PSC-Fernley Hazardous Waste Treatment and Storage Facility

RCRA Part B Permit Renewal Application

Submitted to Nevada Division of Environmental Protection

21st Century Environmental Management of Nevada, LLC (PSC)
2095 Newlands Drive East
Fernley, NV 89408

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SECTION E

GROUNDWATER MONITORING

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E1.0 Groundwater Monitoring Program Summary

This section presents the Groundwater Monitoring Plan (GMP) prepared pursuant to 40 CFR 270.32 as adopted by Nevada Administrative Code (NAC) 444.8632. The GMP covers procedures for monitoring, testing, analysis, and reporting of the ground water monitoring well network. All ground water analytical data collected as part of the GMP will be submitted to the Nevada Department of Environmental Protection (NDEP) on a biannual schedule as identified in Section E4.5.

E1.1. Background

The PSC Fernley facility lies on 10 acres of land in an industrially zoned area, approximately 35 miles east of Reno, Nevada. It is bounded on three sides by undeveloped land with Newlands Drive providing the northern boundary (PSC, 2001a). Figure 1 shows the location of the facility.

The site was constructed in 1986, began operation in April 1987, and was originally owned and operated by ETICAM. Prior to construction the area was undeveloped open space (Ecology and Environment, 1992). In 1981, ETICAM became a Nevada corporation and later changed its name to 21st Century Environmental Management Inc. (EMI). In 1997 PSC purchased this facility through the acquisition of 21st Century EMI.

There are five main processes that are performed at the PSC Fernley facility: bulk liquid processing, drummed liquid processing, lab packing, and solid processing. Bulk liquids are treated on-site using the following methods: oxidation, reduction, neutralization, precipitation, thickening, evaporation, filtration, and decanting. Solid waste is processed on-site using the following methods: drying, bulking, blending, and liquefaction (PSC< 2001b).

Two monitoring wells (Well 1 and Well 2) were installed at the time of facility construction in 1987. Groundwater sampling for inorganics has occurred quarterly since February 1987 at the two monitoring wells at the facility. No well logs or other construction details are available for these monitoring wells. In July 2005 these wells were abandoned in accordance with Nevada Administrative Code (NAC) 534.420. At that time six new wells were installed in areas around the facility. The wells were identified as PF-1 through PF-6. Groundwater monitoring of these wells has been conducted since July 2005. Wells PF-4D and PF-7 were installed during the site RCRA

Facility Investigation (RFI) activities in 2010 and have been sampled as a part of ongoing groundwater monitoring since that time and are now incorporated into this GMP.

Results of surface soil sampling, conducted in 2001 during the RCRA Facility Assessment (RFA), indicated that there may have been a historic release in the area of the East Container Storage. This area was excavated in 2002 for construction of a new runoff collection pond. Additional soil samples were collected after excavation and prior to installation of the pond. These confirmatory samples did not indicate any contamination above the United States Environmental Protection Agency (USEPA) Region 9 Preliminary Remediation Goals (PRGs) for industrial soil ingestion and soil migration to groundwater, Dilution Attenuation Factor (DAF) 20. No other potential sources of contamination have been identified at the PSC Fernley facility.

Since 2007 chromium has been observed in groundwater above its GWQS in well PF-4 and has continued to be observed in elevated concentrations to date where it is just above the MCL (0.100 mg/L). PSC has conducted three phases of the RFI to identify a likely source of the chromium, but to date has not identified it. A fourth phase of RFI sampling has been approved and will be conducted during the third quarter 2012.

E1.2 Objectives

The GMP is designed to monitor the groundwater emanating from the PSC Fernley facility in accordance with the RCRA Part B permit for the PSC Fernley facility and 40 CFR 264.95, 264.97, and 264.98. The objectives of the GMP are:

1. To represent the quality of background water that has not been affected by leakage from a regulated unit.

2. Represent the quality of groundwater passing the point of compliance

3. Allow for the detection of contamination if hazardous waste or hazardous constituents have migrated from the waste management area to the uppermost aquifer.

4. To provide consistent sampling and analysis procedures that are designed to ensure monitoring results offer a reliable indication of groundwater quality below the waste management area.

5. To provide methods for sampling and analysis of the groundwater in the uppermost aquifer that will enable detection and measurement at the compliance point of hazardous constituents from the regulated units that may have entered the groundwater in the uppermost aquifer.

6. To monitor the seasonal variation in concentrations of hazardous constituents that may occur in the groundwater at the site.

7. To monitor the seasonal variation in groundwater flow direction and elevation.

E1.3. Schedule

Groundwater elevation measurements and groundwater sampling shall be conducted on a quarterly basis. Table 1 shows the details of the GMP including the analyte list and sampling frequency.

E1.4 Scope

This GMP addresses the following major elements:

- Methodologies for completing water-level surveys, groundwater sampling, well evacuation, field decontamination procedures, and quality assurance/quality control procedures;
- Personnel functions and responsibilities; and
- How the GMP's objectives will be met.

E2.0 Site Hydrogeological Characteristics

The following provides a summary of the PSC Fernley facility area geology and hydrogeology.

E2.1 Local Geology / Soil Description

The following soil descriptions are from the boring logs provided in the well installation report for the PSC Fernley facility; the report entitled *Well Installation Report Waste Treatment, Storage, and Disposal Facility,* Tetra Tech EM Inc. for PSC Fernley Facility, December 1, 2005. In general soils from surface to approximately 6 feet bgs consist of Silty SAND, fine to coarse, grayish brown cooler. Soils from 6 through approximately 12 feet below ground surface (bgs) consist of Sandy SILT, trace fine sands, brownish grey in color. Soils from approximately 12 feet bgs to approximately 32-35 feet bgs are Silty SAND – fine grained sand with silt, dark grayish brown in color. SILT layers were also described in most wells at various depth intervals, from 20 to approximately 33 feet bgs. Clayey SILT layers were described for well PF-5 at two discrete intervals at depths of 21 to 28 feet bgs, and again from 31 to 33 feet bgs. A Clayey SILT layer was also described for well PF-6 at depths of 35 to 45 feet bgs.

E2.2 Hydrogeology

The following description was presented in the original Preliminary Assessment for the PSC Fernley facility in 1992. The PSC Fernley facility is located in the Fernley Basin hydrological area, a subbasin of the Truckee River Basin.[1],[2] The Fernley Basin is approximately 161 acres in area.[2] Perched groundwater occurs on the site at a depth of approximately 25 feet below ground surface.[3] Perched groundwater extends to a depth of approximately 250 feet below ground surface. A thick clay layer is present at a depth of approximately 250 to 325 feet below ground surface. This clay layer ranges in thickness from 20 to 30 feet and acts as a confining layer for the underlying groundwater. The Fernley aquifer, a regional aquifer, occurs below this clay layer. The Fernley aquifer is primary-source aquifer, serving as the only source of drinking water for the nearby population. However, wells are known to exist that draw from the perched groundwater.[4] The groundwater gradient in the immediate vicinity of the site is anticipated to be toward the northeast while the gradient near the center of the town of

[1]Nevada Division of Water Resources, Report 57, “A Brief Water-Resources Appraisal of the Truckee River Basin, Western Nevada,” 1973
[2]Kramer, Kurt. Utilities Manager, Fernley Utilities District, letter to L.H. Dodigon, NDEP, re: need for wellhead protection program, May 17,1991
[3]Geoffroy, Michael A., Technical Director, Eticam, letter to Joe Levak, NDEP, re: groundwater monitoring, March 26, 1987
[4]Kramer, Kurt. Utilities Manager, Fernley Utilities District, and Peter M. Geiger, E & E, telephone conversation, June 22, 1992

Fernley is regarded as toward the northwest.[2] The average total annual precipitation for the state of Nevada between 1980 and 2000 was 9.66 inches. The average total annual precipitation for Reno, the closest city, between 1980 and 2000 was 7.44 inches.[1]

Historical water level data from groundwater monitoring wells PF-1 through PF-6 collected from July 2005 through December 2011 at the PSC Fernley facility indicate that the water level at the site approximately matches the regional water levels, but are slightly deeper within a range of approximately 29 through 37 feet below ground surface (bgs) and fluctuates approximately from 0.5 to 1.0 feet seasonally.

Groundwater flows in a predominately eastern to southeastern direction, in the direction from wells PF-1 to PF-4, predominantly. The average groundwater flow velocity has varied from quarter to quarter since 2005. Recent flow velocities (Quarters 3 and 4, 2011) were estimated to be 2.88E-03 m/day (Q3 2011), and 3.2E-03 m/day (Q4 2011).

E3.0 Groundwater Monitoring Network

The GMP network and maintenance program for the PSC Fernley facility are described in the following section.

E3.1. Monitoring Well Numbering System

An alphanumeric system was used to number the groundwater monitoring wells. Each well designation will consists of two alphabetic characters which represent the facility's name, PSC Fernley (e.g. PF) followed by, and separated with a hyphen from, a number that corresponds to the particular well location (e.g. PF-1).

E3.2. Monitoring Well Locations

The locations of the monitoring wells are shown on Figure 2. Table 1 lists all wells included in the GMP network. Six groundwater monitoring wells were installed on site in July 2005 and two (PF-4D and PF-7) were installed during the RFI in 2010. The following describes the location of each well.

[1]NOAA website, U.S. Climate at a Glance from the National Climate Data Center in Ashville, North Carolina, www.noaa.gov

- PF-1: Located in the northwestern site boundary, this is considered the background well.
- PF-2: Located along the southern site boundary, near the southwestern corner of the PSC Fernley facility.
- PF-3: Located at the approximate middle of the southern site boundary
- PF-4 and PF-4D: Located along the southern site boundary, near the southeastern corner of the PSC Fernley facility.
- PF-5: Located at the approximate middle of the eastern site boundary
- PF-6: Located near the northeastern corner of the PSC Fernley facility
- PF-7: Located south of the Solids Receiving Area's exterior wall.

E3.3 Monitoring Well Construction

The wells were completed with above-grade, locking monuments set in approximately 2 square foot raised concrete berms marked with the well name. Two traffic bollards were set to protect each well monument. The wells were constructed of two inch, threaded and coupled polyvinyl chloride (PVC) casing and 0.001-inch slot screen to depths ranging from 40 to 45 feet below ground surface. PF-4D is terminated at 48 feet bgs. Fifteen foot well screens were installed in each well; at five feet above the water table depth and 10-feet below the water table depth. Groundwater is generally encountered at 29 to 37 feet below ground surface, depending on the well, mainly due to varying surface topographic elevations.

Each well was completed with a 20/40 silica sand filter pack extending from total depth to at least two feet above the top of the screen interval. The filter pack was topped with at least two feet of hydrated bentonite chips and sealed above the bentonite plug with neat cement to grade surface.

After installation each well was developed by purging accumulated groundwater until fine materials were no longer observed in discharge effluent or until pumped dry. Development included measuring conventional water quality parameters including: dissolved oxygen, pH, conductivity, temperature, turbidity, and salinity. Field logs were completed.

E3.4 Monitoring Well Abandonment

If wells require abandonment in the future, the abandonment will follow the procedures outlined in the NAC 534.4365 Monitoring Wells: Plugging. The abandonment procedure for monitoring wells that may not have been constructed pursuant to the requirements of the NAC consists of pulling the casing form the bore hole and using a tremie pipe to place neat cement or high-solids bentonite grout from the bottom of the well to the surface as the casing is removed from the well bore. All well abandonment procedures would be performed by a Nevada State licensed driller.

E4.0 Water Level and Total Depth Measurements

A water level measurement event will be conducted at the facility before or after each sampling event. Table 1 shows all wells that will be used for water level measurements. A sufficient number of wells have been laced across a broad enough horizontal plane to construct reliable potentiometric surface maps. These measurements provide data to fulfill the objectives of determining groundwater elevations and flow directions seasonally.

The water level measurements will be performed by the sampling team. The procedure for these measurements is provided below.

E4.1 Objectives

Water level data are used to construct potentiometric surface maps and to monitor major hydrologic changes to the area's groundwater system. Potentiometric surface maps, permeability, and porosity are used to estimate groundwater flow directions, quantities, and rates.

E4.2 Schedules

The water level survey involves measuring the water levels quarterly in February/March, May/June, August/September and November/December.

Ideally, water levels at all wells would be measured simultaneously each time a water level survey is performed. However, this approach is not practical. When water levels are surveyed non-simultaneously, transient behavior of the groundwater flow system can confound the interpretation of the data. Therefore, it is desirable to perform the water level survey in the shortest period of time that is practical. For this reason, each time a water level survey is performed, the goal is to complete the survey within an 8-hour period.

E4.3 Equipment

Equipment used for the water level survey is listed in the SOP PSC-120 a provided in Appendix A.

Depth-to-Water measurements are made using an electronic water-level meter. The meter consists of a permanently marked coaxial cable or plastic-coated flat wire with 1.01-foot calibrations, a detection probe, and electronic controls contained in a spool or reel. The water-level meter/sounder registers a response when the probe attached to the cable contacts an electrically conductive medium such as water, thereby completing the electrical circuit. The response is visible (e.g. red light) audible (e.g. alarm) or combination of the two.

