Report all near miss, injury, illness and vehicle accident incidents to the Health and Safety Manager and the Resident Officer In Charge Of Construction (ROICC) within 24 hours and ensure that a Safety Inspection Report (SIR) form is initiated. Accidents resulting in a fatality or inpatient hospitalization of an employee must be reported within 8 hours. The ROICC will be notified and be given a copy of the SIR and a completed Form CSIR-1;

- Notify the Health and Safety Manager when field work lasts more than six months so that the SHASP can be reviewed and updated as needed;

- Immediately notify the Health and Safety Manager and the ROICC upon receiving notice of any regulatory agency inspection;

- Ensure that the project files receive copies of:

  - All internal and external Health and Safety correspondence
  - All air sampling records (including "none-detected")
  - All accident reports and SIR documentation
  - Documentation of audits and corrective actions
  - All Daily Logs.

- The PM must have completed the Hazardous Waste Supervisor's 8 Hour course.

The PM will perform at least one site safety audit per month while field activities are conducted and will ensure that all accidents, incidents and/or near-misses are investigated in a timely manner. The PM will ensure that management performs an investigation of all incidents or accidents that have the potential to cause a lost-time or hospitalization incident or fatality within 24 hours of the incident.

The PM for this project is William Haney.

2.3 Health and Safety Manager

The Health and Safety Manager is responsible for the preparation and modification (as necessary) of this SHASP. The Health and Safety Manager will approve changes and update the SHASP as warranted by altered site conditions and shall have the only authorization to effect such changes (except those changes outlined in the Emergency Response Plan). The Health and Safety Manager will advise the PM on health and safety issues that may have an impact on project operations. In addition, the Health and Safety Manager is responsible to:

- Oversee and review the work of the Site Health and Safety Officer (SHSO);

- Administer the general Health and Safety Program;

- Provide technical assistance to the PM and the PS;

- Investigate significant accidents, illnesses and near misses. Recommend corrective actions as appropriate. Review all Safety Inspection Reports (SIR);

- Establish the required personal protective equipment for each work area;

- Assist the PS and SHSO in establishing decontamination area locations;

- Evaluate and approve contractors regarding health and safety compliance both prior to accepting the contract and upon completion of the project, as appropriate; and

- Establish proper employee exposure monitoring and assess the appropriateness of protective measures.

The NWT Health and Safety Manager is Mark Divoky.

2.4 Project Supervisor

The Project Supervisor (PS) reports to the PM and is responsible for field enforcement of the SHASP. This includes communicating project health and safety requirements to all on-site project personnel (both NWT and subcontractor personnel), consulting with the Health and Safety Manager regarding changes to the SHASP, and conducting periodic health and safety inspections with the SHSO. The PS is responsible for informing the Health and Safety Manager and the PM of any changes to the work plan, prior to implementation, so that health and safety issues introduced by those changes may be properly addressed. The PS will be on-site during all project-related activities. If the PS must leave the site, the PM will designate the responsibilities of the PS to a qualified alternate supervisor [i.e., person(s) having 8-hours of hazardous waste operations supervisory training per 8 CCR 5192 (e)(3)(A).]

Other responsibilities include:

- Reading and being familiar with the Project SHASP, as well as appropriate NWT Policies and Procedures;

- Directing work so as to ensure personnel safety and protection of property and the environment;

- Presiding at tailgate safety meetings (a shared responsibility by the SHSO);

- Providing all required safety supplies to work crews prior to each task;

- Demonstrating a personal commitment to safety on the project;

- Observing project personnel for signs of chemical or physical trauma;

- Conducting job site safety audits with the SHSO at least weekly;

- Immediately notifying the PM and Health and Safety Manager upon receiving notice of any job site inspection by a regulatory agency;

- Correcting any hazards disclosed by project workers or the SHSO;

- Rendering appropriate disciplinary action to individuals who do not strictly adhere to the project SHASP;

- Immediately notifying the PM, Health and Safety Manager, and the SHSO of any illnesses, accidents, injuries, or near-misses related to the project, and submitting appropriate documentation to the Health and Safety Manager with 24 hours;

- Assist the Health and Safety Manager and/or SHSO in establishing appropriate site control zones; and

- The PS must have completed the Hazardous Waste Supervisor's course.

The NWT Project Supervisor is Dan Spicuzza. A qualified alternate supervisor designated by the PM will be available in case the PS is temporarily away from the job site (due to illness or other emergency).

2.5 Site Health and Safety Officer

The Site Health and Safety Officer (SHSO) will represent the Health and Safety Manager on-site during field activities. As such, the SHSO will be responsible for providing independent surveillance of the routine implementation of the project SHASP. The SHSO may not, however, authorize changes to or variances from the SHASP. The Health and Safety Manager must approve any modifications of the project SHASP with written concurrence of the ROICC, the Contracting Officer's representative.

Other duties of the SHSO include:

- Immediately stopping work if Immediately Dangerous to Life or Health (IDLH) or other extremely hazardous conditions are encountered;

- Verifying that all personnel has the necessary training and medical clearance prior to entering the site;

- Identifying all site personnel with medical restrictions to the PS;

- Determining that monitoring equipment is properly calibrated and used, and that the results are properly recorded and filed;

- Providing guidance to the Project Administrator for purchasing safety related equipment;

- Informing the Health and Safety Manager of significant changes in either the environment or work procedures which may require modification of the SHASP;

- Observing work party members for symptoms of on-site exposure or stress;

- Overseeing implementation of the SHASP, reporting any deviations from the Plan, regardless of the potential to adversely impact the health and safety of the employees, to the PS and the Health and Safety Manager;

- Immediately notifying the PS of any unsafe conditions observed and providing technical guidance to the PS for the correction of the condition;

- Recording daily weather conditions as part of the HS logs maintained at the site;

- Conducting employee exposure monitoring for workplace contaminants, noise and/or heat stress as outlined in Section 8;

- Monitoring the use of required protective clothing and safe work practices;

- Recording on the Entry Log forms the names of all personnel who enter the Exclusion Zone (EZ) or Contamination Reduction Zone (CRZ);

- Determining and posting routes to capable medical facilities and emergency telephone numbers (including poison control center), and arranging emergency transportation to medical facilities;

- Notifying local public emergency officers of the nature of the operations, and posting of their telephone numbers in an appropriate location;

- Conducting and documenting required project specific training;

- Conducting job site safety audits at least daily;

- Ensuring that training and medical records are maintained on-site for all NWT and subcontractors personnel;

- Monitoring project personnel to ensure ongoing compliance with the SHASP;
- Assisting the PS in establishing appropriate Work Zones;
- Presiding at tailgate safety meetings (a shared responsibility by the PS) and maintaining attendance records;
- Monitoring that decontamination procedures are meeting established criteria;
- Acting as Project Hazard Communication Coordinator as required by 8 CCR 5194;
- Responding to employee's/contractor's health and safety concerns;
- Periodically auditing subcontractor qualifications to ensure only properly qualified personnel are allowed in the work area;
- Ensure employees are trained on the hazards of any hazardous substances used. MSDSs must be on-hand for all hazardous materials (other than wastes) and containers must be properly labeled;
- Ensure that all safety equipment on site is periodically inspected (monthly for all fire extinguishers); and
- The SHSO must have completed the Hazardous Waste Supervisor's course.

The NWT Project Site Health and Safety Officer is Mark Divoky, who also serves as the Corporate Health and Safety Manager for New World Technology. The Project Manager, with the concurrence of the Health and Safety Manager, will designate another suitable project worker to act as alternate SHSO in case the primary SHSO cannot be on site (due to illness or other emergency).

2.6 Subcontractor Management and Personnel

Subcontractor management is responsible for the compliance of their personnel with this SHASP. Since subcontractors are hired for their specific expertise, they must assume primary responsibility for the health and safety of their personnel. The subcontractor's Field Supervisor or Crew Leader will also be responsible for performing a weekly safety inspection of their operations. A copy of this inspection must be submitted to the PS each week. If the subcontractor personnel will be performing work within either the Exclusion Zone (EZ) or Contamination Zone (CRZ), the subcontractor's Field Supervisor must have successfully completed 8 hours of Hazardous Waste Supervisory training per 8 CCR 5192 (e)(4).

Subcontractors must also:

- Comply with all applicable Occupational Safety and Health Administration (OSHA) regulations as defined in 29 CFR 1910 and 1926, 8 CCR and 22 CCR, as well as the United States Army Corps of Engineers "Safety and Health Requirements Manual" (EM 385-1-1).

- Perform all work in accordance with this SHASP.

- If the work will be performed in the EZ or CRZ, provide documentation for each on-site worker of successful completion of 40 hours training in health and safety practices for hazardous waste operations per 8 CCR 5192 (e)(3)(A). This must be received prior to the employee starting work on the site.

- For work in the EZ or CRZ, provide documentation for each on-site worker of a doctor's approval for the worker to perform hazardous waste remediation work based on an annual medical exam and work history review prior to the worker arriving on site.

- Provide updated documentation as on-site individuals complete annual HAZWOPER refresher training and/or receive annual medical examinations for workers entering the EZ or CRZ. Such documentation must be provided prior to the expiration date of the previous year's training/physical examination.

- Provide their own personal protective equipment (including safety boots, safety glasses, hard hats, respirators, protective clothing and the like), unless otherwise specified in the contract documentation.

- Report all incidents/accidents/injuries/near-misses immediately to the PS. Provide input to NWT's investigation of any mishap or near miss. Provide documentation to NWT of the subcontractor's internal investigation of the mishap/near miss.

- Provide proof of additional (non-HAZWOPER) training upon request (e.g., documentation of forklift training, confined space entry, heavy equipment operation). If the requested documentation is not provided, the subcontractor's personnel may not be permitted to perform the work on site that is covered by the required additional training.

- Submit to the Health and Safety Manager a task-specific hazard analysis for their anticipated work.

- Provide awareness level training to affected NWT workers regarding any material, equipment or operation which may pose a hazard to the NWT employees.

- Provide a Material Safety Data Sheet (MSDS) to NWT for all materials used on the project which are regulated by the Hazard Communication Standard (8 CCR 5194). NWT shall approve MSDSs prior to the material being brought on site.

- Notify NWT in writing prior to bringing any radioactive materials or devices (e.g., nuclear density gauges) onto the job site. Such notification must identify by name the subcontractor's Radiation Safety Officer and list the company's radioactive material license number. A federal license or proof of reciprocity to work on a federal installation must be provided.

- Provide own first aid kits and first aid trained individuals (minimum 2 per crew).

- Have in place an active and effective Drug Free Workplace Program in compliance with the Federal Drug Free Workplace Act.

- Provide written notification to subcontractor's own employees of the results of any industrial hygiene monitoring conducted by NWT on those employees.

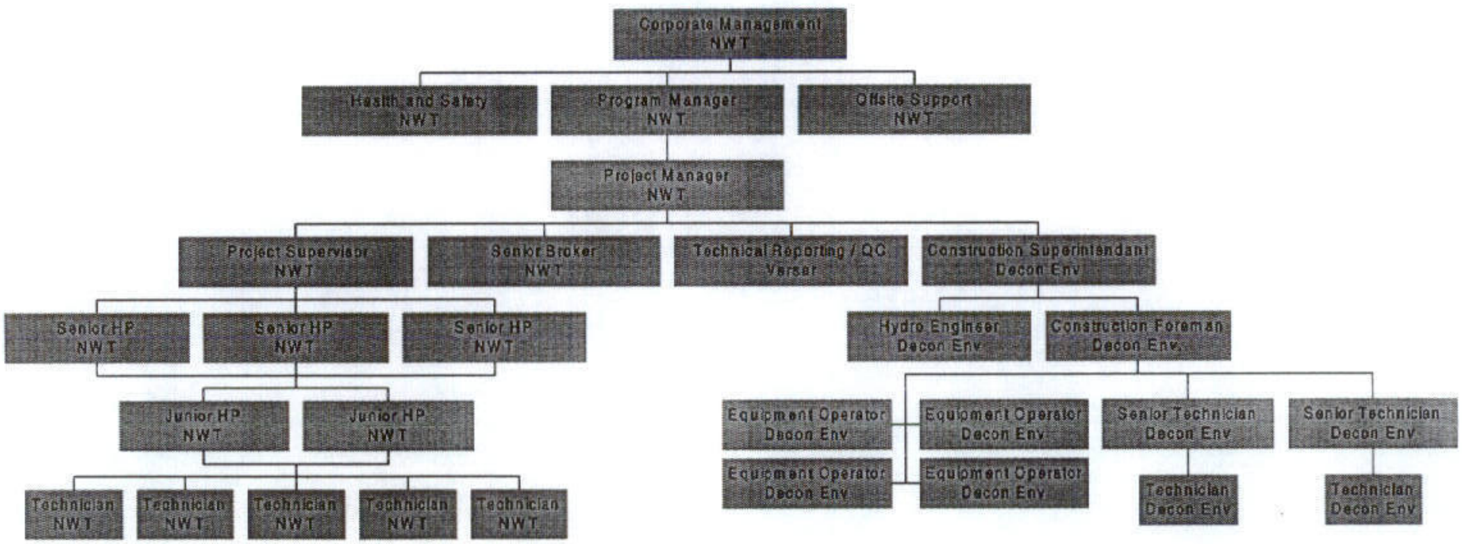
- Immediately inform the NWT Project Supervisor of the presence, or anticipated presence, of regulatory agency officials at the job site. Provide documentation to NWT of any citations or notices of violation issued to the subcontractor for work on, or associated with the project. Such documentation shall include a copy of the written citation and a summary of the subcontractor's corrective action plan.

2.7 On-Site Personnel and Visitors

No visitor will be allowed within the Work Zones without authorization from the PM and the PS. Visitors requesting authorization to enter the Contamination Reduction Zone (CRZ) or Exclusion Zone (EZ) must meet the requirements established for Project Personnel, including appropriate medical exams and training. On-site Navy personnel will also be held to these requirements.

Alameda Point Sewer Line Phase III-IV
US IOC Project USN 97-032

Phase III-IV Project Organization Chart - Field Operations



3.0 Project Hazard Analysis

3.1 Scope of Work

The Alameda Point project will encompass the removal and replacement of concrete storm sewer lines located in and around Buildings 5 and 400. The lines are buried under several structures as well as two main streets in the general vicinity of Buildings 5 and 400. The lines are known to be contaminated with Radium 226 and will be removed, decontaminated and replaced in their entirety. During the removal process a bypass system will be installed to insure continued operation of the system.

Radioactive wastes generated will be packaged for shipment and disposal at Envirocare of Utah.

Additional work will include to investigation and possible removal of a sewer line recently discovered that has no known terminus.

3.2 Activity Hazard Analysis

The activity hazard analysis identifies potential safety, health, and environmental hazards and provides for the protection of personnel, the community, and the environment. Because of the complexity and constant change of remediation projects, supervisors must continually inspect the work site to identify hazards that may harm site personnel, the community, or the environment. The PS must be aware of these changing conditions and discuss them with the PM, the Health and Safety Manager, and the SHSO. The Project PS will keep supervisors for subcontractors informed of the changing conditions. Changes to the hazard analysis may be originated by the SHSO, but must be approved by the Health and Safety Manager. Appendix D contains an activity hazard analysis for each major task associated with this project and is supplemented by the following sections. Tasks to be performed during this project include:

- Mobilization/Demobilization
- Site Preparation
- Saw cutting and Concrete Removal
- Excavation of Non-Contaminated Overburden
- Excavation of Possibly Contaminated Materials
- Excavation of Contaminated Materials
- Pipeline Cleaning

- Pipeline Removal
- Drilling
- Soil & Water Sampling
- Contaminated Waste Packaging
- Pipeline Replacement
- Equipment Decontamination
- Backfill and Site Restoration

The following sections detail hazards likely to be faced by project personnel engaged in site activities.

3.2.1 Materials Handling

Loading and unloading materials such as visqueen, sampling supplies, and decontamination equipment present a variety of hazards. These include cuts and abrasions from sharp objects, back injuries from poor lifting techniques, as well as setting up and dismantling equipment, crushing injuries from falling or moving loads, pinch points, and being struck by moving equipment or loads. The following fundamentals address the proper lifting techniques that are essential in preventing back injuries:

- The size, shape, and weight of the object to be lifted must first be considered. No individual employee is permitted to lift any object that weights over 60 pounds. Multiple employees or the use of mechanical lifting devices are required for objects over the 60-pound limit.
- The anticipated path to be taken by the lifter should be inspected for the presence of slip, trip, and fall hazards.
- The feet will be placed far enough apart for good balance and stability (typically shoulder width). THE FOOTING MUST BE SOLID.
- The worker will get as close to the load as possible. The legs will be bent at the knees.
- The back will be kept as straight as possible and abdominal muscles should be tightened.

- To lift the object, the legs are straightened from their bending position.
- A worker will never carry a load that cannot be seen over or around.
- When placing an object down, the stance and position are identical to that for lifting. The legs are bent at the knees and the object lowered.

When two or more workers are required to handle the same object, coordination is essential to ensure that the load is lifted uniformly and that the weight is equally divided between the individuals carrying the load. When carrying the object, each worker, if possible, will face the direction in which the object is being carried. In handling bulky or heavy items, the following guidelines will be followed to avoid injury to the hands and fingers:

- A firm grip on the object is essential; leather gloves shall be used if necessary.
- The hands and object shall be free of oil, grease, and water which might prevent a firm grip. Fingers shall be kept away from any points that could cause them to be pinched or crushed, especially when setting the object down.
- The item shall be inspected for metal slivers, jagged edges, burrs, and rough or slippery surfaces prior to being lifted.

Site operations shall be organized to minimize the amount of drum and container movement. All employees involved in the transfer of drums or containers shall be warned of the potential hazards associated with the contents of the drums or containers during tailgate safety meetings prior to beginning transfer operations. Tailgate safety meetings should also include information on safe handling techniques, including:

- Proper lifting techniques, back injury prevention;
- Procedures and equipment used to minimize sources of ignition during transfer operations;
- Positioning of drums and containers to minimize obstruction of the work site; and
- Employees are not to stand upon or work from drums or containers at any time.

U.S. Department of Transportation (DOT) specified salvage drums or containers and adequate quantities of proper absorbent shall be kept available and utilized in areas where spills, leaks or ruptures may occur. Drums or containers that cannot be moved without rupture, leakage or spillage shall be emptied into a sound container using the appropriate devise for the type of material being transferred (i.e. explosion proof construction, compatible seal and diaphragm materials, etc.).

3.2.2 Compressed Gas Cylinder Handling

Damage to compressed gas cylinders can result in the release of toxic substances, rupture of the cylinder or rocket-like activity. All project workers should be informed of the proper storage and handling procedures for compressed gas cylinders, including:

- Cylinders are to be stored only in designated areas away from corrosives and heat.
- Stored cylinders should be segregated by type of material contained. Cylinders containing flammable substances should be separated from those containing oxidizers by a distance of at least 25 feet, or by a noncombustible barrier 5 feet high.
- All cylinders must be clearly labeled.
- Full cylinders shall be stored separately from empty cylinders, and should be arranged so that older stock is placed in the most accessible location(s).
- Cylinder caps will be in place at all times during storage and transport.
- Cylinders shall be stored and utilized in an upright position, and secured to prevent falling with chain or rope. The area around and above each cylinder should be clear of potential falling objects.
- Inspect cylinders and lines prior to use. Lines must be tested for leaks with soapy water.
- Do not use any cylinder that shows signs of damage, including rust, corrosion, deep dents or unusual sounds.
- Cap and secure cylinders to the hand truck or other vehicle during transport.
- Remove cylinder caps by hand or with a friction wrench.

3.2.3 Vehicle Traffic

Vehicle operators will check carefully for nearby traffic before proceeding at a cautious pace on facility roadways. Unless otherwise marked, speeds should be held to 15 mph or less while on site.

Care should be taken to ensure that vehicles, equipment and materials are placed in a manner that keeps obstruction of local traffic to a minimum. During work activities, it may become necessary to move equipment in order to accommodate traffic and site activities.

Workers on foot should not wander into the active roadways. If work in active traffic areas is required, workers will wear bright orange safety vests, and the work zone will be marked with barricades, cones, and/or caution tape to warn traffic.

Where traffic control is necessary, base representatives will be contacted to ensure minimal disruption of base activities. When the base cannot provide traffic control officers, project workers may do so using high visibility road vests, hand-held stop signs and traffic cones.

3.2.4 Chemical Hazards
Health effects along with routes of exposure for health significant site contaminants are detailed in the following paragraphs:

Radium – Radium is a radioactive metal with a melting point of 1700 °F. It is highly radioactive, one gram produces 37,000,000,000 disintegrations per second (dps). Radium can enter the body through inhalation, ingestion, or injection (cuts, wounds, abrasions, etc.) Radium replaces the calcium in the bone structure and is a source of irradiation to the blood forming organs. Radon gas is a radioactive daughter product of the natural decay of radium. Both radium and radon are known human carcinogens.

Benzene - Benzene will cause local irritation to the skin, eyes, and respiratory tract and may cause redness, dryness and scaling of the skin due to defatting. Acute systemic affects include headache, dizziness, convulsions, coma and death may occur due to effects on the heart. Chronic exposures effect the blood-forming tissues primarily, resulting initially in increases in blood cell counts followed by aplastic anemia with an overactive or under active bone marrow. Epidemiological studies have linked benzene with leukemia and it is classified as a suspected human carcinogen.

Ethylbenzene - Ethylbenzene will cause local irritation to the skin, eyes, and respiratory tract and may cause defatting, drying and scaling of the skin. Acute systemic effects include headache, dizziness, nausea, loss of appetite, lassitude and eventual coma if exposure is prolonged. Ethylbenzene does not display the effects on the blood forming tissues seen with benzene and is not classified as a carcinogen in humans or animals. Chronic exposures can result in effects on the liver, kidneys and central nervous system.

Hydrogen Sulfide – Hydrogen sulfide is a gas that, in high concentrations can cause fatigue to the sense of smell (odor disappears even though the material is still present.) Inhalation of hydrogen sulfide at low concentrations can cause respiratory tract irritation, headache, dizziness, nausea, vomiting, and loss of coordination. Higher concentrations can cause coma and death within a matter of seconds. When removed from the exposure area, affected persons usually recover the ability to smell the material within a matter of hours.

Toluene - Toluene will cause local irritation to the skin, eyes, and respiratory tract and may cause defatting, drying and scaling of the skin. Acute systemic effects include headache, dizziness, nausea, loss of appetite, lassitude and eventual coma if exposure is prolonged. Toluene does not display the effects on the blood forming tissues seen with benzene and is not classified as a carcinogen in humans or animals. Chronic exposures can result in effects on the liver, kidneys and central nervous system.

Xylene - Acute effects of xylene exposure include skin and mucous membrane irritation, central nervous system effects, and respiratory irritation leading to pulmonary congestion, edema, and hemorrhage. Inhalation exposure can also lead to liver and cardiac damage. Chronic exposure can result in effects on the liver, kidneys and central nervous system and may have an effect on the blood forming tissues. No carcinogenic effects have been documented; possible teratogenic effects have been observed.

Table 3-1 details the chemical specific information for each of the species detailed above.

Other Contaminants
Activities required during the project may result in some slight exposure of site workers and visitors to contaminants at very low concentrations.

During on-site activities, all personnel will wear appropriate protective clothing whenever the possibility for contact with contaminated soil or groundwater exists (see Section 5.0). If respiratory protection is required, only NIOSH approved non-disposable respirators may be worn. Disposable respirators are not permitted.

Material Safety Data Sheets (MSDSs) will be provided on-site for each hazardous material (other than waste) brought on-site. MSDSs are found in Appendix B.

3.2.5 Exposure Standards
Threshold Limit Values (TLVs), Recommended Exposure Limits (RELs), Permissible Exposure Limits (PELs) and Derived Air Concentrations (DACs) refer to airborne concentrations of substances which represent conditions that nearly all employees may be repeatedly exposed to day after day without adverse effect. The TLVs are prescribed by the ACGIH and are based upon the best available information obtained through industrial experience and animal or human studies. RELs are based upon a combination of industry and government research by NIOSH on industrial exposure to chemical contaminants. The PELs are prescribed by OSHA, the DACs are prescribed by the NRC and both have the effect of law. They are the minimum levels that must be followed for worker protection. Due to the wide variation in individual susceptibility, a small percentage of workers may

experience discomfort from some substances at concentrations below these values. It has been policy to use the stricter of these three exposure standards for good hygienic practices; however, whenever applicable, even stricter guidelines may be utilized.

Currently, exposure levels to pesticides and other chemical substances are regulated by OSHA and recommended by the ACGIH and NIOSH. These exposures are based upon the time-weighted average (TWA) concentration for a normal 8-hour workday and a 40-hour workweek. Several chemical substances have short-term exposure limits (STEL) or ceiling values, which allow a maximum concentration to which workers can be exposed continuously for a short period of time without suffering from irritation, chronic or irreversible tissue damage, narcosis of a sufficient degree to result in accidental injury, impaired self-rescue abilities, or substantially reduced work efficiency.

The STEL is defined by the ACGIH as a 15-minute TWA exposure that should not be exceeded at any time during a workday even if the 8-hour TWA is within the TLV-TWA. Exposure above the TLV-TWA up to the STEL should not be longer than 15 minutes and should not occur more than four times per 8 hour work shift. There should be at least 60 minutes between successive exposures in this range. An averaging period other than 15 minutes may be recommended when this is warranted by observed biological effects. OSHA requires that a 15-minute "Ceiling" concentration never be exceeded for that chemical constituent. This notation appears as the letter "C" after the chemical name. Table 3-2 contains the exposure guidelines for identified health significant contaminants.

Exposure to direct ionizing radiation is not expected to exceed 20 millirem (mrem) to the maximally exposed individual worker. Exposure to airborne radioactive contaminates will not exceed 10% of the Allowable Limit on Intake (ALI) as proscribed in 10 CFR 20, App. B.

3.2.6 Drilling Hazards

All persons involved in drilling activities on the sewer pipeline investigation at Buildings 5 and 400 must be aware of the potential for equipment contacting any overhead power lines. Additionally, underground utilities, including water, gas and electrical lines, may be present. The potential for electrocution, equipment damage and disruption of services for residents and businesses exists. Equipment should be oriented to minimize the potential for contact with the lines. Drill rigs must maintain a minimum 20-foot clearance from the overhead lines at all times. If drilling operations must be performed closer than 20 feet from overhead power lines, the Health and Safety Manager must be notified. When clearance to proceed is received from the Health and Safety Manager, the electric utility company must be contacted to turn the power off or physically insulate (protect) the lines until the drilling is finished.

While the rig is being positioned and readied for use, the operator must be completely within the operator's area and no one else shall be permitted to touch the rig until it has been secured. Any vehicles bearing drill rigs or stationary equipment should have the wheels chocked and the parking brake set to prevent accidental movement. Operation and maintenance of the drill rig also presents the hazards of getting caught in or struck by moving parts of the machinery.

Prior to the start of work, the drilling subcontractor will inspect all drilling equipment in the presence of the PS and the SHSO. The inspection will be documented in the field records. If field operations last longer than one week, the drilling equipment inspection must be repeated on a weekly basis.

The location of underground utilities must be ascertained and confirmed prior to the start of drilling operations. In addition to obtaining the utility locations from the client, local utilities, or Underground Services Alert (USA), or a qualified subcontractor, will make a utility survey of each drilling point. The utility survey shall be performed using such equipment that the utility location contractor determines as appropriate. This equipment may include a magnetometer or a ground penetrating radar. Documentation that nearby utilities have been marked on the ground, and that the drill site has been cleared shall be in the possession of the PS (or qualified designee) and the SHSO prior to commencement of the intrusive investigation at that point of the site.

All operations involving the use of powered drilling rigs will follow generally accepted drilling practices. One person will be assigned the responsibility of Lead Driller. Additional personnel will assist with equipment as needed. The Lead Driller will be responsible for operating the drilling rig and ensuring safety.

General rules associated with drilling rig operations will be as follows:

- An "Exclusion Zone" will be established around the drilling rig using barricade tape physical barrier;
- All operators and crewmembers will be familiar with the rig operations and will have received practical training;
- Procedures for equipment and tool chemical and radioactive decontamination will be followed;
- Hard hats are required when working within the drilling rig work zone;
- Goggles or safety glasses with side shields will be worn when operating power tools, sanding, grinding, hammering, or filing;
- No loose fitting clothing, jewelry, or free long hair is permitted near the drilling rig or moving machinery parts;
- Hands and loose clothing must be kept away from moving parts of the machinery;

- Drilling must cease immediately if combustible gas concentrations greater than 10 percent of the Lower Explosivity Limit (LEL) are detected at the borehole;
- A first aid kit and fire extinguisher will be available nearby at all times;
- If lubrication fittings are not accessible with guards in place, machinery must be stopped for oil and greasing;
- Rigging equipment for material handling should be checked prior to use on each shift and as often as necessary to ensure it is safe. Defective rigging shall be removed from service immediately;
- The area around the derrick ladder must be kept clear to provide unimpeded access to the ladder;
- Work areas and walkways must not be obstructed;
- The work area around the borehole shall be kept free of obstructions, and free of undue accumulation of oil, water, ice or circulating fluids;
- No drilling will occur during impending electrical storms or tornadoes, or when rain, ice, snow, or wind conditions create undue potential hazards;
- One worker shall not lift auger flights by himself or attempt to carry equipment or materials of excessive weight;
- The driller will not attempt to reach a well or borehole location in a manner that compromises the safety of the rig or crew;
- The drill crew to ensure that a stable surface exists will inspect all well or borehole locations;
- The drill rig will be properly blocked and leveled prior to raising the mast;
- The drill rig shall be driven or moved only after the mast has been lowered; and
- The leveling jacks shall not be raised until the derrick is lowered.

When drilling is to be conducted in contaminated soil, appropriate monitoring shall be conducted to assess worker exposure as well as effectiveness of control measures. Monitoring to be conducted will be specified in the SHASP. Additional PPE may be required during these conditions.

3.2.6.1 Hoisting Operations

The following procedures shall be followed during hoisting operations:

- Drillers must never engage the rotary clutch without watching the rotary table, and ensuring it is clear of personnel and equipment;

- Unless the drawworks is equipped with an automatic feed control, the brake must not be left unattended, without first being tied down;

- Drill pipe or casing must not be picked up suddenly;

- Drill pipe must not be hoisted until the driller is sure that the pipe is latched in the elevator, or the derrickman has signaled that he may safely hoist the pipe;

- During instances of unusual loading of the derrick or mast, such as when making an unusually hard pull, only the driller may be on the rig floor, and no one may be on the rig or derrick;

- The brakes on the drawworks of every drilling rig must be tested by each driller, when he comes on shift to determine whether they are in good order. The brakes must be thoroughly inspected by a competent individual each week;

- A hoisting line with a load imposed must not be permitted to be in direct contact with any derrick member or stationary equipment, unless it has been specifically designed for line contact;

- Workers must never stand near the boring whenever any wire line device is being run;

- Hoisting control stations must be kept clean and controls labeled as to their functions; and

- Under no circumstances will personnel be permitted to ride the traveling block or elevators, nor will the catline be used as a personnel carrier.

3.2.6.2 Catline Operations
The following procedures shall be followed during catline operations:

- Only experienced workers will be allowed to operate the cathead controls. The kill switch must be clearly labeled and operational prior to operation of the catline;

- The cathead area must be kept free of obstructions and entanglements;

- The operator must not use more wraps than necessary to pick up the load. More than one layer of wrapping is not permitted;

- Personnel must not stand near, step over, or go under a cable or catline which is under tension; and

- Employees rigging loads on catlines must:

  - Keep out from under the load,
  - Keep fingers and feet where they will not be crushed,
  - Be sure to signal clearly when the load is being picked,
  - Use standard visual signals only and not depend on shouting to co-workers, and
  - Make sure the load is properly rigged, since a sudden jerk in the catline will shift or drop the load.

3.2.6.4 Derrick Operations
The following procedures shall be followed during derrick operations:

- The derrick climber must be used whenever climbing the derrick. Personnel on the derrick must be tied off, or otherwise protected from falling when working in an unguarded elevated position;

- All stands of pipe and drill collars racked in a derrick must be secured with rope or otherwise adequately secured;

- Tools, derrick parts, or materials of any kind shall not be thrown from the derrick; and

- The elevators must be properly clamped onto all pipe joints prior to the driller engaging the load.

3.2.6.5 Making and Breaking Joints
The following procedures will be followed when making and breaking joints:

- Tongs shall be used for the initial making up and breaking of the joint. The rotary table shall not be used for the initial breaking of a joint.

- Employees making or breaking joints shall not be permitted to stand within the arc of the tong handles when the tong pull line is in tension. Employees shall handle the tongs only by the appropriate handles.

- Employees shall be trained in the safe use of spinning chains. Spinning chains must not be handled near the rotary table while it is in motion.

3.2.7 Excavation Procedures

Excavation activities will occur in the sewer pipeline removal at Buildings 5 and 400. Excavation of soil is generally accomplished using heavy earthmoving equipment. This equipment introduces loud noise levels that may cause hearing loss, and may present a risk of workers being struck by the machinery. Earthmoving equipment can also tip over if positioned improperly or overextended.

Falls can result from unbarricaded excavations. If workers must enter the excavation, they risk being engulfed or otherwise injured by moving soil unless the excavation is properly shored or sloped. Hazardous atmospheres can also be generated in and around excavations.

When performing excavation activities, the NWT Procedure HS 21.0 for excavation and trenching must be followed. A copy of this procedure along with all other NWT H&S Policies and Procedures will be maintained with the SHSO's field office. Any excavation four (4) feet deep or greater, into which persons will enter and perform work, must be shored, sloped, or otherwise made safe for entry. Excavations less than four (4) feet in depth and which a competent person examines and determines there to be no potential for cave-in do not require protective systems.

NWT anticipates the use of several engineered, pre-fabricated trench boxes during the performance of this contract. These boxes have been designed to meet the minimum requirements for the California Open Excavation regulations, and all trench entries will be performed using one of these devices.

All excavations will be performed from a stable ground position. A competent excavation safety person, one who has received training in excavation safety, will make daily inspections of the excavation and who has been designated a competent excavation safety person by NWT. The competent person will determine the likelihood of a cave-in, and remedial action such as sloping or shoring will be taken if the walls appear to be unstable. The competent person will verify that adequate means of egress are available.

All excavated soils will be located at least 2 feet from the edge of the excavation to prevent it from falling back into the excavation. Perimeter protection will be used for all excavation activities at the site, consisting of warning barricades or fencing placed at a distance not closer than 6 feet from the edge of the excavation and displaying adequate warning at an elevation of 3 feet to 4 feet above ground.

All project personnel will participate in the site-specific training session and be instructed on the following requirements.

- Before excavating, the existence and location of underground pipe, electrical equipment, and gas lines will be determined and documented. If the locations of any lines are in question, metal detectors will be used to positively locate all suspected lines.

- No ignition sources are permitted if the ambient airborne concentration of flammable vapors exceeds 10 percent of the lower explosive limit (LEL) during the excavation. A calibrated combustible gas indicator (CGI) will be used to make this determination.

- Operations must be suspended and the area vented if the airborne flammable concentration reaches 10 percent of the LEL in the area of an ignition source (i.e., sparks from bucket of excavator).

- Combustible gas readings of the general work area will be made regularly.

- If excavating equipment is located in the vicinity of overhead power lines, Table 3-4 will be used to determine safe working distances.

- Ladders will be provided and placed at an angle not more than 30 degrees from vertical, and secured as necessary. Ladder side rails will extend at least 3 feet above the ground surface.

- No one shall enter a trench, greater than four feet in depth, without proper shoring, sloping or benching in place. Entry into trenches and/or excavations also requires daily inspections by a competent person, continued supervision from outside the excavation, and atmospheric testing.

- Excavations greater than four feet in depth that require personnel to enter will have sufficient means of entry and egress (stairs, ladders, ramps). Means of entry/egress will not require personnel to travel laterally further than 25 feet.

- Excavations occurring within 3 feet of existing utilities will be performed by hand digging until the utility line is exposed.

- Crossing directly over the trench will be permitted only where approved walkways with handrails or sufficient trench plates are provided. All other traffic is to be directed around the trench, at a safe distance from the trench edges.

- The trench will be completely filled and compacted upon completion of the work.

3.2.8 Heavy Equipment

Heavy equipment produces loud noise levels that may cause hearing loss, and may also present a risk of workers being struck by the machinery. Earthmoving equipment can also tip over if positioned improperly or overextended.

- Prior to use, all heavy equipment will be inspected. This inspection will be documented in the Daily Logs.

- Heavy equipment not being used in the excavation and trenching operations will be placed a sufficient distance from the trench so that their weight and/or movement does not weaken the excavation walls.

- Blades and buckets on heavy equipment will be lowered during transport and whenever the operator leaves the machine.

- Heavy equipment will have an audible reverse signal alarm that operates automatically with backward movement.

- The operator will check the condition of equipment each day before operating. This check will include brakes, clutches, steering mechanisms, hydraulic and electrical systems, and signs of abnormal wear.

- No worker will use a piece of equipment unless they are familiar with its operation and have been given a performance test by the PS.

- Personnel are not allowed to work off machine implements or to use them as ladders or scaffolds.

- Unauthorized riding on equipment or riding parts of equipment not intended for occupancy by either operator or passenger is prohibited.

3.2.9 Pressure Washing

Pressure washing will be used for pipeline cleaning and possibly for equipment decontamination activities. Because of the significant hazard of cutting and injecting water into the body, refer to HS 23.0 Pressurized Water Cleaning and Cutting Equipment.

Training and providing the proper PPE is extremely important prior to using the pressure-washing unit. At a minimum, safety glasses, a face shield, and leg/metatarsal guards will be worn during all pressure washing activities regardless of the rated operating pressure of the unit being used.

3.2.10 Pipeline Identification and Location

Prior to breaking ground, the areas will be marked for underground utilities and dig permits will be obtained from the Department of Public Works. In addition, an independent geophysical line locating advisory service, such as "Dig Alert," will be used to confirm the location of identified or marked underground utilities and to identify any unidentified, mismarked, and/or additional underground utilities.

Prevention of potential discharge is stressed as a high priority by project management. The primary spill risk is from the activities associated from the removal of the pipelines. To help prevent discharge, the pipeline will be pumped down to the maximum extent possible prior to removal.

Excavation of the pipeline will be conducted with the excavation sidewalls stabilized by sloping, benching, or shoring as appropriate. The excavated materials will be stored on visqueen at the site or moved to a designated contaminated soils stockpile area.

Immediately prior to removal, the pipeline ends will be temporarily sealed with plastic sheeting to prevent the possible spillage of contaminated sludge from the interior. The pipeline sections will be lifted from the excavation and placed on plastic sheeting prior to interior cleaning. All rinse materials generated will be collected and drummed prior to profiling for disposal. Once cleaned the interiors of the pipe sections will be surveyed for residual contamination. Should such contamination exist, the pipe section will be broken up with heavy equipment prior to being placed in the appropriate disposal containers.

3.2.11 Maintenance/Troubleshooting

Equipment and machinery maintenance and troubleshooting work can expose project workers to contaminated materials and other hazards. Troubleshooting electrical and mechanical equipment can expose workers to shock hazards, and crushing or pinch hazards.

Whenever employees or subcontractors are working on equipment or in areas where the activation of the equipment or the charging of hazardous materials lines might endanger the worker's safety, lockout and tagout procedures (NWT Policy HS 20.0) are required. Should the project extend more than 30 days with lockout/tagout planned for more than seven calendar days, or when locking/tagging out specialized equipment having its own lockout requirements, the Health and Safety Manager shall be notified for an addendum to this SHASP.

3.2.12 Hand Tools

Use of hand tools may expose workers to cuts, lacerations or puncture wounds if adequate hand protection is not worn or tools are improperly used or stored. Damaged hand tools may also expose employees to injuries from shattered tools and flying debris.

The following safe work practices apply to the use of hand tools:

- Only use a tool for its designed use.
- Do not use damaged tools.
- Driving faces of hammers, chisels, drift pins, bars, and similar tools must be inspected to eliminate mushroomed heads, broken faces and other defects.
- Tools must be returned to their proper storage place.
- Sharp tools must not be carried in pockets.
- Wood handles must be sound and securely wedged or fastened to the tool. Tape must not be used to cover defects such as cracks.
- When hand tools are being used overhead, those working or standing below must be notified.
- Pipe wrenches must be inspected regularly. Replace the heel and jaw sections if found to be defective or worn out.
- Pipe wrenches must not be used to bend, raise or lift pipe.
- Always wear safety glasses to protect the eyes.

3.2.13 Power Tools

Power tools present many potential hazards, including shock and electrocution, injuries from accidental activation and injuries from using damaged or malfunctioning equipment.

When using power tools, the following precautions shall be followed:

- Power tools will be inspected and their operation tested prior to being placed in service.

- Eye protection (safety glasses or goggles) must be worn whenever operating power tools.

- Power tools must be grounded or of the double-insulated type.

- Power tools shall not be used in wet locations.

- A Ground Fault Circuit Interrupter (GFCI) must protect all power tools.

- Splicing, cutting or "repairing" electrical wire or extension cords by unauthorized personnel is prohibited.

- Plugs and cords must be protected from damage.

- Grounding plug pins are never to be removed.

- Electrical tools are not to be used inside a confined space without prior approval by the SHSO or Health and Safety Manager.

- All electrical tools must be turned off before connecting or disconnecting the power supply.

- Extension cords must be visually inspected each time they are used. Cords must be disconnected from the power source before coiling for storage.

- Extension cords used with portable electric tools shall be of three-wire type and shall be rated for hard or extra-hard usage (Types S, ST, SO, STO, SJ, SJO, SJT, or SJTO).

3.2.14 Ladders

The use of ladders on the project can expose employees to injuries from falls and falling objects, in addition to electrocution hazards.

The following rules apply to all ladders used on the project.

3.2.14.1 Safe Ladder Design

- Rungs must be spaced 12 inches apart vertically.

- Width of ladder must not be less than 15 inches nor more than 20 inches.

- Stepladders must not exceed 20 feet in length. (Use of such ladders taller than 12 feet is not anticipated.)

- Cleat ladders must not exceed 30 feet in length. Double cleat ladders are required for two-way traffic or when used by 25 or more employees.

- Extension ladders shall not exceed 44 feet in length. (Such lengths are also not anticipated.)

- The overlapping section of extension ladders shall not be less than 10 percent of the working length.

- All ladders must have a warning sign prohibiting standing on the top step.

3.2.14.2 Safe Ladder Use

- Do not stand on the top 3 rungs of ladders unless you are protected by a safety belt.

- Remove damaged ladders from use. Tag with "DO NOT USE."

- Do not place ladders where they can be accidentally struck or displaced.

- Secure ladders in use against displacement.

- Extend ladder side rails at least 3 feet above the landing, unless handholds are provided.

- Place ladders outward at approximately 7:1 pitch.

- Do not place planks on top (cap) of stepladders.

- Do not splice ladders together.

- Do not use metal ladders for electrical work or near live electrical parts.

- Mark portable metal ladders:

  CAUTION - DO NOT USE AROUND ELECTRICAL EQUIPMENT

- Portable ladders must be inspected prior to each use for cracks, splits, loose rungs, etc.

- Portable metal or aluminum ladders must be equipped with non-skid feet.

- Wooden portable ladders must not be painted.

- Ladders must not be used in a horizontal position as a scaffold.

- Portable ladders must be secured in place. If not possible, the ladder must be held by another person.

- Heavy, bulky tools and material must be hoisted up separately. Light tools, equipment, etc., must be attached to one's person.

- Personnel must not reach beyond arm's length of the side rails of a ladders to gain better access. The ladder must be moved.

- Only one person is allowed on a ladder at any given time.

3.2.15 Forklift Operations

Forklifts may be required for materials movement during project activities. Forklifts present the potential for damage to equipment or materials due to impaling or striking personnel or materials with the forklift. Additionally, forklifts may tip if they are incorrectly loaded, driven at excessive speeds or operated with the forks too high.

The following rules apply whenever a forklift is used on the project:

- The rated lifting capacity must be posted in a location readily visible to the operator.

- A forklift truck must not be used to elevate employees unless a platform with guardrails, a back guard, and a kill switch are provided on the vehicle. NOTE: When guardrails are not possible, safety belt protection is required.

- The PS must post and enforce a set of operating rules for forklift trucks.

- Only trained and authorized drivers will operate forklifts.

- Stunt driving and horseplay are prohibited.

- Passengers or riders on forklifts are prohibited.

- Employees must not ride on the forks.

- Employees must never be permitted under the forks (unless forks are blocked).
- The driver must inspect the forklift once a shift and document this inspection.
- The operator must look in the direction of travel and must not move the vehicle until all persons are clear of the vehicle.
- Forks must be carried as low as possible.
- The operator must lower the forks, shut off the engine, and set the brakes (or block the wheels) before leaving the forklift operator's position unless maintenance or safety inspections require the forklift to be running.
- Trucks must be blocked and have brakes set when forklifts are driven onto their beds.
- Extreme care must be taken when tilting elevated loads.
- Every forklift must have operable brakes capable of safely stopping it when fully loaded.
- Forklifts must have parking brakes and an operable horn.
- When the operator is exposed to possible falling objects, industrial trucks must be equipped with overhead protection (canopy).

3.2.16 Cranes

A crane may be utilized during sewer pipeline removal on this project. The hazards associated with crane operations include falling loads due to damaged/improperly selected rigging or improperly secured loads, being struck by booms or swinging loads, crushing injuries due to incorrect loading techniques and traffic-related injuries or equipment damage.

Wind is of concern at all sites when crane operations are underway. Wind speed and direction shall be monitored during all lifting operations. Whenever wind speed reaches 20 mph, the qualified person and the SHSO will determine the safety of the planned lift. This determination shall be made prior to commencing the actual lift. They shall stop the lift if in their opinion wind speed exceeds safe parameters. While 20 mph is set forth as a benchmark, this in not meant to preclude stopping a lift at a lower wind speed in necessary or allowing a lift at higher wind speeds if safety is not compromised.

In accordance with the U.S. Army Corps of Engineers Health and Safety Requirements Manual (EM385-1-1), crane operators will work a maximum of 10 hours in any 24 hours when engaged in crane operations during any part of the day. However, time in excess of the 10 hours is authorized before crane operations begin for the daily tailgate safety meeting.

The following rules apply whenever a crane is used on the project:

- Each crane must be certified annually by a qualified person.

- Prior to initial use on the project, all cranes shall be inspected to ensure compliance with NWT Procedure HS 24.0 "Mobil Crane Inspection." All provisions of this procedure shall apply to the use of mobile cranes. Documentation of this inspection will be recorded in the Daily Logs.

- Tag lines shall be attached to guide all lifted loads.

- Hooks must be equipped with safety latches.

- All cranes must be equipped with an audible warning device controllable by the operator.

- No crane shall be operated with wheels or tracks off the ground unless properly bearing on outriggers.

- A signal person shall be provided when the point of operation is not in full and direct view of the crane operator.

- All wire rope and other rigging removed from service due to defects shall be cut up to prevent further use.

- The swing radius of the rear of the rotating crane will be barricaded to prevent an employee from being struck or crushed by the crane

3.2.16.1 Mobile Hydraulic Cranes

- A load-rating chart must be posted at a location readily visible to the operator.

- Each hydraulic crane shall have the following capabilities:

  - Outriggers must be used according to certifying agent requirements.
  - Boom angle indicator must be clearly visible from the operator's station.
  - Boom length indicator (telescopic booms) must be installed.
  - Boom hoist disconnect (boom stop) must be installed.

- A boom stop is required.

3.2.16.2 Boom-Type Mobile Cranes

- This section applies to motor truck cranes.

- All mobile cranes operated by NWT regardless of capacity must be equipped with a load indicating device (or equivalent) approved by Cal/OSHA.

- A readily visible boom angle or boom radius indicator is required for variable radius cranes, and cranes with a boom longer than 50 feet or a maximum rated capacity above 15 tons.

- A fire extinguisher of type 1A5BC rating shall be accessible to the operator's station.

- An operable boomstop is required on any crane which could fall over backwards.

- A canopy-type guard or cab roof must protect the operating station.

- Safe access (by steps and handholds) must be provided.

- The boom hoist must be capable of:

  - Raising the boom with a rated load.
  - Holding a rated load without operator attention.
  - Lowering a rated load only when coupled to the prime mover.

- The boom-hoist mechanism must have:

  - A device permitting immediate starting or stopping of the boom drum.
  - A self-setting safety brake.

3.2.16.3 Slings

- Slings and attachments must be inspected daily for damage or defects.

- Damaged/defective slings must be removed from service immediately and cut up to prevent further use.

- Chain or wire rope slings must not be shortened by knots, bolts, or other means.

- Sling legs must not be kinked.
- Slings must not be overloaded.
- Slings must be padded to protect against damage from sharp loads.
- Suspended loads must be kept clear of all obstructions.
- Wrought iron chains must be annealed every six months; alloy chains must not be annealed.
- Avoid operations that expose employees to overhead loads.
- Deformed, elongated or defective sling hooks and rings must not be used and must be cut up to prevent further use.

3.2.17 Confined Space Entry
It is anticipated that several phases of work conducted during this project will require entry into a confined space. A confined space is defined as an enclosure which is large enough for an employee to enter, but which has limited means of access and egress, is not designed for continuous employee occupancy, and has the potential of generating a hazardous atmosphere.

A permit-required confined space is a confined space as defined above which also contains one or more health and/or safety hazards. This can include chemical, mechanical, electrical, or other hazards.

A survey of the project site will be made by the SHSO to identify any potential permit required confined spaces. All identified permit required confined spaces will be appropriately marked to provide warning to personnel not to enter.

In the event that entry into a confined space is required, the Health and Safety Manager must be notified and a Confined Space Entry Permit will be generated for each space, shift and entry to be made. All entries will be made in compliance with this SHASP and NWT Procedure HS 17.0. Prior to entry, a NWT Entry Supervisor will certify the confined space. Initial and continuous monitoring for combustibility, toxicity, and oxygen content will be conducted to determine the atmospheric class and subsequent protection levels required. In addition, personnel entering the confined space must have completed training specifically for confined space entry. A blank copy of the Confined Space Entry Permit is included with this SHASP as Appendix C.

3.2.18 Noise

Some of the equipment used on the project generates loud noise. Exposure to sound levels above 85 dBA can cause temporary impairment of hearing. Prolonged and repeated exposure to sound levels above 85 dBA can cause permanent hearing damage. The risk and severity of hearing loss increases with the intensity and duration of the exposure. In addition to damaging hearing, noise can impair voice communication, thereby increasing the risk of incidents.

All on-site NWT and subcontractor personnel shall wear hearing protection, with a Noise Reduction Rating (NRR) of at least 25, when noise levels exceed 85 dBA (or wherever voices must be raised in order to be understood at arms length). The SHSO will perform sound level monitoring or noise dosimetry on operations that require hearing protection. All site personnel who may be exposed to noise shall also receive baseline and annual audiograms and training as to the causes and prevention of hearing loss, in accordance with NWT Procedure HS 6.0.

Whenever possible, equipment that does not generate excessive noise levels will be selected for this project. If the use of noisy equipment is unavoidable, wherever possible, barriers or increased distance will be used to minimize worker exposure to noise.

3.2.19 Fire Prevention and Protection

Fire prevention is of primary importance to this project. Every effort will be made to prevent the start of any fires. If a fire should occur, the Alameda County Fire Department will be called, even if the fire has been extinguished.

All flammable liquids will be stored in Underwriters Laboratory (UL) approved storage cans. Small quantities of most flammable liquids (five gallons or less) may be carried in vehicles, providing those materials will be used that day and will be contained in a safety can or other approved container. Class IA flammable liquids should be limited to five gallons in an approved safety can. Any flammable wastes will be stored or disposed of in metal containers, clearly marked as containing flammable materials. Storage of combustible materials, in work areas, will be kept to a minimum.

In order to provide fire protection, NWT will provide and maintain portable fire extinguishers in the following manner:

- Portable fire extinguishers will be provided, where needed, and inspected on a monthly basis. A visual inspection will be made to ensure that extinguishers are fully charged and in an operable condition. Hoses, nozzles, brackets, and supports will be inspected for deficiencies and corrected. Safety pins will be inspected to ensure that the breakaway seal is unbroken. If the breakaway seal is broken, a service technician must service the extinguisher. Gauge pressure will be checked monthly on pressurized units to ensure units are fully charged and non-pressurized units will have their cartridges weighed on an annual basis. The chemical within dry chemical extinguishers will be inspected on an annual basis to ensure that it is powdery and in a free-running condition. An inspection tag will be attached to all extinguishers to designate that they have received an annual inspection.

- Fire extinguishers will be suitably placed, distinctly marked, and readily accessible.

- A fire extinguisher with a rating of not less than 10-B will be located within 50 feet wherever more than 5 gallons of flammable liquid is being used on the work site (this does not apply to integral fuel tanks of motor vehicles).

- A fire extinguisher with a rating of not less than 20-B will be located outside of and within 10 feet of the door opening into any room, building, or trailer used for storage of more than 60 gallons of flammable or combustible liquids.

- If flammable liquids are being stored in an outside location, at least one portable fire extinguisher with a rating of not less than 20-B will be located at least 25 feet from the storage area, but not more than 75 feet away.

- All tank trucks or vehicles used for transporting and/or dispensing flammable or combustible liquids will have a portable fire extinguisher with not less than a 20-BC rating.

- A portable fire extinguisher with a rating of not less than 20-BC will be placed within 50 feet of each service or fueling area.

- Fire extinguishers will be placed in storage areas so they are capable of extinguishing materials being stored.

- A nationally recognized testing laboratory will approve all fire extinguishers.

- At least one dry chemical or carbon dioxide fire extinguisher, with a 5-BC rating minimum, will be available for placement on each unit of heavy equipment, and each site vehicle (excluding rental cars).

- At least one dry chemical fire extinguisher with a rating of 2A 10BC shall be provided in any trailer used as office or work area. If computers or other electronic equipment is in use, an additional CO_2 extinguisher of a 5BC rating may be advisable.

Fuel handling is another hazard that will be present during this task. Refueling of the equipment poses burn hazards. All refueling and fuel handling equipment must be Underwriters Laboratories (UL) listed and Factory Mutual (FM) approved. The refueling must be done in a designated area to prevent contamination from minor spills and to reduce the risk of fires. The following guidelines must be followed whenever personnel are dispensing flammable and combustible liquids:

- Flammable liquid dispensing systems will be electrically bonded and grounded. All tanks, hoses, and containers of 5 gallons or less will be kept in metallic contact while flammable liquids are being transferred; transfer of flammable liquids in containers in excess of 5 gallons will be done only when the containers are electrically bonded.

- Flammable or combustible liquids will be drawn from, or transferred into, vessels, containers, or tanks within a building or outside only through a closed piping system, from safety cans, by means of a device drawing through the top, or from a container, or portable tanks, by gravity or pump, through an approved self closing valve. Transferring by means of air pressure on the container or portable tanks is prohibited.

- Areas in which flammable or combustible liquids are transferred in quantities greater than 5 gallons from one tank or container to another will be separated from other operations by at least 25 feet, or a barrier having a fire resistance of at least 1 hour. Drainage or other means will be provided to control spills.

- Natural or mechanical ventilation will be provided to maintain the concentration of flammable vapor at or below 10 percent of the lower explosivity limit (LEL).

- Dispensing units will be protected against collision damage.

- Dispensing nozzles and devices for flammable liquids will be of an approved type.

In case of a fire on the site, the PS will assess the situation and direct fire fighting activities. NWT personnel trained in the use of extinguisher may attempt to extinguish the fire with available extinguishers, if safe to do so. Fire fighting is a job for the fire department. No property or equipment is so important as to risk an employee's life.

3.2.20 Electrical Power

All electrical equipment must have a GFCI as part of the circuit. All equipment must be suitable and approved for the class of hazard. Temporary wiring conductors installed for operation of construction tools and equipment will be either Type TW or THW contained in metal raceways, or will be hard usage or extra hard usage multiconductor cord. Temporary wiring will be secured above the ground or floor in a workmanlike manner and will not present an obstacle to persons or equipment. Applicable Cal/OSHA standards for electrical power will apply.

3.2.21 Portable Electric Equipment

Various types of portable electric equipment (including portable generators, ground fault circuit interrupters and flexible cords) may be used during the course of the project. To minimize electric shock hazards, the following rules apply to these pieces of equipment.

3.2.21.1 Portable and Vehicle-Mounted Generators

All portable and vehicle-mounted generators must be grounded, except under the following conditions:

- The noncurrent-carrying metal parts of equipment located on the vehicle and the equipment grounding conductor terminals of the receptacles are bonded to the generator or vehicle frame, and;

- The generator supplies only equipment located on the vehicle or the generator and/or cord - and plug - connected equipment through receptacles mounted on the vehicle or on the generator, and;

- The frame of a vehicle-mounted generator is bonded to the vehicle frame, or;

- The generator is single-phase, portable or vehicle-mounted, rated not more than 5 kW and the circuit conductors of the generator are insulated from the generator frame and all other grounded surfaces.

3.2.21.2 Ground Fault Circuit Interrupters

Ground fault circuit interrupters will be used, and tested daily, on all electrical power lines used at the project site. In each case, the ground fault interrupter will be placed as close to the power source as feasible.

3.2.21.3 Flexible Cords

Flexible cords and cables will be protected from accidental damage. Sharp corners and projections will be avoided. When passing through doorways or other pinch points, protection will be provided to avoid damage. Flexible cords used will be of three-wire type and rated for hard or extra-hard usage.

3.2.22 Dust Control

Remediation and demolition activities can create airborne dust. Excessive generation of dust can limit visibility, cause irritation to workers and create airborne chemical contamination which spreads the overall extent of contamination and puts nearby unprotected personnel at risk of overexposure.

Project personnel will take all reasonable precautions to minimize the generation of dust at the work site. Such precautions include operating vehicles in a slow and deliberate manner and working materials in a wet state whenever possible. Where dust generation is significant, the Health and Safety Manager will be contacted to establish an air monitoring program and dust reduction measures (up to and including misting of the dust cloud or ceasing operations) shall be implemented.

Monitoring of the work area for dust shall be performed using a Miniram aerosol sampler (or equivalent) per Section 8 of this plan.

The most effective way to control dust is to minimize its initial generation. Preventative measures will be implemented by project personnel to maintain fugitive dust emissions at levels below action levels established in Table 8-1. The following list indicates methods and measures to be applied.

Methods and Measures

- Enforcement of speed limits on haul roads.
- Use of dust suppressants during loading and hauling operations. Suppressants may include water spraying of haul roads, stockpile(s) and loading equipment.
- Use manufactured dust suppressants that are environmentally acceptable.
- Schedule and stage operations to take advantage of prevailing winds.
- Schedule hauling operations to minimize trips on dirt haul roads.
- Covering of stockpiles for long term storage.
- Air blowing shall not be permitted of cleaning surfaces or clothing.
- Only wet cutting is permitted for cutting concrete blocks and concrete.

3.2.23 Slip, Trip, and Fall Hazards

Poor housekeeping results in a workplace that is laden with slip, trip and fall hazards. Such accidents can cause serious injuries, including broken bones, contusions, and/or deep lacerations.

Much of the work we perform involves working on wet visqueen. This can increase the chances of slip, trip, and fall injuries.

To minimize slip trip and fall hazards caused by poor housekeeping, the following measures shall be taken:

- Work areas shall be inspected daily for adequate housekeeping and findings recorded on daily inspection reports.

- All stairways, passageways, gangways, and access ways shall be kept free of materials, supplies, and obstructions at all times.

- Loose or light material shall not be stored or left on roofs or floors that are not closed in, unless safely secured.

- Tools, materials, extension cords, hoses, or debris shall not be placed where they may cause tripping or other hazards.

- Tools, materials, and equipment subject to displacement or falling shall be adequately secured.

- Empty bags having contained lime, cement, and other dust-producing material shall be removed and properly disposed of immediately.

- Scrap lumber and debris shall be cleared from work areas and access ways.

- Personnel will avoid walking on visqueen whenever possible.

- Field technicians will work together when repositioning sandbags, pulling visqueen, or moving bales of hay (wet hay bales are extremely heavy).

3.2.24 Environmental Hazards

Poisonous or stinging insects, spiders and/or snakes may be a concern for project personnel during sewer pipeline cleaning and other site activities. Disease vectors, such as ticks, may also be present. Poison oak or other noxious flora may be present on or near the site, and can cause severe skin irritation on contact. Physical hazards are also posed by native vegetation in the area, including thistles and other thorny weeds.

Site workers should inspect protected areas (e.g., boreholes, pits and storage areas) prior to reaching into them or entering them in any way. Portable toilets have been a source of spider and snakebites. Stinging insects and their nests shall be avoided wherever possible, and workers shall wear long pants and if necessary, long sleeved shirts and gloves to protect them from insect bites and sharp or irritating plants.

3.2.24.1 Ticks

Ticks are vectors of many different diseases including Rocky Mountain spotted fever, Q fever, tularemia, Colorado tick fever, and Lyme disease. They attach to their host's skin and intravenously feed on its blood creating an opportunity for disease transmission. Covering exposed areas of the body and the use of tick repellent are two ways to prevent tick bites. Periodically during the workday, employees will inspect themselves for the presence of ticks. If a tick is discovered, the following procedure should be used to remove it:

- Do not try to detach a tick with your bare fingers; microorganisms from a crushed tick may be able to penetrate even unbroken skin. Fine-tipped tweezers should be used.

- Grip the tick as close to your skin as possible and gently pull it straight away from you until it releases its hold.

- Do not twist the tick as you pull and do not squeeze its bloated body. That may actually inject microorganisms into your skin.

- Thoroughly wash your hands and the bite area with soap and water. Then apply an antiseptic to the bite area.

- Save the tick in a small container with the date, the body location of the bite, and where you think the tick came from.

- Notify the SHSO of any tick bites as soon as possible.

Recently, Lyme disease has been the most prevalent type of disease transmitted by ticks in the United States.

3.2.24.2 Poisonous Plants

Three or five leaves radiating from a stem identify poison ivy, poison oak, and poison sumac. Poison ivy is in the form of a vine while oak and sumac are bush-like. All produce a delayed allergic hypersensitivity. The plant tissues have an oleoresin, which is active in live, dead, and dried parts. The oleoresin may be carried through smoke, dust, contaminated articles, and the hair of animals. Symptoms usually occur within 24 to 48 hours after exposure resulting in burning or stinging, and weeping and/or crusted blisters. Should exposure to any of these plants occur, rinse the affected area with a warm water, but do not scrub the area in order to prevent spreading the materials to unaffected areas. The best antidote for poisonous plants is recognition and avoidance.

3.2.24.3 Snakes

There are various types of poisonous snakes indigenous to the western United States. The degree of toxicity resulting from snakebites depends on the potency of the venom, the amount of venom injected, and the size of the person bitten. Poisoning may occur from injection or absorption of venom through cuts or scratches.

The most effective way to prevent snakebites is to avoid snakes in the first place. Personnel should avoid walking at night or in high grass and underbrush. Visual inspection of work areas should be performed prior to activities taking place. The use of leather boots and long pants will be required, since more than halves of all bites are on the lower part of the leg. No attempt at killing snakes should be made; many people are bitten in such an attempt.

If a potentially poisonous snake bites someone, the following treatment should be initiated:

- Keep patient calm.
- Notify emergency medical services.
- Wash the wound and keep the affected body part immobile.
- Apply direct pressure to site of bite if bleeding is extreme.
- Keep the affected area lower than the heart.
- Carry a victim who must be transported, or have him/her walk slowly.
- Transport to closest medical facility.

3.2.24.4 Flying Insects

Flying insects such as mosquitoes, wasps, hornets, and bees may be encountered while site activities occur. Table 3-3 discusses problems associated with them.

3.2.24.5 Bird Excrement

Accumulation of bird excrement can pose a biological threat to site workers and visitors. There is a group of pulmonary disease and disorders that result from exposure to infected bird droppings. The inhalation of dust from infected droppings can result in one of these pulmonary infections. All site activities that deal with the disturbance of bird excrement will be performed in Level C PPE using high efficiency particulate air (HEPA) respirator filters at a minimum.

3.2.24.6 Hantavirus

Rodents, such as deer mice, can potentially carry Hantavirus. Deer mice usually live at higher elevations, like mesas, and can be distinguished from other rodents by their small size (2 to 4 inches long) and by their bi-colored tail. However, the Center for Disease Control believes that other rodents also have the potential to carry the virus, so precautions must be taken when dealing with any species of rodent. It is not possible to distinguish whether a rodent carries the Hantavirus by observation.

Hantavirus affects the respiratory system in humans. The first symptoms of infection can occur at any time up to 45 days after exposure and include one or more of the following: fever, muscle aches, headache, or coughing. These symptoms progress rapidly into a severe lung disease that often requires intensive care treatment. Hantavirus can be transferred to humans, primarily from breathing infected rodent excreta particles that have become airborne or ingesting excreta particles that have clung to hands or clothing. It can also be contacted from rodent bites or transferred through broken skin. Though the illness caused by Hantavirus is severe, it is a relatively rare illness that can be prevented by simple precautions and common sense.

The best way to avoid contact with Hantavirus is to avoid contact with rodents and their excreta. Do not leave food or garbage where rodents have access to them; this includes leaving food items and wrappers in vehicles. When possible, seal any opening greater than 1/4-inch diameter in vehicles or structure to prevent rodent access.

Personnel, provided precautions are taken may dispose of minor amounts of rodent excreta and rodents bodies caught in mousetraps. A suggested procedure is:

- When excreta or dead rodents are discovered in an enclosed area, ventilate the area for 30 minutes; the more air flow the better.

- Wear the proper PPE.

- Implement dust suppression techniques (such as use of a "bug" sprayer filled with water and a small amount of detergent to lightly spray the floor prior to entry) may have to be used.

- To dispose of wastes, place the rodent excreta or dead rodent in a plastic bag. Rinse gloved hands with bleach solution of 1 part bleach to 10 parts water, then doff any PPE in proper order, placing disposable items, such as boot covers and respirator cartridges in with the wastes. Place the waste, if any, into a plastic bag and mark the bag clearly as "POTENTIALLY INFECTIOUS." Wet the wastes with the bleach solution, seal the plastic bag, place it into a second plastic bag, and seal this bag. Spray the outside of the plastic bag with a commercial spray disinfectant. The waste may be disposed of as regular garbage.

- After the wastes are properly bagged, spray the surfaces where the wastes originally were found with disinfectant.

- Thoroughly wash hands, face, and forearms with soap and water.

When mousetraps are used to control rodents, the traps should be checked on a regular basis. Dead rodents should be disposed of immediately; the trap may be discarded along with the dead rodent.

3.2.25 Use of a Nuclear Density Gauge

Soil density testing may be conducted using a nuclear density gauge. A nuclear density gauge is an electronic instrument that uses a small amount of radioactive material to measure the density and moisture of construction materials. The Cesium-137 (Cs-137) source capsule is in a holder threaded and adhered in the base of the gauge. The Americium-241/Be (Am-241, Be-7) source is within the gauge and cannot be reached without disassembly of the gauge.

The radioactive material used in the gauge is in a dual sealed source capsule. This means it is inside of a stainless steel capsule that is sealed by welding, and inside of a second stainless steel capsule that is sealed by welding. There is little possibility that the radioactive material will escape. Current source construction techniques are to diffuse the radioactive Cesium-137/Be-7 into a ceramic matrix. If a source constructed in this manner was breached, the radioactive material may possibly break or chip, but it would not be in an inhalable form. The use of a ceramic binder would compromise the intimacy of the Americium-Beryllium mixture so the Am-241/Be is pressed into a pellet.

All use of nuclear density gauges by sub-contractor personnel must be performed in compliance with the following requirements:

- Only authorized users may operate the density gauge. An authorized user has been properly trained on the use of the device and the hazards of radiation, and has been so designated by NWT's Radiation Safety Officer (RSO). Authorized users must carry a letter of designation from the RSO.

- In the case of sub-contractor use of a nuclear density gauge or other instrument with a radioactive source, NWT will make sure that the subcontractor provides a copy of their license and that they can operate the nuclear density or other instrument on property with exclusive federal jurisdiction. This shall include proof of current reciprocity with the U.S. Nuclear Regulatory Commission (NRC)

- The SHSO will assure that gauges are stored and secured in an appropriate area.

- All use of the nuclear density gauge shall comply with NWT 's Radiation Safety Plan, and each user shall have read and reviewed a copy of this plan.

- When using the NDG keep all unauthorized persons out of the immediate operating area (at least 5 feet away).

- The operator must verify that the gauge has had radioactive source capsule leak test measurements at the proper interval.

- When not being used for field measurements the gauge will be placed in the "SAFE" position and returned to its storage case.

- When using the gauge the operator will wear the personal monitoring device (radiation dosimeter) assigned. When the operator is not using the gauge, the monitoring device will be kept in a low background, low heat area (out of direct sunlight, such as the dashboard of a crew vehicle.)

- During transportation the gauge shall be fully secured in the transporting vehicle and located away from personnel. When transported in a closed vehicle (car or van), the case will be locked and the vehicle will be locked when the operator is not with the vehicle. When transported in an open bed vehicle (pickup truck), the case will be locked and the case securely fastened and locked to the truck bed when the operator is not with the vehicle. The gauge will only be transported in an approved DOT shipping container with all the required labels and marking. The authorized user will inspect the shipping case to assure that it is physically sound and that all closure devices (hinges, hasps, latches, etc.) are properly installed, secured and free of defects.

- No one shall attempt to repair, modify or open the sealed source under any circumstances.

- The operator shall examine the integrity of the shutter of the gauge prior to use. If shutter integrity is in question, do not operate the gauge and notify the RSO.

- When field-testing is complete the gauge will be returned to its place of storage as soon as possible.

- At all times, operators will observe as low as reasonably achievable (ALARA) principles to minimize any dose received. This may include: being near the equipment only when necessary, standing away from the equipment when possible during operation, always have base pointed away from body, etc.

- The following documents will be with the equipment storage case at all times (except as required during transport of the gauge):

  - Copy of the License,
  - Copy of authorization letter/card from RSO,
  - Copy of the Gauge Operations Manual,

- Copy of the current Leak Test Certificate,
- Copy of the current Transit Case Certificate.

- All personnel using the gauges will be assigned a personal monitoring device (dosimeter). These will be either a film badge, or a thermoluminescent dosimeter that will be exchanged on a routine basis per the NWT Radiation Safety Policies. The badge will be returned to the NWT RSO at the designated time. Badge loss must be reported immediately and supported by a memo to the RSO that includes date of incident, persons involved, description of the incident, and measures taken to prevent a reoccurrence.

- All radioactive material/equipment will be stored in the designated area only. Equipment will be locked in its case while not in use. The storage area will be locked at all times and key access authorized for operators only. Regulation requires that the storage area meet the following:

  - Storage locker or separate room with a minimum of 10 feet from any permanent work station;

  - Security against unauthorized removal with key/combination lock control;

  - Signs posted which state:

    1. "CAUTION RADIOACTIVE MATERIAL"

    2. Notice to Employees (Form RH-2364).

    3. Notice of where a copy of the; License and Title 17 CCR may be viewed.

    4. Name and phone number of the NWT Radiation Safety Officer (RSO).

  - Area includes sufficient electrical circuits for charging equipment.

While in-transit involving over-night storage, the case should be covered so it is not visible from outside the vehicle while the operator is not present. If appropriate, the gauge should be chain locked in its case to the steering wheel in the cab of the truck.

- Any incident involving potential dispersal of radioactive material, theft or loss of the gauge must be immediately reported to the NWT RSO and subcontractor's RSO as appropriate. Notification to the US Nuclear Regulatory Commission (NRC) and State Health Department may also be necessary and will be coordinated by the NWT RSO

3.2.26 Sanitation

3.2.26.1 Break Area

A designated break area shall be established in the support zone. The break area shall contain drinking water and be arranged to provide shade to workers during hot weather (>85°F.)

3.2.26.2 Potable Water

The following rules apply for all field operations:

- An adequate supply of potable water shall be provided;
- Portable containers used to dispense drinking water shall be capable of being tightly closed, and equipped with a tap;
- All containers used for drinking water shall be clearly marked and not used for any other purpose; and,
- Disposable cups or personal, marked, insulated drink containers will be supplied. If disposable cups are used, both a sanitary container for unused cups and a receptacle for disposing of used cups shall be provided.

Outlets for nonpotable water shall be identified and labeled to clearly indicate that the water is unsafe and is not to be used for drinking or washing. There shall be no cross connection (open or potential) between potable and nonpotable water systems. Nonpotable and potable water systems shall be physically separated so as to minimize confusion and possible cross contamination.

3.2.26.3 Toilet Facilities

A minimum of one separate toilet facility shall be provided for each 20 employees or fraction thereof, of each sex. Such facilities may include both urinals and toilets, with the provision that the number of toilets is at least half of the minimum required number of facilities. Where there are less than five employees, separate toilet facilities for each sex are not required provided the toilet facilities can be locked from the inside and contain at least one toilet.

Toilet facilities on the site are to be kept clean, sanitary, maintained in good working order and provided with an adequate supply of toilet paper. Toilets are to be placed only in cleared areas to reduce the chance of becoming home to reptiles, insects, spiders, etc. The toilet should be inspected before each use.

3.2.26.4 Food Handling and Storage

There shall be no handling of food in the contaminated work areas of the work area. Food may be stored in refrigerators, however, those refrigerators may only be used for storage of foods, and beverages. Refrigerators used for sample or chemical storage should be clearly marked as such.

3.2.26.5 Trash Collection

Trash generated by project personnel will properly be disposed of in trash receptacles. These receptacles will be emptied regularly.

3.2.27 Other Safe Work Practices

- Horseplay is not permitted at anytime on the job.
- Workers shall not use equipment on which they have not been trained.
- Eating, drinking, smoking and applying cosmetics are allowed only in clean areas.

3.2.28 Heat Stress

Wearing PPE may put site personnel at increased risk of heat stress. Heat stress effects range from transient heat fatigue to serious illness and death. A number of interacting factors, including environmental conditions, clothing, workload, and the individual characteristics of the worker cause heat stress. Because heat stress is one of the most common and potentially serious illnesses during field operations, alertness to the symptoms and knowledge of preventive measures are vital.

Heat stress monitoring should commence when personnel are wearing impermeable PPE and the ambient temperature exceeds 70 degrees Fahrenheit (°F). If impermeable garments are not worn, heat stress monitoring should commence at 85°F.

3.2.28.1 Heat Stress Prevention

One or more of the following control measures can be used to help control heat stress and are mandatory if any site worker has a heart rate (measure immediately prior to rest period) exceeding of 115 beats per minute:

- Site workers will be encouraged to drink plenty of water and electrolyte replacement fluids throughout the day.
- On-site drinking water will be kept cool (50 to 60°F) to encourage personnel to drink frequently.
- A work regimen that will provide adequate rest periods for cooling down will be established, as required.

- All personnel will be advised of the dangers and symptoms of heat stroke, heat exhaustion, and heat cramps.

- Cooling devices such as vortex tubes or cooling vests should be used when personnel must wear impermeable clothing in conditions of extreme heat.

- Employees should be instructed to monitor themselves and coworkers for signs of heat stress and to take additional breaks as necessary.

- A shaded rest area must be provided. All breaks should take place in the shaded rest area.

- Employees must not be assigned to other tasks during breaks.

- Employees must remove impermeable garments during rest periods. This includes white Tyvek-type garments.

- All employees must be informed of the importance of adequate rest, acclimation, and proper diet in the prevention of heat stress disorders.

Heat Cramps: Heat cramps are caused by heavy sweating and inadequate electrolyte replacement. Signs and symptoms include muscle spasms and pain in the hands, feet, and abdomen.

Heat Exhaustion: Heat exhaustion occurs from increased stress on various body organs. Signs and symptoms include pale, cool, moist skin; heavy sweating; dizziness, nausea; and fainting.

Stroke: Heat stroke is the most serious form of heat stress and should always be treated as a medical emergency. The body's temperature regulation system fails, and the body temperature rapidly rises to critical levels. Immediate action must be taken to cool the body before serious injury or death occurs. Signs and symptoms of heat stroke include: red, hot, usually dry skin; lack of, or reduced perspiration; nausea; dizziness and confusion; strong, rapid pulse and confusion; and coma.

3.2.29 Cold Stress

Cold and/or wet environmental conditions can place workers at risk of a cold-related illness. Hypothermia can occur whenever temperatures are below 45°F, and is most common during wet, windy conditions, with temperatures between 40 to 30°F. The principal cause of hypothermia in these conditions is loss of insulating properties of clothing due to moisture, coupled with heat loss due to wind and evaporation of moisture on the skin.

Frostbite, the other illness associated with cold exposure, is the freezing of body tissue, which ranges from superficial freezing of surface skin layers to deep freezing of underlying tissue. Frostbite will only occur when ambient temperatures are below 32°F. The risk of frostbite increases as the temperature drops and wind speed increases.

3.2.29.1 Cold Stress Prevention

Most cold-related worker fatalities have resulted from failure to escape low environmental air temperatures or from immersion in low temperature water. The single most important aspect of life-threatening hypothermia is a fall in the deep core temperature of the body.

Site workers should be protected from exposure to cold so that the deep core temperature does not fall below 36 degrees Celsius (°C). Lower body temperatures will very likely result in reduced mental alertness, reduction in rational decision making, or loss of consciousness with the threat of fatal consequences. To prevent such occurrence, the following measures will be implemented:

- Site workers must wear warm clothing such as mittens, heavy socks, etc., when the air temperature is below 45°F. Protective clothing, such as Tyvek or other disposable coveralls, may be used to shield employees from the wind.

- When the air temperature is below 35°F, employees must wear clothing for warmth, in addition to chemical protective clothing. This will include:

    - Insulated suits, such as whole body thermal underwear
    - Wool socks or polypropylene socks to keep moisture off the feet
    - Insulated gloves
    - Insulated boots
    - Insulated head cover such as hard hat, winter liner, or knit cap
    - Insulated jacket, with wind and water-resistant outer layer.

- At air temperatures below 35°F, the following work practices must be implemented:

- If the clothing of a site worker might become wet on the job site, the outer layer of clothing must be water impermeable.

- If a site worker's underclothing becomes wet in any way, the worker must change into dry clothing immediately. If the clothing becomes wet from sweating (and the employee is not uncomfortable), the employee may finish the task at hand prior to changing into dry clothing.

- Site workers must have a warm (65°F or above) break area.

- Hot liquids such as soups or warm, sweet drinks must be provided in the break area.

The intake of coffee and tea should be limited, due to their circulatory and diuretic effects.

- The buddy system must be practiced at all times on site. Any site worker observed with severe shivering must leave the work area immediately.

- Site workers should dress in layers, with thinner lighter clothing worn next to the body.

- Site workers should avoid overdressing when going into warm areas or when performing strenuous activities.

Table 3-1
HAZARDOUS AND TOXIC MATERIALS

CONTAMINANT (SYNONYM)	PHYSICAL DESCRIPTION	CHEMICAL & PHYSICAL PROPERTIES	INCOMPATIBILITIES	SOURCES & ANTICIPATED CONCENTRATION	TARGET ORGANS	SYMPTOMS OF EXPOSURE
Benzene	Colorless liquid with aromatic odor.	MW: 78 BP: 176°F MP: -142°F VP: 75 mm Hg Sol: 0.18% FP: 12°F LEL: 1.3% UEL: 7.1% IP: 9.25 eV	Chlorine, bromine with iron; strong oxidizers	Fuel in equipment, Paint ingredient, possible soils contaminant	Blood, bone marrow, eyes, skin, respiratory system, CNS.	Irritation of eyes, nose, respiratory system; headache, nausea, dizziness; fatigue, anorexia; dermatitis; abdominal pain, bone marrow depression.
Diesel exhaust	Appearance and odor vary - petroleum like combustion odor.	MW: N/A BP: N/A MP: N/A VP: N/A Sol: N/A FP: N/A LEL: N/A UEL: N/A IP: N/A	None anticipated	Vehicle - operations requiring diesel fuel	Eyes, respiratory system	Eye irritation, pulmonary function changes, carcinogen
Ethylbenzene	Colorless liquid with aromatic odor.	MW: 106 BP: 277°F MP: -139°F VP: 10 mm Hg Sol: 0.01% FP: 55°F LEL: 1.0% UEL: 6.7% IP: 8.76 eV	Strong oxidizers	Fuel in equipment, possible soils contaminant	Eyes, skin, upper respiratory system, CNS.	Irritation of eyes, mucous membranes; dermatitis; headache, narcosis, coma.

CONTAMINANT (SYNONYM)	PHYSICAL DESCRIPTION	CHEMICAL & PHYSICAL PROPERTIES	INCOMPATIBILITIES	SOURCES & ANTICIPATED CONCENTRATION	TARGET ORGANS	SYMPTOMS OF EXPOSURE
Gasoline exhaust	Colorless odorless gas	MW: Variable. BP: N/A MP: N/A VP: N/A Sol: N/A FP: N/A LEL: N/A UEL: N/A IP: N/A.	None anticipated	Vehicle operations requiring gasoline fuel	Eyes, respiratory system, CNS	Irritation of the eyes, respiratory system, headache, nausea, dizziness coma, death
Hydrogen Sulfide	Colorless gas with rotten egg odor	MW: 34.1 BP: -77°F MP: N/A VP: 17.6 mm Hg Sol: 7.0% FP: N/A LEL: 4.0% UEL: 44.0% IP: 10.46 eV	Strong oxidizers, nitric acid, metals	Pipelines	Eyes, respiratory system, CNS	Irritation of the eyes, respiratory system, headache, nausea, dizziness, coma, GI disturbance, death
Radium 226	Faintly luminescent off-white solid	AW: 226 BP: 1737°F MP: 700°F VP: <1 mm Hg Sol: ins FP: N/A LEL: N/A UEL: N/A IP: N/A	None anticipated	Paint ingredient, possible soil and pipe contaminant	Skin, eyes, liver, kidneys, bone, pulmonary.	Dermatitis, various carcinomas osteogenic sarcoma, osteitis, blood dyscrasias

CONTAMINANT (SYNONYM)	PHYSICAL DESCRIPTION	CHEMICAL & PHYSICAL PROPERTIES	INCOMPATIBILITIES	SOURCES & ANTICIPATED CONCENTRATION	TARGET ORGANS	SYMPTOMS OF EXPOSURE
Radon Daughter product of Radium 226	Colorless, odorless, inert gas	MW: 222 BP: -62°F MP: N/A VP: >100 mm Hg Sol: 50% FP: N/A LEL: N/A UEL: N/A IP: N/A	None anticipated	Possible soil and pipe contaminant	Skin, eyes, liver, kidneys, pulmonary.	Osteogenic sarcoma, osteitis, blood dyscrasias, various carcinomas
Toluene	Colorless liquid with an aromatic odor similar to benzene.	MW: 92 BP: 231°F MP: -139°F VP: 22 mm Hg Sol: 0.05% FP: 40°F LEL: 1.3% UEL: 7.1% IP: 8.82 eV	Strong oxidizers	Fuel in equipment, Paint ingredient, possible soils contaminant	Skin, liver, kidneys, CNS.	Dermatitis; weakness, fatigue, dizziness; euphoria; dilated pupils, photophobia.
Xylene	Colorless liquid with an aromatic odor.	MW: 106 BP: 281-292°F MP: -12-55°F VP: 7-9 mm Hg Sol: 0.00003% FP: 81-90°F LEL: 1-1.1% UEL: 6-7% IP: 8.44-8.56 eV	Strong oxidizers.	Fuel in equipment, Paint ingredient, possible soils contaminant	Eyes, skin, gastrointestinal tract, blood, liver, kidneys, CNS.	Eye, nose and throat irritation; dermatitis; corneal lesions; dizziness, poor equilibrium; anorexia, vomiting, abdominal pain.

MW: Molecular weight.
BP: Boiling point at 1 atmosphere pressure, in degrees Fahrenheit (°F).
MP: Melting point in °F.

VP:	Vapor pressure at 1 atmosphere pressure and 68˚F.
Sol:	Solubility in water at 68˚F, as percentage (%) by weight.
FP:	Flash point closed cup method, in ˚F.
LEL:	Lower explosive limit in air, as % by volume.
UEL:	Upper explosive limit in air, as % by volume.
IP:	Ionization potential, in electron volts (eV).
CNS:	Central nervous system.
mm Hg:	Millimeters of mercury.
eV:	Electron volts.
˚F:	Degrees Fahrenheit
˚C:	Degrees Celsius
%:	Percent
ppm:	Parts per million
mg/m3:	Milligrams per cubic meter.
µ/l:	Micrograms per liter.
>:	Greater than.
<:	Less than.
N/A:	Not applicable.

Table 3-2
EXPOSURE GUIDELINES FOR IDENTIFIED HEALTH SIGNIFICANT SITE CONTAMINANTS

CONTAMINANT (SYNONYMS)	OSHA PEL		ACGIH TLV		NIOSH REL		NRC DAC	IDLH
	8-HR TWA	15-MIN STEL	8-HR TWA	15-MIN STEL	8-HR TWA	15-MIN STEL	1 ALI	
Benzene	1 ppm	5 ppm	10 ppm	-	0.1 ppm	1 ppm	-	Carcinogen: confirmed Teratogen
Diesel exhaust	-	-	-	-	ALARA	-	-	Carcinogen
Ethylbenzene	100 ppm	-	100 ppm	125 ppm	100 ppm	125 ppm	-	
Gasoline Exhaust	-	-	-	-	-	-	-	Carcinogen
Hydrogen Sulfide	-	20 ppm	10 ppm	15 ppm	-	10 ppm	-	
Radium 226	-	-	-	-	-	-	3×10^{-10} µCi/ml	Carcinogen
Radon 220	-	-	-	-	-	-	9×10^{-9} µCi/ml	Carcinogen
Toluene	200 ppm	300 ppm	50 ppm	-	100 ppm	150 ppm	-	
Xylene	100 ppm	-	100 ppm	150 ppm	100 ppm	150 ppm	-	

OSHA: Occupational Safety and Health Administration. Permissible Exposure Limit.
ACGIH: American Conference of Government Industrial Hygienists.
TLV: Threshold Limit Value.
TWA: Time-weighted average.
STEL: Short-term exposure limit.
NRC Nuclear Regulatory Commission
ALI Annual Limit on Intake
DAC Derive Air Concentration
Hr: Hour.
Min: Minute.
ppm: Parts per million by volume.

Table 3-3
FLYING INSECTS

Organism	Description	Habitat	Problem	Severity	Protection
Hornet	One inch long with some body hair. Abdomen is mostly black.	Round, paper-like nest hanging from trees, shrubs, or under eaves of buildings.	One nest may contain up to 100,000 hornets which will attack in force at the slightest provocation.	Severe pain, allergic reactions similar to bees.	Do not come near or disturb nest. If a hornet investigates you, do not move.
Mosquito	Small, dark, fragile body with transparent wings. From 1/8 to 1/4 inch long.	Where water is available for breeding.	Bites and sucks blood. Itching and swelling result.	Can transmit encephalitis and other diseases. Scratching causes secondary infections.	Use plenty of insect repellant and wear gloves.
Wasp	Very thin waist. Color can be black, yellow or orange with stripes.	Underground nest. Paper-like honeycomb nests in abandoned buildings, hollow trees, etc.	Stings. Some species will attack if you get too close to the nest.	Severe pain, allergic reactions similar to bees. Can be fatal.	Avoid nest. Do not swat at them.
Bee	Generally has yellow and black stripes and two pair of wings.	Hollow logs, underground nest, old buildings,	Stings when annoyed. Leaves venom sac in victim.	If person is allergic, nausea, shock, constriction of the airway can result. Death may result.	Be careful and watch where you walk. Cover exposed skin. Avoid areas where bees are swarming. Avoid wearing sweet fragrances and bright clothing. Move slowly or stand still when bees are swarming about you.

Table 3-4
Minimum Clearance from Energized Overhead Electric Lines

Nominal System Voltage	Minimum Required Clearance
0 - 50 kV	10 feet
51 - 100 kV	12 feet
101 - 200 kV	15 feet
201 - 300 kV	20 feet
301 - 500 kV	25 feet
501 - 750 kV	35 feet
751 - 1000 kV	45 feet

NOTE: Whenever equipment operations must be performed closer than 20 feet from overhead power lines, the Health and Safety Manager must be notified. When clearance to proceed is received from the Health and Safety Manager, the electric utility company must be contacted to turn the power off, or physically insulate (protect) the lines if the operation must be performed closer to the power line than is allowed in this table.

Table 3-5
Fire Extinguisher Requirements

Area	Rating	Location
Flammable liquids 5 gal or more used on work site (not integral fuel tanks of motor vehicles.	10B	Within 50 feet.
Flammable or combustible liquids 60 gal or more. Stored inside a room, building or trailer.	20B	Outside of door of storage area and within 10 feet of the door.
Flammable liquids stored outside.	20-B	At least 25 feet but not more than 75 feet from storage area.
Tank trucks or vehicles used to transport or dispensing flammable or combustible liquids.	2A-20-BC	Mounted in or on vehicle.
Fueling area.	20-BC	Within 50 feet of service or fueling area.
Other storage areas.	2A-10-BC	Near exit no more than 75 feet unobstructed travel to extinguisher from anywhere in storage area.
Vehicle and heavy equipment.	1A-5-BC	Mounted in or on vehicle/ equipment.
Trailers/offices.	2A-10-BC	Mounted near exit not more than 75 unobstructed travel from anywhere in trailer/office.
Hot work activities	2A	Within 50 feet.

Note: These extinguisher ratings are the minimum acceptable for each listed application. Extinguishers with higher ratings may be substituted. For applications not listed, contact the Health and Safety Manager for guidance.

4.0 Buddy System

Project staffing during hazardous waste operations shall meet the requirements and intent of the "buddy system," which requires that at least two persons are required to be at the work area when work is conducted in the exclusion zone, which might result in worker contamination.

The buddy system is a method of organizing employees into work groups and is designed to provide those employees with assistance when needed. Each employee in a work group will be observed by at least one other person. Assignment of designated partners should take place during the Tailgate Safety Meeting (TSM).

The responsibility of the buddy is to:

- Provide assistance if needed;
- Maintain, at all times, line of sight contact or verbal contact with workers in the EZ;
- Observe for signs of chemical or physical trauma or heat/cold stress such as:
  - Changes in complexion and skin discoloration,
  - Changes in coordination or demeanor,
  - Excessive saliva and pupillary response,
  - Changes in speech pattern;
- Periodically verify the integrity of all protective clothing; and
- Notify the SHSO if emergency help is needed.

Entry to or exit from the EZ under the conditions described earlier without a designated partner is prohibited.

The buddy system shall be used whenever workers enter the Exclusion Zones or whenever confined space entry or hot work is performed.

5.0 Personal Protective Equipment

5.1 Levels of Protection

The EPA's terminology for personal protective equipment (PPE) is used on this project (Levels D, C, B, and A). The levels of protection for each task have been assigned in accordance with Table 5-1.

At a minimum, four sets of appropriate PPE will be maintained at the site for visitors. This does not include respiratory protection equipment that is to be supplied to non-NWT personnel by their specific employer, nor does this include other government contractors who must supply their own PPE.

5.1.1 Level D Protection

Level D PPE shall be used when:

- Work functions preclude significant splashes, immersions, or the potential for unexpected inhalation of, or contact with, hazardous concentrations of harmful chemicals.
- Atmospheric concentrations of contaminants are less than one-half the TLV/PEL.

Level D PPE at a minimum shall consist of:

- Standard work uniform or coveralls.
- Steel-toed work boots, ANSI approved.
- Safety glasses, ANSI approved.
- Hearing protection (if necessary) 25 dBA or greater protection.
- Splash shield (if necessary).
- Hard-hat, ANSI approved.
- Leather palm gloves (if necessary).

Heat stress monitoring will be conducted in accordance with section 8.3 of this SHSP.

Level D-modified PPE at a minimum shall consist of:

- Standard work uniform or coveralls.
- Steel-toed work boots, ANSI approved.
- Steel-toed PVC boots - if liquids encountered, ANSI approved.
- Tyvek* coveralls with hoods and elastic wrists and ankles.
- Leather-palmed gloves.
- Latex or Nitrile gloves (inner) - if liquids encountered.
- Nitrile gloves (outer) - if liquids encountered.
- Hearing protection (if necessary) 25 dBA or greater protection.
- Splash shield (if necessary).
- Hard-hat, ANSI approved.
- Safety glasses, ANSI approved.
- Rain gear or poly-coated Tyvek* for pressure washing activities.
- Metatarsal guards (pressure washing activities).

*Or constructed of other materials as appropriate

Openings in the PPE (i.e., ankles, wrists, zippers, etc.) will be duct taped to seal the opening.

Heat stress monitoring will be conducted in accordance with section 8.3 of this SHSP.

5.1.2 Level C Protection

Level C protection shall be used when:

- The types of air contaminants have been identified, concentrations have been measured, and an air-purifying respirator (APR) is available that can remove contaminants.

- Oxygen is at least 20 percent and the lower explosive limit (LEL) is less than 10 percent.

- The substance has adequate warning properties and all criteria for the use of an APR has been met.

Level C protective equipment at a minimum shall consist of:

- Full-face APR with NIOSH/Mine Safety and Health Administration (MSHA)-approved cartridges.

- Combination filter/cartridge providing protection against:

  - Not more than 1,000 parts per million (ppm) organic vapors, chlorine, chlorine dioxide, hydrogen chloride, sulfur dioxide, and escape only from hydrogen sulfide
  - Dusts, fumes, and mists having a TWA less than 0.05 milligrams per cubic meter (mg/m^3).
  - Asbestos-containing dusts and mists.
  - Radionuclides.

- Cartridges approved for the specific contaminants if the cartridge above in not appropriate.

- Surgical scrubs*.

- Steel-toed PVC boots - if liquids encountered, ANSI approved.

- Tyvek* coveralls with hoods and elastic wrists and ankles (poly-coated* when there is a potential for contaminated water contact).

- Leather-palmed gloves.

- Latex or Nitrile gloves (inner) - if liquids encountered.

- Nitrile gloves (outer) - if liquids encountered.

- Hearing protection (if necessary) 25 dBA or greater protection.

- Hard-hat, ANSI approved.

- Safety glasses, ANSI approved if Full-faced APR not worn.

- Splash shield (if necessary). If full-faced APR not worn. Must be worn with safety glasses, ANSI approved.

*Or constructed of other materials as appropriate.

Openings in the PPE (i.e., ankles, wrists, zippers, etc.) will be duct taped to close the openings.

Heat stress monitoring will be conducted in accordance with section 8.3 of this SHSP.

5.1.3 Level B Protection

Level B Protection is required when airborne concentrations of hazardous materials exceed or are expected to exceed twice the OSHA permissible exposure limit (PEL) in confined spaces. Level B protection will not be used on this project without contacting the Health and Safety Manager for an addendum to this SHSP. The equipment listed for Level C protection will be used for Level B protection except a full-face, pressure demand, supplied air respirator, either self contained or an airline with an egress bottle will be substituted for the air purifying respirator worn in Level C.

Heat stress monitoring will be conducted in accordance with section 8.3 of this SHSP

5.1.4 Level A Protection

Level A protection use is not anticipated during this project.

5.2 Respiratory Protection

Respiratory protective equipment shall be NIOSH-approved and respirator use shall conform to American National Standards Institute (ANSI) Z88.2, Cal/OSHA 8 CCR 5144 requirements. NWT Procedure HS 11.0 AND HS 12.0 further defines the respiratory protection program which details the selection, use, inspection, cleaning, maintenance, storage, and fit testing of respiratory protective equipment. This procedure complies with the requirements contained within 8 CCR 1531 and will be maintained in the SHSO's site office along with the rest of NWT's Health and Safety Policies and Procedures.

- All site personnel will have a separate assigned respirator face piece.

- Only properly cleaned, maintained, NIOSH-approved respirators are to be used on this site.

- Contact lenses are not to be worn when a respirator is required

- All site personnel will be clean-shaven in facial areas that touch the sealing surface of the respirator.

- Respirators will be regularly inspected. A positive and negative pressure test will be performed prior to each use.

- When respirators are being used, they shall be cleaned at the end of the work shift using mild soap and warm water, and left to air dry. After drying, the respirator will be stored in a clean plastic bag.

All personnel (including visitors) performing on-site activities, and using an air purifying respirator must have successfully passed a qualitative respirator fit test in accordance with OSHA 8 CCR 1531 within the last 12 months. Documentation of fit testing is the responsibility of each employer. Fit testing and any training related to respiratory protection for NWT personnel will be documented on the NWT Respiratory Training Completion Form.

5.3 Using Personal Protective Equipment

All persons entering the EZ shall don the required PPE in accordance with the entries listed in Table 5-1. When leaving the EZ, PPE will be removed in accordance with the procedures listed, in order to minimize the spread of contamination.

5.3.1 Donning Procedures

These procedures are mandatory, only where Modified Level D or higher PPE is required for the project:

- Remove bulky outerwear.

- Put on the required chemical protective coveralls.

- Put on chemical protective boots.

- Tape the legs of the coveralls to the boots with duct tape.

- Put on chemical protective gloves.

- Tape the wrists of the protective coveralls to the gloves.

- Don respirator if required, and perform appropriate fit check.

- Put hood or head covering over head and respirator straps.

- Don remaining PPE, such as safety glasses or goggles and hard hat.

If these procedures are instituted, one person shall remain outside the work area to ensure that each person entering has the proper protective equipment. No persons shall be allowed to enter an EZ if they are not wearing the required PPE.

5.3.2 Doffing Procedures

Whenever a person leaves a work site requiring Modified Level D or higher PPE, the following decontamination sequence will be followed:

- Upon entering the CRZ, rinse contaminated materials from the boots.

- Clean reusable protective equipment.

- Remove protective garments, equipment, and respirator (if worn). All disposable clothing should be placed in plastic bags, which are labeled with contaminated waste labels.
- Wash face and hands immediately and shower as soon as possible.

- Proceed to clean area and dress in clean clothing.

- Clean and disinfect respirator for next use.

All disposable equipment, garments, and PPE shall be bagged in plastic bags, and properly labeled for disposal.

The level of personal protection selected will be based upon real-time air monitoring of the work environment and an assessment by the Health and Safety Manager or SHSO of the potential for skin contact with contaminated materials. The PPE selection is given in Table 5-1.

5.4 Personal Protective Equipment for Visitors

An adequate supply of hard hats, safety glasses and other personal protective equipment shall be maintained on-site for use by government personnel and other visitors except other government contractors who must supply all of their own personal protective equipment.. Visitors are not to be supplied with chemical protective clothing without prior approval by the SHSO, and proper training documentation. Respirators will not be issued to non-NWT personnel.

5.5 Activity Specific Levels of Protection

The required level of protection is specific to the activity being conducted. At NAS, Alameda, the initial levels of PPE are listed in Table 5-1.

Table 5-1
Activity/Level of Protection

Task	Activity	Initial Levels of PPE
1	Mobilization/Demobilization	D
2	Site Preparation	D
3	Drilling	Mod D
4	Concrete Cutting and Removal	Mod D
5	Excavation of Clean Soils	Mod D
6	Excavation of Suspect or Contaminated Soils	C
7	Pipeline Removal	Mod D
8	Pipeline Cleaning	C
9	Waste Packaging	Mod D
10	Soil & Water Sampling	Mod D
11	Pipeline Replacement	D
12	Support Activities	D
13	Equipment Decontamination	Mod D
14	Backfill and Site Restoration	D

As site activities progress, levels of PPE are subject to change or to modification. Upgrading of PPE can occur when action levels are exceeded or whenever the need arises to protect the safety and health of site personnel. Levels of PPE will not be downgraded without prior approval from the Health and Safety Manager.

6.0 Site Control

The project area will be divided into three work zones: exclusion zone (EZ), a contamination reduction zone (CRZ), and a support zone. The PS and Health and Safety Manager or SHSO shall together be responsible for designation of the work zones. Based upon the exposure to contaminated materials or anticipated hazards associated with the work.

The EZ will include any area where chemical contamination may be encountered and will be marked with barrier tape or other means to warn personnel of the hazards. The EZ will be large enough to prevent contamination from leaving the marked area.

Immediately adjacent to the EZ, a CRZ with a decontamination area for equipment and personnel will be established. This area will also be delineated with traffic cones and/or barrier tape. The CRZ will be large enough to provide a safety zone to prevent the movement of contaminants from the EZ into the support zone.

The remainder of the NWT project area will be designated as the support zone. No special markings or warning labels are required for this area.

Only personnel who have completed 40 hours of hazardous waste operations as defined under 8 CCR 5192 (e), hazardous waste refresher training within the past 12 months, have been certified as fit for hazardous waste operations by a physician within the past 12 months and are wearing the proper PPE shall be allowed within the EZ or CRZ. Personnel without such training may only enter the designated support zone.

6.1 Hazard Briefing

No person will be allowed on the site during site operations without first being given a site hazard briefing. In general, the briefing will consist of a review of the tailgate safety meeting. All persons on the site, including visitors, must sign the site-specific tailgate safety meeting form. Tailgate safety meetings shall be held daily, involving all personnel on site.