E4.4 Procedures for Water Level Measurement

The procedure for measuring water levels is given in SOP-120 as provided in Appendix A. It is important to make sure the water level has stabilized prior to measurement. SOP-120 explains methods to ensure this.

E4.5 Results Reporting

The results of the water table measurements and groundwater sampling conducted on a quarterly basis shall be reported on a semi-annual basis, in January 30 and July 31 of each year. All water level data will be recorded on water level data forms in the field. An example of the form format is provided in Table 2. The water level data forms facilitate the transmission of data from the field to the office. The forms consist of tabular summaries of water level survey results. The results are in the form of depth-to-water values for each well in the network.

The field form is provided to the Project Manager to file with the facility field forms and input into the database. Potentiometric contour maps will be created for an annual progress report along with a summary table of the water level measurements. Water levels will also be used in combination with the soil types observed during well installation to calculate approximate flow rates in each annual report.

E5.0 Groundwater Sampling Methods

All of the groundwater sampling points will be two-inch diameter PVC monitoring wells. The frequencies of groundwater monitoring and water level elevation measurements for each of the monitoring wells are shown in Table 1.

The GMP analytical method list is provided in Table 3. The compounds list in Table 3 includes the constituents proposed for analysis, based on waste types historically handled at the PSC Fernley facility.

E5.1 Equipment

All wells that are used for groundwater sample collection require using disposable polyethylene tubing in conjunction with a peristaltic pump or an electric submersible pump with attached tubing to purge and collect samples. The tubing intake should be placed in the middle of the water column. Wells PF-1 through PF-7 have dedicated low flow pumps with attached dedicated tubing.

E5.2 Groundwater Sampling Procedure

Groundwater samples taken for analysis must contain only fresh formation water to be representative of the water-bearing zone. Water residing in the well casing and/or filter pack becomes stagnant as the solution chemistry of the formation water changes with changes in temperature, pressure or gas content. Therefore, wells must be sampled by evacuating this stagnant water at a low flow rate without disturbing the water column.

E5.2.1. Purging Procedure

All wells will be purged using a low flow method and adhere to SOP PSC-124, which is provided in Appendix A. The purge rate is designed to be low enough to simulate actual groundwater flow and to pull water from a discrete zone from the aquifer near the pump intake into the pump, rather than pulling stagnant groundwater from a large area around the well or outside of the screened area of the well. A low purge rate is also intended to reduce the likelihood of mobilizing colloids in the subsurface that are immobile under natural flow conditions.

E5.2.2. Simple Collection Procedure

Samples are collected according to the methods in SOP PSC-124, which is provided in Appendix A.

E5.2.3. Field Decontamination Procedures

The decontamination procedures for all non-dedicated field sampling equipment are outlined in SOP PSC-200 as provided in Appendix A. This equipment includes any instrument that is placed in a well or becomes in contact with the groundwater sample, including the water-level indicator and/or submersible pump.

E5.2.4. Field Records Preparation

SOP PSC-400 (Appendix A) contains a description of field book documentation procedures required for field sampling events. In addition, there are field forms that are required for some specific tasks. Well evacuation and groundwater sampling information will be recorded in the field logbook and on monitoring well water sampling sheets in the field similar to the one shown in Figure 4. The Monitoring well water sampling sheet is designed to help the sampling team determine when the water quality parameters are stable enough to collect a sample and also facilitates transmission of data from the field to the office. The sampling sheet will be completed with the following information during well evacuation: well identification, date, sampling personnel, headspace, beginning and ending water levels, sampling method, and equipment used and samples collected. Water quality parameters will be recorded approximately every three minutes on the sheet as well for pH, conductivity, temperature, turbidity, dissolved oxygen, and oxidation reduction potential (ORP).

E5.2.5. Sample Label and Identification System

A sample label will be affixed to each sample bottle before sample collection. Each label should include the following information:

- Sample number (see below)
- Sampling event location;
- Date and time of sample collection
- Preservatives added to the sample; and
- Parameter(s) for which the sample is to be analyzed

Water samples will be labeled with a unique sample number. The sample number consists of the appropriate monitoring well designation followed by, and separated by a hyphen from, a date identification code. The date identification code consists of a fourdigit number that represents the month and year that the sample was collected. For instance, the sample number PF-1-0503 denotes a sample collected in May 2003 from monitoring well PF-1. All filed duplicate samples will be identified by attaching “-9-“ after the “PF” but before the well number in the sample identification. For instance, the sample number PF-9-1-0503 denotes a field duplicate sample collected at well PF-1 in May 2003. All equipment blank samples will be labeled as “Equipment Blank”. Distinctions among multiple equipment blanks can be made by the associated dates.

E5.2.6. Sample Storage and Transportation

After sampling is completed for the day, all samples will be packed for shipping and placed in iced transport containers. The transport containers should consist of sturdy, insulated, commercially produced coolers. All bottle caps should be secured tightly. All glass containers will be placed secured into position within the shipping container to avoid breaking. A custody seal will be affixed to the container prior to lab pickup or delivery. The chain-of-custody (COC) for should be taped to the inside lid of the cooler or shipping container in most circumstances.

An example of a COC form is provided as Figure 5. During sample collection or at the end of each day and prior to shipping or storage, COC forms will be completed for all samples by a designated sampling team member. The information on the sample labels will be rechecked and verified against field logbook entries and the COC forms. The COC form should include information such as sample names, sample times, the sample date, the type of media, and the analyses requested. Any necessary changes to COC forms, sample container labels, or the field logbook will be made by striking out the error with one line, initialing and dating the error, and reentering the correct information. Samples with extra volume for laboratory QC procedures (MS/MSD and laboratory duplicates) will be designated as such on the COC form. See Section 5.1.9, Quality Control Procedures. The field team should ensure that analyte method numbers and analyte lists required for the project are either listed on the COC form, attached to the COC form, or referred to on the COC form. Every person who takes possession of the samples while transporting the samples from the field to the laboratory must sign the COC form.

For most samples, the sampling team will either transport the samples to the laboratory or have a lab courier come to the facility at the end of each sampling day to pick up samples for delivery to the lab. However, there are cases when samples must be shipped by mail or other delivery service. Under these circumstances the cooler should be taped shut and the drain should be taped shut. A copy of the shipping papers or tracking number should be kept with the copy of the COC form.

Upon receipt of the sample transport containers by the analytical laboratory, laboratory personnel will open the containers and examine the contents for problems such as damaged transport containers, broken custody seals, missing or broken sample bottles, chain-of-custody discrepancies, and documentation errors. Problems will be reported to the PSC Project Manager. After the samples are analyzed by the analytical laboratory, laboratory personnel will store the samples in a secure location at the laboratory for the remainder of their holding times.

E5.2.7. Waste Management

Investigative derived waste (IDW) will be properly disposed of after each sampling event according to local, state, and federal laws.

E6.0 Quality Control (QC) Procedures

The sampling design, field procedures, and laboratory procedures for this GMP are set up to provide high-quality data for use in this project. QC factors and specific QC sampling procedures are described in this section.

E6.1 Data Quality Factors

Specific data quality factors that may affect data usability include precision, bias, accuracy, representativeness, and comparability.

E6.1.1. Precision

Precision is the agreement among a set of replicate measurements without assumption of knowledge of the true value. Precision is optimized for this project by collecting field QC samples as described in Section 6.2 (Field QC), sampling multiple times a year at many locations, and adhering to strict procedural guidelines that minimize possible sample contamination.

E6.1.2. Bias

Bias is the systematic deviation of a measured value from the true value, often due to matrix effects. Bias can be assessed by comparing a measured value to an accepted reference value in a sample of known concentration or by determining the recovery of a known amount of contaminant spiked into a sample. Bias is minimized for this project by standardizing sampling methodologies including equipment calibration and decontamination sample collection methods, sample collection methods, sample transport, an chain of custody control. Descriptions of the methodologies are described in Sections 4 and 5 and associated SOPs in the appendices.

E6.1.3 Accuracy

Accuracy is the closeness of agreement between an observed value and an accepted reference value. When applied to a set of observed values, accuracy will be a combination of a random component and of a common systematic error (or bias) component. Accuracy is optimized for this project by using procedures designed to reduce potential error that might impact accuracy of results. Proper decontamination methods and equipment are used during sampling to ensure accurate results. An accredited lab that follows proper QC procedures internally will be used for all analytical testing to further reduce error in order to produce accurate results.

E6.1.4 Representativeness

Representativeness is the measure of how well data reflects the actual environment and conditions from which the data is collected. Representativeness is optimized for this project by collecting samples from wells that have been properly designed and installed. The methodologies used to collect samples, as detailed in the specific SOPs, are also designed to collect representative samples without disturbing the environment from which they are collected.

E6.1.5 Comparability

Comparability is how well multiple data sets can be used for a common interpretation. Comparability will be optimized for this project by collecting samples during the same period each year from the same wells, using the same methods and analytical procedures and quality assurance.

E6.1.6 Completeness

Completeness is a measure of the amount of data collected that is found to be valid in relation to the total amount of data intended to be collected according to the sampling design. Completeness is optimized for this project by annually reviewing all results to assess the validity of the data for submittal in the annual progress report to NDEP.

E6.2 Field QC

QC samples are collected as part of groundwater sampling to ensure the data gathered is representative of actual field conditions and potential field contamination or sampling method bias present in sample results. A description of each type of QC sample is described below.

E6.2.1 Field Duplicate

Field duplicates will be collected at a rate of one per 20 samples collected and used to assess the homogeneity of the samples collected in the field and the precision of the sampling method. Field duplicates are collected by collecting two sets of samples from the same groundwater monitoring well at the same sampling time, but giving them two distinct sample identifications for analysis by the laboratory.

E6.2.2 MS/MSD

Extra sample volume must be collected to enable the lab to run this lab QC procedure. MS/MSD sample volume is collected at a rate of one per 20 samples collected and is noted on the COC form.

E6.2.3 Equipment Rinsate Blanks

Equipment blanks are used to assess potential contamination of the equipment used in sampling and will be collected at a rate of one per 20 samples collected. Equipment blanks are collected by filling a set of sample bottles with clean deionized water, in the field, by running the water over or through any equipment that is not dedicated for a well and may come in contact with a sample, such as an electric submersible pump. All such equipment will be properly decontaminated according to the procedures in SOP 200 (Appendix A) prior to equipment blank collection.

E7.0 Analytical Procedures

The sampling schedule and individual well analyses for the GMP are included in Table 1. The specific constituents and methods are listed in Table 3, along with typical laboratory reporting limits for each method. The constituent list includes compounds associated with historical hazardous waste operations at the PSC Fernley facility. Proper containment measures have been installed at the facility to insure containment of any future releases. If a release occurs in the future, PSC may revise the constituent list to include applicable new compounds related to the release to insure that there has been no impact to groundwater.

The analytical laboratory will report an EDD and hard copy of results to PSC within approximately 30 days after the end of each sampling event. A case narrative describing the analytical methods used and discussing any irregularities during sample analyses will be included with the data package.

E8.0 GMP Network Inspection, Maintenance, and Well Replacement

This section describes a program to provide regular inspection, and if necessary, maintenance of the monitoring wells and associated equipment.

E8.1 Well Inspection

Monitoring wells in the network will be inspected annually by the sampling team to determine their integrity. The inspection involves a visual inspection of the monitoring well to determine if the well has been damaged or tampered with. The well inspection verifies the physical condition of the well at the ground surface and the internal well casing.

Problems discovered during the inspection will be recorded on field forms and a well maintenance form, which will be provided by the field personnel to the Project Manager within two weeks after completion of sampling activities. If a significant problem such as a broken wellhead, bent casing, or other damage that compromises well access is discovered, then it may be necessary to remedy the problem as soon as possible and before sampling. A problem with the well integrity may require a modification of the sampling schedule or some other change in the sampling program. All decisions regarding such modifications will be reported immediately by the field personnel to the

Project Manager. The Project Manager will be responsible for maintaining technical liaison with NDEP regarding such issues.

E8.2 Maintenance

The total well depths will be measured at a sufficient frequency to monitor potential silt accumulation. The procedure for sounding the wells is given in SOP PSC-120 (Appendix A). If more than one foot of sediment has built up in the bottom of a well, the well will be redeveloped and the sediment removed, as described in SOP PSC-121 (Appendix A).

All sampling equipment used for groundwater monitoring will be maintained regularly by the sampling team members according to the manufacturer's equipment manuals.

E8.3 Monitoring Well Replacement

If any monitoring well in the monitoring well network must be replaced in the future, the Project Manager will notify NDEP prior to replacement. The replacement will be completed upon approval of NDEP and preferably prior to the next scheduled groundwater sampling event.

If it is agreed that the well should be replaced, the replacement well will be installed as close as possible to the well being replaced. A monitoring well construction form will be completed for the new well and a copy will be submitted to NDEP.

Wells will be decommissioned in accordance with NAC 534.4365 Monitoring Wells: Plugging.

Field personnel will inspect the drilling and construction of all new or replacement monitoring wells. A detailed log of each well will be constructed. The logs and descriptions will include soil lithologic logging. Tables 1, 2 and 3 and Figure 2 will be revised to reflect future changes as necessary.