6.2 Documentation of Certification

A subcontractor training and medical file will be established for the project and kept on site during all site operations. The 40-hour training, update, and specialty training (first-aid/cardiopulmonary resuscitation [CPR]) certificates, as well as the current annual medical clearance for all subcontractor personnel, will be maintained within that file. All NWT and subcontractor personnel must provide their training and medical documentation to the SHSO prior to the start of fieldwork. This documentation will be maintained at the project home office at the close of the project.

6.3 Entry Log

The SHSO at the site will maintain a site entry log with the names of all personnel who enter the CRZ and EZ. These logs will be incorporated into the project file.

6.4 Emergency Entry and Exit

The exclusion zone, contamination reduction zones, evacuation routes, and emergency equipment locations will be included on a site map prior to the initiation of on-site activities. During an emergency, the evacuation routes noted on the site map should be followed. If conditions such as wind direction or physical hazards do not allow access to the prescribed evacuation routes, evacuate by the safest route available and decontaminate to the greatest extent possible. Additional emergency procedures can be found in Section 12

6.5 Entry Requirements

In addition to the entry requirements listed above, no personnel will be allowed in any EZ or CRZ unless they are wearing the minimum PPE as described in Chapter 5.0.

7.0 Decontamination

In general, everything that enters an EZ at a site must either be decontaminated or properly discarded upon exit from an EZ. All personnel must enter and exit an EZ through a CRZ. Prior to movement from an EZ, contaminated equipment will be decontaminated and then inspected by the SHSO before it is moved into the support zone. This inspection will be noted in the daily log.

7.1 Procedures for Equipment Decontamination

Any item or vehicles taken into an EZ must be assumed to be contaminated and must be carefully inspected and/or decontaminated prior to leaving that particular EZ. A visual inspection of the frame and tires of all vehicles and equipment leaving an EZ will be completed.

In order for a vehicle or equipment to pass inspection, it must be in a broom-clean condition, water washed, and free of loose dirt or sludge material on tailgates, axles, wheels, bucket, etc.

Surveys of all possibly contaminated surfaces shall be performed to insure that any smearable contamination has been completely removed from the equipment.

A steam pressure washer will be on site so that any vehicles or equipment can be steam cleaned if the Health and Safety Manager or SHSO deem necessary. All pressure washing activities will be conducted in accordance with section 3.2 of this SHSP.

The equipment decontamination area will be used to remove soil from all equipment leaving the work area. Decontamination procedures will consist of washing equipment to remove mud and/or dirt.

Following the wash, surveys of all possibly contaminated surfaces shall be performed using handheld instruments. Should readings above background be detected a second wash will be performed and the surface survey repeated.

If the second survey indicates the presence of radionuclides, smears of the effected areas will be taken to determine the level, if any, of smearable materials remaining on the equipment. At no time will equipment still deemed contaminated be allowed to leave the decon area.

Once the RSO has determined that all smearable materials have been removed, written permission to remove the equipment will be issued.

Personnel who must come in contact with the equipment during vehicle maintenance and repair will utilize a special "clean area". All equipment requiring maintenance or repair will be staged in a CRZ prior to servicing.

Personnel assigned to vehicle decontamination will wear the protective equipment, clothing and respiratory protection consistent with this SHSP. Seats and flooring in equipment and vehicles that are to be used in the EZ will be covered to the greatest extent possible with disposable polyethylene.

7.2 Personnel Decontamination

NWT will establish personnel decontamination facilities on site to ensure that personnel maintain a high degree of personal hygiene and minimize the possibility of exposure to chemical hazards.

These personnel hygiene facilities will conform to the requirements specified in 8 CCR 5192 (f).

A personnel decontamination area will be established in the CRZ immediately outside the EZ to facilitate decontamination and PPE removal. All personnel exiting the EZ will pass through the decontamination area to remove any contamination. Standard NWT decontamination procedures are as follows:

Decontamination Procedures

- Step into first wash tub and wash PVC boots and outer gloves with soap solution and scrub brush.
- Step into second wash tub and rinse boots and outer gloves with clean water and scrub brush.
- Remove outer gloves (e.g., Nitrile) and dispose in the proper receptacle.
- Remove outer Tyvek coveralls and dispose in the proper receptacle.
- Remove PVC boots and place in boot rack.
- Remove respirator, place in container to be cleaned.
- Perform frisk of extremities and torso.
- Remove inner gloves and dispose in proper receptacle.
- Wash hands and face before eating, drinking, or smoking (break/end of shift).

Personnel are required to wash hands, face, and other exposed skin areas prior to leaving the CRZ for breaks or lunch.

Towels, washcloths, and soap will be provided to personnel as required.

With the exception of work within the SZ, no disposable work clothing, shoes, or boots will be worn off or carried out of the CRZ.

Non-disposable soiled work clothes will be surveyed and if found to be free of contamination will be allowed to leave the site.

Should surveys of the soiled clothing indicate that contamination is present, the clothing will be confiscated and included with the other PPE for disposal. Personnel will be required to provide back-up street clothing in case the clothing they are wearing has become contaminated and must be included with other wastes generated at the site.

Boots and respirators will be decontaminated prior to being taken into the support zone.

All rinse waters will be collected and treated as contaminated waste until proven otherwise.

8.0 Site Monitoring

This section covers site-monitoring requirements for all site contaminants of concern.

8.1 Monitoring

Monitoring is essential to ensure that all field personnel are adequately protected from contaminants. Whenever work is performed that might generate gases, organic vapors, dusts, fumes, mists or exposure to contaminated soils or water is possible, monitoring will be conducted.

- A Photo ionization detector (PID) or flame ionization detector (FID) will be used to measure gasses and organic vapors in the work area.

- Mini Ram aerosol monitors will be used to measure respirable dust, fume, and mist emissions.

- Combustible gas and oxygen reading instruments will be used in the work area if flammable contaminants are anticipated.

- Integrated air sampling will be performed if direct reading instrumentation indicates that the source of organic vapors at the project site is located within the soils as opposed to being generated by nearby heavy equipment.

- Calorimetric detector tubes will be used to detect the presence of benzene, hydrogen sulfide, or other specific contaminants when use is directed by the SHSO or the Health and Safety Manager.

- Micro R and Beta/Gamma (β/γ) meters will be used to determine if radiation is present in the work area.

- High volume air samples for Radon will be used when the presence of Radium 226 is confirmed by use of Micro R and Beta/Gamma (β/γ) meters.

- Personal, badge type, Thermoluminescent Dosimeters (TLD's) will be issued to all personnel operating within the established work zones.

- All monitoring results will be documented in project logs.

Monitoring will be used to determine the effectiveness of engineering control in keeping the readings below the action levels as specified in Table 8-1.

The Health and Safety Manager may direct the SHSO to conduct integrated personal exposure monitoring. Integrated air samples will be analyzed through a laboratory accredited by the American Industrial Hygiene Association (AIHA) or a NAVLAP Certified laboratory in the case of personal radiological dosimetry.

8.1.1 Monitor Locations

All personal, integrated air monitoring samples shall be collected/taken in the approximate "breathing zone" of site personnel and direct reading instrumentation readings taken for the purpose of determining appropriate health and safety precautions shall be taken from suspected contaminated surfaces or materials. Locations to be monitored are found in Table 8-2.

If entry into a confined space is deemed necessary, combustible gas, oxygen, hydrogen sulfide, and total organics readings will be collected and recorded from the top, middle, and bottom of the confined space prior to initial entry.

Surveys shall be taken of ambient dose rates to determine if limited duration tasks will be required to prevent radiation exposure above the regulatory limits. Once the NWT entry supervisor and/or SHSO has reviewed this information, determined the PPE necessary for entry, and the entry has been initiated, readings shall be taken in the approximate "breathing zone" of the NWT employee(s) working within the confined space. All air monitoring data shall be recorded on the Confined Space Entry Permit and posted at the entry point prior to personnel entering the excavation.

Readings may also be taken in other locations to determine areas of localized contamination or combustibility within the confined space. Work shall stop and all personnel shall exit the confined space when readings exceed acceptable values at any location within the space.

8.1.2 Frequency

Breathing zone air monitoring must be conducted periodically throughout the day while work is being performed in the EZ regardless of the level of protection being worn. Such readings must be documented on Daily Logs forms even if contaminant concentrations are "nondetectable" or read "no meter response." Frequency requirements for monitoring are found in Table 8-2. At a minimum, hourly monitoring is required during active excavation of contaminated soils, removal of pipelines, cleaning of pipeline, during confined space entry, and during decontamination activities. The SHSO may reduce the frequency of the monitoring only after receiving approval from the Health and Safety Manager.

8.1.3 Monitoring Equipment Maintenance and Calibration

All monitoring equipment (e.g., photo ionization detectors, flame ionization detectors, radiation meters, etc.) will be maintained in accordance with NWT Procedure HS 7.0 and the specific manufacturer's instructions. Calibration/source checking will occur before and after each use.

All personal sampling pumps shall be calibrated in accordance with OSHA sampling protocols and NIOSH methods for the analyte of interest.

All direct reading instrumentation calibrations should be conducted under the approximate environmental conditions the instrument will be used. All monitoring equipment calibrations and maintenance activities shall be documented on the NWT Daily Logs, or equivalent.

When applicable, only manufacturer-trained and/or authorized NWT personnel will be allowed to perform instrument repairs or preventive maintenance.

8.2 Noise Monitoring

Noise monitoring may be performed by the SHSO under the direction of the Health and Safety Manager if high noise levels are routinely encountered. High noise levels are considered to be levels that make normal conversation difficult to understand at arm's length. The PS is to contact the SHSO or Health and Safety Manager if this situation is routinely present.

8.3 Heat Stress

When workers are in Level D protective equipment, heat stress monitoring shall be initiated whenever ambient temperatures on site exceed 85°F. When workers are in Level C or modified Level D protective equipment, physiological monitoring will begin at 78°F. When workers are in Level B protective equipment, physiological monitoring will begin at 70°F. These benchmarks are not to preclude heat stress monitoring at lower temperatures if workers exhibit signs of heat stress. At the discretion of the Health and Safety Manager, additional environmental and/or physiologic monitoring will be carried out. Physiologic monitoring may consist of pulse rate, external body or body core temperature determinations.

8.4 Safety Reviews

All levels of project management shall conduct project site safety reviews (audits). Specifically:

- The SHSO shall inspect the job site at least daily. Findings shall be documented on Daily Logs and communicated to the PS.

- The PS shall conduct a safety audit with the SHSO at least weekly. Findings shall be documented on Daily Logs and communicated to project workers, the PM and Health and Safety Manager.

- The PM shall conduct an on-site safety audit at least monthly. Findings shall be documented on Safety Inspection Report (SIR) forms and copied to the Health and Safety Manager. Whenever possible, the Health and Safety Manager shall be included in these audits.

- The Health and Safety Manager or designated representative may conduct unannounced job site safety audits at anytime. Findings will be documented on SIRs and copied to the PM and Program Director.

8.5 Monitoring Records

The SHSO shall ensure that site-monitoring records are complete and incorporated into the project file. The Health and Safety Manager will be responsible for establishing, maintaining, and forwarding to other NWT offices (as necessary) all required monitoring information as described below for placement in individual employee files:

- Employee name, social security number, payroll number.
- The date, time, pertinent task information, exposure information.
- Description of the analytical methods, equipment used, and calibration data.
- Type of PPE worn.
- Engineering controls used to reduce exposure.

8.6 Notification

The Health and Safety Manager will ensure that each employee is informed in writing of the results that represent that employee's exposure. Monitoring results representative of an employee's exposure shall be reported in writing to the affected employee, with copies retained in the project file and the employee's medical file.

Whenever the results indicate that the representative employee exposure exceeds the Permissible Exposure Limit (PEL), the notification shall state that the PEL was exceeded, and shall provide a description of the corrective action taken to reduce exposure to a level below the applicable PEL.

NWT may conduct industrial hygiene monitoring on subcontractor employees. Notification of subcontractor personnel, of industrial hygiene monitoring results is the responsibility of the subcontractor.

Table 8-1

Action Levels

When in Level D PPE

Analyte	Action Level[1]	Required Action[2]
Dust	≥ .5 mg/m^3 above background	Upgrade to Level C
Unknown VOC.	≥ 10 ppm above background	Detector tube for Benzene, continue work if no Benzene detected
Airborne radionuclides	> 3 x 10^{-10} µCi/ml	Upgrade to Level C
	≥ 1 ppm ≤ 5 ppm	Upgrade to Level C
Benzene	≥ 5 ppm	Stop work; contact Health and Safety Manager[3]
	≥ 5 ppm ≤ 10 ppm	Upgrade to Level C
Hydrogen Sulfide	≥ 23.5% or ≤ 20%	Stop work; determine cause[3]
O_2	≥ 10% of LEL	Stop work; determine cause[3]
LEL		

When in Level C PPE

Analyte	Action Level[1]	Required Action[2]
Dust	≥ 5.0 mg/m^3 above background	Stop work; initiate dust suppression[3]
Unknown VOC.	≥ 50 ppm above background in breathing zone (BZ)	Stop work; detector tube for benzene; if no benzene continue in Level C[3]
Airborne radionuclides	> 3 x 10^{-9} µCi/ml	Stop Work, contact Health and Safety Manager[3]
Benzene	≥ 5 ppm ≤ 50 ppm	Stop Work, contact Health and Safety Manager[3]
Hydrogen Sulfide	≥ 10 ppm	Stop Work, contact Health and Safety Manager[3]
O_2	≥ 23.5% or ≤ 20%	Stop work; determine cause[3]
LEL	≥ 10% of LEL	Stop work; determine cause[3]

When in Level B PPE

Analyte	Action Level[1]	Required Action[2]
Unknown VOC.	≥ 100 ppm above background in BZ	Stop work; detector tube for benzene; contact Health and Safety Manager[3]
O_2	≥ 23.5% or 20%	Stop work; determine cause[3]
LEL	≥ 10% of LEL	Stop work; determine cause[3]

[1] Five excursions above the action level in any 15 minute period or a sustained reading in excess of the action levels for 5 minutes will trigger a response.
[2] Frequency of air monitoring may be adjusted by the Health and Safety Manager after sufficient characterization of site contaminants has been completed, tasks are modified or site controls have proven effective.
[3] Contact with the Health and Safety Manager must be made prior to continuance of work. The Health and Safety Manager may then initiate integrated air sampling along with additional engineering controls.

<u>No one is permitted to downgrade levels of PPE without authorization from the Health and Safety Manager.</u>

Table 8-2

Monitoring Frequency and Location

WORK ACTIVITY	INSTRUMENT	FREQUENCY[1]	LOCATION
Task 1			
Mobe/Demobe	PID Miniram O_2/LEL NaI and β/γ Detector Tubes	N/A N/A N/A N/A N/A	N/A N/A N/A N/A N/A
Task 2			
Site Preparation	PID Miniram O_2/LEL NaI and β/γ Detector Tubes	N/A N/A N/A Background Survey N/A	N/A N/A N/A General work area N/A
Task 3			
Drilling	PID Miniram O_2/LEL NaI and β/γ Detector Tubes	Continuously N/A N/A Periodically Periodically	Borehole N/A N/A Concrete samples Based on PID readings
a **Task 4**			
Concrete Cutting and Removal	PID Miniram O_2/LEL NaI and β/γ Detector Tubes	N/A Continuously N/A N/A N/A	N/A Downwind N/A N/A N/A
Task 5			
Excavation of Clean Soils	PID Miniram O_2/LEL NaI and β/γ Detector Tubes	N/A Continuously N/A N/A N/A	N/A Downwind N/A N/A N/A
Task 6			
Excavation of Suspect and Contaminated Soils	PID Miniram O_2/LEL NaI and β/γ Detector Tubes	Periodically Continuously N/A Periodically Periodically	Excavation site Downwind N/A Soil stockpile area Based on PID readings

Task 7			
Pipeline Removal	PID Miniram O_2/LEL NaI and β/γ Detector Tubes	Periodically N/A Periodically Periodically Periodically	Each pipe section N/A Each pipe section Each pipe section Based on PID readings
Task 8			
Pipeline Cleaning	PID Miniram O_2/LEL NaI and β/γ Detector Tubes	N/A N/A N/A Periodically N/A	N/A N/A N/A Initial entry and waste stream N/A
Task 9			
Waste Packaging	PID Miniram O_2/LEL NaI and β/γ Detector Tubes	N/A N/A N/A Periodically N/A	N/A N/A N/A Each item and container N/A
Task 10			
Soil and Water Sampling	PID Miniram O_2/LEL NaI and β/γ Detector Tubes	Periodically N/A N/A Periodically N/A	Each sample N/A N/A Each sample N/A
Task 11			
Pipeline Replacement	PID Miniram O_2/LEL NaI and β/γ Detector Tubes	N/A N/A N/A N/A N/A	N/A N/A N/A N/A N/A
Task 12			
Support Activities	PID Miniram O_2/LEL NaI and β/γ Detector Tubes	N/A N/A N/A N/A N/A	N/A N/A N/A N/A N/A
Task 13			
Equipment Decontamination	PID Miniram O_2/LEL NaI and β/γ Detector Tubes	N/A N/A N/A Periodically N/A	N/A N/A N/A Cleaned surfaces N/A

Task 14			
Backfill and Site Restoration	PID Miniram O_2/LEL NaI and β/γ Detector Tubes	N/A Continuously N/A N/A N/A	N/A Downwind N/A N/A N/A

[1] Frequency of monitoring may be adjusted by the Health and Safety Manager after sufficient characterization of site conditions has been completed. Periodic is defined as at least once an hour unless sampling data demonstrates a less frequent monitoring schedule is justified.

9.0 Employee Training

9.1 General

All personnel entering the EZ or CRZ shall have completed at least 40 hours of hazardous waste operations-related training, as required by 8 CCR 5192 (e). All field employees must have received a minimum of three days of actual field experience under the direct supervision of a trained, experienced supervisor. Those personnel who completed the 40-hour training more than 12 months prior to the start of the project shall have completed an 8-hour refresher course within the past 12 months. The PS, PM, Health and Safety Manager, and the SHSO must have completed an additional 8 hours of relevant supervisory health and safety training. With the exception of subcontractor personnel who will be working only in the support zone, subcontractor personnel must meet the above training requirements and subcontractor supervisors must also have the 8-hour hazardous waste supervisor training.

A copy of each training certificate will be maintained at the project job site. Subcontractors must provide certificates of training for the project file for all employees assigned to the project, if they will be working in either the EZ or CRZ. Training certificates for both subcontractor and NWT personnel shall be maintained on-site.

9.1.1 Tailgate Safety Meetings

Prior to the start of the project, all personnel will participate in an initial tailgate safety meeting. During the initial tailgate safety meeting, the SHSP will be discussed. The PS will ensure that the anticipated site hazards are summarized and explained to all personnel, and that those personnel are aware of the precautions they must take to minimize their exposure to those hazards. Tailgate safety meetings will be held at the start of each work shift. All new employees must attend the meeting and be familiar with this SHSP. The PS will not delegate all safety-related training to the SHSO.

Written attendance records and meeting notes shall be maintained with the project file.

9.2 Hazard Communication

All personnel performing field activities will receive basic hazard communication training that involves a review of the NWT Written Hazard Communication Program (NWT Health & Safety Procedures HS 1.0, HS 4.0, AND HS 8.0), MSDSs, container labeling, and chemical health hazards. Personnel will be trained on the hazards of chemicals handled or used on site by reviewing the Chemical Hazards listed in Section 3.2 of the SHSP and the MSDSs in Appendix B. MSDSs will be obtained for all materials purchased for the site that require them.

9.2.1 Site-Specific Health and Safety Plan

The SHSO will present the SHSP (including all attached MSDSs) and discuss it with all personnel assigned to the project. All workers and visitors must read and sign the SHSP acknowledging acceptance of site rules and understanding of site hazards before the start of the site work.

9.3 Site Workers' Basic Course

Each site worker will have received training in basic 40 hour HAZWOPER course and be current in that training through an annual 8 hour refresher training as required, as well as site specific training prior to performing field work. The content of the 40-hour HAZWOPER training will consist of:

- General site safety.
- Physical hazards (fall protection, noise, heat stress, cold stress).
- Names and titles of key personnel responsible for site health and safety.
- Safety, health, and other hazards typically present at hazardous waste sites.
- Use of PPE.
- Work practices by which employees can minimize risks from hazards.
- Safe use of engineering controls and equipment on site.
- Medical surveillance requirements including recognition of symptoms and signs which might indicate overexposure to hazards.
- Worker right-to-know (Hazard Communication, 8 CCR 5194).
- Routes of exposure to contaminants.
- Engineering controls and safe work practices.
- Components of the site health and safety program.
- Decontamination practices for personnel and equipment.
- Confined-space entry procedures.
- Emergency response plan.

9.4 Supervisors' Course Content

Management and supervisors must receive an additional eight hours of training that includes:

- General site safety and health programs.
- PPE programs.
- Air monitoring techniques.
- Spill containment techniques.

9.5 Site-Specific Training

Site-specific training will be accomplished through an initial review of this SHSP by the SHSO and through the daily tailgate safety meetings. All such training shall include training date and signatures of all attendees and shall be documented in the project files.

9.6 First Aid and Cardiopulmonary Resuscitation (CPR)

At least two employees current in first aid/CPR will be assigned to the project, and at least one of these will be on the site whenever operations are ongoing. First aid trained personnel shall also be trained in Bloodborne pathogens hazards and precautions as described in Section 11.0.

First aid and CPR training courses are offered to all NWT employees. Refresher training in first aid and CPR is required to maintain a current certificate. The SHSO and the PS shall be current in first aid/CPR training.

10.0 Medical Surveillance Program

10.1 Medical Examination

As required by NWT Policy and Procedure HS 6.0, all personnel on site working within a CRZ or EZ will have successfully completed a preplacement or periodic/updated physical examination. The contents of this examination have been determined by Federal and State regulation and are consistent with the medical surveillance requirements for hazardous waste operations.

10.1.1 Preplacement Examination

This examination has been designed to meet 8 CCR 5192 (f) requirements for hazardous waste site operations.

The NWT medical surveillance program examination at a minimum consists of:

- Medical and occupational history questionnaire which includes information on past gastrointestinal, hematologic, renal cardiovascular, immunological, and neurologic problems.
- Physical examination.
- Blood pressure measurements.
- Complete blood count (CBC) and differential to include hemoglobin and hematocrit determinations, red cell indices, and smear of peripheral morphology.
- Blood urea nitrogen and serum creatinine.
- Blood chemistry (SMAC 24).
- Pulmonary function test.
- Audiogram.
- Electrocardiogram (EKG) for employees over 35 years old or when other complications indicate the necessity.
- Visual acuity.

The following information is provided to the examining physician:

- A copy of 8 CCR 5192 (f) and associated Appendices.
- A description of employee's duties.
- A list of potential contaminants which the employee may be exposed to.
- A description of the PPE to be used.
- Information from previous medical exams.

The medical surveillance provided to the employee includes a judgment by the medical examiner as to the ability of the employee to use either positive-pressure or negative-pressure respiratory equipment. Any employee found to have a medical condition that could directly or indirectly be aggravated by exposure to these chemical substances or by the use of respiratory equipment will not be employed for the project. A copy of the medical examination is provided to the employee.

The employee will be informed by the examining physician of any medical conditions that would result in work restriction, or that would prevent them from working at hazardous waste sites.

10.1.2 Annual Examination

NWT employees receive either an annual or biannual update examination meeting the requirements of 8 CCR 5192 (f) depending upon the attending physician's determination based on employee exposure, if any. The results of these exams are compared to previous results and the baseline physical to clear the employee for continued work. If any indication of over exposure to hazardous materials is found, appropriate actions are taken as recommended by the occupational medicine physician.

10.1.3 Exit Examination

NWT offers exit physical examinations for all employees involved in the medical surveillance program who are leaving the company for any reason to ensure they are in good health.

10.2 Subcontractor Requirements

Subcontractors must provide documentation that all their employees have successfully completed a physical examination by a qualified physician. The physical examinations will meet the requirements of 8 CCR 5192 (f) and 8 CCR 1531, Respiratory Protection. Subcontractors will provide this documentation by supplying copies of the medical examination certificate for each employee they have on site.

10.3 Medical Records

Medical and personal exposure monitoring records will be maintained according to the requirements of 8 CCR 5192 (f) and will be kept for duration of employment plus a minimum of 30 years.

Confidentiality of employee medical records will be maintained. The written medical opinion from the physician will be made available upon request to the ROICC site representative for any site worker.

10.4 Medical Restrictions

When a medical care provider identifies a need to restrict work activity, the employee's home office will communicate the restriction to the employee, the PS, the SHSO, and the Health and Safety Manager. The terms of the restriction will be discussed with the employee and the PS. Every attempt will be made to keep the employee working, while not violating the terms of the medical restriction. Employees that experienced chemical overexposure will not return to the EZ until given a written release by the occupational medicine physician.

10.5 First-Aid and Medical Treatment

All persons on site must report any near-miss incident, accident, injury, or illness to their immediate supervisor or the Field Supervisor. The employees trained in first aid or the SHSO will provide first aid on site. Injuries and illnesses requiring medical treatment will be accompanied by an "Authorization for Treatment" Form initiated by the SHSO. The employee's supervisor or the Project Supervisor will complete the CSIR-1 and conduct an accident investigation as soon as emergency conditions no longer exist and first-aid and/or medical treatment has been rendered. The investigation should follow the Safety Inspection Report. These two reports must be completed and submitted to the SHSO within 24 hours after the incident. The PS shall notify the PM as soon as possible after the incident occurs. The ROICC must also be notified of the accident by the PM within 24 hours and copies of the CSIR-1 and the SIR will be submitted. The SHSO will notify the Health and Safety Manager of all incidents.

First-aid kits are kept at the CRZ and in all NWT vehicles. If treatment beyond first aid is required, the injured should be transported to the medical facility listed in Chapter 12.0 of this SHSP and the PS should immediately contact the Human Resources Administrator at 925-443-7967 to initiate case management procedures. The PS should describe to the Human Resources Administrator, the circumstances leading to the injury or illness. The Human Resources Administrator will contact the Health and Safety Manager for follow-up on the treatment that the employee is receiving, the work restrictions, and the return to work authorization.

NOTE: If the injured is not ambulatory or shows any sign of not being in a comfortable and stable condition for transport, then an ambulance/paramedics **<u>MUST</u>** be summoned. If there is any doubt as to the injured worker's condition, let the local paramedic or ambulance service examine and transport the worker.

11.0 Bloodborne Pathogen Exposure Control Plan

This section serves as a Bloodborne Pathogen Exposure Control Plan for NWT workers who may serve as voluntary first aid and CPR care providers. At all times, at least one person on site will be adequately trained in first aid and CPR, in the requirements of the Bloodborne Pathogens Standard as listed in 8 CCR 5193, and in the contents of this plan.

11.1 Definitions

11.1.1 Bloodborne Pathogens
Bloodborne pathogens are those agents (i.e., bacteria, virus, fungi) found in blood, blood components, certain body fluids, and other materials, objects, or surfaces that have had contact with blood or body fluids that are capable of causing human disease or death to unprotected people who come into contact with them. Diseases caused by bloodborne pathogens include, but are not limited to, hepatitis B virus (HBV), human immunodeficiency virus (HIV), hepatitis C, malaria, and syphilis. The most significant and of greatest concern are HBV and HIV.

11.1.2 Hepatitis B
HBV is the major bloodborne pathogen hazard that first aid/CPR care providers may encounter. The HBV can remain infectious for up to 10 days even in dried blood. The virus adversely affects 8,000 to 10,000 workers annually resulting in approximately 200 deaths each year. Hepatitis means "inflammation of the liver" causing severe liver damage or cirrhosis. Exposure symptoms include fever, fatigue, nausea, vomiting, muscle aches, loss of appetite, and jaundice (yellowing of the eyes or skin). Hepatitis diagnosis is difficult because some symptoms are similar to the flu, except for the discoloration of the skin and eyes, and may remain mild for an extended period of time. Presently, no cure exists for hepatitis, but it can be prevented with a vaccination.

11.1.3 Human Immunodeficiency Virus
HIV attacks and deteriorates the body's immune system and eventually weakens it to the point that infection sets in causing the disease Acquired Immune Deficiency Syndrome (AIDS). HIV is primarily transmitted through sexual contact, but may also be transmitted through contact with blood and body fluids. HIV is not transmitted by touching or working with people who are HIV-positive.

11.1.4 Human Immunodeficiency Virus Exposure Symptoms
HIV leads to AIDS-related illnesses that eventually cause neurological problems, cancer, pneumonia, and death. People may carry the virus for many years of their lives without experiencing any symptoms. Upon development, symptoms may include weight loss, skin lesions, dry cough, fever, fatigue, diarrhea, or swelling of the lymph glands.

Presently, no cure exists for HIV or AIDS and no vaccination is currently available.

11.2 Exposure Determination

Persons in any job classifications at NWT may be exposed to bloodborne pathogens when administering first aid or CPR, or during decontamination of equipment/surfaces contaminated by blood or other potentially infectious materials during an incident.

NWT employees could be subject to bloodborne pathogen exposure due to:

- Punctures through the skin with a contaminated sharp object (i.e., scissors, needles, broken glass, etc.)

- Contact or absorption of blood or blood-contaminated objects through open or broken skin (i.e., cuts, scratches, rashes.)

- Blood splashes to their eyes, nose, or mouth or other mucous membranes.

Workers can reduce their risk of contacting HBV or HIV by implementing the proper work practices (outlined in this plan) before, during, and after responding to emergency medical incidents involving personal injuries.

11.3 Measures for Prevention

The establishment of work practice controls is an integral part of an effective exposure control plan in preventing accidental infection of employees. These work practices are designed to protect employees from reasonably foreseeable occupational exposures to bloodborne pathogens from blood and other potentially infectious material. The work practice controls outlined in this section are applicable to the administration of first aid in emergency situations and subsequent cleanup only.

11.3.1 Universal Precautions

Universal precautions is an approach to infection control which operates on the assumption that all human blood and bodily fluids are to be treated as if they are known to be contaminated with HIV, HBV, or other infectious diseases. Universal precautions shall be implemented whenever there exists a foreseeable potential for contact with blood or bodily fluids.

11.3.2 Engineering Controls

As a result of the location of the work site, the nature of work in outdoor locations with potential exposure to airborne chemical contaminants, and the potential for exposure being limited to emergency situations, the implementation of engineering controls is not feasible. Exposure control shall be accomplished through implementation of work practice controls and use of personal protective equipment.

11.3.3 Work Practice Controls

Work practice controls shall be instituted whenever foreseeable potential contact with, or exposure to, blood and other bodily fluids exist. Examples of situations in which these controls are to be implemented include, but are not limited to, accidents or injuries in which administration of first aid is required, application of bandages to minor cuts and abrasions of another person, and contact with sores, wounds, or broken skin.

Following are specific work practice controls that shall be implemented:

- Prior to examining or providing first aid treatment to an injured person, put on a pair of clean impervious gloves. Gloves are provided in the first aid kits, latex or nitrile gloves may also be used.

- Open wounds or cuts will be promptly bandaged.

- Wash hands and face as soon as possible after administering first aid or CPR. If wash facilities are not readily available, stock disposable one-time use towelettes.

- No eating, drinking, or smoking is allowed in any work area where a potential exists for occupational exposure to blood borne pathogens.

- Non-disposable equipment or materials that have or may have blood or infectious fluid contact must be washed immediately after their use, (a 1:10 solution of bleach and water is the recommended proper decontamination media.)

- Any clothing that becomes contacted with blood or infectious fluids shall be removed as soon as possible after administering first aid or CPR.

- No personal clothing that becomes contacted with blood or infectious fluids shall be laundered off-site.

- First-aid kits on-site are to be equipped with a pair of surgical gloves and CPR mouthpieces.

Direct contact with blood and bodily fluids should be kept to an absolute minimum, as required in a particular situation. In situations where direct contact is likely, personal protective equipment shall be worn to help prevent infection.

Based upon professional judgment, an employee may choose to temporarily forego the use of PPE if he determines that the use of PPE will further jeopardize his well being or that of the injured worker. The employee must carefully evaluate this limited application. If this does occur, NWT is obligated to investigate and document the circumstances in an effort to provide alternative means to avoid further occurrence.

11.3.4 Personal Protective Equipment

The following are specific personal protective equipment items that shall be implemented:

- Always wear hand (i.e., latex or nitrile surgical gloves) and eye (i.e., safety glasses, or goggles) protection to administer or apply first aid or CPR.
- Always use CPR mouthpieces or ventilation devices.
- Inspect PPE prior to use to ensure it is in good working order and without flaws.
- Do not reuse gloves once removed.
- After use, remove gloves from top to bottom inside out, not allowing unprotected skin to contact the exterior of the gloves.

11.3.5 Waste Handling and Disposal

Disposable items that have or may have blood contact must be bagged separately from other trash. These wastes must be placed in leak proof containers or bags and labeled. A collection container for contaminated articles will be available on-site. Wastes used in medical emergency treatment (i.e., gloves, towels, and gauze) shall be disposed in the infectious waste container(s). The container will be replaced as needed and not be overfilled.

The waste will remain on site in approved container(s) until an approved disposal facility capable of receiving medical wastes is identified. If emergency medical teams who respond to an incident are unable to accept blood-contaminated waste, the Health and Safety Manager shall be contacted to arrange for proper disposal.

11.4 Medical Requirements

11.4.1 Hepatitis B Vaccination

All potentially exposed employees will have made available to them at no cost a Hepatitis B vaccination. The employee will also receive training as to the vaccine's efficacy, safety, benefits, and consequences prior to administration. The vaccination series shall be initiated within 24 hours of providing first aid/CPR in an incident and shall be administered under the supervision of a licensed physician. Employees may at their own discretion decline the vaccination, in which case documentation of declination will be completed and employees may be assigned immediately. If an employee covered by this exposure plan decides to accept the vaccination at a later date, the vaccination will be offered at that time at no cost to the employee.

11.4.2 Post-Exposure Procedures and Evaluation

Subsequent to all reported exposure incidents, a confidential medical evaluation and follow-up shall be made available to each employee exposed in the incidents.

11.4.3 Documentation Procedures

Documentation of the exposure incident shall be recorded as soon as possible, and include the route(s) of exposure, the circumstances surrounding the incident, and the identification of the source individual. Additionally, each incident shall be placed on the "first aid incident list" attached to the location OSHA Log of Occupational Injuries and Illnesses.

11.4.4 Blood Testing

As soon as feasible, the source individual in an exposure incident will be asked to consent to a blood test to determine HBV and HIV infectivity. Where applicable laws require employee consent, written consent shall be obtained prior to testing. If an employee refuses the blood test, documentation of the refusal will be made. Documentation of the test results shall be made available to the exposed employee(s). All results should be kept confidential.

Exposed employees will be asked to consent to a blood test for HBV and HIV serological status. If consent to HIV testing is denied, the blood sample will be preserved for 90 days, within such time the employee may elect to consent to the HIV test.

11.4.5 Post-Exposure Medical Evaluations

Exposed employees shall receive a healthcare professional's written opinion for post-exposure evaluations. The written opinion shall include the results of the evaluation and any medical conditions resulting from the exposure incident which requires further medical treatment.

11.5 Bloodborne Pathogen Hazard Communication

- Containers used for disposal of blood-contaminated supplies and waste will be labeled in accordance with the word "biohazard."

- Warning signs are not applicable, as there are no designated areas for medical treatment on site. In cases of potential exposure, observers and non-essential personnel should be verbally warned to keep a safe distance from injured personnel.

- All associates who are first aid/CPR trained and may provide assistance shall be trained in the requirements of HS 4.0 and this SHSP.

11.6 Record keeping

11.6.1 Training Records

All employees on the project shall review this plan and sign it to document their review. All employees who are trained to provide first aid and/or CPR shall be trained in the bloodborne pathogen standard. Records of this training shall be included in the employees' personnel file.

11.6.2 Medical Records

Medical records necessary for NWT employees must include documentation on HBV vaccination status, medical follow-up, post-exposure testing, and a medical professional's written evaluation. The employee medical records will be forwarded to the Human Resources Administrator (see Chapter 12.0) for inclusion in the employee's medical file.

NWT shall maintain the employee medical records for the duration of the employee's employment plus 30 years thereafter. If, for whatever reason, NWT no longer does business and no successor exists, NWT will notify the Director of NIOSH in writing three months prior to the disposal of records. If so directed, the records shall be transferred to the Director of NIOSH.

11.6.3 Incident Recording

An incident that occurs as a result of rendering emergency medical care will be recorded on the OSHA 200 log as OSHA defines work-related injuries and illnesses. All injuries involving the release of blood or other bodily fluids must be immediately reported to the Health and Safety Department to ensure proper reporting and follow-up.

12.0 Emergency Response Plan and Contingency Procedures

Site personnel must be prepared to respond and act quickly in the event of an emergency or accidental contaminant release. Emergency preparedness and response procedures will aid in protecting site workers and the surrounding environment. Preplanning measures will include employee training, fire and explosion prevention and protection, chemical spill and discharge prevention and protection, and safe work practices to avoid personal injury or exposure.

12.1 Personnel Roles/Lines of Authority

The roles and responsibilities of NWT personnel for response to emergencies at NAS, Alameda will be clearly defined and coordinated with NWT subcontractors, ROICC personnel, and the Alameda County Fire Department emergency support services. The Alameda County Fire Department will evaluate the emergency situation and make the determination whether to involve the HAZMAT Unit in the response. The responsibilities of specific project individuals and the coordination of the Alameda County Fire Department are defined as follows.

12.1.1 Project Superintendent

At all times during scheduled work activities, a designated PS will be present on site. This individual will be responsible for implementing these procedures and determining appropriate response actions. Depending upon the circumstances and time permitting, the PS will review proposed response actions with the SHSO, and the ROICC site representative. Specific responsibilities for the PS include:

- Evaluating and assessing emergency incidents or situations.
- Assigning personnel and coordinating response activities on site.
- Assuring that field personnel are aware of the potential hazards associated with the site.
- Summoning the local emergency response team.
- Notifying the Project Manager or, in the PM's absence, the Program Director of an emergency situation.
- Coordinating response to an incident with the ROICC site representative.
- Assuring that all NWT emergency equipment is routinely inspected and functional.
- Working with the SHSO regarding the correction of any work practices or conditions that may result in injury to personnel or exposure to hazardous substances.

- Assuring that appropriate emergency response agencies are aware of the provisions made herein.

- Evaluating the safety of site personnel in the event of an emergency, and providing evacuation coordination if necessary.

- Maintaining site facilities and assisting site personnel in accessing those facilities.

- Complete the appropriate form or forms and submit them to the program Health and Safety Manager within one business day of the incident.

The PS will direct all emergency response activities conducted or managed by NWT and is responsible for field implementation and enforcement of health and safety policies and procedures. The PS will be fully trained in health and safety procedures and maintain current certification in standard first aid and CPR. Other responsibilities include overall supervision and management of field activities.

12.1.2 Site Health and Safety Officer

The SHSO is responsible for implementing, communicating, and enforcing health and safety policies and procedures during the course of the project. The SHSO will review the fitness and training records of all field personnel for compliance with the established requirements and will assist in arranging proper training and medical examinations. He will also assist in evaluating health and safety concerns with respect to environmental releases and emergency response actions. In the event of an injury, contact the NWT Human Resources Administrator at 925-443-7967.

12.1.3 Project Manager

The PM will provide support to emergency responders and dedicate appropriate project resources to the response effort. If required, the PM will mobilize additional personnel and equipment to the site. The PM will notify the ROICC site representative and provide recommendations concerning any additional action(s) to be taken.

12.2 List of Emergency Contacts and Notification

The PS and SHSO will be notified immediately in the event of an emergency. The PS will immediately evaluate the incident and, if necessary, notify the ROICC and Alameda County Fire Department emergency support services. If not previously notified, the PM, ROICC, and designated environmental contact will be advised of the situation. Telephone numbers for emergency contact personnel are listed in Table 12-1. The list will be maintained with current contacts, and telephone numbers will be posted along with other emergency telephone numbers at all project telephone locations.

The information provided to the notified person should include the nature of the incident and the exact location and suspected contaminants or material involved. Information regarding the incident that should be reported to the emergency operator includes the following:

- Name and telephone number of the individual reporting the incident.
- Location and type of incident.
- Nature of the incident (fire, explosion, spill, or release) and substances involved.
- Number and nature of medical injuries.
- Movement or direction of spill/vapor/smoke.
- Response actions currently in progress.
- Estimate of quantity of any released materials.
- Status of incident.
- Other pertinent information.

Once the urgency of the emergency incident has been resolved, a complete incident report will be completed by the PS with the aid of SHSO and provided via the PM to the ROICC.

12.3 Medical Emergency Response

Prior to fieldwork, the SHSO will contact all potential emergency organizations and coordinate any expected response in the event of a medical emergency. In the event of severe physical or chemical injury, the Alameda County Fire Department personnel will be summoned for emergency medical treatment and ambulance service. Their response time is estimated to be between 5 to 10 minutes upon initial notification. The Alameda County Fire Department responders will be utilized to provide care to severely injured personnel. In serious cases, the normal chemical and radiological decontamination procedures may be abbreviated or bypassed. Care must be taken to prevent exposure to the emergency medical responders. Once an initial assessment is made by the emergency medical technicians, the decision on using ground or air transportation for the victims will be made. Qualified first-aid/CPR providers will treat minor injuries on site. These less serious injuries may only be treated after the employee has been decontaminated. If additional treatment beyond first aid is required, the injured personnel will be transported to the Alameda Community Hospital located at 2070 Clinton Avenue, which can provide 24-hour emergency medical care along with the services of a critical care center.

All employee injuries must be promptly reported to the PS who is to contact the Human Resources Administrator to initiate case management procedures. See Section 10-5 for details.

Transportation routes and maps will be posted in the project office and in each site vehicle prior to the initiation of on-site activities. A copy of this map has been provided in Appendix A.

12.4 Personal Exposure or Injury

Every precaution will be taken to aid in the prevention of injuries and/or exposure to contaminants. These precautions are detailed in this SHSP and generally consist of the following measures:

- Personnel will be properly trained for their work duties.
- Site personnel will wear appropriate PPE for each specific task or work assignment.
- Site personnel will follow the proper field safety protocols as defined.
- Site controls will be enforced so that only authorized personnel are able to access the work zones.
- Site personnel will be made aware of potential environmental and chemical hazards.
- Real-time air monitoring will be performed to evaluate the effectiveness of engineering controls and levels of personal protection.
- Proper decontamination procedures will be followed for personnel and equipment.

In the event of personal exposure to contaminants, the following general guidelines will be adhered to:

- Project personnel who have had contaminants splashed in their eyes or who have experienced eye irritation while in the exclusion zone, shall immediately proceed to the eyewash station, set up in the contamination reduction zone. Do not decontaminate prior to using the eyewash. Remove whatever protective clothing is necessary to use the eyewash. Thoroughly flush the eye with clean water for at least 15 minutes. Arrange prompt transport to the designated medical facility.
- Contact/Absorption through skin - Copious amounts of potable water will be used to flush, for at least 20 minutes, contaminants from the skin. This activity will occur in the on-site shower trailer if available, otherwise use the closest source of potable water available. Start flushing while removing contaminated clothing. If irritation persists, repeat flushing. The condition of the individual will be assessed and transport to a

medical center arranged if necessary. Do not transport victim unless the recommended flushing period is completed or flushing can be continued during transport.

- Inhalation - The victim will be moved immediately to an area providing fresh air. Decontamination of the victim and rescue breathing or Cardiopulmonary Resuscitation will be provided if necessary. The condition of the individual will be assessed and transport to a medical center arranged if necessary via ambulance.

- Ingestion - Immediately contact local poison control center. The victim will be decontaminated, if necessary, and transported to a medical facility via ambulance.

12.5 Fire Control

Prior to intrusive activities at the site, a tour conducted by the SHSO and PS will be given to the Base and Alameda County Fire Department and HAZMAT Unit personnel. Specific hazards inherent with the site will be conveyed at that time. In the event of a fire or explosion, or imminent danger of fire or explosion, all activities will halt and the Alameda County Fire Department will be notified immediately. If it is safe to do so, site personnel may use fire-fighting equipment available on site to remove and isolate flammable or other hazardous materials that may contribute to the fire. Upon arrival of the Alameda County Fire Department emergency responders, the PS will advise the fire chief or lead representative of the location, nature, and identification of the hazardous materials on site.

The following measures will be implemented during site field activities to minimize the risk of fire and/or explosion:

- Smoking is permitted on site only in the designated smoking areas.

- Good housekeeping procedures will be required on site.

- Material storage methods will be in accordance with manufacturers' recommendations.

- Flammable liquids will be stored in approved containers and cabinets only.

- Trained personnel will conduct all storage, handling, or use of flammable and combustible materials.

- Entry and exit pathways will be kept clear of debris or obstacles.

- Work areas will be cleared of excess vegetation and obstructions.

Any base-specific guidelines established by the Navy or civil authorities will be strictly enforced. Any fire, no matter how small, must be reported to the Alameda County Fire Department and ROICC.

12.6 Spills or Leaks

NWT will maintain the following equipment and materials in the CRZ for use during spill response activities:

- Absorbent pads.
- Granular absorbent material (noncombustible).
- Polyethylene sheeting.
- 55-gallon drums.
- Shovels and assorted hand tools.

If a hazardous waste spill or material release to the air, soil, or water at the site is observed, NWT will immediately notify the ROICC site representative. An assessment will be made of the magnitude and potential impact of the release. If it is safe to do so, site personnel will attempt to locate the source of the release, prevent further release, and contain the spilled and/or affected materials as follows:

- The spill or release area will be approached cautiously. Real-time air monitoring will be continuously performed in the spill vicinity.
- Hazards will be identified based on available information from witnesses or material identification documents (placards, MSDSs, logs). The potential hazards will be evaluated to determine the proper personal protection levels, methods, and equipment necessary for response.
- If necessary, the release area will be evacuated, isolated, and secured.
- If possible, spill containment will initially be made without entering the immediate hazard area.
- Entry to the release area will be made with the PPE, personnel, methods, and equipment necessary to perform the work. Hazardous spill containment and collection will be performed in four steps as follows:

- Contain the spill with absorbent socks, booms, granules, or construction of temporary dikes.
- Control the spill at the source by plugging leaks, righting containers, over packing containers, or transferring contents of a leaking container.
- Collect the spilled material with shovels or heavy equipment as necessary.
- Store the spilled material for further treatment or disposal. Treatment and/or disposal options of the material will depend on the amount and type of material.

If site personnel cannot safely and sufficiently respond to an environmental release, evacuation of the area may be warranted. The decision to evacuate will depend upon the risk of exposure to personnel and the severity of the release. The Alameda Fire Department will be notified in the event of a significant spill. Upon their arrival at the site, the PS will brief them on the current situation at hand and any potential hazards the team may be faced with.

12.7 Safety Signals

While working on site, the following hand signals will be used for communication when necessary.

Hand Signal	Meaning
Arms crossed over head	Shut-off equipment
Hand gripping throat	Out of air, can't breath
Both hands around waist	Leave area immediately
Wave hands over head	Need assistance
Thumbs up	Okay, I am all right, I understand
Thumbs down	No, negative

Vehicle or portable air horns will be used for alarm signals as follows:

- One long blast: Emergency evacuation of the site.
- Two short blasts: Clear working area around powered or moving equipment.

12.8 Site Evacuation Procedures

The authority to order personnel to evacuate the area rests with the PS and SHSO. In the event that site evacuation is required, a continuous, uninterrupted air horn will be sounded for approximately ten seconds. Air horns will be located in the word area. Radio communication, if appropriate, will also be used to keep continuous communication between the site and the main office.

Personnel working in the EZ or CRZ will immediately make their way to the pre-designated muster point for a "head count." Depending on the severity of the event and allowable time, personnel exiting the EZ and CRZ may be instructed to forgo or modify decontamination procedures.

Personnel in the support zone will immediately report to the muster point for a "head count" and further instructions. The PS and the SHSO will remain in contact to ensure that evacuation procedures are properly executed. If the muster point is inaccessible, personnel will evacuate to an upwind location as determined by the windsock and perform a "head count."

Situations requiring evacuation may include unusually severe weather conditions, fires, or significant chemical spills or releases. In the event of project evacuation, the ROICC site representative, Alameda County Fire Department, and City of Alameda Police Department will be notified immediately. A site emergency map that delineates evacuation routes, emergency air horn locations, first-aid kit locations, rally point, and site contamination control zone perimeters will be developed once an on-site evaluation of conditions and topography is complete.

12.9 Emergency Decontamination Procedures

Treatment of illnesses or injuries to personnel working within the contaminated areas of the site may be more difficult because of protective clothing requirements and the potential for exposure to the contaminants. The SHSO or Emergency Medical Care Provider must quickly assess the extent of the injury or illness of the victim. A determination will be made if lifesaving medical treatment is critical and if personal decontamination procedures will create additional injuries or aggravate the existing condition. Life-threatening injuries must receive immediate medical attention. Decontamination procedures may be modified, simplified, or eliminated completely under such circumstances.

The following guidelines are established for responding to minor emergencies where an individual may have been injured or overcome by exposure to a hazardous substance at the site. If a truly serious injury exists, only portions of these guidelines may be appropriate to ensure prompt medical treatment.

- Notify supervisory and safety personnel.

- Select an emergency decontamination location upwind and/or uphill (upslope) from any spills, and determine most effective pathway for emergency vehicles.

- Field decontamination should be performed in two stages: washing with soapy water, followed by a clear water rinse.

- Upon reaching the injured party, stabilize any life-threatening problems, such as spills or fires, and remove (i.e., brush or blot with absorbency pads) visible, gross contamination. If possible, prevent coming in contact with any contamination present at the scene. However, do not delay with this task, and be prepared to transport immediately to the decontamination area.

- Have support personnel perform real-time air monitoring.

- Determine type, nature, and extent of exposure or injury based on mechanism.

- Quickly cut or tear first layer of protective clothing (outer suit) off of the injured party and discard. If cutting, always cut away from the body toward the extremities to avoid inflicting further injury.

- Without delay, efficiently move the injured away from the accident scene, possible contamination, or any hazardous substances. Relocate to a nearby "clean" area to expedite removal of respiratory protection and establish communication.

- If the individual is unconscious, evaluate if an adequate airway exists and breathing and circulation are present (ABCs). If absent, commence rescue breathing or CPR without delay.

- Move the injured personnel to the decontamination area and transfer responsibilities to support personnel.

- Using soapy solution, support personnel should carefully wash outer garments as needed and adequately rinse.

- Spray outer protective clothing with clear water.

- Quickly remove tape from the injured individuals wrists and ankles—assume the individual is injured until an assessment indicates otherwise.

- Carefully, but quickly, cut second layer of protective clothing (inner suit, boots, and gloves) off injured party. Always cut away from the body toward the extremities to avoid inflicting further injury.

- Be prepared to turn emergency care over to Emergency Medical Service personnel. Otherwise, administer appropriate standard first aid to injuries.

- Following stabilization of any injuries, monitor and be on the alert for shock, wrap the injured in a warm blanket or other items to conserve body heat, and be prepared for vomiting.

- Cover any contact surfaces of transport equipment with a protective sheet or plastic.

- Inform all arriving personnel and transport crew of nature and extent of injuries and any potential hazards present.

12.10 Adverse Weather Conditions/Natural Disasters

Adverse weather and natural disasters can take many forms. Thunder and lightning storms, hail, high winds, tornadoes and earthquakes are examples. Sudden changes in the weather, extreme weather conditions, and natural disasters can create a number of subsequent hazards. Generally, poor working conditions occur, and slip, trip and fall hazards exist. Natural disasters can create many secondary hazards such as release of hazardous materials to the environment, structure failure and fires.

Routinely monitoring weather conditions and reports may help reduce the impact of severe weather and natural disasters. It may be necessary to halt certain hazardous operations or stop work altogether to allow the situation to pass. The SHSO must decide what operations, if any, are safe to perform based on existing and anticipated conditions.

The best protection against most severe weather episodes and natural disasters is to avoid them. This means seeking shelter before the storm hits. Stay away from pipes and electrical equipment, including telephones, should lightning be a threat and watch for damage caused by lightning strikes nearby.

12.10.1 Earthquakes

The following general guidelines will be adhered to in the event of an earthquake:

- If you are indoors, duck or drop down to the floor. Take cover under a sturdy desk, table or other furniture. Hold on to it and be prepared to move with it. Hold the position until the ground stops shaking and it is safe to move. Stay clear of windows, fireplaces, and heavy furniture or appliances. Do not rush outside. Falling glass or building parts may injure you. Do not try using the stairs or elevators while the building is shaking or while there is danger of being hit by falling glass or debris.

- If you are outside, get into the open, away from all buildings and power lines.

- If you are driving - stop if it is safe - but stay inside the vehicle. Do not stop on or under a bridge, overpass or tunnel. Move your car as far out of the normal traffic pattern as possible. Do not stop under trees, light posts, electrical power lines or signs.

12.11 Critique and Follow-Up of Emergency Procedures

The ROICC site representative will be verbally notified immediately and receive a written notification within 24 hours of all accidents or incidents including releases of toxic chemicals, fires, or explosions. The report will include the following items:

- Name, organization, telephone number, and location of the contractor.
- Name and title of the person(s) reporting.
- Date and time of accident/incident.
- Location of accident/incident (i.e., site location, facility name).
- Brief summary of accident/incident including pertinent details such as type of operation ongoing at time of accident.
- Cause of accident/incident, if known.
- Casualties (fatalities, disabling injuries).
- Details of any existing chemical hazard or contamination.
- Estimated property damage, if applicable.
- Nature of damage, effect on contract schedule.
- Action taken by Contractor to ensure safety and security.
- Other damage or injuries sustained (public or private).

The PS and the SHSO will investigate the cause of the incident to prevent its reoccurrence. The investigation should begin as soon as practical after the incident is under control, but not later than the first work day after the incident. Investigations will follow the procedures described below:

- Interview witnesses and participants as soon as possible or practical.

- Determine the chronological sequence of events (opinions as to cause should not be solicited at this time).
- Note the location, movement, displacement, liquid levels, sounds, noises, or other sensory perceptions experienced by the participants or witnesses.
- Obtain weather data.
- Ascertain the location and position of all switches, controls, etc.
- Verify the condition of all safeguards.

After the facts have been collected, causal factors should be identified. Two causal factors typically exist, apparent and contributing; and there may be several of each. Apparent factors are those which are self-evident or readily deduced. Contributing factors usually become apparent by questioning why the apparent causal factor was allowed to exist.

Table 12-1

EMERGENCY PHONE NUMBERS

Alameda County Fire Department		
Emergency	911	
City of Alameda Police Department		
Emergency	911	
Alameda Community Hospital		
Emergency	(510) 522-3700	
Key Project and NWT Personnel		
Program Director:	William Haney	(419) 855-4640
	Pager	(510) 448-6368
Health and Safety Manager	Mark Divoky	(925) 443-7967
	Pager	(510) 448-1657
Project Manager:	William Haney	(419) 855-4640
	Pager	(510) 448-6368
Site Health & Safety Officer:	Mark Divoky	(925) 443-7967
	Pager	(510) 448-1657
Project Superintendent	Dan Spicuzza	(925) 443-7967
	Pager	(510) 448-0858
Occupational Physician	Dr. Blackwell	(925) 373-0337
Navy Contact ROICC	TBD	
Emergency Medical Care	911	
Hospital	Alameda Community Hospital (510) 522-3700	
Directions to Medical Care	Exit base, turn right to Central, continue on Central to Encinal, right on Willow.	

13.0 Record Keeping and Data Management

Proper record keeping and data management are essential in the implementation of this SHSP. The forms associated with the record keeping and data management requirements must be completed in an accurate, timely fashion and filed with the appropriate entities. It is the responsibility of the PS to ensure that the forms are properly completed. Completed forms will be kept and maintained by NWT. These records will be maintained for a five-year period. Subcontractors will also be responsible for keeping a copy of the forms pertaining to their personnel.

13.1 Logs

The SHSO will maintain and complete a daily log for each day's work. The daily log will document chronologically each day's health and safety activities in sufficient detail for future reference as needed. Other relevant data and field information will be recorded on separate log forms for air monitoring, sampling, equipment calibration inspections, and incident reporting.

An EZ sign-in log will be maintained that will provide a project record of the following information for confined space entry activities:

- Worker's name.
- Work area.
- Duties performed.
- Level of protection.
- Time in/time out.

All personnel will be required to log in and out of the EZ.

A visitor's sign-in log will be maintained in the project office and administration area. Visitors requesting access to hazardous field activities must have appropriate project approval, be medically qualified, and have the health and safety training prerequisites for hazardous waste operations.

An OSHA 200 Log will be kept in the site administration facility.

13.2 Safety Inspections

NWT's accident prevention program is centered on the following key procedures:

- Project reporting, investigation, and review of all near misses, incidents, and accidents.

- Management reviews of all incident/accident reports, corrective action, and project safety concerns.

- Review of project, operations, and construction activities by health and safety professionals.

Safety reviews and inspections are conducted by all tiers of the management structure and are documented. A list of all corrective action items will be maintained showing the corrective action, responsible person, and the date action is to be completed. Health and safety personnel to ensure that corrective actions or measures have been implemented conduct follow-up inspections.

The PS will inspect the site weekly and interview one or two site workers regarding areas of safety concerns or ideas for safety improvement. Site supervisory personnel will inspect site conditions and activities daily to identify changing conditions or potential hazards. Identified safety and occupational health deficiencies and suggested corrective measures will be brought to the attention of the PS and SHSO. Safety review inspections will be recorded and filed for reference by project management and ROICC personnel.

13.3 Accident Reporting and Investigation

All project personnel are required to report all near misses, injuries, illnesses, and accidents to their immediate supervisor. The SHSO will immediately arrange appropriate medical care as required. Once immediate medical care for the injured personnel has been accomplished, the SHSO will complete and submit the appropriate report forms within 24 hours. The appropriate form(s) to be completed may include:

- Navy CSIR-1.

- NWT Safety Inspection Report.

- NWT Vehicle Accident Report.

Copies of the NWT forms listed in Appendix C of this SHSP will be sent to the SHSO in a separate Postings, Permits and Forms package.

Identified safety and occupational health deficiencies and corrective measures will be documented and filed on site for reference by the ROICC or designated representative.

On-site management personnel will investigate all near misses, injuries, illnesses, and accidents. The PS and SHSO will investigate the conditions that led to the accident. They will document how the accident occurred and identify unsafe acts or conditions that occurred or existed at the time of the accident. Corrective actions will be determined and implemented to prevent recurrence of the accident, and responsibility for implementation of corrective actions will be assigned. The investigation will be started immediately, and all information will be collected as soon as possible after the occurrence. The final report and required forms will be submitted to the PM for signature and forwarding to the ROICC and other appropriate personnel.

14.0 Summary and Checklist

14.1 Summary
A brief summary of equipment requirements of the project SHSP is provided here. The project employees are provided this for quick reference.

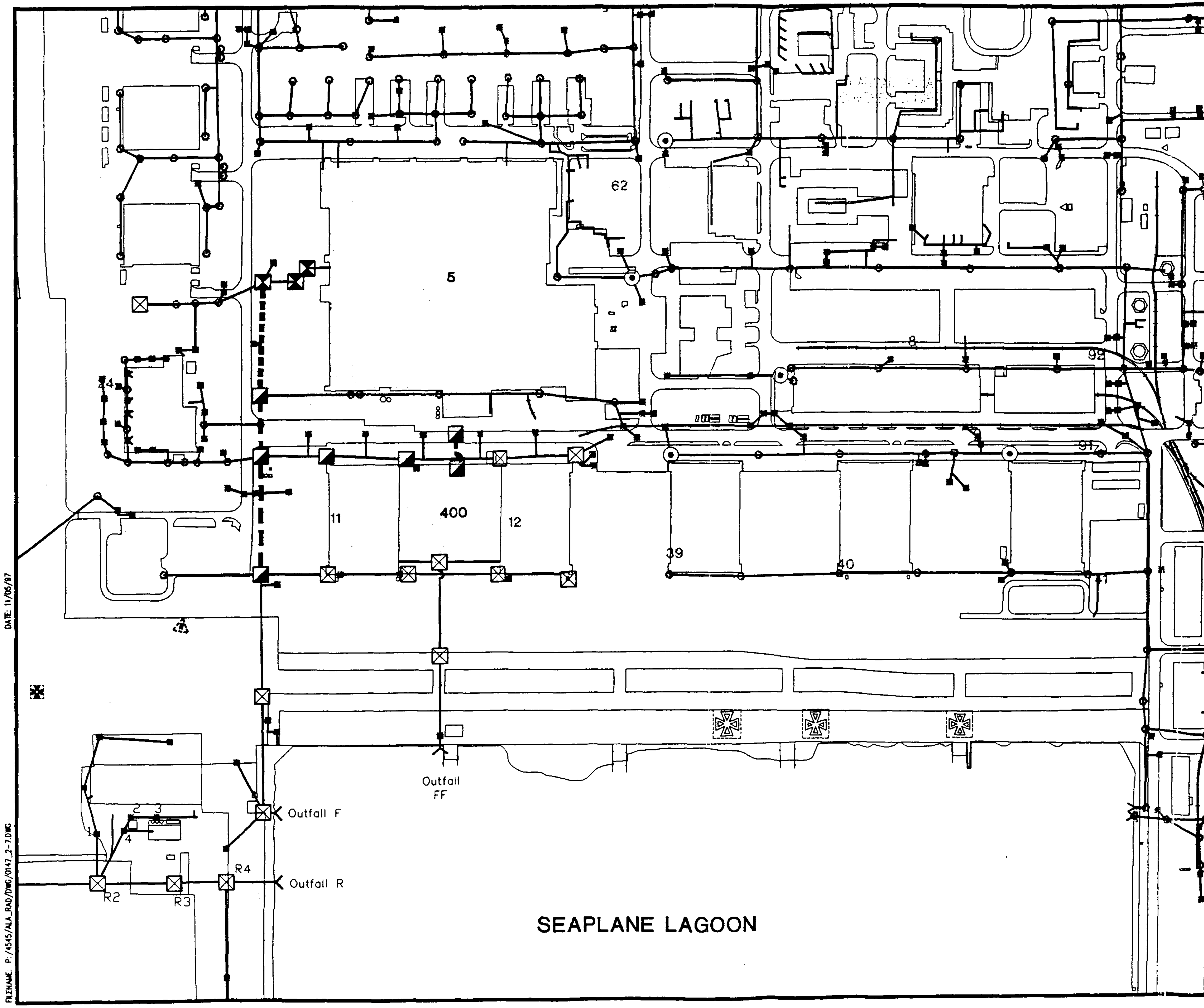
14.2 Checklist

- ☐ First aid kits (one per vehicle and facility)
- ☐ Fire extinguishers (one per vehicle and facility)
- ☐ Safety glasses or goggles, ANSI approved
- ☐ Hard hats, ANSI approved
- ☐ Ear plugs 25 dBA or greater
- ☐ Under gloves (latex, nitrile)
- ☐ Impermeable gloves
- ☐ Work gloves
- ☐ Steel toed work boots, ANSI approved
- ☐ Tyvek suits (sizes XXL - XXXXL)
- ☐ Duct tape
- ☐ Trash bags
- ☐ Eyewash
- ☐ Portable toilet
- ☐ Drinking water and disposable cups
- ☐ Air purifying respirators (full-face)
- ☐ Multigas/HEPA cartridges, NIOSH approved
- ☐ Thermometer
- ☐ Barricade tape (yellow and red)
- ☐ O_2 LEL Meter
- ☐ Photo ionization Detector (PID)
- ☐ Mini Ram Aerosol Monitor
- ☐ Micro R meter
- ☐ Beta/Gamma (β/γ) radiation survey meter
- ☐ Decon tubs
- ☐ Brushes
- ☐ Hand/face wash station
- ☐ Paper towels
- ☐ Complete H&S Plan
- ☐ MSDSs
- ☐ Rubber boots/boot covers
- ☐ Sun block

- [ ] Shade awnings (portable)
- [ ] Air horn
- [ ] Thermoluminescent dosimeters (TLD's)
- [ ] Traffic control signs
- [ ] Traffic control vests
- [ ] Traffic cones
- [ ] Scrubs
- [ ] Towels
- [ ] Laundry service
- [ ] Pulse rate meter
- [ ] HiVol air samplers
- [ ] Air flow calibrator
- [ ] PVC rain gear
- [ ] Detector tubes: benzene, hydrogen sulfide
- [ ] Sensodyne/Drager pump
- [ ] Isobutylene calibration gas
- [ ] Ear muffs
- [ ] Full body harness
- [ ] Extraction device

APPENDIX A

SITE AND HOSPITAL LOCATION MAPS



LEGEND

- MANHOLE/CATCH BASIN LOCATION MAXIMUM ACTIVITY DETECTED > 10^{8} pCi Ra-226
- SEWER SYSTEM LINE MAXIMUM ACTIVITY DETECTED > 10^{8} pCi Ra-226
- MANHOLE/CATCH BASIN LOCATION MAXIMUM ACTIVITY DETECTED > 10^{4} pCi Ra-226 < 10^{8} pCi Ra-226
- SEWER SYSTEM LINE MAXIMUM ACTIVITY DETECTED > 10^{4} pCi Ra-226 < 10^{8} pCi Ra-226
- NO APPRECIABLE DIFFERENCE FROM BACKGROUND (< 10^{4} pCi Ra-226)
- BACKGROUND MANHOLE
- SEWER SYSTEM MANHOLE LOCATION
- SEWER SYSTEM CATCH BASIN LOCATION
- SEWER SYSTEM LINE

SOURCE: "RADIATION SURVEY REPORT, NAVAL AIR STATION, ALAMEDA, CALIFORNIA", PRE-DRAFT FEBUARY 1997

N

150 0 150 300

SCALE: IN FEET

ALAMEDA POINT, ALAMEDA, CALIFORNIA

FIGURE 2-7

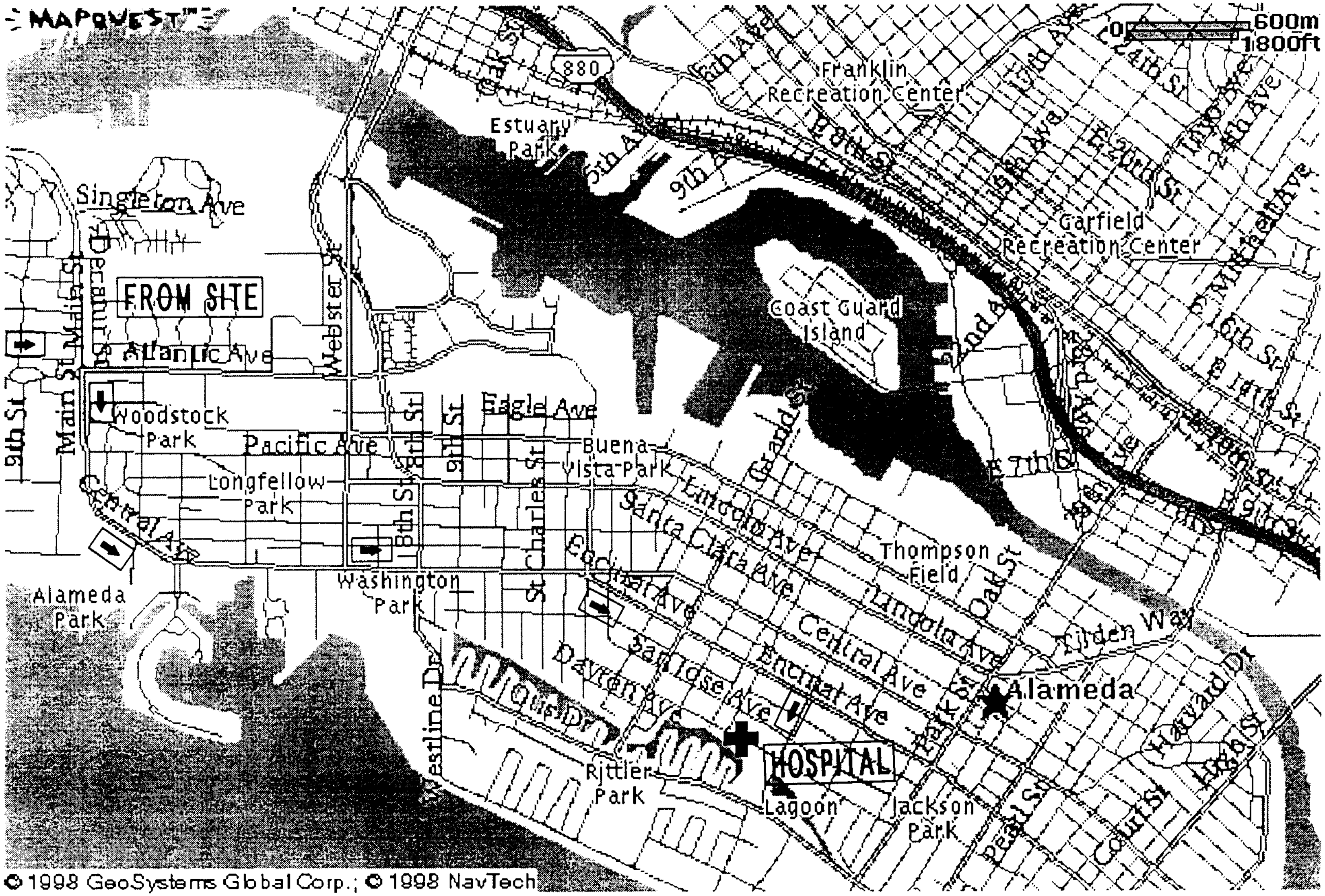
SITES 5 AND 10
BUILDINGS 5 AND 400
EXTERIOR STORM DRAIN LINES AND SEWERS

PROJECT NO.:	ORGINATOR:	CHECKER:	DATE:
4545-0147	ALM	KN	11/97

DATE: 11/05/97

FILENAME: P:/4545/ALA_RAD/DWG/0147_2-7.DWG

HOSPITAL ROUTE MAP - ALAMEDA PHASE III-IV



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APPENDIX B

MATERIAL SAFETY DATA SHEETS

BOUGHT ACCORDING TO SPECIFICATION -- TT-X-916,XYLENE,TECHNICAL - XYLENE,TECHNICAL
MATERIAL SAFETY DATA SHEET
FSC: 6810
NIIN: 005844071
Manufacturer's CAGE: 81348
Part No. Indicator: A
Part Number/Trade Name: TT-X-916,XYLENE,TECHNICAL

General Information

Item Name: XYLENE,TECHNICAL
Company's Name: BOUGHT ACCORDING TO SPECIFICATION
Record No. For Safety Entry: 004
Tot Safety Entries This Stk#: 006
Date MSDS Prepared: 01JAN85
Safety Data Review Date: 21MAR83
Supply Item Manager: CX
MSDS Serial Number: BFGQR
Specification Number: TT-X-916
Hazard Characteristic Code: F4
Unit Of Issue: BT
Unit Of Issue Container Qty: 1 QT

Ingredients/Identity Information

Proprietary: NO
Ingredient: XYLENES (O-,M-,P- ISOMERS) (SARA III)
Ingredient Sequence Number: 01
Percent: UNK
NIOSH (RTECS) Number: ZE2100000
CAS Number: 1330-20-7
OSHA PEL: 100 PPM/150 STEL
ACGIH TLV: 100 PPM/150STEL;9192

Physical/Chemical Characteristics

Appearance And Odor: WATERY LIQUID,COLORLESS,SWEET ODOR.
Boiling Point: 275-293F
Vapor Pressure (MM Hg/70 F): UNK
Vapor Density (Air=1): UNK
Specific Gravity: 0.868
Evaporation Rate And Ref: UNKNOWN
Solubility In Water: NEGLIGIBLE
Percent Volatiles By Volume: UNK

Fire and Explosion Hazard Data

Flash Point: 75F TCC
Lower Explosive Limit: 1.1
Upper Explosive Limit: 6.6
Extinguishing Media: FOAM,DRY CHEMICAL,CARBON DIOXIDE.
Special Fire Fighting Proc: H*2O MAY BE INEFFECTV;COOL CONT;WEAR SELF-CNTND BRTHG APP.
Unusual Fire And Expl Hazrds: VAPOR HEAVIER THAN AIR;VAPOR MAY EXPLODE; FLASHBACK ALONG VAPOR TRAIL MAY OCCUR.

Reactivity Data

Stability: YES
Cond To Avoid (Stability): HIGH TEMPERATURES,OPEN FLAME,IGNITION SOURCES.
Hazardous Decomp Products: CO*2,CO,PARTIALLY BURNED HYDROCARBONS
Hazardous Poly Occur: NO

Health Hazard Data

Signs/Symptoms Of Overexp: VAPOR IRRITATS EYES,SKIN,NOSE,THROAT.
INHALED:DIZZ,BRTHG DIFFICULT,COMA.HARMFUL IF SWALLOWED.
Emergency/First Aid Proc: CALL FOR MEDICAL AID.INHALED:REMOVE TO FRESH AIR.GIVE CPR/OXYGEN IF NEED.SKIN:FLUSH WITH WATER.EYES:FLUSH WITH WATER 15 MIN.INGESTED:DRINK WATER OR MILK.DO NOT INDUCE VOMITING.

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: ELIMINATE IGNITION SOURCES.EVACUATE AREA. STOP LEAK W/O RISK.WATER SPRAY TO KNOCK DOWN VAPORS.SM SPILL:ABSORB W SAND, OTHER NONCOMBUSTIBLE ABSORBENT,FLUSH AREA WITH WATER.LARGE SPILLS:DIKE FAR AHEAD OF SPILL FOR LATER DISPOSAL.
Waste Disposal Method: DISPOSAL OF MATERIAL BY CONSULTING LICENSED DISPOSAL FIRM;MUST BE DISPOSED IN ACCORDANCE WITH ALL FEDERAL,STATE AND LOCAL REGULATIONS.
Precautions-Handling/Storing: STORE IN COOL,DRY,WELL-VENTED,LOW FIRE RISK AREA.PROTECT FROM PHYSICAL DAMAGE.KEEP CONTAINERS CLOSED.AVOID SKIN CONTACT.

Control Measures

Respiratory Protection: WEAR APPRVD CANISTER OR AIR SUPPLIED AIR MASK.
Ventilation: MECHANICAL(GENERAL)/LOCAL EXHAUST RECOMMENDED.
Protective Gloves: PLASTIC
Eye Protection: CHEMICAL GOGGLES.
Other Protective Equipment: BOOTS;PROTECTIVE CLOTHING NECESSARY TO PREVENT CONTACT.
Suppl. Safety & Health Data: BP:135-145C.

Transportation Data

Trans Data Review Date: 83080
DOT PSN Code: PWS
DOT Proper Shipping Name: XYLENES
DOT Class: 3
DOT ID Number: UN1307
DOT Pack Group: III
DOT Label: FLAMMABLE LIQUID
IMO PSN Code: PPF
IMO Proper Shipping Name: XYLENES
IMO Regulations Page Number: 3394
IMO UN Number: 1307
IMO UN Class: 3.3
IMO Subsidiary Risk Label: -
IATA PSN Code: ZPL
IATA UN ID Number: 1307
IATA Proper Shipping Name: XYLENES
IATA UN Class: 3
IATA Label: FLAMMABLE LIQUID
AFI PSN Code: ZPL
AFI Prop. Shipping Name: XYLENES
AFI Class: 3
AFI ID Number: UN1307
AFI Pack Group: III
AFI Label: FLAMMABLE LIQUID
AFI Basic Pac Ref: 7-7

Disposal Data

Disposal Data Review Date: 88267
Rec # For This Disp Entry: 02
Tot Disp Entries Per NSN: 003

Landfill Ban Item: YES
Disposal Supplemental Data: BP:135-145C. IN CASE OF ACCIDENTAL EXPOSURE OR DISCHARGE, CONSULT HEALTH AND SAFETY FILE FOR PRECAUTIONS.
1st EPA Haz Wst Code New: U239
1st EPA Haz Wst Name New: XYLENE; DIMETHYLBENZENE
1st EPA Haz Wst Char New: IGNITABLE (I) TOXIC (T)
1st EPA Acute Hazard New: NO

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Label Data

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Label Required: YES
Label Status: G
Common Name: TT-X-916,XYLENE,TECHNICAL
Special Hazard Precautions: VAPOR IRRITATS EYES,SKIN,NOSE, THROAT.INHALED:DIZZ,BRTHG DIFFICULT,COMA.HARMFUL IF SWALLOWED.
Label Name: BOUGHT ACCORDING TO SPECIFICATION

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LIQUID AIR ALPHAGAZ DIV -- HYDROGEN SULFIDE - HYDROGEN SULFIDE,TECHNICAL
MATERIAL SAFETY DATA SHEET
FSC: 6830
NIIN: 002098029
Manufacturer's CAGE: 42568
Part No. Indicator: A
Part Number/Trade Name: HYDROGEN SULFIDE

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General Information

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Item Name: HYDROGEN SULFIDE,TECHNICAL
Company's Name: LIQUID AIR CORP ALPHAGAZ DIVISION
Company's Street: 2121 N CALIFORNIA BLVD
Company's City: WALNUT CREEK
Company's State: CA
Company's Country: US
Company's Zip Code: 94596
Company's Emerg Ph #: 415-977-6500
Company's Info Ph #: 415-977-6561
Record No. For Safety Entry: 002
Tot Safety Entries This Stk#: 004
Status: SE
Date MSDS Prepared: 01OCT85
Safety Data Review Date: 20MAY92
Supply Item Manager: CX
MSDS Serial Number: BMTVS
Hazard Characteristic Code: G8
Unit Of Issue: CY
Unit Of Issue Container Qty: 100 CU FT
Type Of Container: CYLINDER
Net Unit Weight: 9.1 LBS

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Ingredients/Identity Information

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Proprietary: NO
Ingredient: HYDROGEN SULFIDE (SARA III) *
Ingredient Sequence Number: 01
Percent: 98.5
NIOSH (RTECS) Number: MX1225000
CAS Number: 7783-06-4 *
OSHA PEL: 10 PPM/21 STEL *
ACGIH TLV: 10 PPM/15 STEL; 9192
Other Recommended Limit: NONE SPECIFIED

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Physical/Chemical Characteristics

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Appearance And Odor: COLORLESS GAS-OFFENSIVE ROTTEN EGG ODOR. GAS DENSITY 1.21 (AIR=1)
Boiling Point: -76F,-60C
Melting Point: -122F,-86C
Vapor Pressure (MM Hg/70 F): 13804
Vapor Density (Air=1): .091LB/FT3
Specific Gravity: 57.11 LB/FT3
Solubility In Water: SOLUBLE
Autoignition Temperature: 554F

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Fire and Explosion Hazard Data

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Flash Point: FLAMMABLE GAS
Lower Explosive Limit: 4.0
Upper Explosive Limit: 44.0
Extinguishing Media: WATER SPRAY (TO COOL CYLINDER & EXTINGUISH SURROUNDING FIRE), CARBON DIOXIDE OR DRY CHEMICAL.

Special Fire Fighting Proc: WEAR FULL PROTECTIVE CLOTHING AND NIOSH-APPROVED SELF-CONTAINED BREATHING APPARATUS WITH FULL FACEPIECE OPERATED IN THE POSITIVE PRESSURE MODE.SHUT OFF GAS FLOW
Unusual Fire And Expl Hazrds: HYDROGEN SULFIDE IS SLIGHTLY HEAVIER THAN AIR SO MAY ACCUMULATE IN LOW SPOTS AND MAY "TRAVEL" A CONSIDERABLE DISTANCE TO A SOURCE OF IGNITION AND FLASH BACK.

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Reactivity Data

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Stability: YES
Cond To Avoid (Stability): HEAT, FLAME OR OTHER SOURCES OF IGNITION
Materials To Avoid: CONCENTRATED NITRIC ACID, CHLORINE, NITROGEN TRIFLUORIDE, OXYGEN DIFLUORIDE OR OTHER STRONG OXIDIZING AGENTS.
Hazardous Decomp Products: HIGHLY TOXIC SULFUR OXIDES WHEN HEATED TO DECOMPOSITION.
Hazardous Poly Occur: NO

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Health Hazard Data

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LD50-LC50 Mixture: UNKNOWN
Route Of Entry - Inhalation: YES
Route Of Entry - Skin: YES
Route Of Entry - Ingestion: NO
Health Haz Acute And Chronic: ACUTE-INHALE:HYDROGEN SULFIDE IS HIGHLY TOXIC & IRRITANT TO MUCOUS MEMBRANES & CONJUNCTIVE OF EYES.MAY CAUSE HEADACHE,DIZZINESS OR NAUSEA.EXPOSURES FOR MORE THAN 30 MINUTES AT CONCENTRATIONS OF GREATER THAN 700 PPM HAVE BEEN FATAL DUE TO INHIBITING CELL RESPIRATION.MAY CAUSE DETECTION BY ODOR INEFFECTIVE.CHRONIC-UNK.
Carcinogenicity - NTP: NO
Carcinogenicity - IARC: NO
Carcinogenicity - OSHA: NO
Signs/Symptoms Of Overexp: HYDROGEN SULFIDE IS HIGHLY TOXIC & IRRITANT TO MUCOUS MEMBRANES & CONJUNCTIVE OF EYES. MAY CAUSE HEADACHE, DIZZINESS OR NAUSEA. EXPOSURES FOR MORE THAN 30 MINUTES AT CONCENTRATIONS OF GREATER THAN 700 PPM HAVE BEEN FATAL DUE TO INHIBITING CELL RESPIRATION. MAY CAUSE DETECTION BY ODOR INEFFECTIVE.
Med Cond Aggravated By Exp: PERSONS WITH PRE-EXISTING EYE PROBLEMS OR IMPAIRED RESPIRATORY FUNCTION MAY BE MORE SUSCEPTIBLE TO THE EFFECTS OF THE SUBSTANCE.
Emergency/First Aid Proc: PROMPT MEDICAL ATTENTION IS MANDATORY.RESCUE PERSONNEL SHOULD BE EQUIPPED WITH SELF-CONTAINED BREATHING APPARATUS. INHALED:EXTREME FIRE HAZARD.AVOID IGNITION SOURCES & STATIC DISCHARGE. REMOVE TO FRESH AIR.PROVIDE CPR/OXYGEN IF NEEDED.EYES:FLUSH WITH WATER FOR 15 MINUTES WHILE KEEPING EYELIDS OPEN.PERSONS WITH POTENTIAL EXPOSURE TO HYDROGEN SULFIDE SHOULD NOT WEAR CONTACT LENSES.

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Precautions for Safe Handling and Use

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Steps If Matl Released/Spill: EVACUATE AND VENTILATE AREA. USE APPROPRIATE PROTECTIVE EQUIPMENT. IF LEAK IS IN USER'S EQUIPMENT, BE CERTAIN TO PURGE PIPING WITH AN INERT GAS PRIOR TO ATTEMPTING REPAIRS. IF LEAK IS IN CONTAINER OR CONTAINER VALVE, CONTACT THE CLOSEST LIQUID AIR CO
Waste Disposal Method: DO NOT ATTEMPT TO DISPOSE OF WASTE OR UNUSED QUANTITIES. RETURN IN THE SHIPPING CONTAINER PROPERLY LABELED, WITH ANY VALVE OUTLET PLUGS OR CAPS SECURED AND VALVE PROTECTION CAP IN PLACE TO LIQUID AIR CORP OR CALL EMERGENCY PHONE NUMBER. RQ IS 100 LBS
Precautions-Handling/Storing: STORAGE-STORE CYLINDERS IN COOL(<130F/54C), DRY,WELL-VENTILATED AREA IN UPRIGHT & FIRMLY SECURED POSITION.
Other Precautions: FULL AND EMPTY CYLINDERS SHOULD BE SEPARATED.POST "NO SMOKING/OPEN FLAMES" SIGNS. THERE SHOULD BE NO SOURCES OF IGNITION MANY METALS CORRODE RAPIDLY WITH WET HYDROGEN SULFIDE. EARTH-GROUND AND BOND ALL LINES. USE EXPLOSION-PROOF TOOLS.

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Control Measures

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Respiratory Protection: IF ENGINEERING CONTROLS ARE INADEQUATE TO CONTROL VAPOR CONCENTRATIONS TO AN ACCEPTABLE LEVEL, A NIOSH-APPROVED SELF-CONTAINED BREATHING APPARATUS OR SUPPLIED-AIR RESPIRATOR SHOULD BE WORN.
Ventilation: PROVIDE SUFFICIENT MECHANICAL (GENERAL AND/OR LOCAL EXHAUST) VENTILATION TO MAINTAIN EXPOSURE BELOW TLV(S).
Protective Gloves: IMPERVIOUS
Eye Protection: SAFETY GLASSES
Other Protective Equipment: EYE WASH STATION, QUICK DRENCH SHOWER AND IMPERVIOUS CLOTHING
Work Hygienic Practices: WASH THOROUGHLY AFTER HANDLING. DO NOT BREATHE VAPORS/FUMES. AVOID CONTACT WITH EYES.
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Transportation Data

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Trans Data Review Date: 92141
DOT PSN Code: HMZ
DOT Proper Shipping Name: HYDROGEN SULFIDE, LIQUEFIED
DOT Class: 2.3
DOT ID Number: UN1053
DOT Label: POISON GAS, FLAMMABLE GAS
IMO PSN Code: IJF
IMO Proper Shipping Name: HYDROGEN SULPHIDE
IMO Regulations Page Number: 2151
IMO UN Number: 1053
IMO UN Class: 2(2.3) *
IMO Subsidiary Risk Label: FLAMMABLE GAS *
IATA PSN Code: ZZY
IATA Proper Shipping Name: FORBIDDEN BY THIS MODE OF TRANSPORTATION
AFI PSN Code: NVP
AFI Symbols: T
AFI Prop. Shipping Name: HYDROGEN SULPHIDE, LIQUEFIED
AFI Class: 2.3
AFI ID Number: UN1053
AFI Label: POISON GAS, FLAMMABLE GAS *
AFI Special Prov: 2
AFI Basic Pac Ref: 6-8
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Disposal Data

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Label Data

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Label Required: YES
Technical Review Date: 20MAY92
MFR Label Number: UNKNOWN
Label Status: F
Common Name: HYDROGEN SULFIDE
Signal Word: DANGER!
Acute Health Hazard-Severe: X
Contact Hazard-Slight: X
Fire Hazard-Severe: X
Reactivity Hazard-None: X
Special Hazard Precautions: ACUTE-INHALE:HYDROGEN SULFIDE IS HIGHLY TOXIC & IRRITANT TO MUCOUS MEMBRANES & CONJUNCTIVE OF EYES.MAY CAUSE HEADACHE, DIZZINESS OR NAUSEA.EXPOSURES FOR MORE THAN 30 MINUTES AT CONCENTRATIONS OF GREATER THAN 700 PPM HAVE BEEN FATAL DUE TO INHIBITING CELL RESPIRATION.MAY CAUSE DETECTION BY ODOR INEFFECTIVE.CHRONIC-UNK.STORAGE-STORE CYLINDERS IN COOL(<130F/54C),DRY,WELL-VENTILATED AREA.FIRST AID-PROMPT MEDICAL ATTENTION IS MANDATORY.RESCUE PERSONNEL SHOULD BE EQUIPPED WITH SELF-CONTAINED BREATHING APPARATUS.INHALED:EXTREME FIRE HAZARD.AVOID IGNITION SOURCES & FLUSH WITH WATER
Protect Eye: Y
Protect Skin: Y

Protect Respiratory: Y
Label Name: LIQUID AIR CORP ALPHAGAZ DIVISION
Label Street: 2121 N CALIFORNIA BLVD
Label City: WALNUT CREEK
Label State: CA
Label Zip Code: 94596
Label Country: US
Label Emergency Number: 415-977-6500
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URL for this msds http://hazard.com. If you wish to change, add to, or
delete information in this archive please sent updates to dan@hazard.com.

PROCURED IAW SPECIFICATION -- MR265030DCMAR(MIL-M-10304-5,METER,ELECTR.) - AMMETER
MATERIAL SAFETY DATA SHEET
FSC: 6625
NIIN: 007527537
Manufacturer's CAGE: 81349
Part No. Indicator: A
Part Number/Trade Name: MR265030DCMAR(MIL-M-10304/5,METER,ELECTR.)

General Information

Item Name: AMMETER
Company's Name: PROCURED IAW SPECIFICATION
Record No. For Safety Entry: 001
Tot Safety Entries This Stk#: 001
Date MSDS Prepared: 01JAN87
Safety Data Review Date: 20APR87
Supply Item Manager: TX
MSDS Serial Number: BFMYC
Specification Number: MIL-M-10304
Hazard Characteristic Code: A3
Unit Of Issue: EA

Ingredients/Identity Information

Proprietary: NO
Ingredient: RADIUM 226
Ingredient Sequence Number: 01
NIOSH (RTECS) Number: 1000019RA

Physical/Chemical Characteristics

Form (Radioactive Matl): NORM-SOL

Fire and Explosion Hazard Data

Extinguishing Media: EXTINGUISH WITH AGENT SUITABLE FOR SURROUNDING FIRE
Special Fire Fighting Proc: WEAR CHEMICAL PROTECTIVE SUIT WITH SELF CONTD BRTHG APP.
Unusual Fire And Expl Hazrds: SOME OF MATL MAY BURN. CONT MAY EXPLODE IN HEAT OF FIRE.

Reactivity Data

Stability: YES
Cond To Avoid (Stability): NOT APPLICABLE
Materials To Avoid: ISOLATE,SEGREGATE FROM MOST OTHER TYPE MATERIAL
Hazardous Decomp Products: DEPENDS ON CHEMICAL COMPOSITION; FISSION PRODUCTS
Hazardous Poly Occur: NO

Health Hazard Data

Signs/Symptoms Of Overexp: HAZ DEGREE DEPENDS ON TYPE/QUANT OF RADIATION. LATENT EFFECTS:SOMATIC/GENETIC DAMAGE.
Emergency/First Aid Proc: USE FIRST AID. CALL MEDICAL EMERGENCY CARE. REMOVE/ISOLATE COMTAMINATED CLOTHING.SHOWER VICTIM(S) W. SOAP & H*2O. DETAIN PERSONNEL/EQUIPMENT EXPOSED. ADVISE MEDICAL PERSONNEL THAT VICTIM(S) MAY BE CONTAMINATED.

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: HANDLE BROKEN DEVICE WITH GLOVES & FORCEPS
Waste Disposal Method: CONTROLLED DISPOSAL REQUIRED IAW DOD REGULATIONS &

APPLICABLE FEDERAL,STATE & LOCAL REGULATIONS.
Precautions-Handling/Storing: SHIELD ACCORDING TO EMITTED RADIATION. PROTECT FROM FILM/FILM PLATES. KEEP CONTAINERS CLOSED. STORE IN AREA FOR RADIOACTIVE MATERIALS.

Control Measures

Respiratory Protection: SCBA IF INVOLVED IN FIRE, OTHERWISE GAS MASK.
Ventilation: PROVIDE MECHAN(GEN/LOCAL EXHAUST)VENT TO MAINTN <TLV
Protective Gloves: IMPERVIOUS
Eye Protection: SAFETY GLASSES
Other Protective Equipment: EYE WASH STATION. APRONS. SPECIAL IMPERVIOUS CLOTHING.
Suppl. Safety & Health Data: DGSC GENERATED MSDS; DESC-STM LTR. 8/4/86 INDICATES 'RADIUM PRESENT. REVIEW OF SPEC SUGGEST ITEMS PROCURED PRIOR TO 'D` REVISION(4/27/81) HAD A RADIOACTIVE MATERIAL PER SPEC TT-R-58.

Transportation Data

Trans Data Review Date: 87110
DOT PSN Code: MNS
DOT Proper Shipping Name: RADIOACTIVE MATERIAL, EXCEPTED PACKAGE-INSTRUMENTS OR ARTICLES
DOT Class: 7
DOT ID Number: UN2910
DOT Label: NONE
IMO PSN Code: MXJ
IMO Proper Shipping Name: RADIOACTIVE MATERIAL EXCEPTED PACKAGE - ARTICLES
IMO Regulations Page Number: 7102
IMO UN Number: 2910
IMO UN Class: 7
IMO Subsidiary Risk Label: *
IATA PSN Code: VNR
IATA UN ID Number: 2910
IATA Proper Shipping Name: RADIOACTIVE MATERIAL, EXCEPTED PACKAGE, INSTRUMENTS
IATA UN Class: 7
IATA Label: NONE
AFI PSN Code: VNR
AFI Prop. Shipping Name: RADIOACTIVE MATERIAL, EXCEPTED PACKAGE, INSTRUMENTS OR ARTICLES
AFI Class: 7
AFI ID Number: UN2910
AFI Label: NONE
AFI Basic Pac Ref: 11-11,11-13
Additional Trans Data: SEE SUPPLEMENTAL DATA FIELD.

Disposal Data

Disposal Data Review Date: 88291
Rec # For This Disp Entry: 01
Tot Disp Entries Per NSN: 001
Landfill Ban Item: YES
Disposal Supplemental Data: DGSC GENERATED MSDS; DESC-STM LTR. 8/4/86 INDICATES 'RADIUM PRESENT. REVIEW OF SPEC SUGGEST ITEMS PROCURED PRIOR TO 'D` REVISION(4/27/81) HAD A RADIOACTIVE MATERIAL PER SPEC TT-R-58. ITEM NOT REGULATED AS RCRA HAZARDOUS WASTE BY EPA, BUT MAY BE REGULATED BY NRC (10 CFR).
1st EPA Haz Wst Name New: NOT REGULATED
1st EPA Haz Wst Char New: NOT REGULATED BY RCRA
1st EPA Acute Hazard New: NO

Label Data

Label Required: YES
Label Status: G
Common Name: MR265030DCMAR(MIL-M-10304/5,METER,ELECTR.)
Special Hazard Precautions: HAZ DEGREE DEPENDS ON TYPE/ QUANT OF RADIATION. LATENT EFFECTS:SOMATIC/GENETIC DAMAGE.
Label Name: PROCURED IAW SPECIFICATION

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CONOCO -- DIESEL FUEL NO. 2 - DIESEL FUEL
MATERIAL SAFETY DATA SHEET
FSC: 9140
NIIN: 002865296
Manufacturer's CAGE: 15445
Part No. Indicator: A
Part Number/Trade Name: DIESEL FUEL NO. 2

General Information

Item Name: DIESEL FUEL
Company's Name: CONOCO INC
Company's Street: 600 N DAIRY ASHFORD RD RM 3012
Company's P. O. Box: 4784
Company's City: HOUSTON
Company's State: TX
Company's Country: US
Company's Zip Code: 77210-4784
Company's Emerg Ph #: 713-293-5550/800-424-9300
Company's Info Ph #: 713-293-5550
Record No. For Safety Entry: 028
Tot Safety Entries This Stk#: 092
Status: SMU
Date MSDS Prepared: 14AUG91
Safety Data Review Date: 24JUN92
Supply Item Manager: KY
MSDS Serial Number: BMZTT
Specification Number: VV-F-800
Spec Type, Grade, Class: GRADE DF-2
Hazard Characteristic Code: F4

Ingredients/Identity Information

Proprietary: NO
Ingredient: PETROLEUM MID-DISTILLATE (DIESEL MARINE FUEL)
Ingredient Sequence Number: 01
Percent: 100 %
NIOSH (RTECS) Number: 1004302PE
CAS Number: 68476-34-6
OSHA PEL: 5 MG/M3 AS OIL MIST
ACGIH TLV: 5 MG/M3 AS OIL MIST
Other Recommended Limit: NONE SPECIFIED

Physical/Chemical Characteristics

Appearance And Odor: CLEAR OR LIGHT YELLOW LIQUID, AROMATIC ODOR
Boiling Point: 350 - 680F
Melting Point: NOT GIVEN
Vapor Pressure (MM Hg/70 F): 1 MMHG
Vapor Density (Air=1): > 1
Specific Gravity: 0.85 - 0.93
Decomposition Temperature: NOT GIVEN
Evaporation Rate And Ref: NIL
Solubility In Water: INSOLUBLE
Percent Volatiles By Volume: NIL
Corrosion Rate (IPY): UNKNOWN

Fire and Explosion Hazard Data

Flash Point: 130F,54C
Flash Point Method: TCC
Lower Explosive Limit: 0.4 %
Upper Explosive Limit: 6 %

Extinguishing Media: WATER SPRAY, FOAM, DRY CHEMICAL CAARBON DIOXIDE
Special Fire Fighting Proc: USE WATER TO KEEP FIRE-EXPOSED CONTAINERS COOL. IF LEAK OR SPILL HAS NOT IGNITIED, USE WATER SPRAY TO DISPERSE THE VAPORS AND TO PROVIDE PROTECTION.
Unusual Fire And Expl Hazrds: PRODUCTS OF COMBUSTION MAY CONTAIN CARBON MONOXIDE, CARBON DIOXIDE AND OTHER TOXIC MATERILS. DO NOT ENTER ENCLOSED OR CONFINED SPACE WITHOUT PROPER PPE.

Reactivity Data

Stability: YES
Cond To Avoid (Stability): AVOID HEAT AND FLAME
Materials To Avoid: INCOMATIBLE WITH OXIDIZING MATERIALS.

Health Hazard Data

Precautions for Safe Handling and Use

Control Measures

Transportation Data

Disposal Data

Label Data

Label Required: YES
Technical Review Date: 24JUN92
MFR Label Number: NONE
Label Status: G
Common Name: DIESEL FUEL NO. 2
Chronic Hazard: NO
Signal Word: CAUTION!
Acute Health Hazard-Slight: X
Contact Hazard-Slight: X
Fire Hazard-Slight: X
Reactivity Hazard-None: X
Special Hazard Precautions: STORE IN WELL VENTILATED AREEA. KEEP CONTAINER TIGHTLY CLOSED. STORE IN ACCORDANCE WITH NATIONAL FIRE PROTECTION ASSN REGULATIONS. FIRST AID: INHALATION: REMOVE TO FRESH AIR. IF NOT BREATHING, GIVE ARTIFICIAL RESPIRATION. IF BREATHING IS DIFFICULT, GIVE OXYGEN. CALL A PHYSICIAN. SKIN: FLUSH SKIN WITH WATER AFTER CONTACT. REMOVE CONTAMINATED CLOTHING. EYES: IMMEDIATELY FLUSH WITH WATER FOR 15 MINUTES. CALL A PHYSICIAN. INGESTION: DO NOT INDUCE VOMITING. IMMEDIATELY GIVE TWO GLASSES OF WATER. NEVER GIVE ANYTHING TO IF UNCONCIOUS. CALL MD
Protect Eye: Y
Protect Skin: Y
Label Name: CONOCO INC
Label Street: 600 N DAIRY ASHFORD RD RM 3012
Label P.O. Box: 4784
Label City: HOUSTON
Label State: TX
Label Zip Code: 77210-4784
Label Country: US
Label Emergency Number: 713-293-5550/800-424-9300

BOUGHT ACCORDING TO SPECIFICATION -- VV-G-1690,GASOLINE,AUTOMOTIVE,LEADED,UNLEAD -
MATERIAL SAFETY DATA SHEET
FSC: 9130
NIIN: 002646217
Manufacturer's CAGE: 81348
Part No. Indicator: A
Part Number/Trade Name: VV-G-1690,GASOLINE,AUTOMOTIVE,LEADED,UNLEAD

General Information

Item Name: GASOLINE,AUTOMOTIVE
Company's Name: BOUGHT ACCORDING TO SPECIFICATION
Record No. For Safety Entry: 017
Tot Safety Entries This Stk#: 019
Date MSDS Prepared: 01JAN85
Safety Data Review Date: 30NOV79
MSDS Serial Number: BDQLP
Specification Number: VV-G-1690
Hazard Characteristic Code: F2

Ingredients/Identity Information

Proprietary: NO
Ingredient: GASOLINE
Ingredient Sequence Number: 01
NIOSH (RTECS) Number: LX3300000
CAS Number: 8006-61-9
OSHA PEL: 300 PPM/500 STEL
ACGIH TLV: 300 PPM/500STEL;9192

Physical/Chemical Characteristics

Fire and Explosion Hazard Data

Flash Point: -40F

Reactivity Data

Health Hazard Data

Precautions for Safe Handling and Use

Control Measures

Transportation Data

Trans Data Review Date: 79334
DOT PSN Code: GTN
DOT Proper Shipping Name: GASOLINE
DOT Class: 3
DOT ID Number: UN1203
DOT Pack Group: II
DOT Label: FLAMMABLE LIQUID
IMO PSN Code: HRV
IMO Proper Shipping Name: GASOLINE
IMO Regulations Page Number: 3141
IMO UN Number: 1203
IMO UN Class: 3.1

IMO Subsidiary Risk Label: -
IATA PSN Code: RMF
IATA UN ID Number: 1203
IATA Proper Shipping Name: MOTOR SPIRIT
IATA UN Class: 3
IATA Label: FLAMMABLE LIQUID
AFI PSN Code: MUC
AFI Prop. Shipping Name: GASOLINE
AFI Class: 3
AFI ID Number: UN1203
AFI Pack Group: II
AFI Label: FLAMMABLE LIQUID
AFI Basic Pac Ref: 7-7

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Disposal Data

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Disposal Data Review Date: 88179
Rec # For This Disp Entry: 01
Tot Disp Entries Per NSN: 001
Landfill Ban Item: YES
Disposal Supplemental Data: IN CASE OF ACCIDENTAL EXPOSURE OR DISCHARGE, CONSULT HEALTH AND SAFETY FILE FOR PRECAUTIONS.
1st EPA Haz Wst Code New: D001
1st EPA Haz Wst Name New: IGNITIBLE
1st EPA Haz Wst Char New: IGNITABILITY
1st EPA Acute Hazard New: NO

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Label Data

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Label Required: YES
Label Status: G
Common Name: VV-G-1690,GASOLINE,AUTOMOTIVE,LEADED,UNLEAD
Label Name: BOUGHT ACCORDING TO SPECIFICATION

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URL for this msds http://hazard.com. If you wish to change, add to, or delete information in this archive please sent updates to dan@hazard.com.