E9.0 Personnel Functions and Responsibilities

The specific tasks of personnel involved with the GMP are as follows:

E9.1 Project Manager

The function of the PSC Project Manager is as follows:

- Maintain correspondence related to the GMP between regulatory agencies and PSC.
- Verify parameter requirements and modify the GMP if necessary.
- Assure working condition of the GMP.
- Assure maintenance of a database that contains all GMP results.

E9.2 PSC Facility Manager

The function of the designated facility representative is as follows:

- Maintain security of the monitoring network.
- Provide the sampling team physical access to the monitoring network.
- Provide support for sampling team activities.
- Provide a sampling workstation and storage area.
- Handle all IDW produced during sampling events.

E9.3 Sampling Team Members

The functions of the sampling team members are as follows:

- Learn and follow all of the procedures in this GMP.
- Notify Project Manager of any unresolved problems or deviations from approved procedures.
- Obtain, maintain, and inspect all equipment used to fulfill their responsibilities.
- Oversee field sampling activities and equipment repair.
- Work to prevent sample and/or well contamination.
- Schedule sample analysis services with the analytical laboratory and the field sampling team.
- Verify or arrange for the shipment of sample bottles and sample transport containers, both from the analytical laboratory to the site, and from the site to the laboratory.
- Calibrate equipment.
- Examine sample bottles, preservatives, and sample transport containers.
- Assume responsibility for storage and provide security of sample transport containers and sample equipment.
- Conduct health and safety meeting, and implement safety requirements.

  - Provide on-site technical guidance for sampling and maintenance procedures.
  - Perform or supervise the water-level survey and well inspection.
  - Maintain lines of communication between those personnel involved in the field sampling activities, the Project Manager, the PSC facility manager, and the analytical laboratory.
  - Maintain or service all sampling equipment.
- Take all field measurements.
- Purge monitoring wells.
- Collect and preserve samples.
- Check that samples are correctly identified and packed securely with ice in the sample transport container(s).
- Take neat and complete field notes.

E10.0 Schedule

Four separate sampling events will be completed on an annual basis, consistent with the requirements of 40 CFR 264.97(g) and 40 CFR 264.98(d). Sampling will be scheduled in February/March, May/June, August/September, and November/December.

Two semi-annual reports shall be submitted to NDEP each year summarizing the groundwater chemical date and water level data for the period of that report. The first report for quarters 1 and 2 sampling will be submitted to NDEP on July 31st, and the second report for quarters 3 and 4 sampling will be submitted to NDEP on January 30th of the following year.

At the end of the proposed eight sampling events, PSC will use the most appropriate statistical method, in accordance with 40 CFR 264.97 and 264.98, based on the distribution of data to determine whether there is statistically significant evidence of contamination of any chemical parameter of hazardous constituent specified in the permit. Then PSC will propose to NDEP any additional monitoring or revisions to the GMP, based on results of the statistical analysis of the four rounds of sampling, and in adherence with all sections of 40 CFR 264.97 and 264.98.

E11.0 How To Meet the Objectives of the GMP

This section will address how the objectives described in Section 1.2 will be met by the methodologies proposed in this GMP.

E.11.1 Objectives

The objectives are reiterated here for convenience and are discussed individually in the following subsections.

- Represent the quality of background water that has not been affected by leakage from a regulated unit;
- Represent the quality of groundwater passing the point of compliance;
- Allow for the detection of contamination when hazardous waste or hazardous constituents have migrated from the waste management area to the uppermost aquifer.

1. To provide **consistent sampling and analysis procedures** that are designed to ensure monitoring results offer a reliable indication of groundwater quality below the waste management area.

2. To monitor the **seasonal variation** on groundwater concentrations.

3. To monitor **groundwater flow rate and direction** and elevation seasonally.

4. To provide methods for sampling the groundwater in the uppermost aquifer that will enable **detection and measurement at the compliance point** of hazardous constituents from the regulated units that may have entered the groundwater in the uppermost aquifer.

E11.2 Consistent Sampling and Analysis Procedures

The groundwater sampling SOP follows EPA guidance written to ensure that groundwater samples are representative of the groundwater in and near the well screen without changing the chemical composition of the groundwater as it is removed from the well. Provisions in the SOP that address this issue include:

- Collecting samples at a low flow rate so as not to draw down the water level in the well will, ensuring that the groundwater sample is representative of groundwater in and near the well screen.

- Reducing the amount of water purged (to less than one or more volumes of well water) prior to sampling by having more realistic stability requirements will also ensure that water sampled is representative of groundwater in or near the well screen.
- In addition, the SOP provides that if a well cannot consistently meet the stability requirements of the SOP, the project manager should seek an alternative sampling methodology for that well to ensure that the groundwater sample is representative.

By following the QC guidelines in Section 6, the laboratory analysis of all samples will be consistent and quality control errors will be identified.

E11.3 Seasonal Variation

Multiple sampling events will be completed at the facility. Four quarterly sampling events are scheduled as follows: February/March, September/October, and November/December. This is intended to provide sufficient data to determine seasonal trends in groundwater concentrations throughout the monitoring network.

E11.4 Groundwater Flow Direction

Multiple wells are located surrounding the facility to allow for proper determination of the groundwater flow direction and rate. Quarterly water level measurement events will provide sufficient data to determine seasonal trends in groundwater elevations and in groundwater flow direction and rate.

E11.5 Detection and Measurement at the Compliance Point

For simplicity, the PSC Fernley facility compliance point may be deemed the property boundary. Monitoring wells have been proposed around the facility on all sides, near the perimeter but located conservatively inside the property boundary, in order to monitor groundwater that passes the point of compliance regardless of the groundwater flow direction, since this is not yet determined.

Tables

Figures

Appendices

Standard Operating Procedures

Table 1 Sample Collection Requirements and Frequency

Well ID	Groundwater Monitoring Requirements			
	Water Levels	**Metals by 200.7or 200.8/3113B/245.1/279.2**	**Cyanide by 4500**	**TOC / TOX / Endrin / Lindane / Methoxychlor / Toxaphene / 2,4-D / 2,4,5-TP (Silvex)**
PF-1	February/March May/June August/September November/December	February/March May/June August/September November/December	February/March May/June August/September November/December	May/June November/December
PF-2	February/March May/June August/September November/December	February/March May/June August/September November/December	February/March May/June August/September November/December	May/June November/December
PF-3	February/March May/June August/September November/December	February/March May/June August/September November/December	February/March May/June August/September November/December	May/June November/December
PF-4	February/March May/June August/September November/December	February/March May/June August/September November/December	February/March May/June August/September November/December	May/June November/December
PF-4D	February/March May/June August/September November/December	February/March May/June August/September November/December	February/March May/June August/September November/December	May/June November/December
PF-5	February/March May/June August/September November/December	February/March May/June August/September November/December	February/March May/June August/September November/December	May/June November/December
PF-6	February/March May/June August/September November/December	February/March May/June August/September November/December	February/March May/June August/September November/December	May/June November/December
PF-7	February/March May/June August/September November/December	February/March May/June August/September November/December	February/March May/June August/September November/December	May/June November/December

Table 2
PSC Fernley facility – Water Level Field Form

Field Event:________________ Date (mm / dd / yyyy): _ _ / _ _ / _ _ _ _

Field Geologist (s) - Name (s): ____

Instrument used - Brand: _ __________________________________ Model:________________________________

Well or Piezometer	Well venting		Liquid-Level Measurements		Total Well Depth (if applicable)	Comments
	Time	Headspace PID Reading	Time	Depth to Water		
	24-hr clock	(ppm)	24- hr clock	(feet)	(feet)	
PF-1						
PF-2						
PF-3						
PF-4						
PF-4D						
PF-5						
PF-6						
PF-7						

Table 3
Analytical Compound List
Groundwater Monitoring Program
PSC Fernley Facility

Parameter	CAS Number	EPA Method	Lab Reporting Limit (ug/L)
Arsenic	7440-38-2	3113B	5
Barium	7440-39-3	200.7 or 200.8	10
Cadmium	7440-43-9	200.7 or 200.8	1
Chromium	7440-47-3	200.7 or 200.8	5
Cyanide	7782-42-5	SM4500 CNC	2
Lead	7439-92-1	3113B	2.5
Mercury	7439-97-6	245.1	0.1
Selenium	7782-49-2	3113B	5
Silver	7440-22-4	200.7 or 200.8	5
Endrin	72-20-8	8081 3510C	0.02
gamma-BHC (Lindane)	58-89-9	8081 3510C	0.4
Methoxychlor	72-43-5	8081 3510C	1
Toxaphene	8001-35-2	8081 3510C	0.5
2,4,5-TP	93-72-1	8151A	0.5
2,4-D	94-75-7	8151A	0.5
Total Organic Carbon	-	SW 9060	400
Total Organic Halogen	-	SW 9020B	5
pH	--	--	--
Specific Conductivity	--	--	--
TOX	--	--	--
TOC	--	--	--
Water Levels	--	--	--

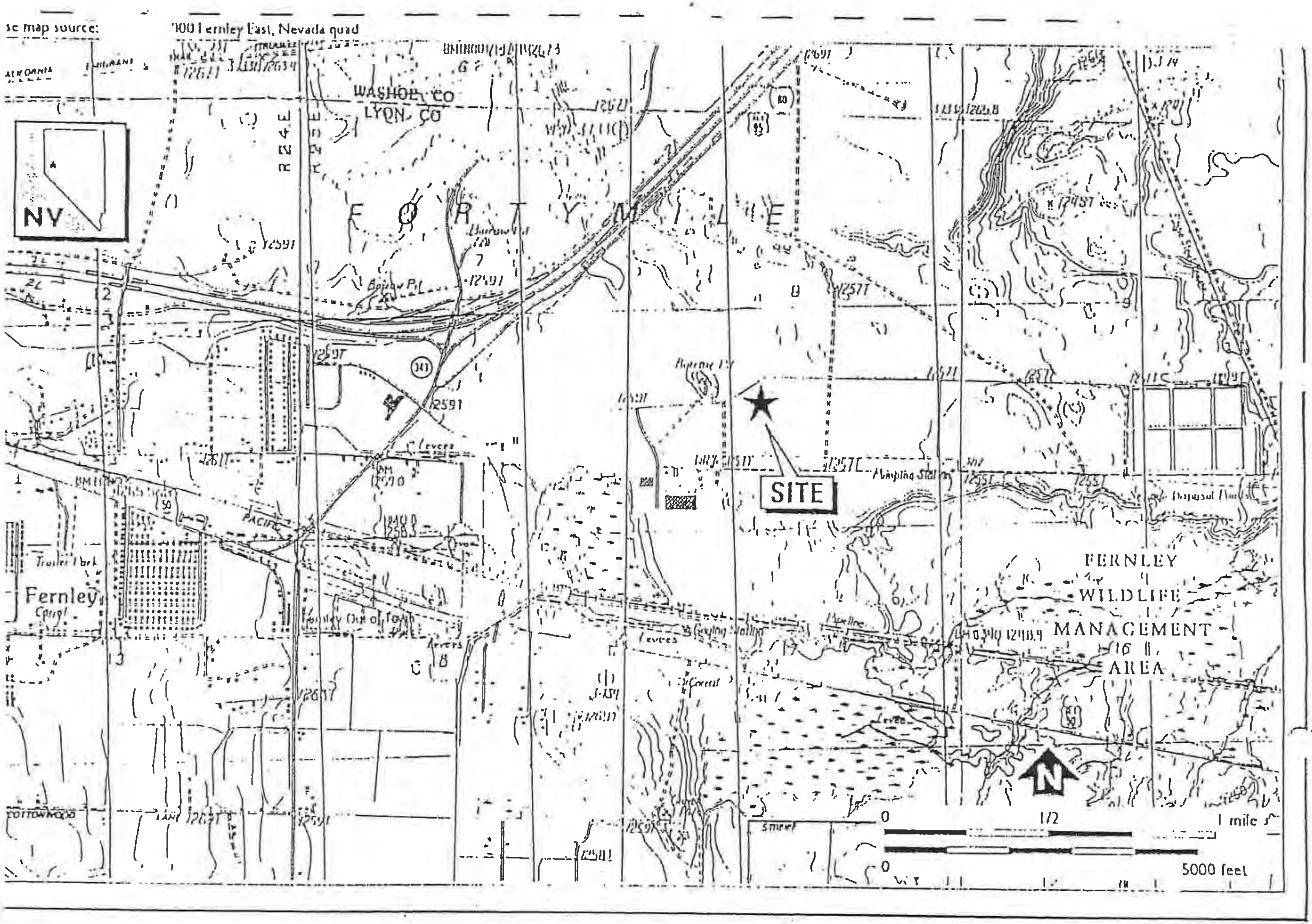
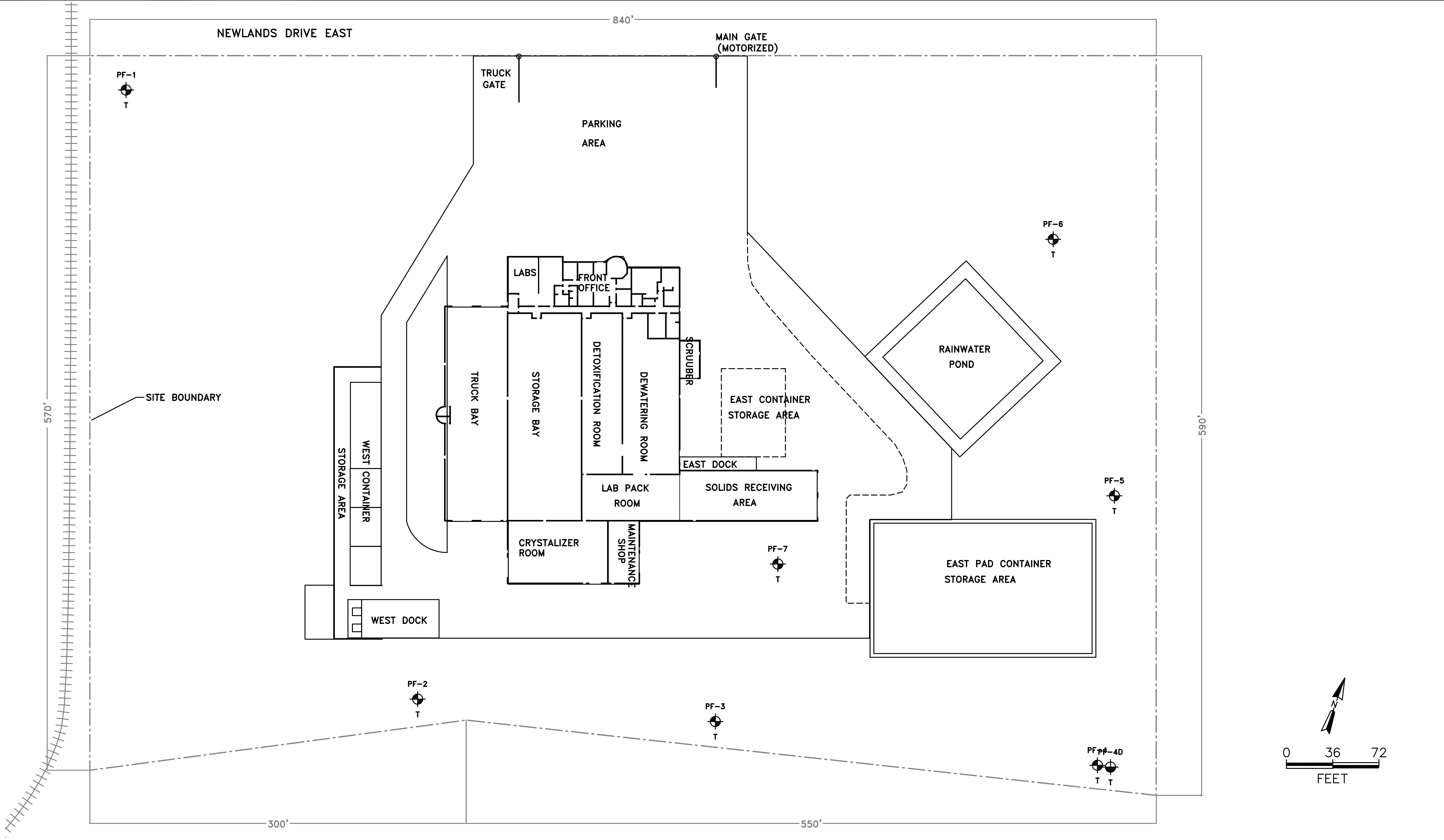