BOUGHT ACCORDING TO SPECIFICATION -- BENZENE,TECHNICAL - BENZENE,TECHNICAL
MATERIAL SAFETY DATA SHEET
FSC: 6810
NIIN: 002572481
Manufacturer's CAGE: 81348
Part No. Indicator: A
Part Number/Trade Name: BENZENE,TECHNICAL

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General Information

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Item Name: BENZENE,TECHNICAL
Company's Name: BOUGHT ACCORDING TO SPECIFICATION
Record No. For Safety Entry: 001
Tot Safety Entries This Stk#: 001
Status: SM
Date MSDS Prepared: 01JAN85
Safety Data Review Date: 23FEB89
Supply Item Manager: CX
MSDS Serial Number: BDPHT
Specification Number: VV-B-231
Spec Type, Grade, Class: GRADE A
Hazard Characteristic Code: F3
Unit Of Issue: GL
Unit Of Issue Container Qty: 1.0 GL
Type Of Container: CAN
Net Unit Weight: 1.0 GL

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Ingredients/Identity Information

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Proprietary: NO
Ingredient: BENZENE (SARA III)
Ingredient Sequence Number: 01
Percent: 100.0
NIOSH (RTECS) Number: CY1400000
CAS Number: 71-43-2
OSHA PEL: 1PPM/5STEL;1910.1028
ACGIH TLV: 10 PPM; A2; 9192

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Physical/Chemical Characteristics

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Appearance And Odor: COLORLESS TO LIGHT YELLOW LIQUID,AROMATIC ODOR
Boiling Point: 176.18F
Vapor Density (Air=1): 2.7
Specific Gravity: 0.879
Solubility In Water: SLIGHT

===

Fire and Explosion Hazard Data

===

Flash Point: 12F CC
Lower Explosive Limit: 1.4
Upper Explosive Limit: 8.0
Extinguishing Media: DRY CHEMICAL,FOAM,CO*2
Special Fire Fighting Proc: WEAR SELF-CONTAINED BREATHING APPARATUS,KEEP CONTS COOL,H*2O
Unusual Fire And Expl Hazrds: MAY BE IGNITED BY HEAT,SPARKS,FLAMES.CONT. MAY EXPLODE IN HEAT OF FIRE.FLAMM.VAPORS MAY SPREAD,EXPLO

===

Reactivity Data

===

Stability: YES
Materials To Avoid: OXIDIZING MATERIALS
Hazardous Poly Occur: NO

===

Health Hazard Data

Signs/Symptoms Of Overexp: EUPHORIA,HEADACHE,VERTIGO,NARCOSIS,RESPIR. IRRITATION,PULMONARY EDEMA,STOM.IRRITATION,VOMITING,COLIC.
Emergency/First Aid Proc: IRRIGATE EYES WITH WATER.WASH CONTAMINATED AREAS OF BODY WITH SOAP & WATER.STOMACH WASH,IF SWALLOWED,FOLLOWED BY SALINE CATHARSIS.ARTIFICIAL RESPIRATION & OXYGEN IF NECESSARY.NO ADRENALIN SHOULD BE USED AS A RESPIRATORY STIMULANT.REMOVE TO FRESH AIR

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: NO FLARES,SMOKING OR FLAMES IN HAZARD AREA. STOP LEAK IF WITHOUT RISK.USE WATE SPRAY TO REDUCE VAPORS.LARGE SPILLS:DIKE FOR LATER DISPOSAL.SMALL SPILLS:TAKE UP WITH SAND,EARTH,OR OTHER NONCOMBUSTIBLE ABSORBENT MATERIAL.
Waste Disposal Method: SPRAY INTO FURNACE UNDER CONTROLLED CONDITIONS FOR INCINERATION.
Precautions-Handling/Storing: PROTECT AGAINST PHYSICAL DAMAGE.DO NOT PUNCTURE CANS.OUTDOOR OR DETACHED STORAGE IS PREFERABLE.INDOOR STORAGE SHOULD BE IN A STD FLAMM.LIQUID STG ROOM
Other Precautions: SPARK RESISTANT TOOLS SHOULD BE USED.WEAR CHEMICAL SAFETY GOGGLES,FACE SHIELD,SELF-CONTAINED BREATHING APPARATUS & RUBBER PROTECTIVE CLOTHING.

Control Measures

Respiratory Protection: SELF-CONTAINED BREATHING APPARATUS
Ventilation: AS REQUIRED TO CONTROL TLV IN AIR
Protective Gloves: RUBBER
Eye Protection: SAFETY GOGGLES
Other Protective Equipment: FACE SHIELD,RUBBER PROTECTIVE CLOTHING.
Suppl. Safety & Health Data: THIS NSN CANCELLED & REPLACE BY 6810-00-281-5272.