Figure 1
SITE LOCATION

ENTERED JUN 1 2 2009

2095 Newlands Drive East
Fernley, N



TITLE:
Well Locations
PSC Fernley Facility
Fernley, Nevada

DWN: dtb	DES.:	PROJECT NO.:
CHKD:	APPD:	
DATE: 7/10/12	REV.:	FIGURE NO.: E-2

Figure 3

Shallow Aquifer Permanent Well Construction

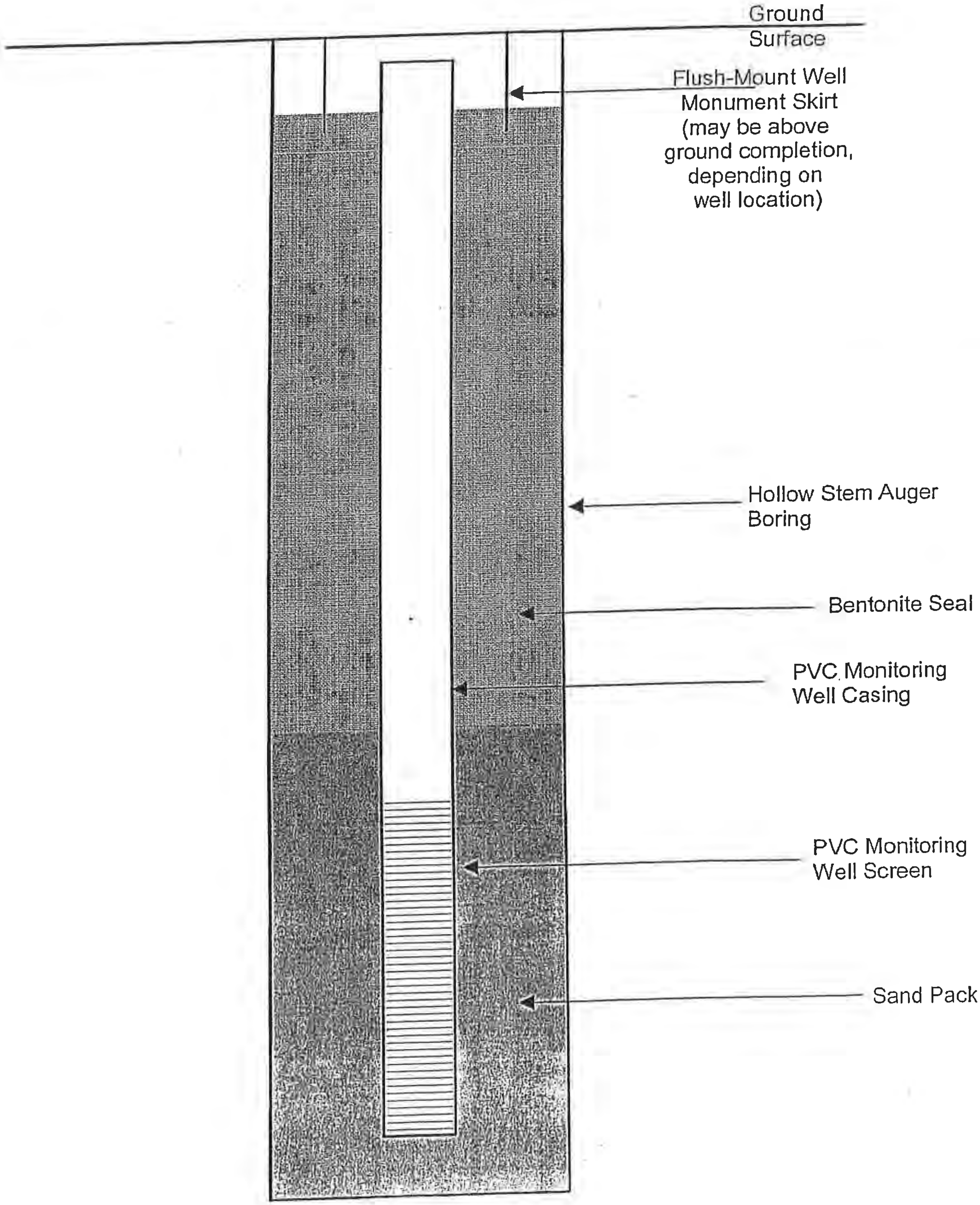


Figure 4

PSC	Monitoring Well Sampling Data Sheet	Well No.
		Facility Fernley
Date	Sampling Personnel	

Water Quality Measurements

Time	Volume Removed	pH	Conductivity	Temperature	Turbidity	Dissolved Oxygen	Redox Potential
(military)	(ml)	(pH units)			(NTU)		

Signature ______________________ Date __________ No. of Bottles ________ Page _____ of ______

Figure 5

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CHAIN OF CUSTODY REPORT

Work Order #:

CLIENT:	INVOICE TO:
REPORT TO:	
ADDRESS:	
PHONE: FAX:	P.O. NUMBER:

TURNAROUND REQUEST in Business Days*

Organic & Inorganic Analyses

10 | 7 | 5 | 4 | 3 | 2 | 1 | < 1

STD.

Petroleum Hydrocarbon Analyses

5 | 4 | 3 | 2 | 1 | < 1

STD.

OTHER Please Specify

*Turnaround Requests less than standard may incur Rush Charges.

PROJECT NAME:

PROJECT NUMBER:

SAMPLED BY:

CLIENT SAMPLE IDENTIFICATION	SAMPLING DATE/TIME	REQUESTED ANALYSES													MATRIX (W, S, O)	# OF CONT.	COMMENTS	NCA WO ID
1.																		
2.																		
3.																		
4.																		
5.																		
6.																		
7.																		
8.																		
9.																		
10.																		
11.																		
12.																		
13.																		
14.																		
15.																		

RELINQUISHED BY:		DATE:	RECEIVED BY:		DATE:
PRINT NAME:	FIRM:	TIME:	PRINT NAME:	FIRM:	TIME:
RELINQUISHED BY:		DATE:	RECEIVED BY:		DATE:
PRINT NAME:	FIRM:	TIME:	PRINT NAME:	FIRM:	TIME:

ADDITIONAL REMARKS: TEMP: PAGE OF

COC REV 3/09

This SOP contains nine sections:

1.0 Purpose

The purpose of this SOP is to provide geotechnical field personnel with an outline of the specific information needed to install and construct monitoring wells in both unconsolidated and bedrock media. The required equipment and documentation are also outlined for each of these procedures. The recommended monitoring well design, as presented in this SOP, is based on the assumption that the objective of the program is to obtain representative ground water information and water quality samples from aquifers.

2.0 Application

Ground water monitoring wells are generally used as collection points for ground water samples and as measuring points for aquifer hydraulic properties.

This SOP provides a step-by-step guideline to be followed by the site geologist to design and install monitoring wells suited to these purposes.

3.0 References

ASTM Proposed Recommended Practice for Design and Installation of Ground Water Monitoring Wells in Aquifers (February 19, 1990).

U.S. EPA, Office of Solid Waste. 1992. RCRA Ground-Water Monitoring Draft Technical Guidance. November.

Driscoll, Fletcher G. 1986. Groundwater and Wells. Second Edition. Published by Johnson Filtration Systems, Inc., St. Paul Minnesota.

4.0 Associated SOPs

Monitoring Well Development
Documentation Procedures

5.0 Installation Equipment and Materials

The following equipment should be provided and maintained by the site geologist:

- a calibrated photoionization detector;
- a weighted fiberglass tape or similar instrument calibrated to .001 foot and of sufficient length to reach the bottom of the deepest bore hole;
- a wooden folding ruler calibrated to a .001 foot;
- an electric water level indicator, immiscible phase probe or chalked steel tape for obtaining water level measurement to an accuracy of .001 foot;
- a field notebook and calculator.
- a camera;
- a small file or saw to permanently mark a double notch at the top of the well casing/riser;
- permanent marker or paint pen to mark the identification of the well on the steel pipe finish;
- a sufficient supply of blank field forms;
- a copy of the Work Plan including, at a minimum, the Field Sampling Plan, the Health and Safety Plan and the Quality Assurance Project Plan
- all required personnel protective equipment as defined in the Health and Safety Plan;
- A brass or hardened-steel security lock.

The drilling contractor is responsible for providing the following:

- well screen and riser components with flush joints with square profile threads to obtain water tight seals;
- machine slotted well screens (0.010 size);
- bentonite pellets or chips;
- “quick-set” additive (if necessary when cold weather conditions);

- filter sand;

- a steam cleaner;

- cement grout, mixer, tremie pipe;

- the project specific required surface finishing materials; and

- all required personnel protective equipment as defined in the Health and Safety Plan.

6.0 Monitoring Well Installation Procedure

Once a stable bore hole has been advanced to the desired depth, the installation of a well screen and riser will proceed as follows:

Materials Inspection and Cleaning

- decontaminate both inside and outside of the well screen, bottom plug and riser (unless the it came certified clean from the manufacturer) immediately prior to assembly and installation, using a water source of known chemistry and a mild non-phosphate detergent then rinse with deionized water; store decontaminated riser and screen in an area free of contaminants and cover with plastic sheeting;

- inspect all materials prior to assembly to insure material integrity.

Bore Hole Preparation

- if viscous drilling fluids were introduced to the borehole, then the borehole should be flushed with clean water of known chemistry. This is done to remove all viscous drill fluids from the bore hole which could prevent proper setting of well construction materials;

- record the volume of water introduce into the bore hole and recovered from the bore hole during flushing. The difference in there two volumes requires recovery during well development in addition to the calculated well volume to be removed in SOP-121.