Transportation Data

Trans Data Review Date: 89054
DOT PSN Code: BRS
DOT Proper Shipping Name: BENZENE
DOT Class: 3
DOT ID Number: UN1114
DOT Pack Group: II
DOT Label: FLAMMABLE LIQUID
IMO PSN Code: BXB
IMO Proper Shipping Name: BENZENE
IMO Regulations Page Number: 3185
IMO UN Number: 1114
IMO UN Class: 3.2
IMO Subsidiary Risk Label: -
IATA PSN Code: DBA
IATA UN ID Number: 1114
IATA Proper Shipping Name: BENZENE
IATA UN Class: 3
IATA Label: FLAMMABLE LIQUID
AFI PSN Code: DBA
AFI Symbols: 0
AFI Prop. Shipping Name: BENZENE
AFI Class: 3
AFI ID Number: UN1114
AFI Pack Group: II
AFI Label: FLAMMABLE LIQUID
AFI Basic Pac Ref: 7-7
Additional Trans Data: THIS NSN CANCELLED & REPLACED BY 6810-00-281-5272(ON,79305).

```
===========================================================================
                              Disposal Data
===========================================================================
Disposal Data Review Date: 88293
Rec # For This Disp Entry: 01
Tot Disp Entries Per NSN: 001
Landfill Ban Item: YES
Disposal Supplemental Data: ITEM IS GRADE "A" OF FEDERAL SPECIFICATION IN
CASE OF ACCIDENTAL EXPOSURE OR DISCHARGE, CONSULT HEALTH AND SAFETY FILE
FOR PRECAUTIONS.
1st EPA Haz Wst Code New: U019
1st EPA Haz Wst Name New: BENZENE
1st EPA Haz Wst Char New: TOXIC (T)
1st EPA Acute Hazard New: NO
2nd EPA Haz Wst Code New: D001
2nd EPA Haz Wst Name New: IGNITIBLE
2nd EPA Haz Wst Char New: IGNITABILITY
2nd EPA Acute Hazard New: NO
===========================================================================
                               Label Data
===========================================================================
Label Required: YES
Label Status: G
Common Name: BENZENE,TECHNICAL
Special Hazard Precautions: EUPHORIA,HEADACHE,VERTIGO,
NARCOSIS,RESPIR.IRRITATION,PULMONARY EDEMA,STOM.IRRITATION,VOMITING,COLIC.
Label Name: BOUGHT ACCORDING TO SPECIFICATION
=======================================================================
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delete information in this archive please sent updates to dan@hazard.com.
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NORTH STRONG -- ETHYL BENZENE, REAGENT - ETHYL BENZENE REAGENT
MATERIAL SAFETY DATA SHEET
FSC: 6810
NIIN: 008257436
Manufacturer's CAGE: 9A714
Part No. Indicator: A
Part Number/Trade Name: ETHYL BENZENE, REAGENT

General Information

Item Name: ETHYL BENZENE REAGENT
Company's Name: NORTH STRONG, INC.
Company's Street: 7322 WESTMORE RD
Company's City: ROCKVILLE
Company's State: MD
Company's Country: US
Company's Zip Code: 20850-1260
Record No. For Safety Entry: 001
Tot Safety Entries This Stk#: 001
Date MSDS Prepared: 01JAN85
Safety Data Review Date: 26NOV79
MSDS Serial Number: BFRJJ
Hazard Characteristic Code: F3
Unit Of Issue: BT
Unit Of Issue Container Qty: 1 KG

Ingredients/Identity Information

Proprietary: NO
Ingredient: ETHYL BENZENE (SARA III)
Ingredient Sequence Number: 01
NIOSH (RTECS) Number: DA0700000
CAS Number: 100-41-4
OSHA PEL: 100 PPM/125 STEL
ACGIH TLV: 100 PPM/125STEL 9192

Physical/Chemical Characteristics

Fire and Explosion Hazard Data

Reactivity Data

Health Hazard Data

Precautions for Safe Handling and Use

Control Measures

Transportation Data

Trans Data Review Date: 79330
DOT Proper Shipping Name: UNDER REVIEW
IMO Proper Shipping Name: FLAMMABLE LIQUIDS, NON-TOXIC, N.O.S./ ETHYL BENZENE
IMO UN Number: 1993
IMO UN Class: 3.2
IATA UN ID Number: 701

IATA Proper Shipping Name: ETHYL BENZENE
IATA Label: FLAMMABLE LIQUID
AFI Prop. Shipping Name: UNDER REVIEW

===

Disposal Data

===

Disposal Data Review Date: 89045
Rec # For This Disp Entry: 01
Tot Disp Entries Per NSN: 001
Landfill Ban Item: YES
Disposal Supplemental Data: IN CASE OF ACCIDENTAL EXPOSURE OR DISCHARGE, CONSULT MANUFACTURER FOR HEALTH AND SAFETY INFORMATION.
1st EPA Haz Wst Code New: D001
1st EPA Haz Wst Name New: IGNITIBLE
1st EPA Haz Wst Char New: IGNITABILITY
1st EPA Acute Hazard New: NO

===

Label Data

===

Label Required: YES
Label Status: F
Special Hazard Precautions: MAY BE POISONOUS IF INHALED OR ABSORBED THROUGH SKIN. VAPORS MAY CAUSE DIZZINESS OR SUFFOCATION. CONTACT MAY IRRITATE OR BURN SKIN AND EYES. FIRE MAY PRODUCE IRRITATING OR POISONOUS GASES. RUNOFF FROM FIRE CONTROL OR DILUTION WATER MAY CAUSE POLLUTION.
Label Name: BIOCLINICAL LABORATORIES INC NORTH STRONG DIV
Label Street: 7322 WESTMORE RD
Label City: ROCKVILLE
Label State: MD
Label Zip Code: 20850-1260
Label Country: US

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PHILLIPS PETROLEUM -- REFERENCE FUEL GRADE TOLUENE - TOLUENE, REAGENT
MATERIAL SAFETY DATA SHEET
FSC: 6810
NIIN: 009351039
Manufacturer's CAGE: 46935
Part No. Indicator: A
Part Number/Trade Name: REFERENCE FUEL GRADE TOLUENE

General Information

Item Name: TOLUENE, REAGENT
Company's Name: PHILLIPS PETROLEUM CO.
Company's Street: 758 ADAMS BLDG
Company's City: BARTLESVILLE
Company's State: OK
Company's Country: US
Company's Zip Code: 74004
Company's Emerg Ph #: 918-661-3865/8118
Company's Info Ph #: 918-661-8327
Record No. For Safety Entry: 001
Tot Safety Entries This Stk#: 001
Date MSDS Prepared: 01JAN85
Safety Data Review Date: 27NOV79
MSDS Serial Number: BFXKZ
Hazard Characteristic Code: F3
Unit Of Issue: DR
Unit Of Issue Container Qty: 55 GALS

Ingredients/Identity Information

Proprietary: NO
Ingredient: TOLUENE (SARA III)
Ingredient Sequence Number: 01
NIOSH (RTECS) Number: XS5250000
CAS Number: 108-88-3
OSHA PEL: 200 PPM/150 STEL
ACGIH TLV: 50 PPM; 9293

Physical/Chemical Characteristics

Fire and Explosion Hazard Data

Flash Point: 40F CC

Reactivity Data

Health Hazard Data

Precautions for Safe Handling and Use

Control Measures

Transportation Data

Trans Data Review Date: 79331
DOT PSN Code: OJY
DOT Proper Shipping Name: TOLUENE
DOT Class: 3

DOT ID Number: UN1294
DOT Pack Group: II
DOT Label: FLAMMABLE LIQUID
IMO PSN Code: OSR
IMO Proper Shipping Name: TOLUENE
IMO Regulations Page Number: 3285
IMO UN Number: 1294
IMO UN Class: 3.2
IMO Subsidiary Risk Label: -
IATA PSN Code: YEL
IATA UN ID Number: 1294
IATA Proper Shipping Name: TOLUENE
IATA UN Class: 3
IATA Label: FLAMMABLE LIQUID
AFI PSN Code: YEL
AFI Prop. Shipping Name: TOLUENE
AFI Class: 3
AFI ID Number: UN1294
AFI Pack Group: II
AFI Label: FLAMMABLE LIQUID
AFI Basic Pac Ref: 7-7
N.O.S. Shipping Name: TOLUOL

===

Disposal Data

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Disposal Data Review Date: 88088
Rec # For This Disp Entry: 01
Tot Disp Entries Per NSN: 001
Landfill Ban Item: YES
Disposal Supplemental Data: IN CASE OF ACCIDENTAL EXPOSURE OR DISCHARGE, cONSULT HEALTH AND SAFETY FILE FOR PRECAUTIONS.
1st EPA Haz Wst Code New: U220
1st EPA Haz Wst Name New: TOLUENE; METHYLBENZENE
1st EPA Haz Wst Char New: TOXIC (T)
1st EPA Acute Hazard New: NO
2nd EPA Haz Wst Code New: D001
2nd EPA Haz Wst Name New: IGNITIBLE
2nd EPA Haz Wst Char New: IGNITABILITY
2nd EPA Acute Hazard New: NO

===

Label Data

===

Label Required: YES
Label Status: F
Special Hazard Precautions: MAY BE POISONOUS IF INHALED OR ABSORBED THROUGH SKIN. VAPORS MAY CAUSE DIZZINESS OR SUFFOCATION. CONTACT MAY IRRITATE OR BURN SKIN AND EYES. FIRE MAY PRODUCE IRRITATING OR POISONOUS GASES. RUNOFF FROM FIRE CONTROL OR DILUTION WATER MAY CAUSE POLLUTION.
Label Name: PHILLIPS CHEMICAL COMPANY
Label Street: 758 ADAMS BLDG
Label City: BARTLESVILLE
Label State: OK
Label Zip Code: 74004
Label Country: US
Label Emergency Number: 918-661-3865/8118

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APPENDIX C

JOB SITE POSTINGS, PERMITS AND FORMS

CONFINED SPACE ENTRY PERMIT

Job No. ____________________ Address: ____________________

Location of Job: ____________________ Identity of Confined Space: ____________________

Describe Hazards of Confined Space (Chemical, Physical, etc.) ____________________

____

Purpose This Permit Authorized: ____________________

CHECKLIST	Yes	Does Not Apply	PERSONAL PROTECTIVE EQUIPMENT (check all that apply)
All lines leading to and from the space have been blinded or disconnected.			**EYE/FACE** ☐ Chemical Goggles ☐ Face Shield ☐ Safety Glasses w/ side shields **EXTREMITIES** ☐ Hard Hat ☐ Glove (Material _____) ☐ Boot (Material _____) ☐ Booties **BODY** ____ Level Suit (Material _____) **RESPIRATORY** ☐ SCBA ☐ Air Line ☐ Egress System ☐ APR (Cartridge ____) ☐ PAPR (Cartridge ____) **OTHER** ☐ Hearing Protection ☐ Harness & Lifeline ☐ Buddy System ☐ Cooling Vest **RESCUE EQUIPMENT** ☐ Mechanical Extraction Device ☐ First Aid Kit ☐ SCBA (1 pair) ☐ Other (Specify) ____________ **EMERGENCY PROCEDURES** ____________ ____________ **COMMUNICATION** ☐ Radios ☐ Air Horn Signals ☐ Hand Signals ☐ Lifeline "Tug" Signals ☐ Other: ____________
All grounding and bonding cables in place.			
All lighting, fittings, power equipment, and extension cords are explosion-proof.			
Ground Fault Circuit Interrupter (GFCI) checked and functioning.			
All ignition sources have been isolated.			
All respiratory equipment and alarms checked and functional.			
All safety harnesses and lifelines checked.			
All required PPE checked and in use.			
All entrants are confined space trained.			
Attendant(s) trained in emergency procedures.			
Attendant(s) trained in rescue procedures.			
Outside rescue service will be used and they have been notified of this entry.			
Appropriate rescue equipment available and checked.			
Ventilation system in use and effective.			
All tests have been completed and indicate that entrance requirements have been met.			
Appropriate warning signs have been posted and unauthorized personnel have been excluded from the Confined Space and area.			

IF THE ANSWER TO ANY OF THE ABOVE QUESTIONS IS NO, ENTRY IS NOT PERMITTED

OTHER PERMITS ISSUED FOR WORK IN THE CONFINED SPACE:

OTHER HAZARD CONTROL PROCEDURES OR INSTRUCTIONS:

Equipment Calibration

Date:
Project Name: Field Technician:

Instrument Used		Calibration Information
Yes	No	
		PID: ☐ Manufacturer/Model No.:____________________ ☐ Serial No.:____________________ ☐ Calibration Gas: Type:________ Conc.:______ Lot No.:_____ ☐ Reference Gas Standard: ____________________ ☐ Span Setting:____________________
		PID: ☐ Manufacturer/Model No.:____________________ ☐ Serial No.:____________________ ☐ Calibration Gas: Type:________ Conc.:______ Lot No.:_____ ☐ Reference Gas Standard: ____________________ ☐ Span Setting:____________________
		Draeger Hand Pump: ☐ Leak Test Performed: ☐ Yes ☐ No
		FID: ☐ Manufacturer/Model No.:____________________ ☐ Serial No.:____________________ ☐ Calibration Gas: Type:________ Conc.:______ Lot No.:_____ ☐ Reference Gas Standard: ____________________ ☐ Span Setting:____________________
		Other Instrument: ☐ Manufacturer/Model No.:____________________ ☐ Serial No.:____________________ ☐ Calibration Information: _
		Other Instrument: ☐ Manufacturer/Model No.:____________________ ☐ Serial No.:____________________ ☐ Calibration Information: _

INTEGRATED SAMPLE COLLECTION FORM

Project #:__________________ Project Name:__________________

Work Shift: ☐ Day ☐ Night Date:_________ Begin Time:________End Time:_________

EMPLOYEE/JOB DATA

Employee Name:____ Gender: ☐ Male ☐ Female

Job Title/Activity:____

PPE/Controls:____

Operation Description:____

Other Employees Represented by Sampling:____

SAMPLING DATA

Sample Location ID:__________________ Distance from Work Face:__________________

Sample Type: ☐ Breathing Zone ☐ Work Area ☐ Other:__________________

Collection Media:_____________ Instrument:_________________ Serial No.:__________

Sampling/Analytical Method(s):____

Sample No.	Time On	Time Off	Time (minutes)*	Flow (ccpm)	Volume (liters)

ANALYTICAL/EXPOSURE DATA

Sample No.	Analyte	Time (minutes)*	Results (units)	8-hour TWA	PEG

Note: * Indicate whether unsampled portion of workday had no exposure or the same exposure as that of the time period sampled.

Chain-of-Custody ID#:______________________ Sample Shipment Date:_________________

CALIBRATION DATA

Calibration Instrument:____________________ Calibration Instrument Serial Number:______________

Date Pre-Calibration:____________________ Calibrator:____________________________________

Manifold Position: Sample #'s:		Manifold Position: Sample #'s:		Manifold Position: Sample #'s:		Manifold Position: Sample #'s:	
Run	Flow (ccpm)	Run	Flow (ccpm)	Run	Flow (ccpm)	Run	Flow (ccpm)
1		1		1		1	
2		2		2		2	
3		3		3		3	
Avg. Pre:		Avg. Pre:		Avg. Pre:		Avg. Pre:	

Date Post-Calibration:____________________ Calibrator:____________________________________

Manifold Position:		Manifold Position:		Manifold Position:		Manifold Position:	
Run	Flow (ccpm)	Run	Flow (ccpm)	Run	Flow (ccpm)	Run	Flow (ccpm)
1		1		1		1	
2		2		2		2	
3		3		3		3	
Avg. Post:		Avg. Post:		Avg. Post:		Avg. Post:	

Comments/Observations:

____

FIELD DATA

Wind Blowing From: ☐ N ☐ S ☐ W ☐ E ☐ Other:

Weather: ☐ Rain ☐ Drizzling ☐ Cloudy ☐ Clear ☐ Foggy ☐ Other:

Wind Speed: ☐ Still ☐ Some Wind ☐ Windy ☐ Other:

Primary Direction of Sample Location in Relation to Wind: ☐ Down Wind ☐ Up Wind ☐ Side or Cross Wind

DATA ENTRY AND REVIEW

Entry Date:________________________ HS Review & Date:________________________

Air Monitoring Log

Date:

Project Name: Field Technician:

Parameter		VOC	LEL	O_2			Sample Wind Dir.*	Comment
Concentration Units		ppm	%	%				
Time	Location							

* Monitoring conducted upwind (UW), downwind (DW), or side or crosswind (SW).

Comments:

	NOT APP.	NOT ACCEP.	ACCEP.
HEALTH AND SAFETY DOCUMENTATION			
Health & Safety Plan			
NWT's HS Policies and Procedures			
Tailgate Safety Meeting			
Emergency Phone Numbers			
Hospital Route Map			
Personnel Training Records			
Personnel Medical Records			
MSDSs			
Air Monitoring Logs			
Equipment Calibration Logs			
Confined Space Entry Permit			
Hot Work Permit			
Accident Forms			
Excavation Inspection			
Other:			
EMERGENCY EQUIPMENT			
First-Aid/CPR Provider(s)			
Communication System			
Fire Extinguishers			
Shower/Eyewash			
HOUSEKEEPING AND SANITATION			
Break Area Clean/Orderly			
General Housekeeping			
Walkways Clear			
Drinking Water/Disposable Cups			
Sanitary Facilities			
Adequate Illumination			
VEHICLE/EQUIPMENT OPERATIONS			
Record of Regular Inspection and Maintenance			
DOT Requirements Met			
Qualified Operators			
Back-up Alarms on Heavy Equipment			
Fire Extinguisher/First-Aid Kit			
Safety Equipment used (e.g., seat belts, parking brake)			
Inside of Vehicle Clean/Neat			
Windshields Clean			
SITE MONITORING			
Volatile Organics			
Semi Volatile Organics			
Inorganic Gases			
Dust			
Noise			
Radiation			
Illumination			
Heat Stress			

	NOT APP.	NOT ACCEP.	ACCEP.
SITE CONTROL			
Security Maintained			
Sign In/Out Log			
Clearly Marked Exclusion Zone			
Clearly Marked Contamination Reduction Zone			
Decontamination Procedures Established/Followed			
PERSONAL PROTECTIVE EQUIPMENT			
Hard Hats			
Safety Glasses with Side Shields			
Steel-Toed Boots			
Work Gloves			
Hearing Protection			
Traffic Vests			
Chemical Resistant Suit(s)			
Respiratory Protection			
Chemical Resistant Gloves/Boots			
Welding PPE			
Other:			
Other:			
ELECTRICAL			
Equipment UL Listed or FM Approved			
Grounding and Bonding			
GFCI is in Place			
Lockout/Tagout Procedures			
Overhead/Underground Utility Checklist			
Adequate Clearance for Overhead Lines			
Utility Markouts Completed			
Uncompromised Insulation			
Qualified Electricians			
HAND TOOLS			
Correct Tool Being Used for Job			
All Guards in Place			
Neat Storage, Safe Carrying			
Grounded 3-Prong Plugs			
Damaged Tools Repaired or Replaced			
LADDERS			
Regular Inspections			
Secured at Top and Bottom			
Side Rails Extended 3 Feet Above Landing			
Ladders Not Painted			
Step Ladders Fully Opened When in Use			
Safety Feet in Use			
Top of Ladder Not Used as Step			
OTHER			

Note: All "Not Acceptable" responses must have a completed line item in the Corrective Action Form on page 2.

Project #:
Inspection Date:
Inspector:

cc: HS Manager (original)
Project Manager
Project Supervisor

Job site postings, permits and forms, as listed below, are being provided to the SHSO for use on the job site only:

Postings:

- Safety & Health Protection on the Job Poster
- Notice - On-The-Job Injuries
- Access to Medical & Exposure Records
- Emergency Phone Numbers
- Workers Compensation Instructions

Human Resource Postings:

- NWT affirmative action program
- Handicapped Individuals and Veterans of the Vietnam Era
- Discrimination in Employment is Prohibited by Law
- Minimum Wage
- EDD Notice to Employees
- Notice: Employee Polygraph Protection Act
- Notice to All Employees Working on Federal Or Federally Financed Construction Projects
- Notice to Employees Working on Government Contracts
- Your Rights Under the Family and Medical Leave Act of 1993
- Payday Notice

Forms (Included):

- Tailgate Safety Meeting
- Safety Inspection Reports
- CSIR-1
- Instrument Calibration Log
- Integrated Air Sampling Log
- Real Time Monitoring Log
- Confined Space Entry Permit
- Underground and Overhead Utility Checklist

Phone: 510-443-7967 **Fax**: 510-443-0119

NWT Project Number	Date
Project Location	Shift

Description of Activities	
	____________________
	____________________
	____________________
	____________________

Hazards			
	☐ LO/TO	☐ Excavation	☐ Chemical
	☐ Radiological	☐ Heavy Equip	☐ Slips/Trips/Falls
	☐ Confined Space	☐ Heat/Cold Stress	☐ Open Water
	☐ Insect/Animal	☐ Other:____________________	

Level of Protection	Tasks	PPE Level	Ensemble Specifications
		EPA Level D	
		EPA Level C	Cartridge Type________ Outer Suit________ Inner Suit________ Outer Glove________ Inner Glove________ Other
		EPA Level B	

Note: EPA Level A is only allowed in emergency situations with the concurrence of a CIH

Daily Instructions	
	____________________
	____________________
	____________________
	____________________

Meeting Conducted By	Name	Signature

Attendees	Name	Signature

NWT PROJECT HEALTH AND SAFETY INSPECTION REPORT

DATE: TIME FROM: TO:	
PROJECT NAME:	PROJECT NUMBER:
PROJECT MANAGER:	PROJECT SUPERVISOR:
GENERAL PROJECT DESCRIPTION:	
SITE ACTIVITIES AT TIME OF INSPECTION:	

INTERVIEWED EMPLOYEE:	
SAFETY ISSUE:	
CORRECTIVE ACTION:	
ASSIGNED TO:	FOLLOW-UP DATE:
CORRECTION VERIFIED:	DATE:

INTERVIEWED EMPLOYEE:	
SAFETY ISSUE:	
CORRECTIVE ACTION:	
ASSIGNED TO:	FOLLOW-UP DATE:
CORRECTION VERIFIED:	DATE:

INSPECTION COMPLETED BY:	DATE:

HEALTH AND SAFETY REVIEW BY:	DATE:

HEALTH & SAFETY INSPECTION CHECKLIST
CORRECTIVE ACTIONS

NOT ACCEPTABLE FINDINGS	CORRECTIVE ACTION	ASSIGNED TO	DATE ASSIGNED	DATE COMPLETED	VERIFIED BY

APPENDIX C – JOB POSTINGS, PERMITS AND FORMS

NWT PROJECT HEALTH AND SAFETY INSPECTION REPORT

PAGE 3 OF 3

PHASE III AND IV HEALTH AND SAFETY PLAN

THE ABOVE IDENTIFIED PAGE IS NOT AVAILABLE.

EXTENSIVE RESEARCH WAS PERFORMED BY NAVFAC SOUTHWEST TO LOCATE THIS PAGE. THIS PAGE HAS BEEN INSERTED AS A PLACEHOLDER AND WILL BE REPLACED SHOULD THE MISSING ITEM BE LOCATED.

QUESTIONS MAY BE DIRECTED TO:

DIANE C. SILVA
RECORDS MANAGEMENT SPECIALIST
NAVAL FACILITIES ENGINEERING COMMAND SOUTHWEST
1220 PACIFIC HIGHWAY
SAN DIEGO, CA 92132

TELEPHONE: (619) 532-3676

TEST DATA (Oxygen, Flammability, and Toxic Contaminants)									
Time	**Percent Oxygen**	**Percent LEL**	**PID VOC**	**FID**	**PEG**	**PEG**	**PEG**	**INITIALS**	**COMMENTS**

AUTHORIZED ENTRANTS	AUTHORIZED ATTENDANT(S) RESCUE PERSONNEL

Diagram the Confined Space, indicate location of manways, ventilators, etc. Indicate the location of the air monitoring conducted.

Key

)(- Manway
0 - Ventilator
X - Monitoring Location

Other:

ACCEPTABLE ENTRY CONDITIONS:
1) Entry Permit Completed at start of Work
2) Oxygen between 20.0 - 23.5%
3) Combustible Gases below 10% LEL
4) PELs of Toxic Gases (List)
5) Other:

CONFINED SPACE SAFE FOR ENTRY:
Date/Time _____ / ______ Name of Entry Supervisor __________________ Signature ______________________________
On-site Entry Supervisor (If Different than Entry Supervisor):____
Entry Permit Expires Date/Time ______/______ **(No longer than 1 shift)**

CONFINED SPACE ENTRY PERMIT CANCELED
Date/Time _____/_____ Signature______________________________
Reason: ☐ Work Completed ☐ Authorized Conditions Not Met ☐ Incident ☐ Weather ☐ Other:

DESCRIBE PROBLEMS DURING OPERATIONS AND RESOLUTION(S):

RECLASSIFICATION TO NON-PERMIT REQUIRED CONFINED SPACE:

Date/Time of Reclassification: _______/_______ Entry Supervisor Signature:______________________________

HS Review of Permit Conducted By: ______________________________________ Date:____________

Underground/Overhead
Utility Checklist

Project Name/Number:______________________ **Date:**______________________

Location:____

This checklist must be completed for any intrusive subsurface work such as excavating or drilling. It records the fact that all underground and overhead structures and utilities in the work area have been identified and located. The Project Manager must request utility markouts before the start of field operations to allow the client and utility companies' time to complete them. If complete information is not available, a magnetometer survey must be performed to locate obstacles prior to excavating or drilling.

Procedure: A diagram of the project area depicting the proposed location of excavation or drilling sites must be attached to this SHASP. The diagram must clearly indicate the areas checked for underground structures/utilities and overhead power lines. The Project Manager, the Project Supervisor, and the client representative (if applicable) must sign this form and the diagram.

Checklist:

Type of Structure	Not Present	Present	Method of Markout
Electric power line			
Natural gas line			
Telephone line			
Water line			
Product line			
Steam line			
Sewer line			
Drain line			
Underground tank			
Overhead power line			
Overhead product line			
Septic tank/drain			

Client Representative
(if applicable) ______________________________________
(signature) (date)

Project Manager ______________________________________
(signature) (date)

Project Supervisor ______________________________________
(signature) (date

EXCAVATION/TRENCH NOTIFICATION WORKSHEET

Project Number:________________________ Project Name:________________________

Customer's Name:____

Specific Jobsite Location:____

Nearest Major Cross Street:____

City: ________________________ County:________________________

Name of Project Manager:____

Starting Date:________________________ Estimated Completion Date:________________________

High Voltage Lines in Proximity: NO: _____ YES: _____ How Near:________________________

Depth Range (ft.):__________ __________ Width Range (ft.):__________ __________ Length (ft.):__________
min max min max

Project Description:____

____

Anticipated Soil Condition: Hard Compact: __________ Unstable: __________ Running:__________

Ground Protection Method: Shoring: ________ Sloping: ________ Trench Shield: _____ Alternate:__________

ALL METHODS MUST MEET ACCEPTED ENGINEERING REQUIREMENTS. PLANS MUST BE KEPT ON SITE.

Describe Chemical Hazards in Work Area:____

____

Subcontractor's Name:____

Equipment to be Used:____

Design Engineer: ________________________ Project Supervisor:________________________

Phone: (   ) __________

==

Health & Safety Use Only

NWT Permit Number:______________ Date Issued:______________ Expires:______________

Issued By:________________________

CAL/OSHA Notification: Date: __________ By:________________________

District Office: ________________________ Contact:________________________

Department of Industrial Relations
Division of Occupational Safety & Health

ACTIVITY NOTIFICATION FORM FOR HOLDERS OF ANNUAL PERMITS
Scaffolding Falsework Trenches/Excavations

CCR 341. (f) requires holders of annual permits to provide notification to the DOSH office nearest the project prior to commencement of any work. This form is provided for you convenience to use for such notification.

This form may be faxed to the nearest DOSH office to comply with the above. Please do not mail duplicate notification to follow-up fax notification.

FAX DATA: Faxed to : ______________________ DOSH District Office on: ______________________
DOSH FAX NO.: ______________________ By: ______________________

Company Name: ______________________ Field Phone: ______________________
Annual Permit Number: ______________________ Office Phone: ______________________
Issuing Region: ______________________ Issuing District: ______________________
Specific Activity Location: ______________________ Number of Employees: ______________________
Nearest Major Cross Street: ______________________ Starting Date: ______________________
City: ______________________ Anticipated Completion Date: ______________________
County: ______________________ High Voltage Lines in Proximity? No ____ Yes ____

INSTRUCTIONS: The appropriate item(s) must be completed and signed by a person knowledgeable about the project for each activity covered by a permit. Please fill in or check off the blanks where appropriate.

Scaffolding: Height _____ Metal _____ Wood _____ Wood over 60 feet _____ Metal over 125 feet.
Metal > 125 feet or Wood > 60 feet requires design by a California Registered Civil Engineer & plans at the site [See CCR 1644(c)(7)]

Falsework/Vertical Shoring: Maximum Height _______ Maximum Span _______ Material ______________
Description: ______________________

Trenches/Excavations: Depth Range (Min/Max)* ______ Width Range (Min/Max)* ______ Total Length ________
Ground Protection Method: Shoring _____ Sloping _____ Trench Shield _____ Professional Engineer ____________
Underground Services Alert (USA) Number _(NORTH 1-800-842-2444/SOUTH 1-800-422-4133)
Soil Analysis to be done? Yes _____ No _____ If No, you must slope 1.5 to 1.
Competent Person: The holder of an Annual Permit who is notifying the District of the commencement of a Trench and/or Excavation project shall designate a competent person in accordance with the requirements of CCR Section 1504, 1541, and 1541.1.

Description: ______________________
____

Ground protection methods for excavations deeper than 20 feet must be designed by a Registered Professional Engineer. See CCR 1541.1, Appendix F.

I hereby certify that to the best of my knowledge, the above information and assertions are true and correct and that I/the applicant have knowledge of and will comply with the foregoing.

Signature: ______________________
Title: ______________________ Date: ______________________

DOSH DIRECTORY

DISTRICT	ADDRESS	TEL. NO.	FAX NO.
Anaheim	2100 E. Katella Ave., Suite 140, Anaheim 92806	(714)939-0145	(714)939-8518
Bakersfield	4800 Stockdale Hwy, Suite 212, Bakersfield 93309	(805)395-1718	(805)395-2841
Concord	1465 Enea Cir., Bldg E., Suite 900, Concord 94520	(510)676-5333	(510)676-0227
Covina	1123 So. Parkview, Suite 100, Covina 91724	(818)966-1166	(818)965-7041
Fresno	2550 Mariposa St., Rm. 4000, Fresno 93721	(209)445-5302	(209)445-5786
Los Angeles	3550 W. 6th St., Rm. 431, Los Angeles 90020	(213)736-3041	(213)736-4526
Oakland	7700 Edgewater Dr., Suite 125, Oakland 94621	(510)568-8602	(510)568-7092
Pico Rivera	9455 E. Slauson Ave., Pico Rivera 90660	(310)949-7827	(310)949-9880
Redding	381 Hemsted, Redding 96002	(916)224-4743	(916)224-4747
Sacramento	2424 Arden Way, Suite 165, Sacramento 95825	(916)263-2800	(916)263-2798
San Bernardino	242 E. Airport Dr., Suite 103, San Bernardino 92408	(909)383-4321	(909)383-6789
San Diego	7807 Convoy Ct., Suite 140, San Diego 92111	(619)637-5534	(619)279-4658
San Francisco	1390 Market St., Suite 718, San Francisco 94102	(415)557-8640	(415) 557-3020
San jose	2010 No. First St., Suite 401, San Jose 95131	(408)452-7288	(408)452-7287
San Mateo	1900 So. Norfolk St., Suite 215, San Mateo 94403	(415)573-3812	(415)573-3817
Santa Rosa	1221 Farmers Lane, Suite 300, Santa Rosa 95405	(707)576-2388	(707)576-2598
Torrance/Long Beach/South Bay	680 Knox St., Suite 100, Torrance 90502	(310)516-3734	(310)516-4253
Van Nuys	6150 Van Nuys Blvd., Suite 405, Van Nuys 91401	(818)901-5403	(818)901-5578
Ventura	1655 Mesa Verde, Rm. 150, Ventura 93003	(805)654-4581	(805)654-4852

EXCAVATION/TRENCH DAILY INSPECTION

Division/Location: ______________________ Job No. ______________________

Customer: ______________________ Address: ______________________

Location of Job: ______________________ Identity of Excavation: ______________________

Describe Hazards of Excavation (Chemical, Physical, etc.)______________________

____

____

Cal/OSHA Notification Form for Holders of Annual Permits Submitted: ☐ Yes (Date: _____) ☐ No (No Entry)

CHECKLIST	Yes	Does Not Apply
Location of underground utilities identified and marked.		
Overhead utilities at least 20 feet from equipment.		
Perimeter free from fissures/cracks		
No indication of weakening of excavation/trench walls. No visible signs of crumbling/material movement.		
Shoring is appropriate for soil classification. [Soil Class:]		
Sloping is appropriate for soil classification. [Soil Class: ; Slope:]		
Encumbrances (trees, boulders, etc.) which create a hazard potential have been relocated or removed.		
Water accumulation controlled or eliminated.		
Spoil is at least 2 feet away from work edge (4-6 feet is strongly recommended).		
Barricades/barriers in place around excavation to prevent unauthorized entry.		
All ignition sources have been isolated.		
All respiratory equipment and alarms checked and functional.		
Non essential equipment/material is a sufficient distance to avoid weakening excavation/trench walls.		
Materials stored at edge of excavation are protected from rolling/falling into excavation.		
All required PPE checked and in use.		
Crew trained in excavation/trench safety.		
Crew trained in the use, care, and limitations of respirators and PPE.		
Crew trained in emergency procedures.		
Entry/egress available every lateral 25 feet from work area.		
Appropriate rescue equipment available and checked.		
Approved walkways with handrails provided for crossing trench.		
Crew can achieve a gas-tight seal with respirator.		
Crew are not wearing contact lens.		
All tests have been completed indicate that entrance requirements have been met.		
Warning signs have been posted and unauthorized personnel have been excluded from the work area.		

PERSONAL PROTECTIVE EQUIPMENT (check all that apply)

EYE/FACE
☐ Chemical Goggles
☐ Face Shield
☐ Safety Glasses w/ side shields

EXTREMITIES
☐ Hard Hat
☐ Glove (Material _____)
☐ Boot (Material _____)
☐ Booties

BODY
__ Level
☐ Suit (Material ____)

RESPIRATORY
☐ SCBA
☐ Air Line
☐ Egress System
☐ APR (Cartridge _____)
☐ PAPR (Cartridge ____)

OTHER
☐ Hearing Protection
☐ Buddy System
☐ Cooling Vest

RESCUE EQUIPMENT
☐ First Aid Kit
☐ SCBA (1 pair)
☐ Other (Specify)
____

COMMUNICATION
☐ Radios
☐ Air Horn Signals
☐ Hand Signals
☐ Other (Specify)
____
____

OTHER PERMITS
____
____

IF THE ANSWER TO ANY OF THE ABOVE QUESTIONS IS NO, EXCAVATION AND/OR ENTRY IS NOT PERMITTED

Other Hazard Control Procedures or Instructions:

Time	Percent Oxygen	Percent LEL	PID VOC	FID	PEG	PEG	PEG	INITIALS	COMMENTS

AUTHORIZED CREW	AUTHORIZED COMPETENT PERSON(S)

Diagram the Excavation. Indicate location of ramps/ladders, heavy equipment, spoils, etc. Indicate the location of the air monitoring conducted.

Key

) (- Ramp/Ladder
☐ - Heavy Equipment
0 - Spoil
X - Monitoring Location
Other:

ACCEPTABLE ENTRY CONDITIONS:
1) Daily Inspection Completed at Start of Work
2) Oxygen between 20.0 - 23.5%
3) Combustible Gases below 10% LEL
4) Permissible Levels of Toxic Gases (List)

_____ _____ _____ _____ _____
_____ _____ _____ _____ _____

5) Other:

EXCAVATION SAFE FOR ENTRY:
Date/Time _____ / _____ Name of Competent Person Performing Inspection _____________________
Signature ____________________ On-site Competent Person (If Different than Inspector): _____________________

EXCAVATION ENTRY PERMIT CANCELED
Date/Time _____/_____ Signature_____________________
Reason: ☐ Work Completed ☐ Authorized Conditions Not Met ☐ Incident ☐ Weather ☐ Other:__________

DESCRIBE PROBLEMS DURING OPERATIONS AND RESOLUTION(S): _____________________

APPENDIX D

ACTIVITY HAZARD ANALYSIS

AHAs INCLUDED:

General Physical Hazards
Materials Handling
Motor Vehicle Operations/Traffic
Construction/Heavy Equipment
Concrete/Asphalt Cutting
Excavation/Trenching
Drilling/Crane Operations
Pressure Washing Operations
Noise
Heat Stress
Cold Stress
Confined Space Entry
Underground/Overhead Utilities
Hazardous Energy and Hazardous Material Sources
Welding, Cutting, and Other Hot Work
Poisonous Plants
Poisonous Snakes and Animals
Insect Hazards
Radiological Hazards
Extended Work Shifts/Multiple Crews
Adverse Weather
Sanitation and Housekeeping
Illumination
Water Safety

General Physical Hazards	Potential Hazards	Control Measures
Equipment to be Used: - Hard Hat - Safety glasses with side shields - Steel-toe Boots - Work Gloves Inspection Requirements - Daily during TSM. Training Requirements - Project-specific training - Proper use and operation of hand tools - First Aid/CPR (American Red Cross)	- Slip, trip, fall	- Site employees will be required to wear hard hat, safety glasses with side shields, work gloves, and steel-toe boots beyond the Main Office Complex and other field offices. - Whenever possible, avoid routing cords, ropes, and hoses across walking pathways. - Flag or cover inconspicuous holes to protect against falls.
	- Poor housekeeping	- Work areas will be kept clean and orderly. - Garbage and trash will be disposed of daily in approved refuse containers. - Tools and accessories will be properly maintained and stored. - Work areas and floors will be kept free of dirt, grease, and slippery materials. - Materials shall be stored to allow clear access to aisles, pathways, and travel routes. - Field vehicles will be kept clean and orderly (i.e., cab, truck beds, tool boxes, trunk, camper shells).
	- Manual lifting	- Size up the job. Think it through- - Lift with your legs, not your back. Use mechanical equipment whenever possible. - Get assistance when manually lifting awkwardly-sized items or those items over 60 pounds.
	- Minor cuts and bruises	- Workers shall wear appropriate field attire (i.e., no tank tops, shorts, open-toe shoes, jewelry). - Tools not functioning properly shall be removed from service immediately and tagged for repair. - Workers shall wear cotton or leather work gloves when handling equipment. - Have at least two NWT persons on site trained in First Aid/CPR. - All crew personnel on site shall use the buddy system (working in pairs or teams).
	- Chemical contact	- Material Safety Data Sheets (MSDSs) shall be obtained for chemicals brought on site. - MSDSs shall be reviewed with project personnel before using the chemical material.

Materials Handling	Potential Hazards	Control Measures
Equipment to be Used: - Flammable storage containers/cabinets - Drum dolly - Forklift Inspection Requirements: - Daily Training Requirements: - HazWOPER - Safe lifting practices	- Back injury	- Size up the job. Use mechanical equipment to lift and move items, when necessary. Lift with your legs, not your back. - Do not lift awkwardly sized items and those items over 60 pounds. - Get assistance when necessary. - If a worker loses control of item, STAND CLEAR and DO NOT try to prevent its fall. - Assure path is clear while transporting items manually (housekeeping).
	- Pinch points	- Keep hands and feet clear of moving/suspended materials and equipment. - Wear steel toe/shank safety shoes/boots.
	- Drum Spillage/Puncture	- Use a drum dolly or forklift to move drums. - Label all drums as to their contents. - Do not move bulging or leaking drums.
	- Slip, trip, or fall	- Assure path is clear while transporting items manually (housekeeping). - Do not stand on drums, boxes, or bags of stored materials. - Get assistance when necessary. - Use mechanical equipment to lift and move items when necessary.
	- Cuts, bruises	- Use cotton or leather work gloves for materials handling.
	- Splashes	- Wear eye protection as needed (i.e., safety glasses/goggles, and face shield)
	- Chemical burns	- Wear appropriate protective clothing and chemical resistant gloves as specified.

Motor Vehicle Operations/Traffic	Potential Hazards	Control Measures
<u>Equipment to be Used</u>: - Passenger vehicles - Traffic cones - Orange vests - Barricades - Flag person(s) <u>Inspection Requirements</u>: - Continuous - Annual check of employee motor vehicle records - Monthly Vehicle Inspection <u>Training Requirements</u>: - Driver's license	- Vehicle accidents - Personal injury	- Place physical (i.e., barricades, fencing) around work areas regularly occupied by pedestrians. - If working adjacent to roadways, have workers wear fluorescent orange vests. - Use warning signs or lights to alert oncoming traffic. - Assign flag person(s) if necessary to direct local traffic. - Set up temporary parking locations outside the immediate work area. - Motor vehicle operators shall obey all posted traffic signs, signals, and speed limits. - Wear seat belts when vehicles are in motion. - Contractor employees are not authorized to operate NWT motor vehicles without authorization form the Project Manager. - Passenger vehicles and light trucks yield to heavy equipment.

Construction/Heavy Equipment	Potential Hazards	Control Measures
<u>Equipment to be Used</u>: (Check all that apply) ☐ Forklift ☒ Crane ☒ Drill rig ☐ Front-end loader ☒ Backhoe ☒ Trackhoe ☐ Grader ☐ Dozer ☒ Compactor ☐ Excavator ☐ Other: ____________ <u>Inspection Requirements</u>: - Daily by operator - Check brakes and all required safety devices - Monthly maintenance <u>Training Requirements</u>: - Qualified equipment operators - Drill Rig Safety	- Personal injury - Property damage - Equipment damage	- Only authorized personnel who are qualified and trained shall operate heavy equipment. - Moving heavy equipment must have properly functioning back-up alarms. - Spotters on the ground will assist operators in manipulating vehicles and equipment into tight or confined spaces. - Operators shall maintain a constant awareness of personnel and equipment in the work areas. - Machinery or equipment shall not run unattended unless secured by the operator. No equipment shall be left running beyond a shift's end. - Blade, bucket, etc. will be fully lowered or blocked when not in use or being repaired. - Rollover protection shall be used when conditions call for such use. - No overhead work shall be performed when, as a result of that work, the possibility of a falling object striking any person exists. - When any machinery or equipment is found to be unsafe as a deficiency is noted, the equipment shall immediately be taken out of service and its use prohibited until unsafe conditions have been corrected. - Machinery or equipment shall not be operated in a manner that will endanger persons or property nor shall the safe operating speeds or loads be exceeded. - Getting off or on any equipment while it is in motion is prohibited. - Seats should be provided for each occupant of the equipment. - Safety belts shall be used by the operator while equipment is in use. - Equipment operated on the highway shall be equipped with headlights, taillights, brake lights, back-up lights, and turn signals visible from the front and rear. - All mobile equipment and the areas in which they are operated shall be adequately illuminated. - Mechanized equipment shall be shut down prior to and during fueling operations. - Whenever equipment is parked, the parking brake shall be set. - The rated capacity on lift trucks and cranes shall be posted on the vehicle so as to be clearly visible. - The load capacity ratings shall not be exceeded at any time. - No guard, safety appliance, or device shall be tampered with. - Heavy equipment operators shall inform their Supervisor(s) of any prescribed medication that they are taking that would impair their judgment. - When conditions are such that lightning is occurring, all equipment operations shall cease. Operations shall not start up again for 30 minutes after last occurrence. - Personnel are not allowed to work off of machinery or to use them as ladders. - Never walk or work directly in back of or to the side of heavy equipment without the operator's knowledge.

Concrete/Asphalt Sawing and Removal	Potential Hazards	Control Measures
Equipment to be Used: - Walk behind saw cutter - Barricades/barriers Inspection Requirements: - Daily prior to start-up Training Requirements: - Experienced Operator - General physical hazards awareness	- Projectiles	- Use of protective headgear, eye and face, and foot protection will be mandatory. - Work area will be swept to remove loose debris that can be caught by blade. - Only experience personnel will be allowed to operate the cutter. - All cutting shall be performed using wet cutting methods. - Cuts shall be made in 4 inch increments to avoid overloading the or binding the blade. - The equipment operator will position his body behind the bulk of the machine during cutting operations. - All personnel not invloved in the operation will be kept a minimum of 100 feet from the cutter.
	- Slip, trip, fall	- All work shall be performed from a stable ground position. - All cutting liquids will be swept/squeegeed on a regular basis to prevent pooling in the work area.
	- Underground interference	- Identify work area to be cleared. - Look at underground drawings/trenching. - Receive approval for cutting or relocate activities. - Complete the Underground/Overhead Utilities Checklist.
	- Noise	- Refer to AHA specific to noise hazards.
	- Rotating blades	- Operator will always be at the controls when the unit is running. - Maintenance may only be performed when the equipment is shut off. - Operator will not wear loose or baggy clothing or jewelry that could be caught in the machine. - The blades should be allowed to cool prior to performing any maintenance.

Excavation/Trenching	Potential Hazards	Control Measures
Equipment to be Used: - Backhoe/excavator - Barricades/barriers Inspection Requirements: - Daily prior to start-up - Prior to each entry throughout excavation activities Training Requirements: - Excavation Safety Training - NWT Policy Excavation and Trenching	- Cave-Ins	- Entry into any excavation shall be allowed only after consultation with the HS Manager. Regulatory notice shall be given prior to excavation entry > 5 feet deep. - Excavations >5 feet deep shall not be entered unless sloped, stepped, or shored. - Design of any support system shall be reviewed and approved by a professional engineer. - A competent person will be present in the field and shall perform/document daily inspections on all excavations > 4 feet deep. - Nonessential equipment will be staged at least 6 feet outside the immediate work area. - Material used for piling, bracing, shoring, and under-pinning shall be in good serviceable condition. - Foundations adjacent to where the excavation is to be made below foundation depth shall be supported by shoring, bracing, or underpinning.
	- Slip, trip, fall	- All work shall be performed from a stable ground position. - For entry into excavations 4 feet or greater, a means of entry/egress shall be provided every lateral 25 feet. - Spoil material shall be placed at least 2 feet from the edge of the excavation to avoid load strain on the sidewalls. - The excavation shall be guarded on all sides, if traffic (pedestrian/vehicle) may be in area. - Excavations shall be backfilled as soon as practical after work is completed and all associated equipment removed. - Ladders placed into excavation shall extend 3 feet above the top of the excavation. - Excavation/trench shall be secured properly and clearly visible to prevent unauthorized personnel from entering during non-working hours.
	- Underground utilities	- Identify work area to be cleared. - Look at underground drawings/trenching. - Receive approval for excavation or relocate activities. - Complete the Underground/Overhead Utilities Checklist.
	- Hazardous Atmospheres	- Excavations > 4 feet which have potential for hazardous atmospheres, and personnel may enter, shall have air monitoring performed to determine potential risk.

Drilling/Crane Operations	Potential Hazards	Control Measures
Equipment to be Used: - Crane - Drill Rig Inspection Requirements: - Daily inspection by the operator - Check brakes and all required safety devices - Load capacity rating of crane - Monthly Equipment Inspection Training Requirements: - Qualified crane operator(s) - NWT Mobile Crane Inspection	- Personnel injury - Property damage - Equipment damage	- Use qualified and trained crane operators. - Ground personnel shall not be allowed to work under suspended loads. - The operator shall not exceed the load capacity rating for the crane. - The load capacity shall be posted and clearly visible on the crane. - The crane jacks must be placed on firm ground before picking up a load. - Loads shall be lifted to the minimum height necessary to accomplish the task. - The load shall be well secured and balanced in the sling or hook before being lifted more than a few feet. - Crane operators shall inform their Supervisor(s) of any prescribed medication that they are taking that would impair their judgment. - Personnel shall not be lifted with cranes unless designed specifically for that purpose. - Drill rigs shall have a minimum 20 feet clearance from underground utilities. - The hoist rope or cable shall not be wrapped around the load. - Cranes, derricks, drill rigs, booms or similar equipment shall have a minimum 20 feet clearance from overhead electrical power lines. - Loads shall never be carried over personnel. - The rated capacity on lift trucks and cranes shall be posted on the vehicle so as to be clearly visible. - The load capacity ratings shall not be exceeded at any time. - Drill rig shall only be moved with the derrick lowered. - The operator and NWT Representative shall pre-inspect/assess for safe access to the given worksite. - The operator and crew shall wear required PPE at all time's when drill rig/crane is in operation and for in exclusion zone. - The operator shall operate/maintain drill rig systems (ie. lifting lines, drilling tools, air, downhole or casing hammer, mud etc...) in a safe manner. - Maintain good housekeeping in rig vicinity to prevent slip, trip, fall hazards. - Be aware of possible thunderstorm activity, shut down and disperse from rig/mast area if thunderstorm in near vicinity.

Pressure Washing Operations	Potential Hazards	Control Measures
Equipment to be Used: - Hot/Cold Water Pressure Washer Wand and Tips Inspection Requirements: - Daily prior to start-up - Weekly by H&S Training Requirements: - NWT Policy High Pressure Washer	- Out of control wand	- Requirements of NWT H&S Procedure 23 – High Pressure Washer shall be strictly enforced. - No taping or blocking of wand control for any reason. - Work area will be barricaded and shielded in such a way as to prevent over spray.
	- Slip, trip, fall	- All work shall be performed from a stable ground position. - Crew will use skid resistant boots at all times - All standing water shall be removed a frequent intervals. - Work areas shall be secured properly and barricades clearly visible to prevent unauthorized personnel from entering during operations.
	- Injection hazards	- Use of foot/leg guards is mandatory - Wand shall have a positive cutoff lock on handle to prevent accidental activation. - Head, face, eye, and hand protection required per procedure and SHASP PPE requirements. - Use of fan type tips is preferred to use of shotgun tips.
	- Noise	- Use of hearing protection for all members of cleaning crew is required

Noise	Potential Hazards	Control Measures
<u>Equipment to be Used</u>: - Ear plugs - Ear muffs - Ear canal caps <u>Inspection Requirements</u>: - Start-up <u>Training Requirements</u>: - Use of sound level meter - Annual hearing conservation - NWT Policy Hearing Conservation	- Temporary threshold shift. - Permanent threshold shift.	- Review elements of Hearing Conservation Program. - Employees shall be informed of high noise areas where hearing protection is required and these areas marked. - Provide annual audiograms for employees. - Conduct noise surveys on activities in question. - Provide hearing protection on site. - Require use of hearing protection when noise levels are at exceed 85 dBA. - Exposure to impulse or impact noise should not exceed 140 dBA peak sound level. - Use engineering controls (i.e., guards, mufflers, distance) to reduce worker exposure.

Heat Stress	Potential Hazards	Control Measures
<u>Equipment to be Used</u>: - Cooling vests - Core control suits - Oral thermometers - Watch <u>Inspection Requirements</u>: - At each break <u>Training Requirements</u>: - Heat stress Prevention, Symptoms, Treatment - NWT Policy Working in Hot Environments	- Heat rash	- Keep the skin clean and dry. - Change perspiration-soaked clothing, as necessary. - Bathe at end of work shift or day. - Apply powder to affected areas. - Wear clean/dry undergarments.
	- Heat cramps	- Drink plenty of cool fluids even when not thirsty. - Provide cool fluids for work crews. - Move victim to shaded, cool area. - Inform Supervisor of cramps even if occurring off the job.
	- Heat exhaustion	- Physiological worker monitoring as needed (i.e., heart rate, oral temperature). - Set up work/rest periods. - Use the buddy system. - Allow workers time to acclimate. - Have ice packs available for use on breaks.
	- Heat stroke	- Evaluate possibility of night work. - Perform physiological monitoring on workers during breaks. - Wear body cooling devices.

Cold Stress	Potential Hazards	Control Measures
Equipment to be Used: - Insulated clothing Inspection Requirements: - On each break Training Requirements: - Cold stress Prevention, Symptoms, Treatment - NWT Policy Cold Stress	- Frost nip - Frostbite - Hypothermia	- Wear insulating clothing when temperatures drop below 40EF. - Drink warm beverages on breaks. Refrain from drinking caffeinated beverages. - Remove wet clothing promptly. - Take breaks in warm areas. - Reduce work periods as necessary. - Layer work clothing.

Confined Space Entry	Potential Hazards	Control Measures
Equipment to be Used: - Portable lighting (Intrinsically Safe) - Air monitoring instruments - Extrication device (tripod/winch, etc.) - Body harness/lanyard/lifeline - Air horn, Radios - Stokes basket Inspection Requirements: - Prior to entry - Continuous throughout activities - Each shift - Entry permit, PRCS Training Requirements: - Confined Space (entrant, attendant, supervisor) - FA/CPR (American Red Cross) - Bloodborne Pathogen, as needed - NWT Policy Confined Spaces	- Chemical exposure	- Use PPE and respiratory equipment. - Conduct air monitoring prior to and during confined space activities. - Establish action levels based on anticipated hazards.
	- Poor ventilation	- Use a blower or negative air machine to circulate or introduce air into confined space.
	- Asphyxiation	- Work only in areas that contain 20-23.5% oxygen (regardless of level of protection).
	- Worker down	- Use the buddy system. - Have two standby personnel. - Set up extrication means prior to start of activities. - Set up means of communication among confined space entry team. - Assigned rescue personnel must have rescue training. - All moving parts and machinery in confined space will be lockout/tagout or isolated. - Rescue personnel shall only attempt a rescue in SCBAs.
	- Explosion	- Use explosion proof lighting/equipment in potentially flammable atmospheres. - Do not work in confined space where LEL is 10 percent or greater.

Underground/Overhead Utilities	Potential Hazards	Control Measures
Equipment to be Used: - Magnetometer (as needed) - Nonconducting probe - Hand shovels Inspection Requirements: - Utilities inspection - Excavation Permit (as needed) - Underground/overhead utility checklist Training Requirements: - Use of magnetometer (as needed)	- Electrocution - Explosion	- Before beginning intrusive activities, the Project Manager shall ensure that underground utilities (i.e., electrical, phone, gas, water lines) are located. - Review blueprints and as-built drawings of facility layout. - Field work shall maintain a 20 feet clearance whenever possible. - When underground utilities are exposed, they shall be protected to avoid damage. - All uncovered lines shall be identified before work proceeds. - Personnel on the ground will assist in probing the soils to find the exact location of the lines and will use hand shovels to carefully remove the soil adjacent to the lines. - Identify work area to be cleared. - Look at underground drawings. - Contact owner of work area. - Receive approval for excavation/trenching or relocate activities - Complete the Underground/Overhead Utilities Checklist. - Use surface geophysical methods to locate underground lines if blueprints or as-built drawings are deemed insufficient to accurately locate underground lines.

Hazardous Energy and Hazardous Material Sources	Potential Hazards	Control Measures
Equipment to be Used: - Ground Fault Circuit Interrupter (GFCI) - Double-insulated tools - Generator Inspection Requirements: - Prior to start-up Training Requirements: - Electrical safety awareness - NWT Policy Use of Portable Electrical Equipment - NWT Policy Hot Work	- Electrocution - Electrical burns - Fire	- Maintain a minimum distance of 20 feet between electrical lines and any part of equipment. - Portable electrical tools and equipment will be double-insulted. - Portable fire extinguishers rated 10A:20BC will be kept on site. - Workers will not handle electrical equipment or wires if their hands are wet or they are standing on wet surfaces. - Electrical cords shall be pulled from the outlet by the plug, not the electrical cord. - Identify the location of underground/overhead electrical lines in the work area, as appropriate. - Power tools shall be tagged and removed from service when not functioning properly. - Lockout/tagout procedures shall be implemented when employees need to perform repair or maintenance on electrical equipment where the unexpected energization, or start-up of stored energy could cause injury. - Worn or frayed extension cords shall be replaced. - All electrical wiring and equipment shall be a type listed by Underwriters Laboratories or another recognized listing agent for the specific application. - Before work begins, the Project Manager shall ensure by inquiry, observation, or instruments that any part of an electric power circuit will not bring any person, tool, or machine into contact with it. - Extension cords shall not be fastened with staples, hung from nails, or suspended by bare wire.

Welding, Cutting and Other Hot Work	Potential Hazards	Control Measures
Equipment to be Used: - Welder - Cutter - Gas cylinders (acetylene and oxygen) Inspection Requirements: - Prior to each use check equipment Training Requirements: - Qualified welder - Hot Work Permit - NWT Policy Hot Work	- Welding flash - Welding burns - Fire	- Cutting, welding, or other operations that produce excessive heat, open sparks, or flames shall not be permitted within 50 feet of a potential liquid fuel source. - One 10A:20BC multipurpose dry chemical fire extinguisher shall be readily available in the hot works area. - Complete a Hot Work Permit prior to initiation of hot works. - The area shall be monitored with a combustible gas meter to ensure <10% LEL. Work will not be permitted in atmospheres >10% LEL. - The worker shall be protected from sparks or flame by wearing leather guards (Tyvek is not protective against heat sources). - Welders shall wear welding goggles or hood. - Complete a Hot Work Permit for each shift and when conditions change. - Compressed gas cylinders shall be secure in an upright position. - Gas regulators shall be in proper working order. - Cylinders shall be marked or stenciled to identify the type of gas in the cylinder. - Oil and oily rags shall be kept away from oxygen equipment. - Cylinder valves shall be closed when work is finished and when cylinders are empty or moved. - Objects to be welded, cut, or heated shall be moved to a safe location when possible. - Remove all potential fire hazards in the vicinity. - Review possibility of chemical coating on item(s) to be welded, cut, or heated; provide appropriate respirators protection, if needed, to operator. - Acetylene regulators shall not be adjusted to permit a discharge >15 psig. - Fuel/oxygen combination used for cutting, welding, or heating shall have reverse-flow check valves between torch and regulator.

Poisonous Plants	Potential Hazards	Control Measures
<u>Equipment to be Used</u>: - Topical ointment - Clothing for barrier <u>Inspection Requirements</u>: - Daily <u>Training Requirements</u>: - Identification of poisonous plants	- Dermatitis - Allergic Reaction	- Post areas that have been identified with poisonous plants. - Avoid contact with these plants to the extent possible. - Wear clothing or coveralls with long sleeves. - Promptly wash clothing that has contacted poisonous plants. - Wash affected areas immediately with soap and water. - Apply ointment to affected areas. - Inform HS and Project Manager if hypersensitivity allergic reactions to a certain plant is known.

Poisonous Snakes and Animals	Potential Hazards	Control Measures
Equipment to be Used: - 9-1-1 Inspection Requirements: - Daily - Prior to entry - During work activities Training Requirements: - Identification of poisonous snakes/animals.	- Rabies - Bites - Allergic Reaction	- Keep work areas clear of vegetation and small brush. - Avoid placing hands or feet into obscure areas (i.e., beneath rocks, well pads, brush piles). - Wear rubber or PVC boots into vegetated areas where poisonous snakes or animals inhabit. - Use the buddy system. - Postpone work in areas where poisonous snakes or animals are nested. - Inspect protected areas before entering. - Inform HS and Project Manager if allergic to bites, and carry emergency kit as required.

Insect Hazards	Potential Hazards	Control Measures
<u>Equipment to be Used</u>: – Insect repellant <u>Inspection Requirements</u>: – Daily – Prior to entry – During work activities <u>Training Requirements</u>: – General awareness	– Ticks	– Wear light colored clothing (can see ticks better). – Mow vegetated and small brush areas. – Wear insect repellant. – Wear long sleeves and long pants. – Visually check oneself promptly and frequently after exiting the work area.
	– Bees, wasps, ants	– Identify infested areas to the Site Supervisor. – Workers who are allergic or capable of allergic reactions to bee, wasp, or ant stings or bites shall notify their Supervisor(s). – Evaluate need for sensitive workers to have prescribed antibiotic or medicine to combat onset of symptoms.

Radiological Hazards	Potential Hazards	Control Measures
Equipment to be Used: - Moisture/Density Gauge - Radiation Dosimeter Inspection Requirements: - General work areas. Training Requirements: - Moisture/Density Gauge user course. - HazComm: Radiation	- Radiation exposure. - Accidental release - Loss of radiation	- Operators of moisture/density gauges must be authorized by the Radiation Safety Officer. - Operators will wear their assigned radiation dosimeter while working with, carrying, and/or transporting a gauge. - ALARA (as low as reasonably achievable) principle to govern use of gauges. - Operators are to maintain maximum allowable distance at all times. - Unauthorized users will maintain a distance of 5 feet when gauge is outside of its case. - Maintain visual contact with gauge while in the field to prevent equipment from running over it. - Gauge is to be secured and locked at all times while not in the field.

Extended Work Shifts/Multiple Crews	Potential Hazards	Control Measures
<u>Equipment to be Used:</u> - Multiple Crews - Portable lights <u>Inspection Requirements:</u> - Employee fatigue - Availability of work space <u>Training Requirements:</u> - General safety awareness	- Fatigue - Reduced productivity. - Increased incident potential. - Increased hazard exposure potential. - Inattention due to familiarity/relaxing of precautions.	- No employee or contractor is authorized to work when they are overly fatigued. - If driving a motor vehicle is part of their assignment, then workers will not work more than 14 hours in a 24 hour period. - Heavy equipment will not be operated by one individual for more than 10 hours in any 24 hour period without a minimum of 8 hours off duty. - Employees experiencing negative effects of extended work shifts shall be instructed to rest off duty for a sufficient time period to eliminate the negative effects. - Operators which may extend shifts beyond 10 hours per day, six days a week or which will have multiple shifts operating shall be reviewed by the Site HS Officer.

Adverse Weather	Potential Hazards	Control Measures
<u>Equipment to be Used</u>: - Radios - Shelter <u>Inspection Requirements</u>: - Throughout work activities <u>Training Requirements</u>: - General awareness - FA/CPR (American Red Cross)	- Lightening Strikes	- Whenever possible, halt activities and take cover. - If outdoors, stay low to the ground, but limit the body surface area that is in contact with the ground (i.e., kneeling on one knee is better than laying on the ground). - Seek shelter in a building if possible. - Stay away from windows - If available, crouch under a group of trees instead of one single tree. - Keep 6 feet away from tree trunk if seeking shelter beneath tree(s). - If in a group, keep 6 feet of distance between people. - Suspend drill rig/crane operations if thunderstorm/lightning is in immediate vicinity.
	- Thunderstorms - Tornadoes	- Listen to the radio or TV announcements for pending weather information. - Cease field activities during thunderstorm or tornado warnings, as directed by the Project Manager. - Seek shelter. Do not try to outrun a tornado. - Do not stand near windows or door glass.
	- Earthquakes	- Seek immediate shelter (e.g., door jambs, desks, etc). - Do not stand near windows or door glass.

Sanitation and Housekeeping	Potential Hazards	Control Measures
Equipment to be Used: - Trash containers - Hand tools Inspection Requirements: - Daily Training Requirements: - General awareness	- Slip, trip, fall	- Personnel will clean-up the work site daily and dispose of trash. - Refuse containers or bins will be readily available on site. - Provide adequate storage for tools and equipment. - Provide adequate lighting in all work areas. - Provide adequate ventilation in all work areas. - Work areas and floors shall be kept clear of debris. - Materials shall not be stacked higher than 6 feet. - Provide stools, ladder where workers need to access elevated storage areas. - Protruding nails in scrap boards, planks, and lumber shall be removed, hammered in, or bent over flush with the wood. - Weeds and grass shall be kept down. - Flammable materials shall be placed in approved flammable storage containers.

Illumination	Potential Hazards	Control Measures
Equipment to be Used: - Portable lights/light towers Inspection Requirements: - General HazComm Training Requirements: - General safety awareness	- Eye strain/fatigue. - Increased injury/ incident potential due to lowered visual acuity.	- Minimum of 5 foot-candles required.

APPENDIX D – ACTIVITY HAZARD ANALYSIS

WATER SAFETY

PHASE III AND IV HEALTH AND SAFETY PLAN

THE ABOVE IDENTIFIED FORM IS NOT AVAILABLE.

EXTENSIVE RESEARCH WAS PERFORMED BY NAVFAC SOUTHWEST TO LOCATE THIS FORM. THIS PAGE HAS BEEN INSERTED AS A PLACEHOLDER AND WILL BE REPLACED SHOULD THE MISSING ITEM BE LOCATED.

QUESTIONS MAY BE DIRECTED TO:

DIANE C. SILVA
RECORDS MANAGEMENT SPECIALIST
NAVAL FACILITIES ENGINEERING COMMAND SOUTHWEST
1220 PACIFIC HIGHWAY
SAN DIEGO, CA 92132

TELEPHONE: (619) 532-3676

SITE QUALITY ASSURANCE PLAN

STORM WATER DRAIN EXCAVATION, CLEANING, REMOVAL, AND REPLACEMENT AT BUILDINGS 5 and 400 ALAMEDA POINT, ALAMEDA, CALIFORNIA

(FORMERLY NAVAL AIR STATION, ALAMEDA, CALIFORNIA)

Project No. USN 97-032
Phase III & IV

Submitted to:

U.S. Army Industrial Operations Command
Attn: AMSIO-DMW (Mr. David Horton)
Rock Island, IL 61299-6000
(309) 782-1759

Submitted by:

New World Technology
1236 Concannon Blvd.
Livermore, CA 94550
(925) 443-7967

Revision 2

July 1998

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SITE QUALITY ASSURANCE PLAN APPROVALS

STORM WATER DRAIN EXCAVATION, CLEANING, REMOVAL, AND REPLACEMENT AT BUILDINGS 5 and 400 ALAMEDA POINT, ALAMEDA, CALIFORNIA

Revision 2
July 1998

Submitted by: ______________________ Date: 7/28/98
Mark Divoky, REA
NWT Health and Safety Manager

Approved by: ______________________ Date: 7-28-98
Donald Wadsworth MSHP
NWT Corporate Radiation Safety Officer

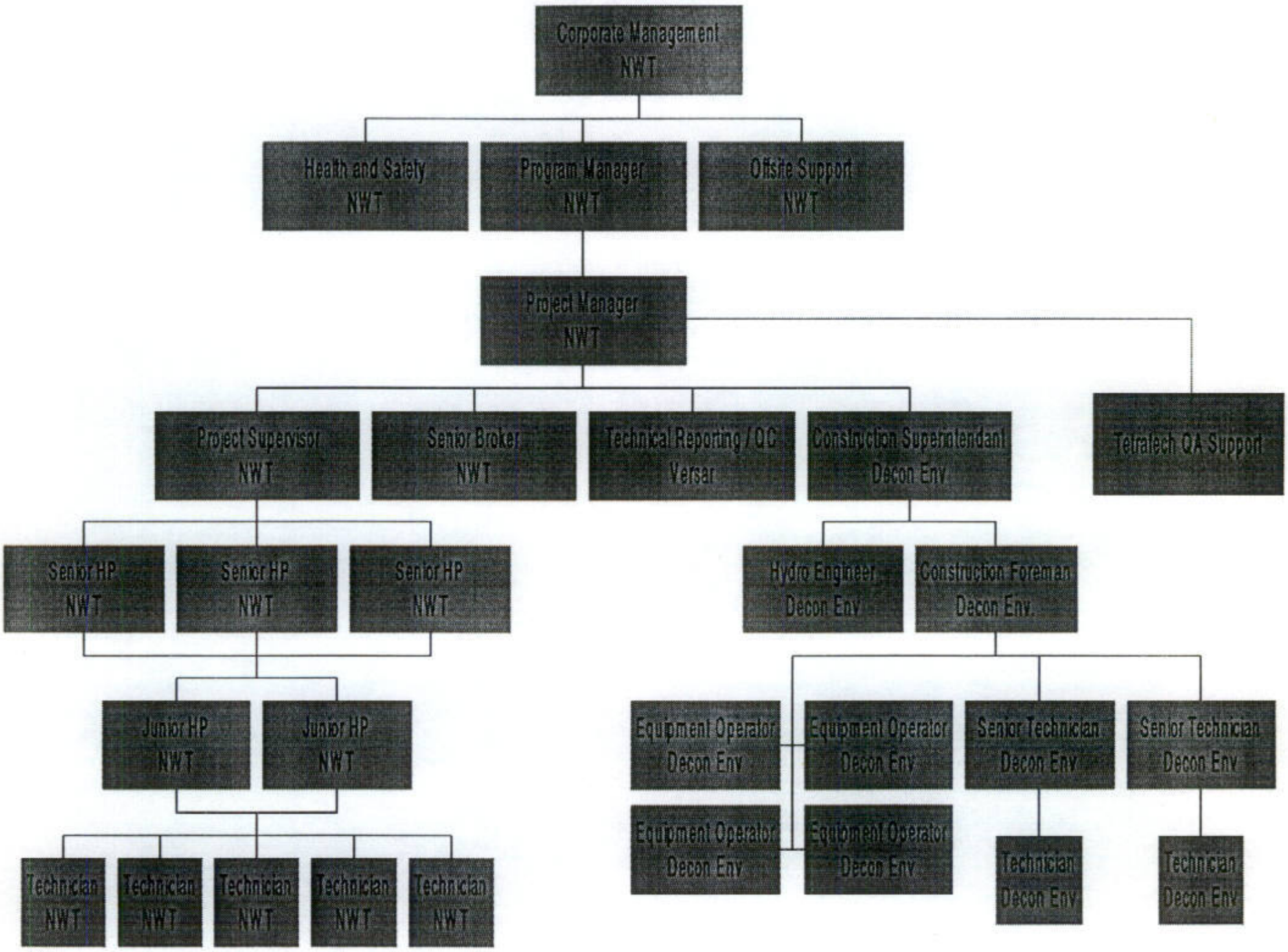
Approved by: ______________________ Date: 7/27/98
William Haney
NWT Program Director/Project Manager

Table of Contents

NWT Contract Laboratory	Thermo NU Tech Laboratories 2030 Wright Avenue Richmond, CA 94804-0040 (510) 235-2633
Government QA Laboratory	TO BE DETERMINED

1.0 PROJECT ORGANIZATION

Phase III Project Organization Chart - Field Operations



1.1 QA Position Description

Tetratech, Inc of San Francisco will perform as the primary Quality Assurance (QA) Contractor for this project. Tetratech has been contracted to perform this function as part of the Navy's Installation Restoration (IR) Program. All QA requirements and Data Quality Objectives (DQO's) are to be established by Tetratech and approved by the IR Project Manager. Development of the DQO's and the associated QA procedures are outside the present Scope of Work of the New World Technology contract.

2.0 PROJECT DESCRIPTION

This project involves the removal of 1,000 linear feet of sewer line located at two locations on the site formerly known and operated as the Naval Air Station, Alameda, in Alameda, California. (Refer to the Drawings and Contract Documents for exact locations and quantities of materials expected to be removed during this contract.)