- check the total depth of the bore hole using a weighted fiberglass tape and a constant datum such as the ground surface;

- a 1.0 foot thick base layer of filter sand should be placed at the base of the bore hole using a decontaminated, flush threaded, one inch internal diameter (minimum) tremie pipe. Alternatively, the filter sand may be added directly between the rise pipe and the auger or casing. Verify the depth of the top of the sand base;

<u>Monitoring Well Pre-assembly</u>

- pre-cut the uppermost section of the well riser so that when the well is in place, the top of the well riser will be approximately 4 to 6 inches below the ground surface for flush finished wells, or 3.0 feet above the ground surface for wells designed with a standpipe finish;

- permanently identify the survey and measuring point on the upper rim of the well riser by cutting a double notch into the rim;

<u>Monitoring Well Installation</u>

- quickly assemble the well within the bore hole by adding sections to the top of the column until the screened section is set at the desired depth. Care should be taken to prevent any materials from entering the well during down hole assembly;

- use of a geosock to prevent fines from entering the well should be discussed on an individual basis per project. If used, slip it on over the screened interval as the well is being assembled.

- cap the well riser to prevent materials from entering the well during construction;

- begin placing the chemically inert filter pack within the annular space surrounding the well screen while simultaneously removing the augers or casing;

- the filter pack should be added slowly in order to prevent bridging of the sand between the riser and the borehole or auger; when adding filter pack below the water table or to a deep well, a tremie pipe should be used;

- add the filter sand until it extends no more than 2.0 feet inside the auger or casing, then pull the casing upward allowing the filter sand to flow from the bottom, filling the resultant annular space. Frequent depth measurements should be taken using a weighted tape to verify the effectiveness of this procedure. The augers or casings should not be extracted in greater than 2.0 foot increments to minimize the potential for native sediments to cave or slump into the annular space;

- continue placing the filter pack until it extends above the screen for a distance equal to approximately 20% of the total screened interval, but not less than 2.0 feet above the top of the screen. Where there is a hydraulic connection between the zone to be monitored and the overlying strata, this upward extension of the filter pack should be minimized, subject to the construction described above, to prevent seepage from upper zones which may result in less than representative sampling;

- it is optional to place a secondary, finer filter pack directly above the first to prevent intrusion of the bentonite seal into the primary filter pack. This filter pack should be designed with a vertical thickness ranging between 0.5 and 2.0 feet. As with the primary filter pack, the secondary filter must not extend into an overlying hydrologic unit. The need for this filter pack should consider the gradation of the primary filter pack, the hydraulic heads between adjacent units, and the potential for grout intrusion into the primary filter pack;

- place an annular sealant seal directly above the filter pack(s) while continuing to remove the augers or casing in 2.0 foot increments. This seal consisting of bentonite pellets or chips, should extend a minimum of 3.0 feet above the top of the filter pack. Frequent depth measurements should be taken using a weighted tape to verify the efficiency of this procedure.

- pour water of a known chemistry over the bentonite pellets or chips if the seal is located in the vadose (unsaturated) zone (i.e., above the water table) to hydrate the bentonite. Record the amount of water added during this procedure for corrected well water removal during well development (SOP-121).

- fill the remaining annular space with a bentonite grout slurry continuing to remove the augers or casing in two foot increments. The slurry should extend to approximately 5.0 to 6.0 feet below ground surface and all augers or casing should be withdrawn. Allow 24 hours to settle and set;

- top-off the grouted column to 5.0 to 6.0 feet below the ground surface and allow to set.

7.0 Standard Surface Finishing Designs

The following defined our standard “flush mount” and “stand pipe” monitoring well finishing procedures:

7.1 Standard Flush Mount Finish

This finishing design is used when monitoring wells are installed in high traffic areas or other areas where a low profile design is needed. Flush mount wells are less preferable than stand pipe wells because there is a greater chance of surface water entering a flush mount well. The standard flush mount finish is constructed as follows:

- place a bentonite seal using water of known chemistry;

- place filter sand in the annular space between the well riser and the steel casing to a depth of 1.0 foot below ground surface;

- center a 13 inch diameter, aluminum cast, manhole-type cover equipped with a water tight gasket and a 1.0 foot aluminum vertical extension, over the well. The top of the aluminum cover should be approximately a ¼ inch above the ground surface;

- add grout to the excavated area, allowing the grout to flow into the annular spacing surrounding the steel casing. Fill the excavation evenly to a depth of approximately 8 inches below the ground surface and allow to settle and set (to shorten the setting time, the use of adding "quick-set" to the grout is acceptable). The bottom few inches of the aluminum cover should be seated in the cement;

- add cement to the excavated area surrounding the aluminum cover until the cement is flush with the ground surface. Gently grade and smooth the cement from the edge to the cover, so that runoff is away from the well and allow to set;

- permanently identify the well by labeling the cement pad, aluminum cover and lid to the locking steel casing; and

- secure well with an approved brass or hardened-steel lock.

7.2 Standard Stand Pipe Finish

This finishing design is used when the flush finish design is not needed. The standard stand pipe finish is constructed as follows:

- add filter sand to the annular space above the grouted column to a depth of approximately 1.5 feet below ground surface;

- center a 5.0 foot length of 4 or 5 inch inside diameter steel casing, with locking steel cap into the bore hole. This casing should be placed so that the locking lid rests approximately 2 inches above the top of the capped well riser, and is seated a minimum of 6 inches into filter sand;

- place filter sand in the annular space between the well riser and the steel casing to ground surface;

- excavate a 2.5 foot square which measures approximately 6 inches deep around the edges and grades deeper with depth at a slope of approximately 45° toward the bore hole. Take care to minimize the deposition of soil into the annular space outside the steel casing;

- using 2' x 6' lumber, construct a 3.0 foot square wooden frame and insert the frame into the excavation. Situate the frame so that all edges are flush with the ground surface;

- place three 3.0 foot long steel bumper guards in the excavation to protect the stand pipe from damage resultant from vehicular traffic on the line;

- add cement to the excavated area, allowing the cement to flow into the annular spacing surrounding the steel casing, until the cement is flush with the ground surface. Gently grade and smooth the cement from the edge to the casing, so the runoff is away from the well, and allow to set (to shorten the setting time, the sue of adding "quick-set" to the cement is acceptable under cold weather conditions);

- permanently identify the well by labeling the cement pad, stand pipe and lid to the locking steel casing; and,

- secure well with an approved brass or hardened-steel lock and record key number in field log book.

8.0 Documentation

Documentation of all monitoring well installation activities including all geotechnical forms and the maintenance of a detailed field notebook will be recorded in accordance with SOP-400.

9.0 Measure of Proficiency

Field staff will demonstrate proficiency on this SOP by successfully completing Sections 6.0, 7.0 and 8.0 a minimum of twice under the direct supervision of the Project Manager or a designee.

This standard operating procedure (SOP) contains nine sections:

1.0 Purpose

The purpose of this SOP is to provide field personnel with a set of guidelines to assure proper monitoring well development. According to EPA all monitoring wells should be developed to create an effective filter pack around the well screen, to rectify damage to the formation caused by drilling, to remove fine particulates from the formation near the borehole, and to assist in restoring the natural water quality of the aquifer in the vicinity of the well.

2.0 Application

This SOP provides a step-by-step guideline to be followed by the field sampling crew for performing or overseeing monitoring well development.

3.0 References

RCRA Groundwater Monitoring Draft Technical Guidance (Nov. 1992) EPA/530-R-93-001

4.0 Associated SOPs

Equipment Decontamination Procedure SOP
Documentation Procedures SOP

5.0 Equipment

The following equipment is necessary to properly develop a ground water monitoring well:

- A well key, hand drill, socket set, pad lock key, or other well access equipment.
- An electric water meter and oil/water interface probe calibrated to a hundredth of a foot, and sufficiently long to reach the bottom of the well.
- Well purging equipment (e.g. bailer, silicone line, PVC pipe, plug, pump, tubing, power supply, and extension cord), as needed.
- A solid PVC surge block.
- A sufficient number of 55-gallon drums (including lids, gaskets, and fasteners) to contain all purge water, unless other water handling arrangements have been made.
- A calibrated water quality meter that measures temperature, pH, specific conductivity, dissolved oxygen, redox potential, and turbidity.
- All required documentation including sample labels, field books, sampling forms, and chains-of-custody.
- Personal protective equipment as described in the Site Health and Safety Plan.
- Decontamination equipment as specified in the Work Plan.

6.0 Decontamination

All equipment that will come in contact with the well water will be decontaminated prior to arrival on site, relocation on site, and site exit. The Decontamination SOP shall be followed.

7.0 Well Development Procedures

Upon arrival at each well, the following procedures shall be followed:

- Suit up in appropriate personal protective equipment as described in the Site Health and Safety Plan.

- Brush any soil or vegetation and pump any standing water away from the well opening.

- Lay plastic sheeting around well to place equipment on and keep cords, tubing and pumps from touching the ground.

- Open the well cap.

- Measure and record the depth to LNAPL, water, DNAPL, and total depth of the well using a decontaminated oil/water interface probe or water level indicator (depending on the historical presence of NAPLs in the well). All LNAPL and DNAPL measurements are to be made in accordance with SOP-120. Measurements are to be made to the nearest one hundredth of a foot and recorded in the field book and on the appropriate field form.

- Compute the unit purge volume using the following formula and the input values on the attached Well Volumes Sheet.

  1 well volume (including annular space) = [x(total well depth – water level)] + [y(total well depth – bottom of seal)]

  where "x" is the Casing/Riser Volume per Unit Length, Internal (gal/ft) and "y" is the Annular Volume per Unit Length (gal/ft)

7.1 New Well Development Procedure

- If a submersible pump is to be used for well development, gently lower the pump to the well bottom. If a non-submersible pump is used, lower the tubing to the bottom of the well.

- Begin to purge the well at a rate sufficient to remove fines, slowly run the pump up and down the well over the length of the screen, and initiate physical water quality testing at least every 20% water removed for temperature, pH, conductivity, dissolved oxygen, and turbidity.

- A minimum of three and maximum of five well volumes (including annular space) will be removed. If this is the first time the well has been developed and water was used in the drilling process, the volume of water introduced into the formation during well formation must also be removed during development. *Purging is completed once the following has occurred:*
    - *the minimum purge volume has been removed and the water quality parameters have stabilized by the following screening requirements for three consecutive readings: Turbidity <5 NTU, specific conductivity within 10% of each other, and pH within 0.5 units;* *OR*
    - *the well runs dry;* *OR*
    - *five purge volumes and drilling process water volumes have been removed.*

- Measure total depth of well after development.

- Containerize all purge water in 55-gallon drums, unless other handling arrangements have been made.

- Record additional information such as unique odors or water color, and a description of the suspended particle content in the field book and on appropriate field forms.

- Upon completion of development, both the well and the purge drums are to be properly sealed and secured.

- All drums are to be permanently labeled as follows:
  Well ID
  Facility Name
  Drum Contents
  Date
  Drum Number

- Close the well appropriately and record any well integrity concerns in the field book and on the sampling form.

7.2 Existing Well Development Procedure

- Remove pump from well.

- Attach one length of twine to the surge block or use a drill rig or tripod and lower it to the bottom of the well.

- Vigorously begin moving the surge block up and down in the well creating a surging action across the screened interval. This action will bring the finer grained materials into suspension.

- Remove the surge block.

- Begin to purge the well at a sufficient rate to remove fines and initiate physical water quality testing at a minimum of every 20% water removed for turbidity.

- Repeat surging and purging to reduce silt presence in water and keep checking total depth measurements.

- A minimum of three and maximum of five well volumes (including annual space) will be removed. *Purging is completed once the following has occurred:*
  - *the minimum purge volume has been removed and the water quality parameters have stabilized by the following screening requirements for three consecutive readings: Turbidity <5 NTU, specific conductivity within 10% of each other, and pH within 0.5 units; OR*
  - *the well runs dry; OR*
  - *five purge volumes and drilling process water volumes have been removed.*

- Measure total depth of well after development.

- Containerize all purge water in 55-gallon drums, unless other handling arrangements have been made.

- Record additional information such as unique odors or water color, and a description of the suspended particle content in the field book and on appropriate field forms.

- Upon completion of development, both the well and the purge drums are to be properly sealed and secured.

- All drums are to be permanently labeled as follows:
  Well ID
  Facility Name
  Drum Contents
  Date
  Drum Number

- Close the well appropriately and record any well integrity concerns in the field book and on the sampling form.

8.0 Documentation

Documentation of all monitoring well development activities including all field forms and the maintenance of a detailed field book are described in SOP-400.

9.0 Measure of Proficiency

Field staff will demonstrate proficiency on this SOP by successfully completing sections 6.0, 7.0, and 8.0 a minimum of twice under the direct supervision of the Project Manager or her/his designee.

This standard operating procedure (SOP) contains the following sections:

1 Purpose

The purpose of this SOP is to provide personnel with the specific information needed to collect and document consistent and representative data on liquid levels at, and total depths of, monitoring wells and piezometers.

2 Application

This SOP shall be followed by all personnel who measure liquid levels at, and total depths of, monitoring wells and piezometers.

3 References

Yeskis, D. and B. Zavala. May 2002. Ground-Water Sampling Guidelines for Superfund and RCRA Project Managers. EPA Office of Solid Waste and Emergency Response. EPA 542-S-02-001.

U.S. EPA. Nov 1992. RCRA Groundwater Monitoring: Draft Technical Guidance. Office of Solid Waste. EPA/530-R-93-001.

4 Associated SOPs

Low-Flow Groundwater Sampling Procedure
Equipment Decontamination Procedure
Documentation Procedures

5 Terminology

The following terminology is used in this SOP:

> "NAPL" means nonaqueous-phase liquid. "DNAPL" and "LNAPL" mean dense and light NAPL (described below), respectively.
>
> "Wells" means groundwater-monitoring wells and piezometers.
>
> "Liquid levels" means the elevations of fluid interfaces in wells. These include the following:
>
>> The "LNAPL level" is the elevation of the air/LNAPL interface, if floating LNAPL is present.
>>
>> The "water level" is either (1) the elevation of the air/water interface if LNAPL is absent, or (2) the elevation of the LNAPL/water interface if LNAPL is present.
>>
>> The "DNAPL level" is the elevation of the water/DNAPL interface, if DNAPL is present.
>
> The level is measured as the depth of the interface, from the well's measuring point (MP).

6 Equipment and Supplies

The following equipment and supplies are necessary to properly measure liquid levels and total depths:

- Equipment required to open the well monuments (e.g., padlock keys, well keys, hand drill, socket set, Allen wrenches or other tools).
- An electric water-level indicator and/or an electric oil/water interface detector. Each

such instrument must have a chemically inert suspension line that is graduated in 0.01-foot increments and sufficiently long to reach the bottom of the well.

- Fully charged batteries for each battery-powered instrument.
- An accurate and reliable watch that has been properly set.
- Documentation materials as described in SOP-400.
- Health-and-safety equipment and supplies (e.g., personal protective equipment [PPE]) as described in the relevant site health-and-safety plan (HSP).
- Decontamination equipment and supplies as specified in SOP-200.

Although not essential, the following items are useful for verifying the correctness of field measurements:

- A construction (as-built) diagram for each well, showing the well's total depth and its screened interval.
- A table or graph (e.g., a well hydrograph) of field measurement results (liquid levels, total depth) from previous monitoring events, for each well.

7 Procedures

7.1 Simultaneity of Measurements

If liquid-level measurements are to be completed at a group of wells at a site, then complete the entire set of measurements for the group within a single business day. In addition, if any of the wells at a site are screened in tide-influenced hydrogeologic units, then complete the set of measurements corresponding to those wells within a single one-hour period. To facilitate compliance with this requirement, the water-level field form for each site shall identify those wells screened in tide-influenced units.

7.2 Order of Completion

At each well, complete the liquid-level and total-depth measurements in the following order:

1. LNAPL level
2. water level
3. DNAPL level

4. total depth

7.2.1 Special Instructions for Wells with Dedicated Pumps

The instrument access ports on some dedicated pumps will not accommodate some probes (e.g., most oil/water interface probes). If so, the pump must be removed from the well to measure the DNAPL level and the total depth. At wells with dedicated pumps, complete the measurements in the following order:

1. Measure the water level.

2. Remove the pump from the well and place it in a clean plastic bag.

3. Allow the liquid levels to stabilize.

4. Measure the DNAPL level.

5. Measure the total depth.

7.3 Pre-Measurement Procedures

On arrival at each well, complete the following steps in the order listed:

1. Don appropriate PPE as described in the site HSP.

2. Remove any debris (e.g., soil, vegetation, or refuse) and any standing water from the well opening, to prevent foreign matter from entering the well.

3. Open the well monument.

4. Vent the well by carefully removing the well cap. Record the time at which the well is initially vented to the atmosphere (i.e., the time at which the well cap is removed). If the gas in the well casing appears to have been over-pressurized or under-pressurized relative to the atmosphere, then note this in the field book or Field Sample Data Sheet (FSDS).

   Caution (1): Never put your face, head, or any other body part over the well when venting it. If possible, vent the well gradually, so the cap does not become airborne.

   Caution (2): Handle monitoring wells with care at all times. If it is necessary to apply lift or torque to a well cap to remove it (e.g., if the casing is airtight and under a vacuum), then be extremely careful to prevent the well casing from being raised or rotated.

5. Wait at least 20 minutes from the time the well is vented, to allow the liquid levels in the

well to equilibrate to the current atmospheric pressure, before measuring liquid levels. At some wells it may be necessary to vent for longer periods.

7.4 General Measurement Procedures

Each liquid level measurement involves lowering an instrument probe into the well, until the instrument emits the appropriate response, indicating the probe has reached the desired fluid interface in the well. Depending on the type (manufacturer and model) of instrument, the response may be audible (e.g., a tone is steadily or intermittently emitted), visible (e.g., an indicator light is steadily or intermittently illuminated), or both. Consult the instrument's operating manual for details. The probe is attached to the body of the instrument by a flexible suspension line consisting of a graduated "tape" or coaxial cable that sheathes an electric conductor. After lowering the probe to the appropriate level in the well (see below), hold the upper end of the graduated tape against the well's MP and read the numeric value off the tape. Record all of the measurements to the nearest 0.01 foot below the well's MP. If the MP is not clearly marked (typically by a notch cut into the top of the well riser), then measure all levels from the top of the north side of the riser or dedicated pump.

Duplicate each liquid-level and total-depth measurement in the field to ensure that the reading is accurate. Record all results (times, measured values, etc.) both in the field book and on the water-level field form.

7.5 Measuring LNAPL Levels

LNAPLs are NAPLs that are less dense than water. In the subsurface, free-phase LNAPL tends to accumulate on the water table. Free-phase LNAPL that enters a well tends to accumulate on the air/water interface. Some wells routinely contain LNAPL. Typically, the thicknesses of the LNAPL layers in such wells are measured at the same time the water levels are measured.

Use an oil/water interface detector for the measurement. Turn the detector on. Then slowly lower the probe into the well. In some cases a very thin (~ 0.01 foot) layer of LNAPL may accumulate on the air/water interface in the well, so the probe must be lowered very slowly if the LNAPL layer is to be detected and accurately measured. The oil/water interface detector emits one type of response to indicate that the probe has contacted NAPL, and a different type of response to indicate that the probe has contacted water. First, lower the probe until the air/LNAPL interface is detected. Measure the depth to the interface. Record the result. Record "sheen" if the instrument detects an LNAPL layer whose thickness is less than 0.01 foot.

7.6 Measuring Water Levels

Measure water levels using either an oil/water interface detector or, if no LNAPL is present, using an electric water-level indicator.

7.6.1 Measuring Water Levels Using the Oil/Water Interface Detector

After measuring the depth to LNAPL in the well, and before retrieving the probe from the well, slowly lower the probe further into the well. When the LNAPL/water (or air/water) interface is detected, measure the depth to the interface. Record the result.

7.6.2 Measuring Water Levels Using the Electric Water-Level Indicator

Turn the water-level indicator on. Manually adjust the sensitivity to a medium level. Slowly lower the indicator probe into the well until the indicator emits a short audible tone, indicating the probe has contacted the air-water interface. Measure the depth to the interface. Record the result.

7.7 Measuring DNAPL Levels

DNAPLs are NAPLs that are denser than water. In the subsurface, free-phase DNAPL tends to sink below the water table. Free-phase DNAPL that enters a well tends to sink to the bottom of the well. DNAPL levels are measured at some wells at the same time that the water levels are measured. Use an oil/water interface detector to measure the DNAPL level as described below.

If the well does *not* have a dedicated pump, then after measuring the water level in the well, and before retrieving the probe from the well, slowly lower the probe further into the well. If the well *does* have a dedicated pump, then after the pump has been removed from the well and the liquid levels in the well have been allowed to stabilize, slowly lower the probe into the well.

When (if) the water/DNAPL interface is detected, measure the depth to the interface. Record the result.

7.8 Measuring Well Total Depths

For measuring well total depths, complete the following steps in the order listed:

1. Lower the instrument (water-level indicator or oil/water interface detector) probe to the bottom of the well to measure the well's total depth.

2. Gently bounce the probe on the well bottom to determine when the probe is at the bottom of the well, and take up the slack on the suspension line.

3. Measure the total depth. Record the result.

7.9 Post-Measurement Procedures

After all of the measurements have been made at a well, and the results have been recorded, complete the following steps in the order listed:

1. Retrieve the instrument (water-level indicator and/or the oil/water interface detector) suspension line and probe from the well, and simultaneously decontaminate the instrument suspension line and probe (see below).

2. If the well has a dedicated pump that was removed to complete the measurements, replace the pump.

3. Close (seal) and secure the well.

4. Record any well integrity concerns in the field book or FSDS and on the well maintenance form.

8 Decontamination

Decontaminate all equipment that may come in contact with the well water or NAPL, at the following times:

- prior to, or on, arrival at the site
- on moving from one well to another, on site
- immediately prior to exit from the site.

Follow the decontamination procedures given in SOP-200.

9 Documentation

Record all measurement results (liquid levels, total depth, and time of measurement) on the appropriate field forms and field book or FSDS. Follow the documentation procedures given in SOP-400.

10 Measure of Proficiency

Field staff shall demonstrate proficiency on this SOP by successfully completing sections 7, 8, and 9 at least twice under the direct supervision of the Project Manager or her/his designee.

This standard operating procedure (SOP) contains nine sections:

1 Purpose

The purpose of this SOP is to provide personnel with the specific information needed to consistently collect and document representative groundwater samples for laboratory analyses from monitoring wells using a low-flow groundwater sampling technique.

The purpose of low-flow groundwater sampling is to collect a groundwater sample that is representative of actual site conditions. Therefore, the purge rate is designed to be low enough to simulate actual groundwater flow and to pull water from a discrete zone near the pump intake into the pump rather than pulling groundwater from a large area around the well or outside of the screened area of the well. A low purge rate is also intended to reduce the likelihood of mobilizing colloids in the subsurface that are immobile under natural flow conditions.

2 Application

This SOP applies to groundwater sampling of permanent monitoring wells at the Fernley PSC facility.

3 References

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Wilkin, R.T., M.S. McNeil, C.J. Adair and J.T. Wilson. 2001. Field Measurement of Dissolved Oxygen: A Comparison of Methods. *Ground Water Monitoring and Remediation*, Vol. 21, No. 4, pp. 124-132.

Phoenix Health and Safety, Inc. January 2001. Site Health and Safety Plan – Corrective Actions Group.

PSC, 2002. Groundwater Sampling Field Manual. (Updated Annually)

4 Associated SOPs

Measuring Water, LNAPL, and DNAPL Elevations
Equipment Decontamination Procedure
Documentation Procedures

5 Equipment

The following equipment is recommended for properly sampling a groundwater monitoring well:

- A groundwater sampling field manual that includes a map of well locations, sampling plan, appropriate SOPs and well construction information.
- A well key, hand drill, socket set, padlock key, or other well access equipment.
- An electric water-level indicator and/or oil/water interface detector calibrated to 0.01 foot, and sufficiently long to reach the bottom of the well.
- A weighted tape measure for determining total depths of wells, when this is required.
- Well purging equipment (e.g.; pump, converter, tubing, power supply and extension cord).

- A sufficient number of containers (e.g., 55-gallon drums with lids, labels, gaskets, and fasteners) to store all purge water, unless other water handling arrangements have been made.
- A calibrated flow-through water-quality meter(s) and calibration solutions to measure temperature, pH, specific conductivity, dissolved oxygen (DO) and oxidation-reduction potential (ORP).
- An instrument and calibration solutions to measure turbidity.
- Disposable 0.45 micron filters.
- A sufficient number of sampling containers, including containers for regular samples and quality control samples (e.g., equipment blanks, duplicates, and matrix spike/matrix spike duplicates).
- All required documentation including sample labels, field books, applicable field forms, chain-of-custody (COC) forms, pens and paper for sampling forms, and COC seals.
- Personal protective equipment (PPE) described in the site health and safety plan.
- Decontamination equipment as specified in SOP-200.
- Water flow-rate measurement equipment (e.g., flow meter, or graduated container and stopwatch).
- Sampling support equipment and supplies (e.g., sample coolers, ice/blue ice, bubble wrap and VOC bottle holders, tape, plastic locking bags, razor knives, garbage bags, paper towels, deionized water, nitrile gloves, five-gallon buckets, and protective plastic sheeting) as needed.

6 Decontamination

All reusable equipment that will contact the well and/or water samples will be decontaminated prior to its use, according to the procedures described in SOP-200.

7 Well Sampling Procedures

7.1 Set Up

On arrival at each well, the following procedures shall be followed:

- Don appropriate PPE as described in the site health and safety plan.

- Remove any soil or vegetation, and standing water from the well monument casing. Check the well condition, making sure the flexible gasket seals are clean and intact. If applicable, also check the condition of the dedicated pump cap. Record any problems in the field book and the appropriate field forms.
- Lay plastic sheeting on the ground around the well, and place the sampling equipment and bottles on the sheeting to keep them from touching the ground.
- Remove the well cap.
- Set up the pump, converter, and flow-through cell and turbidity meter in preparation for purging. Connect the discharge line from the pump to a flow-through cell. A "T" connection is needed in the tubing between the pump discharge line and the flow-through cell to allow for the collection of water for the turbidity measurements, using a turbidimeter or similar instrument. The discharge line from the flow-through cell must be directed to a container to contain the purge water during the purging and sampling of the well.
- Record the depth of the pump intake on the sampling form and/or in the sampling field book. The pump intake should be set at the middle of the middle of the water column for wells screened at the water table and at the middle of the screened interval of the well for deeper wells. Check with the project manager if there is uncertainty regarding this issue. The pump should be lowered into the well alongside of a weighted measuring tape or water-level indicator to ensure that the intake of the pump is set at the appropriate depth.
- Measure and record the depth to water using a decontaminated water-level indicator or oil/water interface detector to the nearest 0.01 foot, in accordance with SOP-120. Record the reading in the field book and on the appropriate field form(s). Calculate the volume of water in the casing and the screened interval. The following equation is used to calculate the well volume:

$$V = V_{casing} \text{ (well depth - static water depth)}$$

where:
V_{casing} = casing volume per unit length
(e.g., ~ 0.17 gal/ft for two-inch casing)

- Before purging, adjust the pumping rate to its lowest setting, and set the data logger in the flow-through cell to record readings every three minutes.