800 linear feet of the pipeline is located in Building 400 and 200 linear feet of the pipeline is located in Building 5. The pipelines are of various sizes with the majority measuring 24-inches (ID), the maximum and minimum sizes are 6-inches (ID) and 48-inches (ID), respectively. The pipeline to be removed begins within the interior of the structures and will be removed and replaced out to the first terminator (manhole) on the exterior of the buildings. Additional lines, not physically connected to the sewer line, run parallel to the pipeline to be replaced and consist of gas service, water and additional sewer/storm drains. Work shall include the blinding and removal of various piping at the terminal point, complete removal and cleaning of the subject pipeline prior to disposal, and the removal and disposal of incidental contaminated soils or ground waters encountered during the removal operations.

Finally, all areas disturbed during the removal portion of the contract shall be restored to their former condition prior to demobilization from the project site.

3.0 CONTRACTUAL SCOPE OF WORK (SOW)

To provide for the remediation of radioactive drains at Alameda Point (formerly Naval Air Station Alameda, Alameda, CA.) The contractor shall remove the contaminated drains and any associated surrounding soils or materials from Building 400 and Building 5. The contractor shall package and transport radioactively contaminated materials to Envirocare of Utah, Inc. Following removal of the contaminated drains, the contractor shall survey the surrounding soil or material to ensure it meets the radioactive material contamination limits. The contractor shall restore the area, including restoration of the drain system, areas disturbed by remediation, and disturbed concrete or paved areas.

3.1 Details of SOW.

Remove contaminated drains from Building 400, including subterranean interior drain lines, down comers, and sanitary sewer, to manhole R112, north of Building 400. NOTE: Navy personnel will remove exposed portions of contaminated drains in Building 400.

During work on the sanitary sewer system, provide a by-pass system as necessary to maintain the system operational and restore the system to operational status following remediation.

Remove contaminated drains from Building 5 including subterranean interior drain lines. NOTE: Navy personnel will remove exposed portions of contaminated drains in Building 400.

During work on the storm drain system, provide a by-pass system as necessary to maintain the system operational. Also, restore the removed portions of the drain system to operational status following removal of the contaminated drains from Building 5.

During all remediation effort, sort and segregate materials removed to minimize the waste volume and disposal costs.

Analyze waste material and complete the waste profile process for disposal of radioactive and mixed waste at Envirocare of Utah. The contractor shall determine if a more cost effective location for disposal is available and notify IOC of the results.

Package and ship contaminated material to Envirocare of Utah for disposal in compliance with the guidelines of "Industrial Operations Command, AMSIO-DMW, Standard Operating Procedure, Shipping Procedure for Unwanted Radioactive Material."

Perform work under this scope of work using the contractors Nuclear Regulatory Commission or agreement state license.

Collect and analyze samples, treat, and dispose of groundwater removed from excavations for this project.

Perform work following the plans prepared for this project during Phase II.

4.0 DATA QUALITY OBJECTIVES

4.1 Data Uses.

Previous investigations at Alameda Point have identified subsurface contamination in the vicinity of the sewer and storm water discharge system. Elevated concentrations of Radium 226 (Ra226) were noted. Although the integrity of the entire sewer and storm water system is not known, based on the age of the system it can be assumed that during the removal process additional areas of subsurface contamination will be discovered. The airfield is a restricted use area therefore control of the effected area can be reasonable attained.

Data from the removal phase will be used to determine the vertical and lateral extent of Radium 226 contaminated soils. This information will be used to determine the extent of any subsurface soil removal authorized for this project.

4.2 Data Types.

During the removal process, Radium 226 contamination is the primary focus. Data collected will be utilized to verify that all contaminated materials, to below the specified soil contamination action level, have been removed. At the present, there is no reasons to believe that other contaminants are present (i.e. pesticides, herbicides, etc.) **NOTE: At the time that this plan is being developed the action limits for Radium 226 have not been set by the contracting agency in a accordance with the regulatory requirements.**

4.3 Data Quality Factors.

Prioritized Data Uses:	Soil "over-excavation"
Appropriate Analytical Levels:	Field Screening: Level I Analytical Laboratory: Level III
Contaminants of Concern:	Radium 226 (and daughters)
Levels of Concern:	Radium 226: (To Be Determined)
Required Detection Limits:	See Section 4.6 "Analytical Methods"
Critical Samples:	Samples at outer boundary of the excavations

4.4 Data Quality Needs.

To meet the requirements of the State of California Water Resources Board, California and Federal Environmental Protection Agencies (Cal/Fed EPA), Navy Installation Restoration Program, and other State and Federal agencies, samples will be taken below the invert of the former sewer and storm water system, and at the outer boundaries of any excavations. See Section 5.2 for a more detailed description of sample locations.

4.5 Review of PARCC Parameters.

Precision - Precision shall be evaluated through the collection and analysis of field and laboratory duplicate samples. The relative percent difference for field and laboratory duplicates shall be calculated and used as a measure of precision. Field duplicates shall be collected at a frequency of 10% (1 duplicate sample for each 10 field samples taken) for each matrix being sampled. All duplicates shall be labeled and identified is such a way as to blind the contract laboratory to their true identity.

Accuracy - Accuracy shall be evaluated through the collection and analysis of matrix spike, matrix spike duplicate samples, and laboratory control samples. Each shipment made to the contract laboratory shall include sufficient materials to provide for the preparation of matrix spike and matrix spike duplicate samples. Use of DI water or reagent grade sand for LCS analysis shall be used to independently check for matrix effects.

Representativeness - A sampling frequency will be established that will insure that the concentration of the contaminate of concern is accurately determined throughout the excavations and within the waste stream. At no time will laboratory procedures effect the concentration of the sample, either in concentrating the analyte or in diluting the analyte of concern.

Completeness - Completeness shall be defined as the percentage of Contract Laboratory controlled QC parameters that are acceptable. Holding times shall not be exceeded for any samples on this contract. Matrix effects shall not impact completeness checks provided the interference is sufficiently documented. Qualitative completeness shall involve the analysis of all events occurring during the sampling event, including, but not limited to, COC procedures, cooler temperatures, custody seals, etc.

Quantitative analysis shall include contract laboratory QC checks of surrogate recovery, analysis of duplicates for RFD %, matrix spike and matrix spike duplicate analysis for recovery and RFD, initial and continuing calibrations of analytical equipment and analysis of contract laboratory samples recovery, proper preservation and holding times. The minimum quantitative limit for completeness is 90%. All the above parameters shall be analyzed for completeness and no single parameter shall be allowed to exceed the 90% threshold.

Comparability - The use of standard soil sampling procedures and recognized field analytical procedures should make the resulting data comparable with other data of the same type. Laboratory results shall be reported on a standard tabular form indicating, but not limited to, sample numbers, matrix types, analytes, minimum detection levels (MDL's), and individual sample results.

All results, including QA/QC samples, shall be reported on the same type report as the results of the sample analyses. Out of compliance reports for any analysis, including QA/QC analyses, shall be stated on the report form as well as stated on a cover sheet accompanying each batch of sample results. Corrective actions and possible root causes for the out of compliance report shall also be included on the cover sheet accompanying the analysis report.

4.6 Analytical Methods

Analyte	Analytical Method
Ra226 (Radium 226) – Soil Matrix	901.1 (Gamma)
Ra226 (Radium 226) – Water Matrix	903.1 (Radon)

Method Reference	Method Number	Desc. of Method	Matrix	Quantitation Limit
Radiochemistry:				
	901.1	Gamma Scan	Soil	Per Methodology
	903.1	Radon Emission	Water	Per Methodology

5.0 FIELD ACTIVITIES

5.1 Equipment, Containers and Supplies.

All samples will be placed in the appropriate container as determined by a review of the requirements of 40 CFR Part 136 Table II.

Methodology	Container / Volume
EPA 901.1 – Soil Matrix	Amber Glass Wide Mouth (250 ml) / 750 g
EPA 903.1 – Water Matrix	Amber Glass Wide Mouth (250 ml) / 250 ml

All containers will be pre-cleaned to meet EPA Protocol A-3000 requirements. Samples will be acquired using the appropriate methods as detailed in Section 5.4 "Sampling, Decontamination, and Preservation Procedures".

5.2 Sample Locations.

AREA	SAMPLE LOCATIONS AND AMOUNTS
Pipeline Excavation Trench sidewalls, bottoms, and soil/water interface. Pipeline exterior/interior Pipeline contents	SOILS Periodic use of handheld Model 3 with 44-9 probe (or equivalent) and handheld Model 9 (or equivalent). Performed by NWT. Following the overexcavation of contaminated areas Radium 226 samples at intervals established by the Tetratech DQO's. To be performed by the Navy QA contractor. .
Pipeline Excavation Soil/water interface. Pipeline contents	WATER As required by incursion. To be performed by the Navy QA contractor

All sample locations, when finalized, will be surveyed, using GPS equipment, and marked on appropriate site maps for future location and cross-referencing. All samples will be analyzed using the indicated (numbered) EPA Methods mentioned previously in Section 4.6 "Analytical Methods"

5.3 General Information and Definitions.

Some commonly used definitions are given below.

a. Subcontractor Laboratory. The laboratory performing analysis of the field samples. This may be an A&E laboratory, a Remedial Action subcontractor laboratory or a laboratory subcontracted by either.

b. QA and QC Samples. Samples analyzed for the purpose of assessing the quality of the sampling effort and of the analytical data. QA and QC samples include splits or replicates of field samples, rinsate blanks, trip blanks, and background samples.

c. QC Samples. Quality Control samples are collected by the sampling teams for use by the contract laboratory. The identity of these samples is held blind to the analysts and laboratory personnel until data is in deliverable form. The purpose of the sample is to provide site specific field originated checks that the data generated by the analytical lab are of suitable quality. QC samples represent approximately 10% of the field samples.

d. QA Samples. Samples sent to a third party QA laboratory by overnight delivery and analyzed to evaluate the contract laboratory performance. QA samples will be acquired, packaged, transported, and analyzed by a separate contractor. Quantities, locations, and other specific of this sampling protocol are beyond the scope of the NWT contract and are the responsibility of the QA contractor, Tetratech of San Francisco. NWT shall coordinate with the designated QA contractor when it is determined that the excavations require sampling.

e. Split Samples. Samples that are collected as a single sample, homogenized, divided into two or more equal parts, and placed into separate containers. The sample shall be split in the field prior to delivery to a laboratory. Ordinarily, two different laboratories analyze split samples.

f. Replicate (duplicate. triplicate. etc.) Samples. Multiple grab samples, collected separately, that equally represent a medium at a given time and location.

g. Rinsate Blank. A sample consisting of reagent water collected from a final rinse of sampling equipment after the decontamination procedure has been performed. The purpose of rinsate blanks is to determine whether the sampling equipment is causing cross contamination of samples.

h. Trip Blank. Containers of organic-free reagent water that are kept with the field sample containers from the time they leave the laboratory until the time they are returned to the laboratory. The purpose of trip blanks is to determine whether samples are being contaminated during transit or sample collection. Trip blanks pertain only to volatile organic analyses; therefore, the containers must contain no headspace. Only one trip blank is needed for one day's sampling and shall satisfy trip blank requirements for all matrices for that day if the volatile samples are shipped in the same cooler.

5.4 Sampling, Decontamination, and Preservation Procedures.

5.4.1 Soil Samples.

Soil samples for laboratory analysis will be collected using the following method;

After marking the location of the sample on the sample location map, a technician will hand augur/slide hammer a core sample from the soil approximately 6 inches below the existing grade of the site as required by the sampling plan. The technician will then don a fresh pair of vinyl sample gloves, (new gloves will be donned for each sample taken), and using appropriate hand tools remove 1/4" to 1/2" of soil from the top of the auger/slide hammer to prevent the introduction of slough into the sample stream.

The soil core will then be removed from the auger/slide hammer while still in the brass tube.

Using hand tools, the soil will be transferred into the sample container (250-ml Amber Wide Mouth Jar.)

The container will be capped, sealed with a custody seal and placed into a shipping cooler.

Depth, number, time, sampler, description, and any other pertinent data will then be entered into the Sample Log and the Sample Label.

Samples will be shipped to the laboratory using Federal Express to insure prompt delivery and compliance with the holding time requirements for the samples to be analyzed.

5.4.2 Water Samples.

Water samples will be collected using the following method;

All water sampling procedures are based on the recommended procedures published in SW-846.

Using a stainless steel bacon bomb, water samples will be removed from the excavation. Due to the active hydrology at the site, and the possibility of rain during the sampling event the exact depth at which the water sample will be removed cannot be determined, however all samples will be taken at 1 foot below the upper boundary of the water recharging the excavation. The water will be immediately transferred to the properly prepared sample containers (250-ml Amber Wide Mouth Jar.)

The containers will be capped with Teflon coated lids, labeled, sealed, and placed into shipping coolers.

Depth, number, time, sampler, description, and any other pertinent data will then be entered into the Sample Log and the Sample Label.

Samples will be shipped to the laboratory using Federal Express to insure prompt delivery and compliance with the holding time requirements for the samples to be analyzed.

At the end of each shift a chain of custody form will be filled out for every sample generated.

Samples will be shipped to the laboratory using Federal Express to insure prompt delivery and compliance with the holding time requirements for the samples to be analyzed.

5.4.3 Equipment Decontamination.

All soil and water sampling equipment and containers will be decontaminated prior to use, using the following procedure.

The sampling equipment decontamination procedure will consist of the following steps, subsequent to each sampling event:

1) Detergent wash (with brush) in LOC (Liquid Organic Cleaner).
2) Distilled water rinse.
3) Final rinse and air dry with distilled water.
4) Every 15 samples a rinsate blank will be generated using an additional rinse of DI.

All sampling gloves and rinse waters will be collected and stored in lined DOT approved 55 gallon 1A2 steel drums, supplied by the contractor. Storage, analysis, and disposal of the materials generated during the sampling activities will be per the specifications and the waste acceptance criteria of Envirocare of Utah.

Additionally, the sampling slide-hammer will be triple rinsed at the beginning of every workday to reduce the possibility of cross contamination of samples.

5.4.4 Sample Preservation.

The samples will be placed in insulated coolers until they are delivered to the laboratory for analysis. All Chain of Custody documents for any samples held in the cooler shall be stored within the unit to preserve the integrity of the custody chain. Any preservatives required by SW-846 will be introduced to the sample containers during their use in the field. All types of chemical and/or mechanical preservation will be noted on the Chain of Custody that will accompany each set of samples during transit to the laboratory.

5.5 Field Documentation.

Each sampler will keep a field notebook (bound with pages numbered) to record sample collection procedures, dates, laboratory identification, sample collection location, and the name of the sampler.

The logbook will be signed and dated by this person prior to initiation of fieldwork. This designated person will execute all entries into the logbook. If it is necessary to transfer the logbook to alternative personnel during the course of field work the person relinquishing the logbook will sign and date the logbook at the time the logbook is transferred and the person receiving the logbook will do likewise. Corrections to erroneous data shall be made by crossing a line through the entry and entering the correct information. The correction shall be initialed and dated by the person making the entry. Unused portions of logbook pages will be crossed out, signed, and dated at the end of each workday. Logbook entries must be dated, legible, in ink, and contain accurate documentation. Language used shall be objective, factual, and free of personal opinions. Hypotheses for observed phenomena may be recorded, however, they must be clearly indicated as such and only relate to the subject observation.

6.0 SAMPLE CHAIN OF CUSTODY, PACKING AND TRANSPORT

All sample labeling, packing, transportation and chain of custody procedures shall follow the USACE Document, *Chemical Data Quality Management for Hazardous, Toxic, Radioactive Waste Remedial Activities* (ER 1110-1-263, 1 April 1996).

6.1 Chain of Custody Record.

See attached example. It is important to note that only one site may be listed per form even if the sites have the same project number. Top original goes with the samples; a copy should be saved for the sampler's files.

6.2 Procedures for a Chain of Custody (COC) Form.

This procedure will familiarize the reader with the different sections and requirements of a completed Chain of Custody (COC) form as is necessary for the proper tracking and acceptance of hazardous / radioactive samples by EPA certified laboratories and disposal facilities across the United States.

This procedure is not a primer on basic sampling procedures and a certain amount of knowledge concerning sample preparation and procedures is assumed. Wherever possible examples and sample forms will be used in this procedure to demonstrate the correct methodology for completing the required documentation associated with sample submission.

Overview

Refer to Illustration #1 the " Chain of Custody / Analysis Record " form following this page.

Section A relates all of the pertinent project information as well as the point of contact and the destination for any correspondence.

Section B is used to list each sample container, and the specific information concerning each sample as well as any analysis required.

Section C is used to denote any hazardous/radioactive hazards associated with the samples in addition to certain basic physical features used for preliminary analysis/treatment suitability comparisons.

Section D is the Custody Tracking record and is used to establish the responsible party for the samples at any time during the evolution of generation, transport, analysis, and disposal.

New World Technology

Chain of Custody

Project Name : ______________________________

Project # : ______________________________

Analysis Required

P.O.# : ______________

Sampler:

SECTION A

Notes:

Sample Identification	Date Collected	Time Collected	Grab	Composite	Soil	Water	Other	# of containers										Remarks	Check if RUSH
SECTION B																			

Name of Shipper	Airbill No.	Date	Time	Sample Relinquished By:	Date	Time	Sample Received By:	Date	Time
Received by (Lab)	Date	Time	Condition on receipt						

Turnaround Time Requested: (please circle): Normal Rush

(Rush TAT is subject to Client approval and Laboratory surcharge)

Report Results By: (Date) ______________

SECTION C

Rush results requested by: (please circle): Phone Fax

Report Results To:

SECTION D

Address:

Telephone:

Fax:

Type: (please circle) Haz Rad Mixed Unknown

Disposal By: (please circle) Lab Client Contractor

White Copy – (Original) Retain with Samples Yellow Copy - Customer Pink Copy - Retain for Project Files

Procedure

Section A:

1. Completely fill in all areas with the required information. Any area that does not apply, i.e. the project has no dedicated fax line, should be noted with " N/A".

2. Standard practice is for the Project Manager to remain the point of contact (POC) through out the duration of the project. However, if the project personnel includes a Project Chemist or Project Health Physicist then this person should be the POC. Additionally the Project Manager may, at his/her discretion choose to assign another member of the project team and/or a non-project related person as the POC depending on the circumstances relating to the specific project. At no time is an employee or representative from a firm other than NWT to be designated as the POC. All attempts should be made to keep the POC the same person throughout the duration of the project in an effort to limit the possibility of confusion between the laboratory/disposal facility and the Project Manager.

3. While it is recommended that at least a fax of the sample results be sent to the project site so that timely action can be taken in response to the results, it is not recommended that the final copies of the laboratory analyses be sent to the job site. The primary reason for this is to insure the integrity of the result documents. Sending the reports to a fixed office allows adequate copies to be made and archiving of the original documents pending the final reporting for the project. Copies of the final analytical results, as a matter of procedure, will be immediately forwarded to the job site upon their receipt and duplication.

4. In the upper left corner of Section A is a space for the "Document No.". This area is to be used to CONSECUTIVELY number the COC's generated on a job site. A number is preprinted in this space and should be used as a reference concerning all samples listed on the document. All correspondence and questions concerning a sample listed on the particular COC should also reference this number.

Section B:

1. This section is used to individually list each sample container and the analysis required. Refer to illustration #2 for a sample of a partially completed COC form.

2. There is room for ten (10) samples on each form. Any unused lines should have a single line marked through them, i.e. if only four (4) samples are shipped, then lines 5 through 10 should be lined through, see Illustration #2.

3. EACH SAMPLE should be given its own line on the COC form. Some laboratory procedures require more than one container of material for the same analysis, i.e. Volatile Analysis in soil require three (3) VOA vials per analysis, the number of containers should be listed in the "Notes" area of the COC form on the line dedicated to that sample. An example of this can be seen on Line 4 of the sample COC in Illustration #2.

4. "Sample ID" refers to the identification number assigned each sample by NWT field personnel. These numbers are to be unique identifiers for each sample and shall be logged in the project sample log maintained at the project site.

5. "Type" refers to the sample matrix. In other words the materials that comprise the sample. Acceptable descriptions include, but are not limited to; soil, sand, gravel, tar, sludge, mud, water, liquid, or gas. Unacceptable descriptions include; dirt, goo, black stuff, etc.

6. "Container" and "Volume" describe the type of container used to hold the sample. Container types include, but are not limited to, glass, hdpe, plastic, VOA, and brass tube. The volume indicated should be the nominal volume of the container prior to use, not the actual volume of materials placed in the container. Container volumes should be annotated with the correct volume designation, i.e. ml for milliliter, l for liter, etc. Use of the containers recommended in EPA SW-846 (Solid Waste Procedures Manual 846) is mandatory for all NWT operations involving hazardous materials/wastes sampling.

7. NOTE: When sampling material, it is important to pick the appropriate size container necessary, based upon the analytical requirements of the project and the detection limitations imposed by the laboratory equipment. Prior consultation with the contract laboratory and the NWT Corporate Heath and Safety Office will determine the containers and volumes necessary to attain the project's analytical goals. Additionally when placing sample materials into the specified container it is always recommended that the entire container be filled, insuring that no voids are left when the container is sealed.

8. "Preservative" refers to either the physical or chemical materials necessary, as specified by the laboratory and SW-846, to prepare the sample for analysis. Preservatives will either be external treatments such as cooling to 4° Celsius or chemical treatments added to the sample such as pH lowering using acids. Most in-container pre treatments are done by the container supplier prior to shipment to the project site, however there may be occasions when the on site personnel will be required to add the specified materials at the time of sampling.

9. "Analysis Req'd" is used to determine which tests will be conducted on a specific sample. This is one of the most critical sections of the COC since it determines the fate of the sample upon reaching the laboratory. Ambiguity or unclear instruction will cause delays in analysis that would impact the success of the entire project and/or the safety of the crews working at the site. Standard practice is to specify the analysis required using the EPA SW-846 test number i.e. metals analysis is Method 6010. It is also acceptable to request analysis using the materials of concern, specifically the chemicals of interest to the sampler, using the example above, it would be sufficient to list the metals by their IUPAC designations, i.e. Pb is lead, Ba is barium, etc. It is unacceptable to request analysis using vague or general categories of chemicals such as solvents or fuels.

10. "Notes" is a section in which any information deemed vital is added concerning the listed sample. If certain samples were requested to be analyzed on a rush basis it would be appropriate to designate this request in the Notes area.

11. "[Laboratory ID #]" is for the use of the contract laboratory to note the in house sample number given to each NWT sample sent. This area should be left blank at the time of submission to the laboratory.

Section C:

1. This section provides the laboratory/disposal facility with vital information concerning the health and safety hazards associated with the samples listed. It also provides valuable physical information necessary for the proper characterization and analysis of the materials.

2. While the information provided by this section is important, it is not always possible to determine all of the values requested at the time of submittal. At a minimum the sections pertaining to hazards and physical form should be filled in. If it is not possible to determine the remaining information, a notation of "CBD - Cannot Be Determined" or simply "CBD" should be inserted into the spaces.

3. "Sample TAT Req'd" indicates the turn around time (TAT or speed of analysis) requested for the majority of the samples. As noted earlier if rush analysis is required for certain samples this should be noted in the individual Notes area for each sample. Standard TAT's include 24 hour, 72 hour, 5 day, and 15 day. Never indicate a turn around time as "standard" or "normal" since this will vary between laboratories. Care should be taken when specifying TAT's since high premiums are usually charged for accelerated analysis. Also certain tests require minimum times for processing that may delay specific results, an example of this is a metals analysis for Pb (lead), which requires a minimum 48 hours for digestion thereby precluding the possibility of a 24 hour turn around time. Consult with the NWT Project Manager and the contract laboratory to determine the correct turn around times.

4. The section titled "SAMPLE CHARACTERISTICS" is used by the laboratory/disposal site for the purposes of worker protection and sample characterization. At a minimum the hazard classes and physical characteristics of the samples should be indicated. An effort should be made when completing the COC forms to group the samples by similar physical characteristics in an effort to simplify this portion of the documentation. Any radioactive data or hazardous waste ID numbers should be noted in the Notes area of this section as a precautionary measure.

5. Determination of the other physical characteristics is not mandatory, however this information will facilitate the analysis/disposal process and an effort should be made to complete as much of this area as possible.

6. "Sp. Grav." refers to the specific gravity of the samples and should be indicated by ">1.0", heavier than water, "=1.0", same as water, or "<1.0", lighter than water.

7. "Flash Pt." refers to the flash point of the materials to be sampled. The temperature of flash ignition should be reported in either degrees Fahrenheit or Celsius.

8. "Color" and "Odor" refer to the physical properties of the materials. Colors should be reported as either a primary color or a mix of primaries, i.e. Black, Brown, Gray/Green, etc. Odor should be reported as a qualitative amount such as "Slight", or "Heavy".

Section D:

1. The final section of the COC is the Custody Tracking portion. This section is used to show the person(s) responsible for the samples from the point of origin through final analysis and disposal.

2. After sampling operations are completed for the work shift, the designated responsible party, commonly the POC mentioned previously, collects all samples and completes the required labels and COC forms prior to shipment of the sample containers. This is the first person to sign the COC in space number 1 "Relinquished By". When the samples are picked up for delivery to the laboratory/disposal facility the courier will sign for the samples on Line number 1 "Received By". Upon delivery of the samples to the appropriate destination the courier will then sign on line number 2 "Relinquished By" and the laboratory/disposal facility will sign on line number 2 "Received By". An additional line is included if there is an intermediate transition between the point of origin and the final destination.

Summary

The COC form is a three part, three color form. The pages are all the same, being made with carbonless paper for the two bottom sheets. The distribution of copies is as follows:

WHITE (Top) - Included with samples as original signature document. This page must remain with the samples until disposal.

YELLOW (Middle) - Sent to Corporate Office for inclusion in the main project files. This copy is a backup in case the originals or job site copies are misplaced/destroyed.

PINK (Bottom) - Retained at the job site for referral should questions arise from the laboratory / disposal facility. Also used as a cross reference when results are received.

Documentation of samples is the most important portion of any sampling effort. All writing should be in block lettering and in waterproof blue or black ink. No cursive writing or pencil is allowed. Errors should be lined out and initialed. Whenever possible typed reports should be used. Finally, only experienced sample technicians or their supervisors should be responsible for completing the forms associated with a sampling effort.

New World Technology

Chain of Custody

Project Name : US Government Agency

Project # : USA-1234567-89

Analysis Required

P.O.# : 123456

Sampler: Mark Dlvoky

Notes: Background samples for Anybase USA

Sample Identification	Date Collected	Time Collected	Grab	Composite	Soil	Water	Other	# of containers	Volatile Organics	418.1								Remarks	Check if RUSH
Sampleanon01	Anydate	Anytime	X			X		2	X									VOA Analysis	
Sampleanon02	Anydate	Anytime		X	X			1		X								TPH (Diesel footprint)	

Name of Shipper	Airbill No.	Date	Time	Sample Relinquished By:	Date	Time	Sample Received By:	Date	Time
NWT, Inc	N/A				7/7	1700			

Received by (Lab)	Date	Time	Condition on receipt

Turnaround Time Requested: (please circle): Normal Rush

(Rush TAT is subject to Client approval and Laboratory surcharge)

Report Results By: (Date) ____________________

Rush results requested by: (please circle): Phone Fax

Report Results To: NWT Project Manager

Address: 1236 Concannon Blvd, Livermore, CA 94550

Telephone: 925-443-7967 **Fax:** 925-443-0119

Type: (please circle) Haz Rad Mixed Unknown

Disposal By: (please circle) Lab Client Contractor

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6.3 Sample Documentation.

Each sample will be marked with a date, time of collection, site name, samplers signature, and analytes of concern on a label that will not float/soak off - no masking tape, please. Use only indelible ink on all labels. Numbered sample labels should be used on all samples. Some projects may also require the use of sample tags in addition to labels.

6.4 Sample Logging.

Each sample or field measurement shall be logged into the appropriate log books, (bound with consecutively numbered pages), maintained at the site using waterproof ink. All log entries shall occur at the time of measurement or sample generation. Only the designated sample technician or his/her supervisor shall make or correct entries into the project log books. Copies of the log books shall be made weekly and forwarded to the contractor's corporate offices so that backups of all data may be archived in the event of loss or damage to the original logs.

6.5 Sample Numbering System.

A sample numbering system has been developed to identify each sample removed from the project site. The system provides a tracking mechanism to allow retrieval and cross referencing of sampling information and allow for anonymity of the samples at the contract laboratory. A listing of all sample numbers will be maintained in a designated field Sample log book.

The numbering system to be used on the project will take the form:

S-00001-XX

The 'S' used before the dash denotes the matrix of the sample as soil, 'W' will be used to designate water samples. The number is a consecutive, unique number assigned to each sample. The final letters denote the area being sampled and a key of these two letter codes will appear as the first page of the field Sample log book and will be summarized in the Closure Report.

6.6 Custody Seals.

Each sample container will be sealed with a tamper proof custody seal to insure the integrity of the sample. The seal will be attached in such a way so that any attempt to open the container will result in the breaking of the seal. The coolers used for shipment of the samples will also be sealed with custody seals to add an additional layer of security to the samples.

NEW WORLD TECHNOLOGY

SAMPLE LOG

DATE		PROJECT NUMBER	

OPERATION DESCRIPTION	

SAMPLE TEAM		

SAMPLE #	MATRIX (CIRCLE)	DATE/TIME SHIPPED	COC NUMBER	WAYBILL NUMBER	LABORATORY REPORT NUMBER
	S / W / A / O				
	S / W / A / O				
	S / W / A / O				
	S / W / A / O				
	S / W / A / O				
	S / W / A / O				
	S / W / A / O				
	S / W / A / O				
	S / W / A / O				
	S / W / A / O				
	S / W / A / O				
	S / W / A / O				
	S / W / A / O				
	S / W / A / O				
	S / W / A / O				
	S / W / A / O				

6.7 Chain of Custody Record.

A chain of custody record will be completed and accompany each shipment of samples. Procedures and samples of complete COC's are included in this section.

6.8 Corrections to Documentation.

Unless prohibited by weather conditions, all original data will be entered in the field using waterproof ink. When an error is made on an accountable document, corrections will be made by marking a single line through the entry, initialing the line out and entering the correct data.

6.9 Definition of Custody.

A sample will be under custody if one or more of the following criteria are met;

1) It is in the technicians possession.
2) It is in view after being in the technicians possession.
3) It was in the technicians possession and then locked up to prevent tampering.
4) It is in a designated area of the technicians responsibility.

6.10 Field Custody.

The sampling technician will have responsibility for the care and custody of the samples from the time of collection until they are transferred to another individual or shipped off site. The sampling technician will be responsible for properly filling out the chain of custody documentation for all samples in his/her care. When transferring custody, the individuals relinquishing and receiving custody will sign, date, and note the time of the transfer on the appropriate spaces of the chain of custody record.

6.11 Packaging and Shipping.

The following is a general checklist to following when preparing a sample shipment.

- Waterproof metal (or equivalent strength plastic) coolers only.

- After filling out the pertinent information on the sample label and tag, put the sample in the bottle or vial and screw on the lid. For bottles other than VOA vials, secure the lid with strapping tape. (Tape on VOA vials may cause contamination.)

- Mark volume level on bottle with grease pencil.

- Place about 3 inches of inert cushioning material such as vermiculite in the bottom of the cooler. Enclose the bottles in clear plastic bags through which sample tags and labels are visible, and seal the bag. Place bottles upright in the cooler in such a way that they do not touch and will not touch during shipment.

- Put in additional inert packing material to partially cover sample bottles (more than halfway).

- Fill cooler with cushioning material.

- Put paperwork (chain of custody record) in a waterproof plastic bag and tape it with masking tape to the inside lid of the cooler.

- Tape the drain shut.

- Secure lid by taping. Wrap the cooler completely with strapping tape at a minimum of two locations. Do not cover any labels.

- Attach completed shipping label to top of the cooler.

- Put "This Side Up" labels on all four sides and "Fragile" labels on at least two sides. "Fragile" labels are optional for coolers not containing glass bottles.

- Affix numbered and signed custody seals on front right and back left of cooler. Cover seals with wide, clear tape .

- Remember that each cooler cannot exceed the weight limit set by the shipper.

Sample containers will be delivered to the laboratory by private courier. The courier service will be coordinated between the sampler with the laboratory.

7.0 EQUIPMENT CALIBRATION AND CARE

7.1 Calibration Frequency.

Field instruments shall be, at a minimum, source checked daily. Specific quality control criteria for initial and continuing calibrations for all analytical instruments is detailed in the following table.

Field Measurement	**Instrument**	**Field Calibration Procedure**	**Precision**
Depth or Length	Steel/Fiberglass tape	Comparison to new tape	± 0.1 foot
Gross Gamma in Soil	Model 3, 44-9 probe (or equivalent)	Check with known certified source (Tc^{99} - 47 mm)	>10% efficiency
Gross Gamma on surface	Model 3, 44-9 probe (or equivalent)	Check with known certified source (Tc^{99} - 47 mm)	>10% efficiency
Radiation Dose	Model 19 Micro-R (or equivalent)	Check with button source (Cs^{137} or equivalent)	± 20% response
Metallic Interference's	Schonstedt 72 CV	Shielded steel source	± 3 inches

7.2 Preventative Maintenance.

Preventative maintenance will be only be performed by qualified personnel. Records of repair, adjustments, and calibration will be maintained and available for inspection by the CO on request.

Proper training, by and experienced user, shall be given to all field personnel prior to their operating any equipment used in the environmental investigation portions of the project. This training will include the correct procedures for calibrating, using, transporting, maintaining, and cleaning of the instruments. Upon completion, this training will be documented for review by the Project Manager/HSO and placed in the personnel files of the project.

During field operations, all instrumentation, including PPE, will be inspected and tested prior to issuance and usage in the field. Instrument inspections and calibration records will be completed and maintained daily in the field office of the project. Instrumentation that fails the in field testing and calibration shall be tagged as "Out of Service" and shipped to a manufacturers authorized service center for corrective repairs. At no time will field operations be allowed to proceed without the minimum required field instruments, on site and in proper working order.

8.0 CONTRACT LABORATORY INTERNAL PROCEDURES

8.1 Contract Laboratory Responsibilities.

The laboratory contracted to perform all off site analyses, other than QA sampling, for the Alameda Point pipeline removal project is:

Thermo NU Tech Laboratories
2030 Wright Avenue
Richmond, CA 94804-0040
(510) 235-2633

All samples will be analyzed at fully permitted and authorized facilities within the State of California. Certifications from the State of California and Utah are attached to this plan.

All samples, except QA samples, will be acquired, labeled, packaged, and delivered by NWT, Inc personnel. All field sampling procedures are the responsibility of the contractor and are detailed in the appropriate sections of this QAPP.

DQO's are the responsibility of the QA contractor, Tetratech of San Francisco, and are not included with this QAPP. Requirements for PARCC (Precision, Accuracy, Representativeness, Completeness, and Comparability) are listed under section 4.5.

Included in the following sections are the contract laboratories operating procedures for equipment maintenance, record keeping, and analysis (inclusive of QA/QC). Data requirements and confidence levels are to be established by the QA contractor and are outside the scope of work of NWT. Should conditions at the site or analyte of concern change during the course of the on-site operations, changes in the operating procedures will be implemented on a case by case basis with the prior approval of the NWT PM/HSO and the IOC Contracting Officer (CO).

8.2 Accuracy - General Chemistry.

Accuracy will be determined through the analysis of laboratory control samples (LCS) and by spiking samples with surrogate compounds where applicable.

QC criteria (surrogate recoveries, LCS recoveries) must fall within the 65 to 135 percent range. These quality control criteria will be subject to the approval of the IOC CO. Failure of the contract laboratory to present QC criteria (including appropriate corrective actions) that are acceptable to the US IOC will result in NWT retaining another laboratory for the contract services.

Accuracy is a quantitative parameter of the bias in a measurement system. Sources of possible error are the sampling process, field contamination, preservation, handling, sample matrix, sample preparation and analytical procedures. Accuracy is calculated as follows:

For measurements where matrix spikes are used:

$$\%R = 100\% \times \left(\frac{S - U}{C_{sa}} \right)$$

%R	-	percent recovery
S	-	measured concentration in spiked aliquot
U	-	measured concentration in unspiked aliquot
C_{sa}	-	actual concentration of spike added

For situations where a surrogate or a standard reference material (SRM) is used instead of, or in addition to matrix spikes:

$$\%R = 100\% \times \left(\frac{C_m}{C_{arm}} \right)$$

%R	-	percent recovery
C_m	-	measured concentration of SRM
C_{arm}	-	actual concentration of SRM

For each shipment of the samples that are shipped to the contract laboratory, one sample will be provided in sufficient quantity such that a matrix spike and a matrix spike duplicate can be generated in addition to an aliquot reserved for actual sample analysis. The frequency of duplicates will be 5% or 1 in 20 samples, whichever is greater, per shipping container.

This sample will include sufficient volume such that one re-extraction/reanalysis of the MS/MSD pair may be performed as necessary. Only samples from this project will be used for MS/MSD procedures. Trip blanks and rinsate blanks will not be knowingly used for MS/MSD analysis.

The matrix spike and matrix spike duplicate samples will be spiked with a series of method target compounds, while a third aliquot of the sample will be analyzed unspiked. Accuracy will be measured in terms of percent recovery of each of the spiked components.

MS/MSD not meeting the contract laboratory quality control criteria specified in section 2.6 will be re-extracted and reanalyzed once at no additional cost to the US IOC. Failure of different spike analytes on successive runs for methods with multiple spike analytes will be considered a reanalysis failure and will satisfy the requirements for reanalysis.

Analysis exhibiting out of control surrogate recoveries will be reanalyzed once at no additional cost to the US IOC.

LCS analyses are matrix spikes on a blank matrix (de-ionized water, reagent grade sand) to access contract laboratory accuracy independent of matrix effects. Use of sodium sulfate and/or other matrices may be used only after receiving prior approval from the US IOC CO. Failure of the MS/MSD and/or LCS analyses to meet the contract laboratory QC criteria will be cause to initiate a review of all analytical data generated in the corresponding analytical batch.

If the review indicates out of control data due to laboratory error, NWT's contract laboratory will perform re-sampling/re-extraction/re-analysis to correct the out of control condition. With the exception of compromised data due to well-substantiated and documented matrix effects, the contract laboratory will perform re-sampling/re-extraction/re-analysis at no additional cost to the US IOC.

8.3 Sensitivity.

Detection limits for all analyses are dependent on matrix effects and background readings at the time of analysis. The detection limits will be subject to the approval of the US IOC CO. Failure of the contract laboratory to present detection limits that are acceptable to the US IOC will result in NWT retaining another laboratory for the contract services.

Detection limits will be consistent with those specified in EPA-600/4-80-032, August 1980.

Matrix effects will be considered in assessing the contract laboratory's compliance with the requirements for sensitivity. A detailed analysis of all failure to meet the requirements for sensitivity will be included in the narrative section of the required certificate of analysis.

8.4 Precision.

Section 4.5 specifies the contract laboratory quality control criteria for precision (expressed a relative percent difference (RPD)). Precision will be evaluated through the collection and analysis of field and laboratory duplicate samples. Laboratory duplicates not meeting the quality control criteria will be re-extracted/re-analyzed once.

These quality control criteria will be subject to the approval of the US IOC CO. Failure of the contract laboratory to present QC criteria for precision (including appropriate corrective actions) that are acceptable US IOC will result in NWT acquiring a new contract laboratory to complete the project.

Precision is a quantitative parameter for the variability of a group of measurements compared to their average value. Sampling precision is evaluated from field duplicate samples and analytical precision is evaluated from matrix spike duplicate samples and split samples.

Precision is calculated in terms of the relative percentage difference as follows:

$$RPD = \left(\frac{(C_1 - C_2) \times 100\%}{(C_1 + C_2) \div 2} \right)$$

RFD	-	relative percent difference
C_1	-	larger of the two observed values
C_2	-	smaller of the two observed values

RPD's will not be calculated in cases in which one analyte of the duplicate pair is reported as non-detected. The RPD for field and laboratory duplicates will be calculated and used as a measure of precision; however, only laboratory duplicates will be included in the quantitative assessment of completeness. Results of field duplicates will be described in the qualitative assessment of completeness.

Field duplicates (QC samples) will be collected at a frequency of 1 sample for every 10 samples of a given matrix. The identity of the QC sample will be held blind to the contract laboratory until after the analyses have been completed.

8.5 Laboratory Internal QC Procedures.

Included, as appendices to this plan, are the contract laboratory's project specific internal QC requirements. Additional information supplied in the appendices are the analytical procedures and the certifications of the laboratory from the State of California and Utah.

9.0 QAPP DELIVERABLES

9.1 Daily Quality Control Report.

A report shall be generated for each day of activities at the project site. The report shall be in summary form and shall contain as a minimum the following items;

- Location of work.
- Weather conditions
- Work Performed.
- Results of any inspections.
- Problems encountered and corrective actions applied.
- Types and quantities of tests performed, including sample technician's name.
- Instructions or directions received from the US IOC representatives or other agency representatives.
- General comments or notes.
- Calibrations performed.

9.2 Non-Routine Occurrences Reports.

A report, in writing, shall be made to the US IOC representative concerning any occurrences or conditions encountered on the project that will impact the quality, quantity, and/or cost of the sampling data or work to be performed. Submission of the problem, corrective actions taken, or recommended and the instructions of the US IOC representative shall be received by the IOC within 48 hours of discovery.

9.3 Certificates of Analysis.

All samples are scheduled for a normal turn around time (TAT) of 28 days (calendar) for the receipt of formal certificates of analysis. All certificates shall be submitted to the IOC as they are received, but no later than the 28 days previously mentioned.

9.4 Contractor Quality Control Summary Report.

A report summarizing the following items shall be submitted at the completion of the sampling effort;

- Project scope.
- Project description.
- Sampling procedures used.
- Summary of Daily Quality Control Reports.
- Analytical procedures.
- Data presentation including analysis and validation.
- QC activities.
- Conclusions and Recommendations.

10.0 REFERENCES

- U.S. Army Corps of Engineers, *Chemical Data Quality Management for Hazardous, Toxic Radioactive Waste Remedial Activities* ER 1110-1-263, 1 April 1996

- U.S. Army Corps of Engineers, *Quality Management* ER 1110-1-12, 1 June 1993

- U.S. Environmental Protection Agency, *Gamma Spectroscopy* Method 901.1 EPA-600/4-80-032, August 1980

- U.S. Environmental Protection Agency, *Radon Emanation Technique* Method 903.1 EPA-600/4-80-032, August 1980

- U.S. Environmental Protection Agency, *A Compendium of Superfund Field Operations Methods* 1989

- U.S. Environmental Protection Agency, *CERCLA Compliance with Other Laws Manual* 1988

- U.S. Environmental Protection Agency, *Test Methods for Evaluating Solid Waste, Third Edition* EPA SW-846

- U.S. Environmental Protection Agency, *Guidance for the Data Quality Objectives Process* EPA QA/G-4, September 1994

- U.S. Environmental Protection Agency, *EPA Requirements for Quality Assurance Project Plans for Environemntal Data Operations* EPA QA/R-5, October 1997

- U.S. Environmental Protection Agency, *EPA Guidance for Quality Assurance Project Plans* EPA QA/G-5, February 1998

- U.S. Environmental Protection Agency, *Guidance for the Preparation of Standard Operating Procedures (SOPs) for Quality Related Documents* EPA QA/G-6, November 1995

11.0 APPENDICES

NWT SOP for the Operation and Calibration Of the Ludlum Model 3 Survey Meter HP-IP-001

HP-IP-001
Revision 0

NEW WORLD TECHNOLOGY

OPERATING PROCEDURE

OPERATION
OF THE
LUDLUM MODEL 3 SURVEY METER

New World Technology
1236 Concannon Blvd.
Livermore, CA 94550

OPERATION
OF THE LUDLUM MODEL 3 SURVEY METER

1.0 SCOPE

This procedure sets forth the specific requirements to be used for the operation of the Ludlum Model 3 Survey Meter for use on New World Technology projects.

2.0 Purpose

The purpose of this procedure is to provide instructions for the operation of the Ludlum Model 3 Survey Meter in accordance with the requirements specified in Reference 3.1.1.

3.0 REFERENCES

3.1 References

3.1.1 Regulatory Guide 10.8, Rev.2-1987, Guide for the Preparations of Applications for Medical Use Programs

3.1.2 ANSI N3.1-1987, Selection, Qualification and Training of Personnel For Nuclear Power Plants

3.1.3 Manufacturer's instruction manual for the Ludlum Model 3 Survey Meter

3.1.4 ANSI N323-1978, Instrument Test and Calibration

4.0 PRECAUTIONS, LIMITATIONS

4.1 Precautions

4.1.1 Take care not to puncture the thin mica window of the "pancake" G-M detector, or the thin mylar window of the ZnS (Ag) scintillation detector.

4.1.2 To prevent contamination of the probe, avoid contact with the person(s) or object(s) being surveyed.

4.1.3 When using this instrument case in a known, or suspected contaminated area, seal the instrument in a protective media (i.e., plastic, poly) to prevent contamination of the instrument.

4.2 Limitations

4.2.1 The operation of the Model 3 depends on the condition of the battery. Therefore, the battery check should be performed before operation and periodically during use to ensure proper operation.

4.2.2 Calibration shall be performed annually, after maintenance is performed, if the instrument fails the performance test or if its proper operation is in question.

4.2.3 A daily performance test is required when the instrument is in use.

4.2.4 "Pancake" GM detectors and ZnS (Ag) scintillation detectors shall be considered 10% efficient unless otherwise noted for a specific situation.

5.0 RESPONSIBILITIES AND QUALIFICATIONS

5.1 Responsibilities

5.1.1 NWT Radiological Field Operations Manager

5.1.1.1 Implementation of this procedure.

5.1.1.2 Periodic reviews of the adherence of personnel to the requirements of this procedure.

5.1.1.3 Ensures by training and experience Health Physics Technicians are qualified to perform the requirements of this procedure.

5.1.2 Health Physics Supervisors

5.1.2.1 Performs periodic surveillance of the use and maintenance of the instrument.

5.1.2.2 Ensures the instrument is calibrated at specified intervals.

5.1.2.3 Ensures that records pertaining to the instrument are maintained on file throughout the duration of the project and copies retained in the permanent project file.

5.1.3 Health Physics Technicians

5.1.3.1 Performance of the requirements in Section 6.1,6.2, and 6.3 of this procedure.

5.1.3.2 Documentation of all records in this procedure.

5.1.3.3 Notification to Health Physics Supervision of any unsafe or unusual conditions observed during operation of the instrument.

5.1.4 Health Physics Instrument Personnel

5.1.4.1 Perform the requirements of Sections 6.1, 6.2, and 6.3 of this procedure.

5.2 Qualification

5.2.1 Health Physics technicians shall be qualified in accordance with the requirements of ANSI 3.1 - 1987 to operate this instrument for any of the following: Surveys, radiation work permits and job coverage.

5.2.2 Junior Health Physics and Decontamination Technicians may operate this instrument under supervision of a Health Physics Technician meeting the requirements of section 5.2.1.

6.0 PROCEDURE

6.1 Operation

6.1.1 Verify that the instrument has a valid Calibration Data Sticker Label # NWTL-DCK and is not out of calibration, and the daily performance test has been completed and initialled on the Performance Test Daily Check Sticker. If the performance test has not been completed, have a Health Physics Technician perform the test (Section 6.3).

6.1.2 Inspect the instrument for any obvious physical damage which could interfere with its proper operation. It should include inspecting for loose, damaged knobs, buttons, broken or damaged meter movements/displays, dented or corroded instrument cases, punctured/deformed probe/probe window(s). Particular attention should be given to cables and connectors, since these components frequently become damaged or worn. Any instrument or detector having a questionable physical condition shall not be used until properly corrected.

6.1.3 Perform a battery check on the instrument by moving the switch to the "BAT" position. Observe the meter indication for the current battery condition.

6.1.4 If unsatisfactory results are obtained, refer to Reference 3.1.3 for the replacement of the batteries and repeat the check. The instrument shall display a satisfactory battery check prior to each use.

6.1.5 Set the audio switch to the "on" position. Set the response switch to the slow "s" position, and range selector to the lowest setting.

6.1.6 In a low background area perform a background check on the instrument. If the instrument is equipped with a ZnS (Ag) scintillation detector hold the detector probe up to, and facing a light source. Observe the instruments reading. Reading should be between 0 and 5 cpm. If a greater reading is noted, the detectors mylar window may be damaged, the instrument should be Health Physics Supervision notified immediately.

6.1.7 If the instrument is equipped with a "pancake" GM detector observe the instruments reading. If the reading is ≥300 cpm the instrument must be moved to a lower background area for air sample filter, smear filter, and masslin counting purposes. The lowest possible background area should be used for counting purposes.

> NOTE: When using a ZnS (Ag) alpha probe or GM pancake probe, to do an evaluation of a surface which may contain natural radioactivity (such as concrete or plaster), determine background near contact with a non-contaminated section of the material. This will ensure that activity determination accounts for the presence of low level natural radioactivity in the material.

6.1.8 If a low background rate cannot be achieved check the instrument probe face for contamination. Decontaminate if necessary, taking care not to damage the probe face.

6.1.9 Proceed with operation in accordance with the desired use.

6.1.10 If performing a direct probe survey with a "pancake" GM detector, the detector face should be within 1/2" of the surface being surveyed. The movement rate of the detector probe should be one probe width per second or slower.

6.1.11 If performing a direct probe survey with a ZnS (Ag) scintillation detector, the detector face should be within 1/4" of the surface being surveyed. The movemen rate of the detector probe should be one probe width per second or slower.

6.1.12 If counting air sample filters the counting time should be of a minimum of 1 minute, or when meter deflection stabilizes.

6.1.13 If counting smears, masslinn etc. the counting time should be a minimum of 30 seconds, or when meter deflection stabilizes.

6.1.14 When performing direct scan surveys of objects, surface areas etc., static readings should be performed frequently to insure the detection of residual activity.

6.1.15 If the Model 3 is calibrated with the Ludlum Model 44-6 Probe or equivalent as a dose rate meter, ensure probe is parallel to the source/surface being surveyed.

6.1.16 High energy betas may be seen if the Model 44-6 probe shield is rotated sideways exposing the GM tube.

NOTE: This probe only indicates the presence of beta and is not a quantitative measurement. Measurement of photon dose rates are strongly energy dependent and calibration must ensure determination of meter response for a specific energy range.

6.1.17 Efficiency determination

6.1.17.1 Connect Ludlum Model 44-9 probe or equivalent to the instrument.

6.1.17.2 Determine and record on form NWT-007 the background count.

6.1.17.3 Obtain a 47mm diameter Tc-99 plate source, or equivalent.

6.1.17.4 Verify the current DPM of the reference source or decay correct the reference sources using the following formula:

$$A = A_O e^{-.693 (t)/t½}$$

Where: A = corrected source activity
A_O = original activity
e = 2.71828
t½ = radionuclide half-life
t - elapsed time

6.1.17.5 Place the probe 1/2" above the Tc-99 source and record the resulting count rate on form NWT-007.

6.1.17.6 Subtract the background CPM from the source CPM to obtain the net counts per minute.

6.1.17.7 Determine the efficiency using the following formula:

$$\%EFF = \frac{\text{Net Counts Per Minute (cpm) x 100\%}}{\text{Source Activity (DPM)}}$$

Record the results on form NWT-007.

6.1.17.8 The efficiency must be greater than 10%. If not, terminate this procedure and arrange for repair of the meter.

6.1.18 Determine Performance Test Reference Data

6.1.18.1 Obtain a 47mm diameter Tc-99 plate source, or equivalent, and record the serial number on form NWT-007.

6.1.18.2 Perform a one minute background count and record on form NWT-007.

6.1.18.3 Perform a one minute source count and record results on form NWT-007.

6.1.18.4 Determine the reference value by subtracting the background count from the source count.

6.1.18.5 Calculate the reference range, ± 20% of the reference value, and record on form NWT-007.

NOTE: Step 6.1.19 need only be performed if the Model 3 is calibrated to the Ludlum Model 44-6 Probe or equivalent as a dose rate meter.

6.1.19 Model 3 Dose Rate Calibration

6.1.19.1 Dose rate calibrations of the Model 3 shall be performed by the manufacturer or qualified vendor.

6.1.19.2 Upon receipt from the manufacturer or qualified vendor, initiate the Instrument Service Record - Ludlum Model 3 (Dose Rate) form NWT-007-1 by completing Section 1.

6.1.19.3 Perform a physical condition inspection of the instrument for transient damage. Record on form NWT-007-1 as satisfactory or unsatisfactory. Unsatisfactory conditions shall require a description of the defect in Section 3 of form NWT-007-1.

6.1.19.4 Perform a battery test. Replace the batteries if necessary. Document on form NWT-007-1 as satisfactory or unsatisfactory.

6.1.19.5 Determine Performance Test Data

(a) Obtain a 5µCi Cs-137 or equivalent Button Source and record the serial number on form NWT-007-1.

(b) Place the source in contact with the side of the Model 44-6 probe, switch the instrument to the appropriate range to obtain an on-scale reading. Record the reading on form NWT-007-1.

(c) Calculate the reference value range ± 20% of the source reading, and record on form NWT-007-1.

6.1.19.6 Attach a copy of the manufacturer or qualified vendor's Calibration Data

Sheet to form NWT-007-1

6.1.20 If the above calibration steps are completed satisfactorily, attach a completed Calibration Data Sticker, and Performance Test Daily Check Sticker to the instrument and complete Section 3 of form NWT-007. The old Calibration Data Sticker shall be attached to the new form NWT-007.

6.2 Performance Test

6.2.1 Conduct a performance test daily check on the instrument and record all data on form NWT-003, Performance Test Log Sheet.

6.2.2 Obtain the Performance Test source designated by the Performance Test Daily Check Sticker on the instrument.

6.2.3 Record the information for each section of form NWT-003.

6.2.4 Examine the instrument for any obvious physical damage which could interfere with its proper operation.

6.2.5 Verify that the instrument has a current Calibration Data Sticker and Performance Test Daily Check Sticker.

6.2.6 Perform a Battery Check to ensure that the battery is within the Batt OK range on the meter.

6.2.7 Expose the detector to the performance test source. If the response is within the designated range for the source, proceed to step 6.3.9. If the instrument fails, record "F" for fail on form NWT-003 and remove the instrument from service for repair or calibration.

6.2.8 If the instrument fails any portion of the performance test, log the instrument as failing on the Performance Test Log Sheet, remove from service. and notify Health Physics Supervision.

6.2.9 If the instrument passes the performance test, record "P" for pass on form NWT-003, then initial the Performance Test Daily Check Sticker on the instrument and initial the Performance Test Log Sheet.

6.3 Maintenance