7.2 Purging Monitoring Wells

7.2.1 Purging Procedure

Measure the initial (static) water level in the well and record the reading on the field form(s). All wells have dedicated tubing that will be used for both purging and sampling.

Start the pump at a flow rate of 200 to 500 mL/min. Maintain a steady flow rate while maintaining a drawdown of less than 0.33 foot. The flow rate can be measured using a graduated cup and a stop watch.

To determine water-level stability, subtract the second water-level reading (not the static water-level reading) from the current water-level reading to determine the current drawdown.

After the flow rate is stable, record the water level and the flow rate every three to five minutes. Record water levels more frequently if the rate is being adjusted. A drawdown less than 0.33 foot is preferred but may not always be possible. If the drawdown exceeds 0.33 foot at low flow rates (≤ 500 mL/min), lower the flow rate as practical (not to drop below 100 mL/min) to reduce the drawdown.[*]

Begin recording water-quality parameters after all water has been purged from the sample tubing, pump, and flow-through cell. Initiate water-quality testing for temperature, pH, specific conductivity, DO, ORP and turbidity. Record water-quality parameters every three to five minutes.

7.2.2 Purging Requirements

Sampling cannot begin until the drawdown is no greater than 0.33 foot, and all water-quality parameters are stable. Each water-quality parameter is considered stable when it satisfies the corresponding stability criterion specified in the table below.

---

[1] *The 0.33-foot drawdown goal may be difficult to achieve under some circumstances due to geologic heterogeneities within the screened interval, and may require adjustment based on site-specific conditions and personal experience. The water levels in water-table wells should not be allowed to drop below the pump intake. In all other cases, the water level should not be allowed to drop below the top of the well screen. If the water table drops below one of these minimum values, the pump should be turned off and the water level should be allowed to recover. See section 7.2.2, fifth bullet for more information.*

Water-Quality Parameter	Stability Criterion
Turbidity	{X} < 5 NTU or RPD < 10 % for values {X} > 5 NTU
Dissolved Oxygen	$\Delta \leq 0.3$ mg/L
Specific Conductivity	RPD $\leq$ 3 %
ORP	$\Delta < 10$ mV
pH	$\Delta < 0.1$ unit

Where: {X} = the last three water-quality readings

$$m = \text{mean} = \frac{\text{Max}\{X\} + \text{Min}\{X\}}{2}$$

$$\Delta = \text{Max}\{X\} - \text{Min}\{X\}$$

$$\text{RPD} = \frac{\Delta}{m} \times 100\%$$

In some circumstances, the well may not stabilize according to the above criteria, but the well can be sampled if one of the following conditions occurs:

- Wells are unable to meet stability criteria due to equipment accuracy. The accuracy of the instruments will often limit the ability to achieve stabilization on a percentage basis. For example, if the ORP is consistently fluctuating between 1 and 15 mV, then $\Delta = 14$ mV, which is not within the requirements for stability. However, the accuracy of the instrument currently used is +/- 20 mV. Therefore, in this case the stability criterion would be considered satisfied within the range of accuracy of the equipment. This is particularly important when the water-quality parameter values are low. Examples of accuracy limits for the equipment that may be used (e.g.; YSI and Horiba flow-through cells, and the HF Scientific Turbidimeter) are provided here for reference. However, if another instrument is used, field personnel must consult the instrument's manual to determine its accuracy.

Water-Quality Parameter	Equipment Accuracy
Turbidity	+/- 0.02 NTU
Dissolved Oxygen[2]	+/- 0.2 mg/L
Specific Conductivity	+/- 0.001 mS/cm
ORP[2]	+/- 20 mV
pH	+/- 0.2 unit

- Wells for which all water-quality parameters have stabilized may be sampled if it is clear that the drawdown will not stabilize before the water level drops below the minimum allowable value (i.e., pump intake, or top of screen if aquifer is confined).

- Water-quality parameters are not stable, but at least one well volume of water has been removed from the well. See the equation in Section 7.1.

- The water level drops below the minimum value (i.e., the pump intake, or the top of the screen if the aquifer is confined) during purging. In this case, the pump should be turned off and the well should be allowed to recover. As long as a minimum of two tubing volumes (including the tubing and pump) has been removed from the well, then the well should be sampled as soon as the water level has recovered sufficiently to collect volume of groundwater necessary for all samples. Use the following equations to determine the minimum volume of groundwater to be removed prior to sampling when this problem occurs:

  Minimum purge volume = 2 [500 mL + M (length of tubing in feet)]
  where M is the volume (in mL) contained in a one-foot length of tubing

  For tubing of various inner diameters, M is equal to:

Inner Diameter	M
1/8"	2.4
¼"	9.7

---

[2] If the final dissolved oxygen measurement is less than 1 mg/L, a sample should be collected and analyzed by the spectrometric, colorimetric or Winkler titration methods.
[3] ORP may not always be an appropriate stabilization parameter, depending on site conditions. The project manager may designate wells in the Groundwater Sampling Field Manual that will not require ORP measurements.

½"	39

This is acceptable even though the water-quality parameters have not stabilized and one well volume has not been removed.

Record in the field book and field form if any monitoring wells did not meet the stabilization and drawdown criteria and describe the rationale for sampling the well at the time it was sampled.

7.3 Sampling Procedure

Do not stop pumping after the purging requirements have been met. Don clean nitrile gloves. Disconnect the sampling tube from the T-fitting. Collect each sample directly from the sampling tubing through a disposable field filter into the sample collection bottle. Minimize the turbulence by allowing the groundwater to flow gently down the inside of the container.

The sampling flow rate may remain at the established purge rate or may be adjusted slightly to minimize aeration, bubble formation, or turbulent filling of sample bottles. Typically, flow rates less than 500 mL/min are appropriate.

Samples do not have to be collected in a particular order.

7.4 Post-Sampling Procedures

After all of the samples have been collected in containers that are labeled and appropriately treated with preservatives, the following tasks should be completed:

- Measure and record the depth to water to determine total drawdown. Record the estimated total volume of water purged from the well.
- If dedicated equipment is in place at the well, disconnect aboveground tubing and properly seal the well.
- If non-dedicated equipment is used, then remove the equipment. Discard disposable items and decontaminate reusable items according to SOP-200.
- Close and secure the well, and record any well integrity concerns (bolt tightness, etc) in the field book and on the sampling form.

- Rinse the water-quality meters with deionized water between wells.

- Report if any monitoring wells did not meet the stabilization and drawdown criteria with recommendation on how to conduct the sampling for the next sampling event.

8 Documentation

SOP-400 describes the documentation of all monitoring well sampling activities, including all field forms, and the maintenance of a detailed field book.

9 Measure of Proficiency

Field staff will demonstrate proficiency on this SOP by properly completing sections 6, 7 and 8 at least twice under the direct supervision of the Project Manager or her/his designee.

PSC Fernley SOP

Equipment Decontamination Procedure
SOP - 200
Origination Date: 1/28/03
Revision Date: 1/28/03
Revision No.0

This standard operating procedure (SOP) contains eight sections:

1.0 Purpose

The purpose of this SOP is to provide field personnel with an outline of the procedure and frequency of decontaminating equipment that has come into contact with monitoring well water.

2.0 Application

This SOP provides a step-by-step guideline to be followed by the field sampling crew to prevent cross-contamination between monitoring wells and preserve well integrity.

3.0 References

RCRA Groundwater Draft Technical Guidance (EPA, 1992)

4.0 Associated SOPs

Measuring Water, LNAPL, and DNAPL Elevations
Monitoring Well Development
Low Flow Groundwater Sampling Procedure
Documentation Procedures

5.0 Equipment

The following equipment is necessary to properly decontaminate equipment used with monitoring wells:

- De-ionized water and spray bottle.
- Alconox and spray bottle, hexane and spray bottle, and 10% Nitric acid and spray bottle, paper towels/rags.
- PVC pipe, capped on one end, 5 feet long.
- A clean hose and tap water source.
- A labeled 55-gallon drum for wastewater and a bucket to use for smaller volume prior to containing in drum.
- Personal protective equipment as described in the Site Health and Safety Plan.

6.0 General Decontamination Procedures

All reusable equipment that will come in contact with the well and/or be used to acquire samples will be decontaminated prior to arrival on site, relocation on site, and site exit.

6.1 Decontamination When Organic Constituents Are of Interest

- Wash the equipment with a solution of nonphosphate detergent (Alconox or equivalent) and water.
- Rinse the equipment with tap water.
- Rinse the equipment with Hexane.
- Rinse the equipment with DI water.

6.2 Decontamination When Inorganic Constituents Are of Interest

- Wash the equipment with a solution of nonphosphate detergent (Alconox or equivalent) and water.
- Rinse the equipment with tap water.
- Rinse the equipment with 10% Nitric Acid solution.
- Rinse the equipment with DI water.

6.3 Decontamination When Inorganic and Organic Constituents Are of Interest

- Wash the equipment with a solution of nonphosphate detergent (Alconox or equivalent) and water.
- Rinse the equipment with tap water.
- Rinse the equipment with Hexane.
- Rinse the equipment with DI water.
- Rinse the equipment with 10% Nitric Acid solution.
- Rinse the equipment with DI water.

7.0 Specific Decontamination Procedures

7.1 Non-Dedicated Submersible Pump Decontamination Procedure

After sampling or developing a well using a non-dedicated submersible pump, decontaminate the pump as follows:

- Use hose to spray off pump with tap water.
- Place pump into a capped approximately 5' long, 3" diameter PVC pipe.
- Fill the PVC pipe with tap water and detergent.
- Run the pump until the pipe is empty, refilling it with tap water 3 times. The discharge decontamination water will be pumped into a 55-gallon drum.
- Remove the pump and wash out the pipe using tap water from the hose.
- Place the pump in the pipe again and fill with tap water.
- Repeat the process, running the pump until the pipe empties 3 times, when there is half a pipe of water left, add 2L of Hexane and continue pumping until pipe is empty.
- Remove the pump and rinse out the pipe with tap water.
- Place the pump back in the pipe and fill with tap water.
- Run the pump until the pipe empties 3 times, when there is half a pipe of water left add 2L of 10% Nitric Acid.
- Run the pump until it empties, then rinse it with water and refill the pipe with di-ionized water.
- Run the pump until the pipe empties three times with the deionized water.

8.0 Documentation

Documentation of all decontamination procedures associated with monitoring well activities including all field forms and the maintenance of a detailed field book as described in SOP-400.

9.0 Measure of Proficiency

Field staff will demonstrate proficiency on this SOP by successfully completing sections 6.0, 7.0, and 8.0 a minimum of twice under the direct supervision of the Project Manager or her/his designee.

This standard operating procedure (SOP) contains seven sections:

1.0 Purpose

The purpose of this SOP is to outline, in detail, the required documentation needed to maintain accurate logs and files of all field procedures.

2.0 Application

This SOP provides documentation guidelines, including examples, required for all geotechnical exploratory and sampling procedures.

3.0 References

None

4.0 Associated SOPs

Measuring Water, LNAPL, and DNAPL Elevations
Monitoring Well Development
Low Flow Groundwater Sampling Procedure
Equipment Decontamination Procedure

5.0 Field Books

All field books should be pocket size "Rite in the Rain" or equivalent and should have non-removable pages. These field books are to be dedicated to a project, and the field sampling crew is responsible for maintaining a field book inventory. This inventory should include a numbering and tracking mechanism for each field book assigned to a particular case.

Each field book is to be maintained as follows:

- Label the outside front cover with the following information: PSC, Fernley, Dates Included, and Book Number. The inside cover should include: Pier 91, Project Manager's name, Site address, Project Manager's phone number, dates included, and book number.

- Inside the cover, list the full names and initials of each person working on the project that will be referred to in the field book.

- Maintain all field notes directly in the field books (i.e. notes are not to be taken then transferred to the field books at a later time).

- Record all field notes in permanent ink (sharpie markers).

- Initial, date, and number each page upon completion.

- Correction of mistakes are made with a single line and initialing and dating the correction.

- Avoid blank spaces within the notes. Unavoidable blank spaces are to be struck with a single line.

Examples of information required in the field book include:

- The date of entry.
- Time of entry for specific events (in military time).
- A meteorological description of daily changes.
- Personnel present including arrival and departure times and affiliations.
- Make, model and condition of equipment used.
- The time interval and reasons for delays including a detailed description of corrective actions taken by the field crew.
- A detailed description and rationale for any deviations from the Work Plan, Sampling Plan, or Health and Safety Plan.