6.3.1 Instruments shall be stored in areas which prevent damage by movement, accumulation of moisture or dust. Detector covers shall be used for storage when practical.

6.3.2 Electronic maintenance (except probe and cable replacements) shall be performed by an Health Physics Instrumentation Technician or by the manufacturer or a approved vendor.

7.0 RECORDS

The following records will be generated and retained in the permanent project file as a result of using this procedure.

7.1 Form NWT-007 Instrument Service Record- Ludlum Model 3

7.2 Form NWT-007-1 Instrument Service Record- Ludlum Model 3 (Dose Rate)

7.3 Form NWT-003 Daily Instrument Performance Test Log Sheet

7.4 Calibration Data Sticker

7.5 Performance Test Daily Check Sticker

8.0 FORMS AND EXHIBITS

8.1 Forms

8.1.1 NWT-007, Instrument Service Record- Ludlum Model 3

8.1.2 NWT-007-1, Instrument Service Record- Ludlum Model 3 (Dose Rate)

8.1.3 NWT-003, Daily Instrument Performance Test Log Sheet

8.2 Exhibits

8.2.1 Performance Test Daily Check Sticker

8.2.2 Calibration Data Sticker

NWT SOP for the Operation and Calibration Of the Ludlum Model 19 Micro-R Meter HP-IP-002

HP-IP-002
Revision 0

NEW WORLD TECHNOLOGY

OPERATING PROCEDURE

OPERATION OF THE LUDLUM MODEL 19 MICRO-R METER

New World Technology
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OPERATION
OF THE
LUDLUM MODEL 19 MICRO-R METER

1.0 SCOPE

This procedure sets forth the specific requirements to be used for the operation of the Ludlum Model 19 Micro-R Meter for use on NWT projects.

2.0 PURPOSE

The purpose of this procedure is to provide instructions for the operation and calibration of the Ludlum Model 19 Micro-R Meter in accordance with the requirements specified in Reference 3.1.1.

3.0 REFERENCES

3.1 References

3.1.1 Regulatory Guide 10.8, Rev.2-1987, Guide for the Preparations of Applications for Medical Use Programs

3.1.2 ANSI N3.1-1987, Selection, Qualifications and Training of Personnel For Nuclear Power Plants

3.1.3 Manufacturer's instruction manual for the Ludlum Model 19 Micro-R Meter

3.1.4 ANSI N323-1978, Instrument Test and Calibration

4.0 PRECAUTIONS, LIMITATIONS

4.1 Precautions

4.1.1 Due to the very low response ranges on the Model 19 only the 5,000 μR scale can be calibrated to an actual source reading. All other scales will be calibrated to a pulse generator.

4.1.2 These detectors are not guaranteed light tight when outside of their instrument cases.

4.1.3 Due to the very low response ranges this instrument should not be used in areas where elevated (>5 mrem/hr) radiation fields are anticipated.

4.4.4 When using this instrument in a known, or suspected contaminated area, seal the instrument in a protective media (i.e., plastic, poly) to prevent contamination of the instrument.

4.2 Limitations

4.2.1 The operation of the Model 19 depends on the condition of the battery. Therefore, the battery check should be performed before each use and periodically during use to ensure proper operation.

4.2.2. Calibration shall be performed annually, after maintenance is performed, if the instrument fails the performance test or if proper operation is in question.

4.2.3 A daily performance test is required when this instrument is in use.

4.2.4 This is a gamma ray/photon exposure rate survey instrument only. Due to the non-linear detection efficiency of the sodium iodide detector, the term exposure rate is used loosely in this sentence.

5.0 RESPONSIBILITIES AND QUALIFICATIONS

5.1 Responsibilities

5.1.1 NWT Radiological Field Operations Manager

5.1.1.1 Implementation of this procedure.

5.1.1.2 Periodic reviews of adherence to the requirements of this procedure.

5.1.1.3 Ensure Health Physics Technicians are qualified by training and experience to perform the requirements of this procedure.

5.1.2 Health Physics Supervisors

5.1.2.1 Perform periodic surveillance of the use and maintenance of the instrument.

5.1.2.2 Ensures the instrument is calibrated at specified intervals.

5.1.2.3 Ensures that records pertaining to the instrument are maintained on file throughout the duration of the project and copies retained in the permanent project file.

5.1.3 Health Physics Technicians

5.1.3.1 Performance of the requirements in Section 6.1,6.2, and 6.3 of this procedure.

5.1.3.2 Documentation of all records in this procedure.

5.1.3.3 Notification to Health Physics Supervision of any unsafe or unusual conditions observed during operation of the instrument.

5.1.4 Health Physics Instrument Personnel

5.1.4.1 Perform the requirements of Sections 6.1, 6.2, and 6.3 of this procedure.

5.2 Qualifications

5.2.1 Health Physics technicians shall be qualified in accordance with the requirements of ANSI 3.1 - 1987 to operate this instrument for any of the following: Surveys, radiation work permits and job coverage.

5.2.2 Junior Health Physics and Decontamination Technicians may operate this instrument under direct supervision of a Health Physics Technician meeting the requirements of section 5.2.1.

6.0 PROCEDURE

6.1 Operation

6.1.1 Verify that the instrument has a valid Calibration Data Sticker, is not out of calibration, and the daily performance test has been completed and initialed on the Performance Test Daily Check Sticker. If the performance test has not been completed, have a Health Physics Technician perform the test (Section 6.2).

6.1.2 Inspect the instrument for any obvious physical damage which could interfere with its proper operation. It should include inspecting for loose, damaged knobs, buttons, broken or damaged meter movements/displays, dented or corroded instrument cases, punctured/deformed probe/probe window(s). Particular attention should be given to cables and connectors, since these components frequently become damaged or worn. Any instrument or detector having a questionable physical condition shall not be used until properly corrected.

NOTE: The Model 19 detector is a scintillation solid attached to a fragile glass photomultiplier tube with a glass wall. The thickness of this wall is similar to that of a light bulb. If the detector is subjected to shock the tube will break and disable the detector.

6.1.3 Perform a battery check by pressing the "BAT" button on the meter with the instrument selector switch turned to an "on" scale position. Ensure that the meter needle is within the "BATTERY" area on the meter face.

6.1.4 If unsatisfactory results are obtained, refer to Reference 3.1.3 for replacement of the batteries and repeat the check. The instrument shall display a satisfactory battery check prior to each use.

NOTE: If entering a limited visibility area to perform a survey check the meter face light by depressing the "L" button.

6.1.5 If the instrument fails any of the above checks, remove it from service, notify Health Physics Supervision, and arrange for repair of the meter.

6.1.6 Set the audio response switch to the "on" position.

6.1.7 Set the F/S selector switch to the appropriate setting. (F:Fast, 4 sec response time, erratic needle deflection S:Slow, 22 sec response time, stable needle deflection).

6.1.8 Set the range selector switch to an appropriate range for the activity being investigated. When entering an area of unknown radiation levels always enter the area on the highest scale (5,000 μR/hr) and scale down until an upward meter deflection is observed.

NOTE: 1 μR/hr = .001 mrem/hr.

6.1.9 The instrument's case is constructed with three dimples on the bottom front end of the case. These dimples represent the detector crystal centerline. This area of the instrument should be held closest to the source of activity when performing surveys.

6.1.10 Read the meter after sufficient response time (i.e., the meter needle is relatively stable) changing ranges as necessary for the activity encountered. If the meter is used for an extended period of time, check the battery condition periodically to ensure proper operation.

6.1.11 Upon completion of instrument use, Sections 6.1.2 and 6.1.3 should be performed to ensure the instrument is still functioning properly. If the instrument fails either portion, notify Health Physics Supervision and arrange for instrument repair.

6.2 Performance Test

6.2.1 Determine Performance Test Data

6.2.1.1 Obtain a 5 µCi Cs-137 or equivalent button source and record the serial number on NWT-008.

6.2.1.2 Switch the instrument to the appropriate range and obtain a source reading on contact. Record the observed reading on NWT-008.

6.2.1.3 Calculate the performance test range, ± 20% of the source reading, and record the results on NWT-008.

6.2.1.4 If the above steps are completed satisfactory, attached a completed Calibration Data Sticker and Performance Test Daily Check Sticker to the instrument. Complete form NWT-008 as appropriate.

6.2.2 Performance Test

6.2.2.1 Perform a performance test on the instrument and record all data form NWT-003, Performance Test Log Sheet.

6.2.2.2 Obtain the performance test source designated by the Performance Test source designated by the Performance Test Daily Check Sticker on the instrument.

6.2.2.3 Record the information for each section of form NWT-003.

6.2.2.4 Examine the instrument for any obvious physical damage which could interfere with its proper operation.

6.2.2.5 Verify that the instrument has a current Calibration Data Sticker and Performance Test Daily Check Sticker.

6.2.2.6 Perform a battery check by turning the selector switch to the 5000 µR/hr scale and depressing the "BATT" button, if the unit does not read in the "BATTERY" area, replace the batteries.

6.2.2.7 Expose the center of the detector to the designated source. If the reading is within the designated range for the source, proceed to Step 6.3.9. If the instrument fails record "F" for "FAIL" on NWT-003 and remove the instrument from service for repair or calibration.

6.2.2.8 If the instrument fails any portion of the performance test, log the instrument as failing on the Performance Test Log Sheet, remove from service, and notify Health Physics Supervision.

6.2.2.9 If the instrument passes the performance test, record "P" for "PASS" on form NWT-003, then initial the Performance Test Daily Check Sticker on the instrument and initial Performance Test Log Sheet.

NOTE: Due to the extremely low ranges incorporated in the instrument, only the high scales may be performance tested to an actual source reading.

6.3 Maintenance

6.3.1 No special storage requirements.

6.3.2 Electronic maintenance shall be performed by an Health Physics Instrumentation Technician or by the manufacturer or a approved vendor.

6.3.3 All maintenance shall be performed in accordance with the manufacturers' specifications.

6.3.4 If re-calibration is not required, performance test the instrument as per Step 6.2 prior to returning the instrument to service.

7.0 RECORDS

The following records will be generated and retained in the permanent project file as a result of using this procedure.

7.1 Form NWT-008 Instrument Service Record- Ludlum Model 19

7.2 Form NWT-003 Daily Instrument Performance Test Log Sheet

7.3 Calibration Data Sticker

7.4 Performance Test Daily Check Sticker

8.0 FORMS AND EXHIBITS

8.1 Forms

8.1.1 NWT-008, Instrument Service Record- Ludlum Model 19

8.1.2 NWT-003, Daily Instrument Performance Test Log Sheet

8.2 Exhibits

8.2.1 Performance Test Daily Check Sticker

8.2.2 Calibration Data Sticker

NWT SOP for Radiation and Contamination Survey Techniques
HP-OP-001

HP-OP-001
Revision 0

NEW WORLD TECHNOLOGY
OPERATING PROCEDURE

RADIATION AND CONTAMINATION SURVEY TECHNIQUES

New World Technology
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RADIATION AND CONTAMINATION SURVEY TECHNIQUES

1.0 SCOPE

This procedure provides guidelines for the performance and documentation of Radiation and Contamination surveys on New World Technology field projects.

2.0 PURPOSE

The purpose of this procedure is to specify requirements for consistent general radiological surveys and documentation of acquired data for routine, pre-operation and post-operation surveys as well as job coverage surveys. This procedure is intended to satisfy the requirements of DOE Order 5480.11.9g (3) (b) and 5480.11.9.g (4) (a) (b) (c) and 10 CFR 20.

3.0 REFERENCES AND DEFINITIONS

3.1 References

3.1.1 10 CFR 20, Standards for Protection Against Radiation

3.1.2 DOE 5480.11, Radiation Protection for Occupational Workers

3.1.3 ANSI N3.1 - 1987, Selection, Qualifications and Training of Personnel For Nuclear Power Plants

3.1.4 NUREG/CR-5849 -1992, Manual for Conducting Radiological Surveys in Support of License Termination

3.1.5 HP-OP-003, Release of Materials from Radiologically Controlled Areas

3.1.6 HP-OP-002, Radiological Area Posting and Access Control

3.2 Definitions

3.2.1 Activity - The rate of disintegration (transformation) or decay of radioactive material. The units of activity for the purpose of this procedure are disintegrations per minute (dpm), Becquerel (Bq), or micro-Curies for loose contamination and disintegrations per minute or millirad/hour for fixed contamination.

3.2.2 Check Source - A sample of radioactive material in which the exact quantity of radioactive material is not known but the type and energy of the emission is known. These sources are used for field qualitative response checks or radiation detection instrumentation. These sources are labelled with a sticker that indicates an approximate value of the count rate to be expected when performing a qualitative response check.

3.2.3 Contamination - Deposition of radioactive material in any place it is not desired, particularly where its presence may be harmful. The harm may be actual exposure to individuals or release of the material to the environment or general public. Contamination may be due to the presence of alpha particle, beta particle or gamma ray emitting radionuclides.

3.2.4 Controlled Area - Any area to which access is controlled in order to protect individuals from exposure to radiation and radioactive materials and/or to prevent the release of radioactive materials to the uncontrolled areas.

3.2.5 Fixed Contamination - Radioactive contamination that is not readily removed from a surface by applying light to moderate pressure when wiping with a paper or cloth disk smear, or masslin.

3.2.6 Minimum Detectable Activity (MDA) - For purposes of this procedure, MDA for removable radioactive contamination is defined as the smallest amount of sample activity that will yield a net count with a 95% confidence level based upon the background count rate of the counting instrument used.

3.2.7 Qualitative Response Check - A check of a radiation detection instrument in which the performance of the instrument is checked against a check source for response only.

3.2.8 Quantitative Response Check (Performance Test) - A check of a radiation detection instrument in which performance of the instrument is checked against a reference standard with an acceptance value of ± 20% of the reference value.

3.2.9 Reference Standard - A sample of radioactive material, usually with a long half-life, in which the activity and the type of emission is known and is N.I.S.T. traceable. These standards are used for calibration and quantitative source checks (Performance Test) of radiation detection instruments.

3.2.10 Transferrable (Loose) Contamination - Radioactive contamination that is readily removed from a surface by applying light to moderate pressure when wiping with a paper or cloth disk smear, or masslin.

3.2.11 Radiation Work Permit (RWP) - A document generated by Health Physics to provide:

3.2.11.1 A description and scope of the work to be performed.

3.2.11.2 The existing radiological conditions in the work area.

3.2.11.3 The limitations placed upon the scope of work.

3.2.11.4 The maximum radiological limits allowed.

3.2.11.5 The protective measures to be employed during the work to protect the worker(s).

3.2.11.6 The period of time the RWP is valid.

3.2.11.7 Special instructions to workers and Health Physics Technicians during the course of work.

3.2.11.8 The proper approvals required to start work.

4.0 PRECAUTIONS, LIMITATIONS

4.1 Precautions

4.1.1 Personnel performing surveys in known or suspected contaminated areas should avoid unnecessary contamination of survey instruments by using plastic film coverings and exercise care. Covering the mylar window may decrease the beta and alpha efficiency; avoid covering mylar windows.

4.1.2 Exercise care when performing contact measurements with mylar window exposed to prevent damage.

4.1.3 Avoid unnecessary exposure when performing surveys by practicing good ALARA practices.

4.1.4 The surveyor should be aware of:

4.1.4.1 The operation and limitations of the survey instrument(s) used; refer to the particular instrument's operation and calibration procedure.

4.1.4.2 The anticipated range of radiation and contamination levels in the area to be surveyed.

4.1.4.3 Activities in the area that may have or will change radiological safety conditions.

4.1.4.4 Safety considerations and requirements in effect in the area to be surveyed.

4.1.4.5 The nature of the work to be performed in the area the survey is to be performed if the survey is to be used for Radiation Work Permit generation.

4.1.5 Radiation surveys used as a basis for Radiation Work Permits or area postings shall be performed by a Health Physics Technician meeting the requirements of Reference 3.1.3 or by an individual not meeting those requirements under the direct supervision of an Health Physics Technician.

4.1.6 Equipment or area surveys used to determine radiation and contamination levels for informational purposes only (such as during decontamination to check progress) may be performed by individual's not meeting the requirements of Reference 3.1.3

4.1.7 Health Physics Technicians shall follow all applicable RWP and posting instructions when performing radiation and contamination surveys.

4.1.8 Health Physics shall leave an area immediately if during the survey the radiation detection instrument in use appears to be malfunctioning or radiological conditions in the area being surveyed change unexpectedly.

4.1.9 All material such as smears or other survey materials shall be treated as radioactive material until a survey is performed on the material in question.

4.1.10 Sources of radiation smaller than the open window area of an ion chamber instrument may require the use of different beta correction factors. Also, the field beta correction factor and the contact beta correction factor will differ. Refer to the appropriate ion chamber operation and calibration procedure or the calibration sticker for these values.

4.1.11 Contact exposure rates shall be measured at a distance of less than one inch from the source of radiation.

4.1.12 Thirty-centimeter (~12 inches) readings shall be used as the whole body reading for posting purposes.

4.1.13 Prior to entering the area or performing any survey, each radiation detection instrument shall be:

- Battery Checked.
- Checked for obvious physical damage.
- Quantitatively response-checked daily prior to use.
- Checked to ensure the instrument is within current calibration.

If any of the above conditions are unsatisfactory, the instrument shall be tagged out of service and not used.

4.2 Limitations

4.2.1 This procedure does not apply to characterization surveys, nor is it intended to alter current or future characterization survey techniques.

4.2.2 For exposure rate surveys used to determine RWP requirements, job coverage, or stay times, an ion chamber instrument should be used.

4.2.3 The survey techniques described in this procedure do not alter or replace the requirements of Reference 3.1.5.

4.2.4 When using cloths (or masslin) to perform large area smears, results shall be reported in disintegrations per minute (DPM) or mrad/hr above background. Do not attempt to quantify the survey area.

4.2.5 Radiation and contamination surveys may be used to write RWP's if the survey has been performed within 24 hours of RWP initiation or there is reasonable assurance that conditions have not changed.

5.0 RESPONSIBILITIES

5.1 The NWT Radiological Field Operations Manager shall be responsible for:

5.1.1 Implementation of this procedure.

5.1.2 Periodic reviews of adherence to the requirements of this procedure.

5.1.3 Ensure Health Physics Technicians are qualified by training and experience to perform the requirements of this procedure.

5.2 The Health Physics Supervisors shall be responsible for:

5.2.1 Reviewing and approving data generated by the use of this procedure.

5.2.2 Insuring personnel using this procedure comply with all procedural requirements.

5.3 Health Physics Technicians shall be responsible for:

5.3.1 Performing the requirements of this procedure.

5.3.2 Completing all required records and submitting them for review to Health Physics Supervision.

5.4 Junior Health Physics/Decontamination Technicians shall be responsible for:

5.4.1 Performing the requirements of this procedure under direct supervision of an Health Physics Technician.

5.4.2 Completing all required records under direct supervision of an Health Physics Technician.

6.0 PROCEDURE

6.1 General

6.1.1 Radiation and contamination surveys shall be performed on an as-needed basis. The need for performing a survey is identified by the following conditions:

6.1.1.1 An RWP is needed to perform an approved job.

6.1.1.2 A procedural requirement requires a survey.

6.1.1.3 A condition exists where radiological data is needed to form a decision by Health Physics supervision.

6.1.1.4 An investigation is required due to abnormal conditions or indications.

6.1.1.5 An on-going job requires a survey to update radiological postings and/or RWP.

6.1.2 Determine the type of survey to be performed and select the proper radiation detection instrument(s) for the survey.

6.1.2.1 Select an instrument capable of detecting the type of radiation to be surveyed.

6.1.2.2 Select an instrument capable of detecting the range of exposure rate or contamination level expected.

6.1.2.3 Select an instrument calibrated to the range of expected emission energy.

6.1.2.4 Select an instrument that has been calibrated for the type of radiation to be surveyed.

6.1.3 Review and sign in on the applicable RWP for the area to be surveyed.

6.1.4 When entering posted or suspected high radiation areas, or unknown areas, the ion chamber instrument range selector switch shall be selected to the highest range and moved down through the lower ranges until the meter indicates on scale.

6.1.5 When surveying for radiation levels using an ion chamber, gamma reading shall be taken with the beta window closed.

6.1.6 When surveying for beta radiation levels using an ion chamber, readings shall be taken with the beta window open (OW) and then closed (CW). The beta correction factor (CF) for contact beta readings is listed on the instrument calibration sticker. The beta correction factor for field beta readings (30cm from source) is 1.5.

Corrected beta dose rate = (OW-CW) X CF

6.1.7 Instruments used to perform radiation and contamination surveys shall be operated in accordance with their operation and calibration procedure.

6.2 Standard Health Physics Practices concerning performance of Radiation Surveys.

6.2.1 Check out necessary survey instruments and comply with operational procedures of the instrument's operation and calibration procedure.

6.2.2 The instrument's operation and calibration procedure may be used to assist in determining necessary survey instruments. Instrument limitations are described in these procedures.

6.2.3 General Area Beta/Gamma Radiation Surveys.

6.2.3.1 General area surveys are normally conducted to measure only gamma radiation levels. However, when suspected, general area beta radiation levels can be measured with Model-9, RO2, or RO2A (or equivalent) using the field beta correction factor of 1.5 Document all general area beta radiation levels ≥ 1 mrad/HR on the survey form.

6.2.3.2 For general area room surveys, hold the instrument detector at waist to chest level, utilizing the highest reading obtained for documentation of survey records and postings. Normally, general area surveys are considered as being greater than 30cm away from relevant components and equipment.

6.2.3.3 General area room surveys for RWP's should include accessible areas and positions or levels where personnel will be performing work.

6.2.3.4 Survey data should be documented in accordance with Section 6.6 of this procedure.

6.3 Contact Beta/Gamma Radiation Surveys.

6.3.1 Contact surveys should be taken at approximately one inch away from relevant components and equipment.

6.3.1.1 Conduct Beta Radiation surveys:

(a) On open radioactive systems and exposed contaminated equipment internals.

(b) Whenever leakage from a radioactive system is in evidence or is suspected to have occurred.

6.3.2 Contact surveys should also be taken on relevant components and equipment which personnel will be likely to contact during the performance of their work.

6.3.3 When conducting contact surveys on surfaces with high levels of exposed surface contamination, obtain an open window reading and a closed window reading to determine the beta contribution.

6.3.3.1 Denote all corrected Beta readings on the survey form.

(a) True Beta Dose Rate is determined by open window reading minus closed window reading times the beta correction factor of 1.5 for field beta measurements or the contact beta correction factor (4.0) found on the calibration stickers for contact beta measurements.

6.3.4 Document survey data in accordance with Section 6.6 of this procedure.

6.4 Standard Health Physics Practices concerning Smearable Contamination Surveys.

6.4.1 Smear Surveys

6.4.1.1 Wipe a cloth or paper disc smear over an area of 100 cm^2. 100 cm^2 is approximated by a four-inch square or an 18-inch "S".

6.4.1.2 Avoid cross-contaminating the smear samples.

6.4.1.3 Count the disc smears on the appropriate counting equipment. The following guidelines should be used when counting smears.

(a) The Model-3/44-9 or equivalent should be used for counting smears > 1,000 dpm and smears taken in posted contaminated areas for beta-gamma.

(b) The Model-3/43-5 or equivalent should be used to count smears obtained from contaminated areas for alpha.

(c) All smears taken for the purpose of determining if the item or area smeared is below the posting requirements for loose activity in accordance with Reference 3.1.6, must be counted on instruments capable of detecting 20 dpm alpha and 1,000 dpm beta-gamma (Model-2929).

(d) Report results in units of dpm/100 cm^2 and document in accordance with Section 6.6 of this procedure.

(e) Smear results >50,000 cpm may be reported in mrad/hr/100 cm^2.

6.4.2 Large Area Smear Survey (Wipe)

6.4.2.1 Large area smears are used to obtain a gross indication of contamination levels in large areas or on pieces of equipment suspected to have contamination present. Large area smears may also be used to check normally clean areas or equipment for presence of contamination.

6.4.2.2 Wipe over the surface to be surveyed.

6.4.2.3 Count the wipe with a count rate meter equipped with a 44-9 probe or equivalent for beta-gamma and/or a Model-3/43-5 or equivalent for alpha.

6.4.2.4 Use the highest reading obtained for reporting results. Results should be recorded in units of dpm/wipe above background.

(a) When using wipes to check a clean area, or piece of equipment for contamination; if there is any indication of activity above background on the wipe, the area must be smeared using disc smears in accordance with Step 6.4.1 of this procedure.

6.4.2.5 Document results in accordance with Section 6.6 of this procedure.

6.5 Standard Health Physics Practices concerning Fixed Contamination Surveys.

6.5.1 Fixed contamination surveys are used to obtain indications of fixed contamination levels on surface areas, pieces of equipment, or tools for characterization and/or release surveys.

6.5.2 The Model-3/44-9 or equivalent should be used for fixed contamination surveys for beta-gamma.

6.5.3 The Model-3/43-5 or equivalent should be used for fixed contamination surveys for alpha.

6.5.4 When surveying for fixed beta-gamma contamination the probe should be held within one-half inch or less from the surface being surveyed. The movement rate of the detector probe should be one probe width per second or slower.

6.5.5 When surveying for fixed alpha contamination the probe should be held within one-quarter inch or less from the surface being surveyed. The movement rate of the detector probe should be one probe width per second or slower.

6.5.6 When performing direct scan surveys of objects, surface areas etc., static readings should be performed frequently to insure the detection of residual activity.

6.5.7 When performing free release or characterization surveys 100 % of all accessible areas should be direct frisk surveyed.

6.5.8 Use the highest reading obtained for reporting results. Results should be reported in units of net CPM above background or dpm/100 cm^2.

6.5.8.1 The following formula should be used for converting direct probe readings in CPM to dpm/100 cm^2 :

$$\text{dpm/100 cm}^2 = \frac{\text{Gross CPM - Background CPM}}{\text{Instrument Efficiency (Eff. c/d)}} \times \frac{100}{\text{Probe Area (cm}^2\text{)}}$$

6.5.9 Document the results in accordance with Section 6.6 of this procedure.

6.6 Documentation of Surveys

6.6.1 All radiation and contamination surveys shall be documented on an Radiological Survey Report NWT-001 or equivalent form.

6.6.1.1 Smears counted with portable instruments shall have the results recorded in the appropriate columns.

6.6.1.2 Drawings shall be included as necessary to clearly explain survey locations.

6.6.1.3 The header of the NWT-001 shall be complete prior to submission for review.

6.6.1.4 All unused blank areas of NWT-001 shall have N/A entered in the area.

6.6.1.5 Survey numbers are obtained from the Radiation/Contamination Survey Log NWT-034.

6.6.1.6 Gamma readings are recorded in mR/hr.

6.6.1.7 Corrected beta readings shall be annotated as such.

6.6.1.8 Neutron readings shall be annotated as mrem/hr.

6.6.1.9 Alpha values shall be annotated with the α symbol.

6.6.1.10 Beta values shall be annotated with the β symbol.

6.6.1.11 Contact readings shall be annotated with an asterisk.

6.6.1.12 30 cm readings shall be annotated with the value underlined.

6.6.1.13 Smear locations shall be numbered with the number circled.

6.6.1.14 Large area smears shall be numbered with the number inside a triangle.

6.6.1.15 A narrative explanation of abnormal or unsafe conditions should be included on the survey.

6.6.2 Smears counted with fixed instrumentation such as the Ludlum Model-2929 shall be recorded on Form NWT-006.

6.6.3 Isotopic analysis results shall be attached to Form NWT-001. The survey (NWTS) number shall be recorded on each page.

7.0 RECORDS

The following records are generated by the use of this procedure. These records shall be reviewed daily by Health Physics supervision and retained in the permanent project file.

7.1 Smear Counting Analysis Report, NWT-006

7.2 Radiological Survey Report, NWT-001

7.3 Radiation/Contamination Survey Log, NWT-034

8.0 FORMS

8.1 NWT-006, Smear Counting Analysis Report

8.2 NWT-034, Radiation/Contamination Survey Log

8.3 NWT-001, Radiological Survey Report

Thermo NUtech SOP for Quality Assurance
QAP-11

1.0 INTRODUCTION

1.1 Preface

Quality Control (Q.C.) samples (blanks, duplicates, or spikes) are submitted to the chemistry groups by the Quality Assurance (Q.C.) Officer who uses the analytical results to assure that the goals of precision and accuracy are met, and to verify that the chemistry groups are performing within acceptable limits. This procedure establishes the protocol for the submission of Q.C. samples to the chemistry groups, the methods for calculating and evaluating the resulting data, and the actions required as a result of the data.

1.2 Purpose

To establish a protocol for the processing of quality control samples and the evaluation of the resulting analytical data.

1.3 Scope

This procedure applies to personnel who generate and process Q.C. samples and to those who evaluate the analytical results.

2.0 REFERENCES

2.1 Thermo NUtech Quality Assurance Program Manual.

2.2 Specific Procedure Manuals applicable to the analysis being performed.

2.3 Reg. Guide 4.15 "Quality Assurance for Radiological Monitoring Programs (normal operations) - Effluent Streams and the Environment"

3.0 DEFINITIONS

3.1 **Quality Control (Q.C.):** The overall system of technical activities that measures and controls the quality of a process, item, or service so that it meets the stated need of the user.

3.2 **Quality Control Sample:** A sample processed through the analytical system which provides a means to determine the precision and accuracy of the monitoring processes.

3.3 **Duplicate Sample:** A Q.C. sample that provides a means to determine precision.

3.4 **Laboratory Blank:** A Q.C. sample that provides a means to detect and measure radioactive contamination of analytical samples.

3.5 **Spiked Sample:** A Q.C. sample which, with known concentration of nuclides, provides a means to determine accuracy.

4.0 RESPONSIBILITY

4.1 The Laboratory Manager is responsible to assure implementation of this procedure.

4.2 The Q.A. Officer is responsible to assure that Q.C. samples are prepared and submitted to the chemistry groups, that results are received and evaluated, and that corrective action is requested when results are not in compliance with prescribed policy.

4.2 Program Managers are responsible to request specific Q.C. samples to satisfy contractual, technical, and internal Q.C. requirements

4.3 The Operations Manager is responsible to assure Q.C. samples are analyzed on a timely basis and that results are reported to the Q.A. Officer.

5.0 SAFETY

The requirements of the Thermo NUtech - Richmond Laboratory Safety Manual and the Thermo NUtech - Richmond Radiation Safety Manual shall be observed during all operations in the laboratory.

6.0 MATERIAL

In addition to the material normally used in the laboratory, certified radioactive tracer and standard material will be needed.

7.0 PROCEDURES

The program manager determines the type and quantity of Q.C. samples to be submitted to the laboratory for analysis based on program, procedure, or Q.C. requirement. This information is provided to the Q.A. officer who causes the required Q.C. sample to be produced. After analysis, radiometrics personnel or the program manager provides the Q.A. Officer with the results and the associated error (σ). The Q.A. Officer will evaluate the results for acceptability in accordance with this procedure.

The fact that the results of a Q.C. sample meets the acceptance criteria outlined in this procedure does not relieve the program manager of the responsibility for investigating and correcting deficiencies resulting from a more stringent requirement imposed by a particular program, contract, or by the program manager's own procedure for data review.

7.1 Out-of-Control and Warning Conditions

Results are out-of-control if greater than or less than the upper or lower control limit respectively. The results are in the warning range if greater than or less than the upper or lower warning limit respectively. The warning limits are defined as two thirds of the control limits.

7.2 Control and Warning Limits

7.2.1 Spike Results

The Found (F) to Added (A) ratio is the Recovery (R) and is calculated as R = F/A. This ratio is the control parameter and the limits are defined as follows:

	Control Limits		Warning Limits	
	Lower	Upper	Lower	Upper
Gross Alpha	0.60	1.40	0.73	1.27
Gross Beta, ^{14}C	0.70	1.30	0.80	1.20
All other	0.80	1.20	0.87	1.13

Specific contract requirements may result in spiked samples with very low activities. If, as a result of this, the one sigma error of the spike result is greater than 10%, then the control limits are widened by the one sigma error value.

7.2.2 Blank Results

Blank results are compared to the MDA (Minimum Detectable Activity) of the blank analysis. The control limits for all analyses are defined as ± 2 times the MDA except for analyses performed in the high level lab, in which case the control limits are defined as $\pm$ 5 times the MDA. The calculation of the MDA is method specific and is documented in the appropriate calculation procedures. No warning limits are defined for blanks.

7.2.3 Duplicate Results

7.2.3.1 If both duplicate and the original sample results are less than or equal to two times their respective MDAs, or five times their respective MDAs for analyses performed in the high level lab, then no RSD (Relative Percent Difference) is calculated and the duplicate sample result is acceptable.

7.2.3.2 If the results plus or minus their respective 2σ absolute errors overlap, then the duplicate sample result is acceptable and a RPD is calculated.

7.2.3.3 If both the original and the duplicate sample results are reported as upper limits and the difference between the two values is less than a factor of 10, then no RPD is calculated and the duplicate sample result is acceptable.

7.2.3.4 If only the original, or the duplicate, is reported as an upper limit and if the result not reported as an upper limit is less than 2 times the reported upper limit, then no RPD is calculated and the duplicate sample result is acceptable.

7.2.3.5 If the RPD is less than, or equal to, one of the following values, then the results is acceptable:

Gross Alpha	40
Gross Beta, C-14	30
All other analyses	30

7.2.3.6 If none of the above criteria is met, then the duplicate result is not acceptable (a failure).

7.3 Trend Analysis - Analysis of the history of Q.C. results may reveal trends in the Q.C. program that require corrective actions. Trend analysis is performed once a month on the previous months history of Q.C. results. All data generated the previous month will be reviewed. In cases where fewer than ten (10) data points were generated, the review will extend as far as the previous three (3) months. The following circumstances result in out-of-control trends:

7.3.1 Two results in succession are out-of-control.

7.3.2 Four results out of ten are out-of-control.

7.3.3 Four results out of ten are lower than the lower warning limit.

7.3.4 Four results out of ten are greater than the upper warning limit.

7.4 Evaluation of Calibration Bias - On a semi-annual basis, an average of the Q.C. Spike found/added ratios for the previous six months will be calculated. Obvious outliers will be rejected before the averaged are computed. Any bias value that is greater than one-half of the warning limits for that analysis are considered out-of-control.

7.5 Corrective Action - A Corrective Action Request (CAR) will be issued when an out-of-control trend as defined in 7.3 is observed. A CAR will not be issued for an individual out-of-control result.

8.0 **APPENDIX: N/A**

9.0 **SUPERSESSION**

This procedure supersedes QAP 11, Rev. 05, same title, dated 11--06-95.

EPA Methods
Analysis of Gamma Emitters and Radium 226
EPA Methods 901.1 and 903.1

SECTION 4
GAMMA EMITTING RADIONUCLIDES IN DRINKING WATER
METHOD 901.1

1. Scope and Application

   1.1 This method describes the use of gamma spectroscopy for the measurement of gamma photons emitted from radionuclides without separating them from the sample matrix. This technique makes it possible to ascertain whether a hazardous concentration of a specific gamma emitter is present in a drinking water sample.

   1.2 The limits set forth in PL 93-523, 40 FR 34324 recommend that in the case of man-made radionuclides, the limiting concentration is that which will produce an annual dose equivalent to 4 mrem/year. This is calculated on the basis of a 2 liter per day drinking water intake using the 168 hour data listed in NBS Handbook 69. If several radionuclides are present, the sum of their annual dose equivalent must not exceed 4 mrem/year.

   1.3 Two types of gamma detectors are currently widely used, namely, the thallium activated sodium iodide crystal, NaI(Tl), and the lithium drifted germanium detector, Ge(Li). The Ge(Li) detector does not detect gamma photons as efficiently as the NaI(Tl) detector, but its photon energy resolution is far better than that of the NaI(Tl) detector. Because of its energy resolution advantage and the availability of large active volume Ge(Li) detectors, a Ge(Li) detection system is recommended for measuring gamma emitting radionuclides in drinking water samples.

   1.4 The method is applicable for analyzing water samples that contain radionuclides emitting gamma photons with energies ranging from about 60 to 2000 keV. The required sensitivity of measurement for the more hazardous gamma emitters is listed in the National Interim Drinking Water Regulations, Section 141.25. For a method to be in compliance, the detection limits for photon emitters must be 1/10 of the applicable limit. The detection limits for cesium-134 and cesium-137, which are 10 and 20 pCi/l respectively, are met by this procedure.

2. Summary of Method

   2.1 A homogeneous aliquot of drinking water is put into a standard geometry for gamma counting. The counting efficiency for this geometry must have been determined with standard (known) radionuclide activity. Sample aliquots are counted long enough to meet the required sensitivity of measurement, specified by the NIPDWR (see Appendix C).

2.2 The gamma spectrum is printed out and/or stored in the appropriate computer-compatible device for data processing (calculation of sample radionuclide concentrations).

3. Sample Handling and Preservation - See Section 3, Method 900.0

4. Interferences

4.1 Significant interference occurs when counting a sample with a NaI(Tl) detector and the sample radionuclides emit gamma photons of nearly identical energies. Such interference is greatly reduced by counting the sample with a Ge(Li) detector.

4.2 Sample homogeneity is important to gamma count reproducibility and counting efficiency validity. When sample radionuclides are adsorbed on the walls of the counting container, the sample is no longer homogeneous. This problem can be lessened by adding 15 ml 1N HNO_3 per liter of sample at collection time.

5. Apparatus - See Appendix D for Details and Specifications

5.1 Large volume (> 50 cm^3) Ge(Li) detector or 4" x 4" NaI(Tl) detector.

5.2 Gamma-ray spectrometer plus analyzer with at least 2048 channels for Ge(Li) or 512 for NaI(Tl).

5.3 Standard geometry sample counting containers for either detector. (1-pint cylindrical container or 4-liter Marinelli polyethylene beaker.)

5.4 Access to a computer.

6. Reagents

6.1 Radon free distilled or deionized water for standard preparation and sample dilution.

6.2 Nitric acid, 1N: Mix 6.2 ml of 16N HNO_3 (conc.) with distilled water and dilute to 100 ml.

7. Calibration

7.1 A Ge(Li) detector-gamma spectrometer can be calibrated for energy resolution as follows:

NBS or NBS-traceable standard solutions are prescribed for this calibration. Adjust the analyzer amplifier "gain" and analog-to-digital converter "zero offset" to locate each photopeak in its appropriate channel. For a Ge(Li) detector system a 0.5 or 1.0 keV per channel calibration is recommended. For a NaI(Tl) detector system a 10 or 20 keV per channel calibration is satisfactory since the energy resolution of this type detector is lower than that of the Ge(Li) detector.

7.2 For NaI(Tl), a library of radionuclide gamma energy spectra is prepared with known radionuclide-water sample concentrations at standard sample geometries; for Ge(Li), a single solution containing a mixture of fission products may be used. These standard solutions are available from NBS or the Quality Assurance Division, EMSL-Las Vegas. Counting efficiencies for the various gamma energies (photopeaks) are determined from the activity counts of those known value samples. A counting efficiency vs. gamma energy curve is determined for each container geometry and for each detector that is to be used for sample analysis. Known amounts of various radionuclides that emit gamma photons with energies well spaced and distributed over the normal range of analysis may also be used for this calibration. These are put into each container geometry and gamma counted for a photopeak spectrum accumulation.

7.3 The detector efficiency, E, at a given photopeak energy for a given geometry is determined by using a known quantity or concentration (for a volume geometry) of a gamma emitting radionuclide, as follows:

$$E = \frac{C}{A \times B}$$

where:

C = net count rate, cpm, (integrated counts in the photopeak above the base line continuum divided by the counting time in minutes),

A = activity of radionuclide added to the given geometry container (dpm),

B = the gamma-ray abundance of the radionuclide being measured (gammas/disintegration).

8. Procedure

8.1 Measure an aliquot of the drinking water sample in a standard geometry (one that has been calibrated).

8.2 Place the standard geometry container (with the sample aliquot) on a shielded Ge(Li) or NaI(Tl) detector and gamma count for a period of time that will meet the required sensitivity of measurement, specified by the NIPDWR. (The required counting time can be determined by equations given in Appendix C).

8.3 Print the gamma spectrum and/or store the spectrum on the appropriate computer-compatible device.

8.4 Calculate the radioactivity of the gamma emitters present in the sample.

9. Calculations

These calculations are for determinations using a Ge(Li) detector system. With a NaI(Tl) detector system, similar calculations can be done by a computer using a library of radionuclide spectra and a least-squares (1,2) or matrix analysis program (3).

9.1 The isotopes indicated by the gamma spectrum are determined as follows:

9.1.1 Identify all photopeak energies.

9.1.2 Integrate the photopeak regions of the spectrum and subtract the area under the base line continuum to determine the true photopeak area.

9.1.3 Isotopes are identified by their appropriate photopeaks, and ratios to each other when more than one gamma photon is emitted by an isotope in the sample.

9.2 Calculate the sample radionuclide concentrations, A, in pCi/l as follows:

$$A = \frac{C}{2.22 \times BEV}$$

where:

C = net count rate, cpm, in the peak area above base line continuum,
B = the gamma-ray abundance of the radionuclide being measured (gammas/disintegration),
E = detector efficiency (counts/gamma) for the particular photopeak energy being considered.
V = volume of sample aliquot analyzed (liters).
2.22 = conversion factor from dpm/pCi.

10. Precision and Accuracy

10.1 Precision and accuracy of this test procedure will be determined by a separate collaborative study. However, a summary of the EMSL-Las Vegas cross-check and performance sample studies (six and two respectively) for the period of August, 1978, to October, 1979 gives the following information about acceptable performance in the analyses of water samples for gamma emitting radionuclides by gamma spectroscopy. Some laboratories used Ge(Li) detector/gamma spectrometer systems and others used NaI(Tl) detector/gamma spectrometer systems.

10.2 Six gamma emitting radionuclides were used in those studies, namely, chromium-51, cobalt-60, zinc-65, ruthenium-106, cesium-134, and cesium-137. Samples for the August 1978 and October 1978 cross-check samples and the April 1979 performance samples contained cobalt-60 and cesium-134. The February 1979 cross-check samples contained cobalt-60, zinc-65, cesium-134, and cesium-137. The October 1979 cross-check samples contained chromium-51, cobalt-60, cesium-134, cesium-137. The October 1978 performance samples contained cesium-134 and cesium-137.

10.3 Cesium-134 in seven studies was analyzed by an average of 46 laboratories for a 90.8 ± 11.6% average acceptable performance. Cesium-137 in five studies was analyzed by an average of 48 laboratories for a 87.7 ± 11.7% average acceptable performance. Since the radionuclide concentrations in the samples for all studies were well below the maximum allowable concentrations for drinking water, this non-destructive gamma-emitting procedure to ascertain whether cesium-134 or cesium-137 is present is recommended as an alternate to Method 901.0.

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SECTION 7
RADIUM-226 IN DRINKING WATER
RADON EMANATION TECHNIQUE
METHOD 903.1

1. Scope and Application

   1.1 This method covers the measurement of radium-226 in a drinking water sample and would be employed after the gross alpha or the gross radium alpha screening technique had indicated possible non-compliance with the alpha radioactivity limits set forth in the Safe Drinking Water Act, PL 93-523. 40 FR 34324.

   1.2 This method is specific for radium-226, and is based on the emanation and scintillation counting of radon-222, a daughter product of radium-226.

   1.3 The detection limit for this method assures measuring radium-226 concentrations as low as 0.1 pCi/l.

2. Summary of Method

   2.1 The radium-226 in the drinking water sample is concentrated and separated by coprecipitation on barium sulfate. The precipitate is dissolved in EDTA reagent, placed in a sealed bubbler and stored for ingrowth of radon-222. After ingrowth, the gas is purged into a scintillation cell. When the short-lived radon-222 daughters are in equilibrium with the parent (~4h), the scintillation cell is counted for alpha activity.

   2.2 The absolute measurement of radium-226 is effected by calibrating the scintillation cell system with a standard solution of this nuclide.

3. Sample Handling and Preservation (see Sec. 3, Method 900.0).

4. Interferences

   4.1 There are no radioactive interferences in this method.

5. Apparatus - See Appendix D for details and specifications.

   5.1 Scintillation cell system. (Figure 1.)

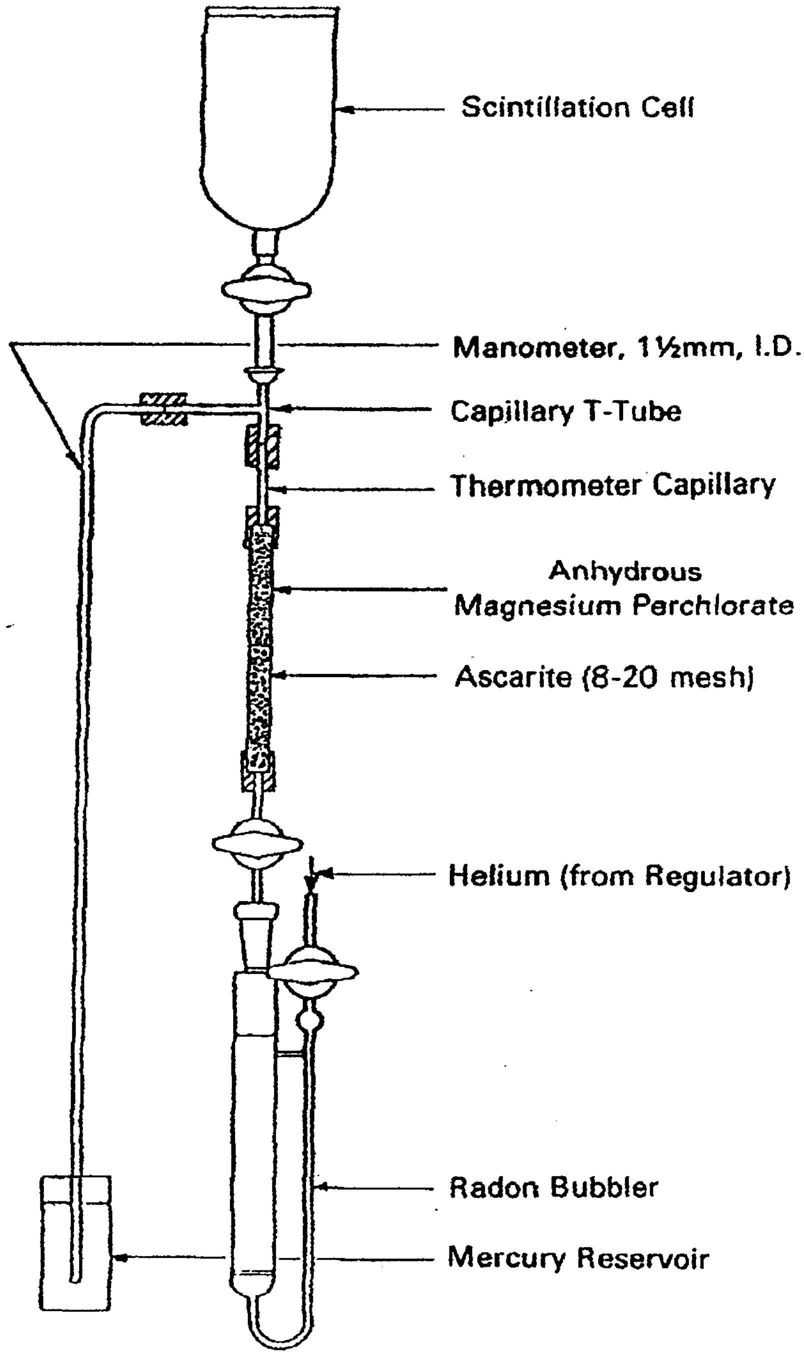

Figure 1. Radon emanation apparatus with scintillation cell

5.2 Radon emanation apparatus:

a) Radon bubbler - (Figure 2.)
b) Scintillation cell - (Figure 3.)

5.3 Electric hot plate

5.4 Analytical balance

5.5 Centrifuge

5.6 Glassware

6. Reagents

6.1 Distilled or deionized water.

6.2 Ammonium hydroxide, 15N: NH_4OH (conc.), sp. gr. 0.90, 56.6%.

6.3 Ascarite, drying reagent: 8-20 mesh.

6.4 Barium carrier, 16 mg/ml, standardized: (see Sec. 6, Method 903.0).

6.5 EDTA reagent, basic, (0.25M): Dissolve 20g NaOH in 750 ml water, heat and slowly add 93g disodium ethylenedinitriloacetate dihydrate, ($Na_2C_{10}H_{14}O_8N_2.2H_2O$) while stirring. After the salt is in solution, filter through coarse filter paper and dilute to 1 liter.

6.6 Helium, gas.

6.7 Hydrochloric acid, 12N: HCl (conc.), sp. gr. 1.19, 37.2%.

6.8 Magnesium perchlorate, $Mg(ClO_4)_2$: reagent grade.

6.9 Sodium hydroxide, 10N: Dissolve 40g NaOH in 50 ml water and dilute to 100 ml.

6.10 Standard radium-226 tracer solution: preferably purchased from National Bureau of Standards, Special Publication 260, 1978, SRM 4960. Prepare stock dilution equivalent to 50 pCi radium-226 per ml.

6.11 Sulfuric acid, 18N: Carefully mix 1 volume 36N H_2SO_4 (conc.) with 1 volume of water.

6.12 Sulfuric acid, 0.1N: Mix 1 volume 18N H_2SO_4 with 179 volumes of water.

7. Calibrations

7.1 The calibration constant of each scintillation cell must be

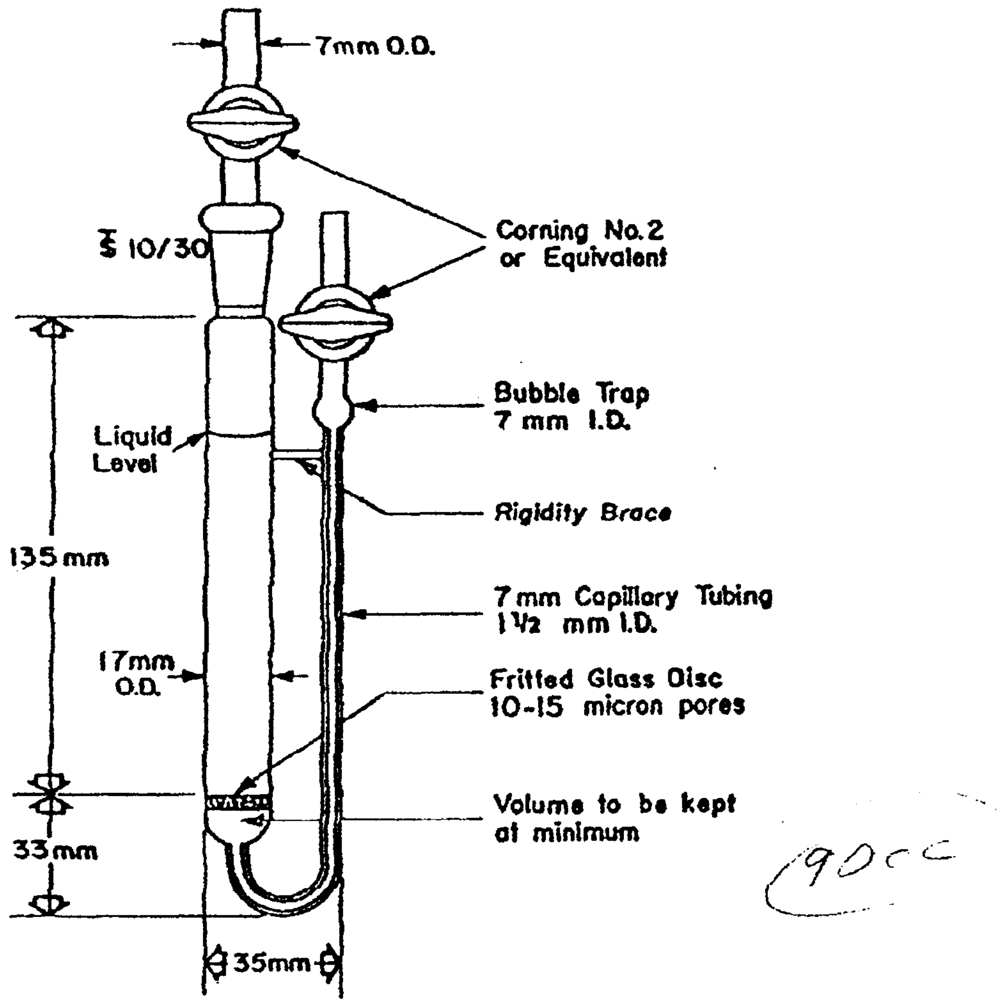

Figure 2. A typical radon bubbler

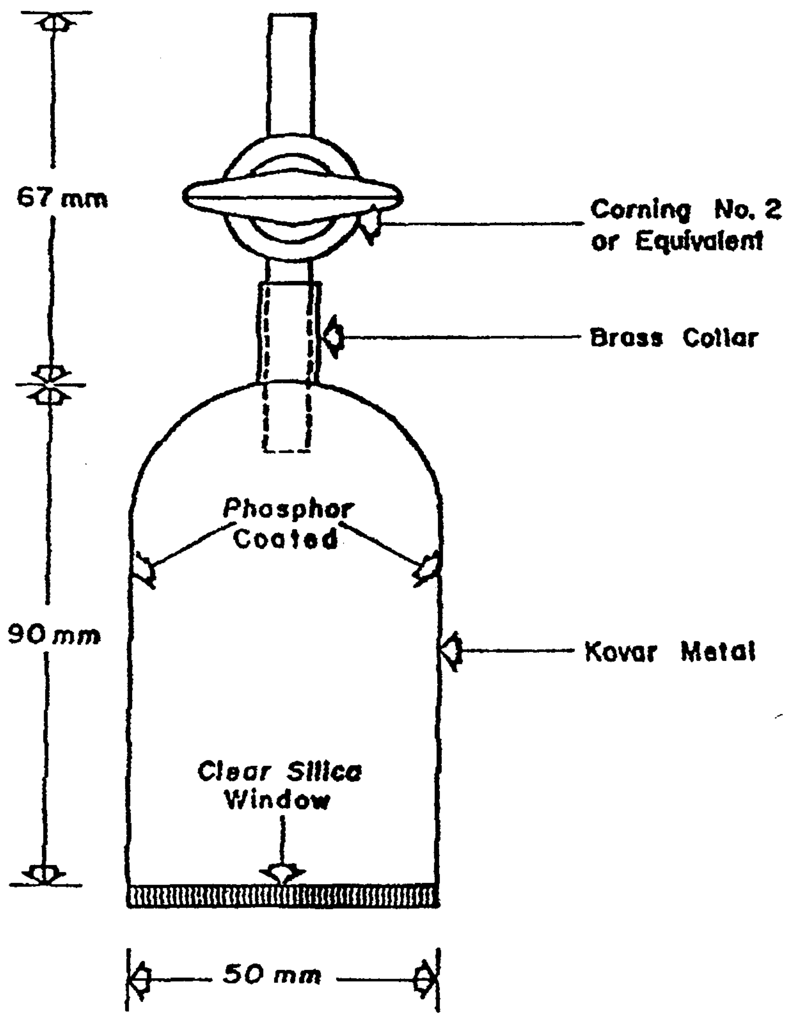

Figure 3. A typical scintillation cell for radon counting

determined using a standardized radium-226 solution with a labeled cell and a specific photon counter. This is determined as follows:

7.1.1 Place 50 pCi of the radium-226 standard solution in a bubbler (50 pCi of radium-226 will produce about 6 pCi radon-222 in 18 hours). Attach the bubbler to the radon assembly. (Fig. 1.)

7.1.2 With the scintillation cell disconnected, bubble helium gas through the solution for 20 minutes to remove all radon-222.

7.1.3 Close both stopcocks on the bubbler to establish zero time for ingrowth of radon-222.(Refer to 9.2) Set aside for approximately 18 hours.

7.1.4. Evacuate the scintillation cell and attach to the column and bubbler.

7.1.5. Proceed with steps 8.8 - 8.13, Radon Emanation Technique.

7.1.6. The calibration constant is determined from the radium-226 activity in the bubbler and the ingrowth time of radon-222.

7.2 The calibration constant includes the de-emanation efficiency of the system, the counting efficiency of the cell, and the alpha activity contributed by polonium-218 and polonium-214, which will be in equilibrium with radon-222 when the sample is counted 4 hours after the de-emanation. A 100-minute counting time will be sufficient for the standard and will eliminate the need to correct for decay of radon-222, which occurs during counting.

7.3 The bubbler used for the radium-226 standardization should not be used for sample analysis. It should be set aside to be retained for future calibrations. Each scintillation cell should be calibrated periodically with the radium-226 standard to ensure instrument quality control.

8. Procedure

8.1 To a 1000-ml drinking water sample, add 20 ml 12N HCl and 2.0 ml barium carrier and heat to boiling.

Note: If there is solid matter in the sample, do not filter before starting analysis. Follow procedure steps through 8.4, then filter solution into a clean centrifuge tube. Add 1 ml $(NH_4)_2SO_4$ (200 mg/ml) and stir thoroughly. Add glacial (17.4N) acetic acid (CH_3COOH) until barium sulfate precipitates, then add 2 ml excess. Digest in a hot water bath until precipitate settles. Centrifuge and discard supernate. Repeat step 8.4 and continue with radium analysis.

8.2 Cautiously and with vigorous stirring, add 20 ml 18N H_2SO_4. Digest 5 to 10 minutes and let precipitate settle overnight. Decant and discard supernate.

8.3 Slurry the precipitate and transfer to a centrifuge tube with a minimum amount of 0.1N H_2SO_4. Centrifuge and discard supernate. Wash twice with 0.1N H_2SO_4. Centrifuge and discard washes.

8.4 Add 20 ml basic EDTA reagent, heat in a water bath and stir well. Add a few drops 10N NaOH if the precipitate does not readily dissolve.

8.5 Transfer the solution to a radon bubbler (Fig. 2). Open both the upper and lower stopcocks and de-emanate the solution by slowly passing helium gas through the bubbler for about 20 minutes.

Note: The volume of these bubblers is usually greater than 20 ml allowing for at least a 1 cm air space between the bubbler and the stopper. In those instances where the solution volume exceeds the capacity of the bubbler, it will be necessary to continue the boiling in the water bath until the volume is reduced.

8.6 Close the two stopcocks, and record time. Store the solution for 4 to 8 days for ingrowth of radon-222 (Fig. 4).

8.7 At the end of the storage period, fill the upper half of an absorption tube with magnesium perchlorate and the lower half with ascarite.

Note: For minimizing corrections that would be required in subsequent calculations, the voids above the bubbler must be kept very small. Capillary tubing should be used whenever possible, and the drying tube volume with the ascarite and magnesium perchlorate must be kept to a minimum. A typical system consists of a drying tube 10 cm x 1.0 cm (I.D.), with each of the drying agents occupying 4 cm and being separated by small glass wool plugs. The column can be reused several times before the chemicals need to be replaced.

8.8 Attach the tube to the radon bubbler and then attach the evacuated scintillation cell (Fig. 3) to the tube. Open the stopcock on the cell and check the assembly for leaks. Gradually open the outlet stopcock on the bubbler, and when the stopcock is fully open and no further significant bubbling takes place, close the stopcock.

8.9 Adjust the helium gas pressure so that the gas flows at slightly above atmospheric pressure.

8.10 Connect the hose to the bubbler inlet and gradually open the inlet stopcock using the bubbling as a guide. When the stopcock can be

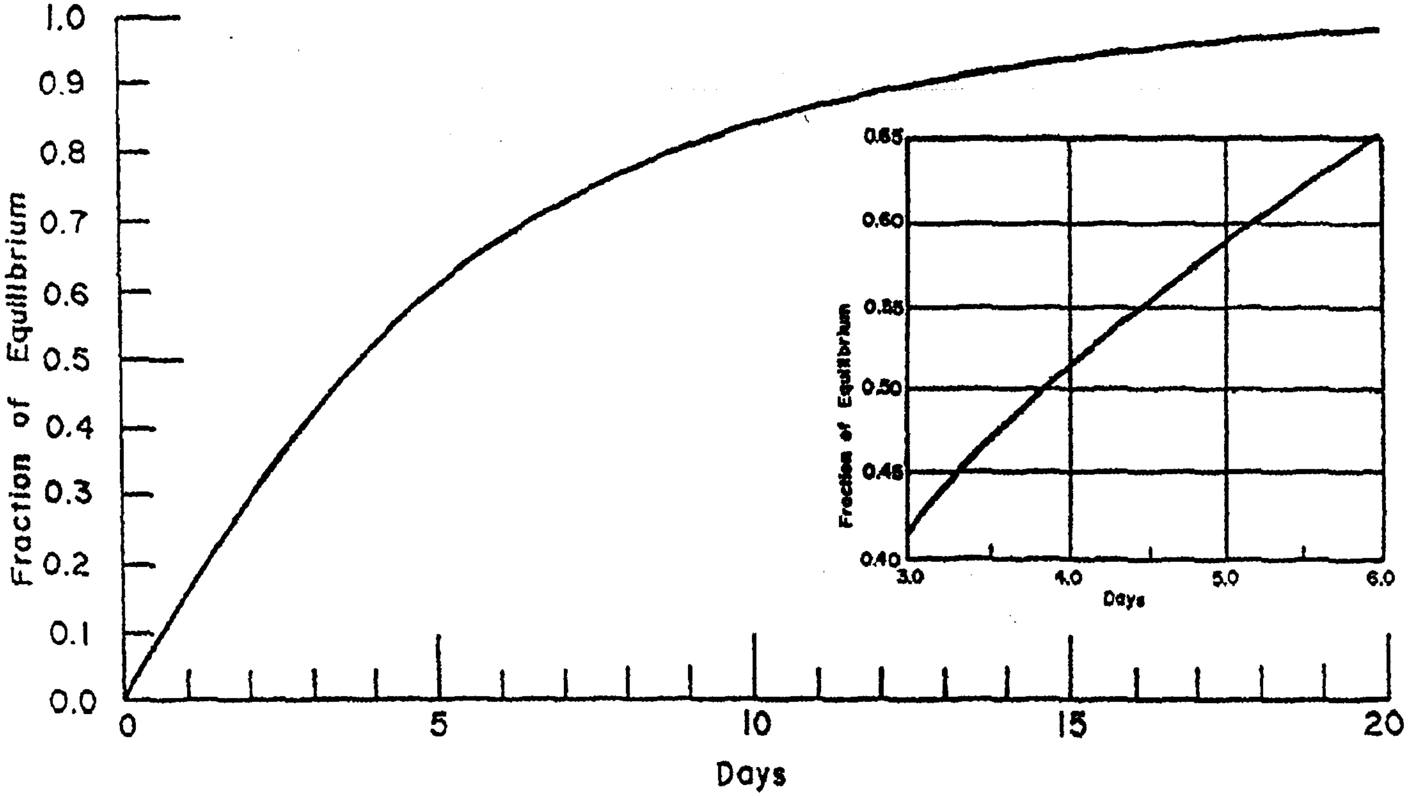

Figure 4. The growth of radon-222 from radium-226

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fully opened without a significant amount of bubbling, the bubbler is essentially at atmospheric pressure again.

8.11 Open the outlet stopcock very slightly and allow bubbling to proceed at a rate, determined by experience, such that 15 to 20 minutes are required to complete de-emanation.

8.12 Toward the end of the de-emanation, when the vacuum is no longer effective, gradually increase the helium gas pressure. When the system is at atmospheric pressure, shut off the helium gas, disconnect the tubing from the bubbler inlet and close the inlet and outlet stopcocks of the cell and bubbler, and record time. This is the beginning of radon-222 decay and ingrowth of radon-222 daughters.

8.13 Store the scintillation cell for at least 4 hours to ensure equilibrium between radon and radon daughters. Count the alpha scintillations from the cell in a radon counter with a light-tight enclosure that protects the photomultiplier tube. Record the counting time to correct for the decay of radon-222.

<u>Note</u>: After each analysis, flush the cell three times by evacuation and filling with helium, and store filled with helium at atmospheric pressure. This procedure removes radon from the cell and prevents the build-up of radon daughter products. Before each analysis, the scintillation cell should be evacuated, filled with helium and counted to ascertain the cell background.

9. Calculations

9.1 Calculate the radium-226 concentration, D, in picocuries per liter as follows:

$$D = \frac{C}{2.22\ EV} \times \frac{1}{1-e^{-\lambda t_1}} \times \frac{1}{e^{-\lambda t_2}} \times \frac{t_3}{1-e^{-\lambda t_3}}$$

where:

C = net count rate, cpm,
E = calibration constant for the de-emanation system and the scintillation cell in counts per minute/disintegrations per minute of radon-222, (see 9.2),
V = liters of sample used,
t_1 = the elapsed time in days between the first and second de-emanations (steps 8.6 and 8.12) and λ is the decay constant of radon-222 (0.181 d^{-1}),
t_2 = the time interval in hours between the second de-emanation and counting and λ is the decay constant of radon-222 (0.00755 hr^{-1}),

t_3 = the counting time in minutes and λ is the decay constant of radon-222 (1.26×10^{-4} min^{-1}), and
2.22 = conversion factor from dpm/pCi.

9.2 The calibration constant, E, is determined by the following equation:

$$E = \frac{C}{A\ (1-e^{-\lambda t_1})\ \ (e^{-\lambda t_2})}$$

where:

C = net count rate, cpm,
A = activity of radium-226 in the bubbler (dpm),
t_1 = ingrowth time of radon-222 in hours,
t_2 = decay time of radon-222 in hours occurring between de-emanation and counting, and
λ = decay constant of radon-222, (0.00755 $hour^{-1}$).

10. Precision and Accuracy

A number of laboratories which participate in the EPA, EMSL-Las Vegas intercomparison program for radium-226 in water used this method in their analyses of water samples received in that program for the period 4/78 through 12/78. Five intercomparison studies for radium-226 in water were conducted during that period. Two of the five studies were "Performance Studies" in which the sample contained other radionuclides. In the other three studies the samples contained only radium-226, radium-228 and their decay products. The radium-226 concentrations in the test samples for the five studies ranged from 3.7 to 9.2 pCi/l, all low level, which should relate well to drinking water supplies. Data from those five studies were used for this precision and accuracy evaluation of the method.

10.1 The number of laboratories that participated in the five studies (labs that were called and indicated that they used this method) ranged from 12 to 17 laboratories per study. The results from one laboratory in one study was rejected as an "outlier" as determined by the T test (ASTM Standards, Part 31, page 15, 1978). All laboratories reported triplicate analyses for each study (one test sample per study). The total number of analyses for the five studies was 207 of which 174 were acceptable results (within 3 sigma of the known value, 1 sigma being 15% of the known value). This calculates to be 84% acceptability of results as determined by this method.

10.2 A statistical evaluation of the data from the five studies was made according to the methods of Youden(4) and Steiner(5). The coefficient of variation for within-laboratory error ranged from 6.4% to 19% with an average of 10.2% for the five studies. The coefficient of variation for systematic error between laboratories ranged from 14% to 18% with an average of 16.2% for the five studies. The coefficient of variation for the total error between laboratories based on a single analysis ranged from 16% to 26% with an average of 19.4% for the five studies. A comparison of the grand average values with the known values in a test for systematic error in a method gave a value for one of the studies higher than the critical value, indicating a bias (low) for the method. However, values for the other four studies were well below the critical values, indicating no bias for the method.

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Thermo Nutech Certifications for California and Utah

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BERKELEY WAY, ANNEX 2
ELEY, CA 94704-1011
540-2800

R... ..D
MAR 5 1998

March 1, 1998

Certificate No.: 1145

RODNEY K. MELGARD
THERMO NUTECH - RICHMOND
P.O. BOX 4040
RICHMOND, CA 94804

Dear RODNEY K. MELGARD:

This is to advise you that the laboratory named above continues to be certified as an environmental testing laboratory pursuant to the provisions of the California Environmental Laboratory Improvement Act of 1988 *(Health and Safety Code (HSC), Division 1, Part 2, Chapter 7.5, Section 100825, et seq.).* Certification for all currently certified Fields of Testing which the laboratory has applied for renewal shall remain in effect until *03/31/2000*, unless revoked. Also, please note that continued use of the certificate is contingent upon:

- successful completion of the renewal site visit;
- acceptable performance in the required performance evaluation (PE) studies;
- timely payment of all fees, including an annual fee due 03/31/1999;
- compliance with Environmental Laboratory Accreditation Program (ELAP) statutes (HSC, Section 100825, et seq.) and Regulations (California Code of Regulations (CCR), Title 22, Division 4, Chapter 19).

An updated "List of Approved Fields of Testing and Analytes" will be issued to the laboratory upon completion of the renewal process. The application for the next renewal must be received 90 days before the expiration of this certificate to remain in force according to the CCR, Section 64801 through 64827.

Please note that the laboratory is required to notify ELAP of any major changes in the laboratory such as the transfer of ownership, change of laboratory director, change in location, or structural alterations which may affect adversely the quality of analyses (HSC, Section 100845(b)(d)). Please include the above certificate number in all your correspondence to ELAP.

If you have any questions, please contact ELAP at (510) 540-2800.

Sincerely

George C. Kulasingam

George C. Kulasingam, Ph.D., Manager
Environmental Laboratory
Accreditation Program

CALIFORNIA DEPARTMENT OF HEALTH SERVICES
ENVIRONMENTAL LABORATORY ACCREDITATION PROGRAM
List of Approved Fields of Testing and Analytes

Thermo NUtech-Richmond	TELEPHONE No: (510) 235-2633	CERTIFICATE NUMBER: 1145
2030 Wright Avenue	CALIFORNIA COUNTY: Contra Costa	EXPIRATION DATE: 03/31/98
Richmond, CA		

6 Radiochemistry

- 6.1 Gross Alpha and Beta Radiation
- 6.2 Total Radium
- 6.3 Radium 226
- 6.4 Uranium
- 6.5 Radon 222
- 6.6 Radioactive Cesium
- 6.7 Iodine 131
- 6.8 Radioactive Strontium
- 6.9 Tritium
- 6.10 Gamma and Photon Emitters
- 6.11 Gross Alpha by Co-precipitation
- 6.12 Radium 228
- 6.13 Radioactive Iodine
- 6.14 Gross Alpha & Beta in Hazardous Wastes
- 6.15 Alpha Emitting Radium Isotopes in Hazardous Wastes
- 6.16 Radium 228 in Hazardous Wastes

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Utah Department of Health

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NOV 20 1996

ROD MELGARD
THERMO NUTECH - CA
PO BOX 4040
RICHMOND CA 94804-0040

Customer ID: TMA1
Account No: 5102352633

On the basis of your most recent audit results and compliance with the ELCP requirements, the laboratory listed is certified for environmental monitoring under the Safe Drinking Water Act and authorized to perform the following analytes, or groups of analytes by method:

RADIOLOGICS
- RADIUM - 226
- RADIUM - 226 305
- STRONTIUM - 89/90
- STRONTIUM - 89/90 303

TOTAL RADIUM
TOTAL RADIUM 304
TRITIUM
TRITIUM 306

This laboratory's certification is effective OCT 31 1996.

The analytes or groups of analytes by method which a laboratory is authorized to perform at any given time will be those indicated in the most recent certificate letter. The most recent certification letter supersedes all previous certification or authorization letters. Any discrepancies must be documented and notice received by this Bureau within 15 days of receipt. The certification will be recalled in the event that your Laboratory's certification is revoked.

Respectfully,

CBrokopp

Charles Brokopp, Dr. P.H.
Director

cc. Utah Department of Environmental Quality
Kevin W. Brown - Division of Drinking Water
Dennis Downs - Division of Solid and Hazardous Waste
Don A. Ostler - Division of Water Quality
U.S. EPA Region VIII QAO

* ...xpiration date for this laboratory's certification is SEP 30 1998. The Utah ...onmental Laboratory Certification Program (ELCP) encourages clients and data users to ...fy the most current certificate letter for the authorized method. Please call 801-584-8469.