6.0 Field Forms

The field forms, hard copy or electronic, have been designed to detail all steps, actions, and readings associated with specific field procedures. These forms are to be completed in full. No sections are to be left blank, if a section is "not applicable", it is to be indicated as such. All forms, including location diagrams, are to be completed in the field with permanent ink.

7.0 Measure of Proficiency

Proficiency assessment for documentation is associated with specific procedural proficiency, therefore, no separate proficiency measures for documentation are needed.

SECTION F

PROCEDURES TO PREVENT HAZARDS

SECTION F PROCEDURES TO PREVENT HAZARDS

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SECTION F. PROCEDURES TO PREVENT HAZARDS

F1.0 SECURITY PROCEDURES AND EQUIPMENT

F1.1 Barriers and Means to Control Entry

40 CFR 264.14 (b)(2)(i),(ii),270.14(b)(4)

The PSC Fernley Facility is completely surrounded by a six-foot-high chain link fence. Exits and entrances are located to control traffic flow, limit access to the active areas (i.e., waste and product handling areas) of the facility, and provide emergency escape. Figure F1-1, PSC Fernley Facility Site Plan, shows the facility fences and gates. The plant is illuminated by automatic outdoor lighting. Surveillance cameras are installed throughout the interior and exterior of the facility providing additional security. These cameras can be monitored through remote access by the facility management.

The facility currently accepts waste between the hours of 7 a.m. and 4 p.m., Monday through Friday. However, the facility's operational schedule may vary, potentially operating up to 24-hours a day, seven days a week. Each shift of workers is led by a Supervisor knowledgeable in emergency response and notification procedures.

During operational hours, the gates allowing access to parking areas and offices are closed. An intercom system is used to allow visitor access to the facility. Personnel have access to either a key card or combination for entry. Access to the active area of the facility is restricted to waste transportation vehicles, authorized personnel, and visitors. Employees monitor the active area of the facility to prevent access by unauthorized personnel. All visitors to the facility must first sign in at the front office. Authorized visitors undergo a briefing outlining activities and hazards at the facility, and then are escorted under direct observation by plant personnel at all times while in the active areas of the facility.

During non-operational hours, all gates are closed and locked. The locks are heavy-duty units keyed alike. Only authorized personnel are issued keys, and each key is stamped "DO NOT DUPLICATE". Access to the primary employee entrance gate is gained by electronic key card. Cards are issued only to employees. Master keys, which can access all locks on the premises, are assigned to the Plant Manager, emergency response coordinators, supervisors, and lead personnel. Keys with limited access are assigned on an as-needed basis.

F1.2 Warning Signs

40 CFR 264.14(c)

Signs printed with the legend, "Danger – Unauthorized Personnel Keep Out" are posted on the gates and approximately every 50 feet along the perimeter fence. The demographics of the City of Fernley do not indicate a need for warning signs in languages other than English. The signs are visible from any approach to the facility and legible from a distance of 25 feet. They are attached to the fence and gates at a height of approximately five feet.

F2.0 INSPECTION PLAN

40CFR 264.15(a),(b),(c),(d), 270.14(b)(5)

The inspection plan is intended to protect human health and the environment by detecting, preventing, and responding to malfunctions, deterioration, operator errors, and unplanned discharges. The inspection plan, which is kept in the facility operating record, is based on operating experience and engineering knowledge.

F2.1 General Inspection Requirements

40 CFR 264.15(b)(1),(3),(4),264.33, 264.174

In general, facility inspections are conducted to prevent, detect, or respond to environmental or human health hazards. Inspections address the following items: safety and emergency equipment, security equipment, operational equipment, container storage areas, load/unload areas, and tank systems.

The inspection schedules in Tables F2-1 to F2-5 and the associated inspection forms in Appendix F-1 specify the items inspected, the types of problems looked for during inspections, and frequency of inspection. Table F2-7 provides a checklist for emergency shut down procedures. The following paragraphs describe in general the inspection schedule.

Frequency of inspection is based on the rate of possible deterioration of equipment and structures, and the probability of an environmental or human health incident if an unsatisfactory condition (i.e. deterioration, malfunction, or operator error) goes undetected between inspections.

Operational equipment is inspected before use to ensure safe operation, and regularly scheduled servicing is completed to maintain the equipment in good operational condition. Table F2-6 provides a schedule for the testing and maintenance of specific operational equipment/areas at the facility.

In cases where specialized outside contractors are needed to perform specific inspections (e.g. sprinkler systems), the results will be reported on the contractor's inspection forms, checked-off on the PSC - Fernley inspection form and made part of the formal inspection records. PSC - Fernley reserves the right to change contractors, which provide equivalent services, without notice.

Areas most likely to have a spill are loading and unloading areas. These areas include the west pad dock and the truck bay and are addressed separately in this inspection plan. Containerized offloading/unloading areas spills will be addressed immediately. Since these spills will generally be no larger than 55 gallons, the time necessary to remediate the spill is typically no longer than two or three hours. Truck bay spills could conceivably be as large as 5,000 gallons. Complete remediation of these spills could take as long as 24 hours.

Daily Inspections

Safety and emergency equipment is checked daily for access and operability in the event of an emergency.

Security equipment is inspected monthly to prevent unauthorized access to the facility, ensure warning signs remain posted, and to ensure the facility is properly lighted.

Sumps, secondary containment structures, and portable secondary containment pallets, provided for all tank systems, container storage areas, load/unload areas, and treatment systems are visually inspected daily during operational hours, and at a minimum every 24 hours during non-operational hours, for leaks, spills, or accumulated liquids. In this way accumulated liquids can be detected within 24 hours. During operational hours, any accumulated liquids will be removed by the end of the eight-hour shift in which it was detected. In the case of a spill or release during non-operational hours, the inspector will contact the emergency coordinator (EC) for an immediate response. Also during non-operational hours, any accumulated precipitation will be noted on the inspection form and be removed with 24 hours or as necessary to prevent overflow.

To ensure tanks are operated according to design specifications, wastestreams undergo procedures outlined in the Waste Analysis Plan (see Section C2.0) prior to unloading into tanks and during tank treatment.

Each piece of Subpart X processing equipment is checked for proper operation, machinery maintenance and service, structural integrity, deterioration, corrosion or erosion and evidence of leakage or spills.

The plant manager is responsible for implementation of the inspection program. The plant manager has the training and authority to implement required inspections, perform necessary evaluations and hazard assessments, and recommend appropriate corrective or remedial actions. Specific duties may be delegated by the plant manager to employees under his supervision who are trained to perform such duties.

Containers are inspected daily for leaks, spills, appropriate and visible labels, proper stacking arrangements, aisle spacing, and proper segregation of incompatible materials. Also, containers are inspected for any signs of physical deterioration or corrosion. Containers storing hazardous wastes are labeled in accordance with the Environmental Protection Agency (EPA). As a minimum the words “Hazardous Waste,” the accumulation date and the primary hazard associated with the waste will be on each container. Wording is checked to ensure it is legible.

Tank systems, which include the bulk receiving areas, secondary containment structures, and tank system piping and controls (ancillary equipment), are inspected daily for visible signs of leakage, spills, deterioration, damage, and secondary containment erosion or deterioration. Tank level indicators are monitored daily, and any deficiencies are reported. Over-filling control equipment tested annually to verify that alarms and controls are in good working order. The assessment of tanks to detect corrosion and determine vessel integrity is addressed in Section F2.4, Tank Condition

Assessment. All hazardous waste storage and treatment tanks are closed-roof and/or under cover and are not subject to overtopping by wave or wind action, or precipitation.

Monthly Inspections

All secondary containment systems are inspected at least weekly for the deterioration or cracking of concrete and chemically resistant coating, where applied, and the accumulation of dirt or other materials that may prevent the inspection of coatings or concrete. The inspections are conducted to determine the integrity of the containment area. Integrity is the ability of the secondary containment to prevent a release of hazardous waste to the environment.

Monthly inspections of SCBAs are conducted. Documentation for these inspections is provided on the inspection cards attached to each SCBA.

Quarterly Inspections

Quarterly inspections of the alarm systems will be conducted. Subject alarm systems are delineated in Section G.

Annual Inspections

Annual inspections consist of fire extinguisher and fire suppression system checks and an annual fire inspection certification. These inspections are conducted by outside sources and the results will be incorporated into the operating record.

F2.2 Inspection Log

40 CFR 264.15(d)

The inspection log consists of periodic (i.e. daily, non-operational, monthly) inspection forms. The forms are designed to ensure the inspection, within designated frequencies, of all items addressed in the inspection schedules indicated in Tables F2-1 to F2-5. Each form has been developed to assess a certain area of the facility such as: Storage Bay, the Solids Receiving Area, a container storage area, security equipment, and Truck Bay. Forms note the date and time of inspection and the printed name and signature of the inspector. Each form contains a detailed list of specific equipment and areas to inspect, the points of observation for each piece of equipment and area, and a space for the inspector to note whether or not the observation points are in satisfactory or unsatisfactory condition. There are also spaces for the inspector to note comments, remedial actions and a correction date regarding any unsatisfactory condition. Example inspection forms are provided in Appendix F-1. The inspection forms are periodically updated and modified to accommodate the changing needs of the facility.

The specific areas addressed in this inspection plan are:

West Pad Container Storage Area
Truck Bay
Crystallizer Room
Lab Pack Room
Solids Receiving Area
Storage Bay
Detoxification Room
Dewatering Room
East Pad Container Storage Area
East Container Storage Area

Each of these areas has a specific inspection checklist as found in Appendix F-1.

F2.3 Remedial Action

40 CFR 264.15(c)

If during a periodic inspection (e.g. daily, monthly), the inspector notices that a point of observation is in unsatisfactory condition, the procedures for repair or remediation described in the paragraphs below.

When direct response by an inspector discovering an unsatisfactory condition is required (e.g. leaking container), the situation will first be brought under control. Afterwards, the situation and the corrective action will be noted on the inspection form. A maintenance request form may also be completed if necessary.

When there is no requirement for direct response by the inspector, the inspector notes and describes any unsatisfactory conditions in the comments column of the inspection form. Inspections that reveal deficiencies that require maintenance support will be immediately reported to a supervisor. The supervisor will assign a work order number to the maintenance item. Unsatisfactory conditions that do not require repair or maintenance of equipment (e.g., torn labels, fire extinguishers out of place) will be corrected by the end of the shift in which they were detected. The date and time of the corrective action will be noted on the inspection form by a plant supervisor. For unsatisfactory conditions that require repair or maintenance of equipment (e.g., containment pad crack, hole in security fence), a priority level is determined and a maintenance request form is issued which outlines the appropriate repair/remedial action. The maintenance request number is noted on the inspection form.

Priority levels are assigned to all repairs requiring maintenance support. Maintenance items are assigned a priority of repair based on the following definitions:

- An urgent response level (Priority 1) indicates the repair/remedial action is to be initiated immediately and closely monitored until completion. A Priority 1 response level indicates an immediate threat to human health or the environment.

- A routine response level (Priority 2) indicates the repair/remedial action is typically expected to be completed within a week. However, physical or operational constraints such as availability of replacement parts or equipment may require longer routine repair/remedial times.

- A long-term response level (Priority 3) is for projects which do not present an immediate threat to human health or environment and where the repair requires a shut down of equipment that will result in an unscheduled cessation of the operational unit.

A Priority 1 designation indicates that an immediate response is required to address a threat or potential threat to human health or the environment. Normal operations will only resume when the repair is complete. Priorities 2 and 3 do not pose an immediate threat to human health or the environment. Priority 2 repairs will typically be completed within one week. If the repair cannot be completed within one week, a schedule for completion will be developed and maintained in the operating record. Priority 3 repairs will be scheduled for repair. Priority 3 repairs that cannot be accomplished within one week will have a schedule of repair developed and maintained in the operating record.

Maintenance work orders specify corrective action/repairs taken and note any supplies or equipment used to ensure that replacements are ordered. A log is kept of issued work orders and reviewed weekly by facility management (Plant Manager, Plant Superintendent, or plant Supervisor) to ensure that required repairs/remedial actions are taken. An example of a maintenance request form is provided in Appendix F-2. Maintenance request forms are provided to maintenance personnel. Maintenance personnel are responsible for preserving the maintenance log and will report to management when repairs are complete. This is typically done by completing the work order and forwarding it to the maintenance supervisor.

Copies of all inspection forms, work orders and maintenance log are kept in the facility operating record for a minimum of three years.

F2.4 Tank Condition Assessments

The integrity of tanks used to store or treat hazardous waste is periodically assessed to ensure that each tank retains its structural integrity and will not collapse, rupture or fail (see Section D2.2, Tank Integrity Assessments). The inspection frequency is based on the age of the tank system, materials of construction, type of corrosion or erosion protection used (where applicable), historical and/or estimated data on corrosion rates, the nature of the material stored/treated and the threat to public health posed by a release of the contents due to failure. The assessment schedule and procedures are adequate to detect cracks, leaks, corrosion, or erosion. The schedule and assessment procedures and methods are discussed in this section. All tank inspections and assessments are maintained as part of the facility operating record.

In-house tank inspections will be conducted on all storage and treatment tanks annually. For new tanks, the first tank inspection will be conducted after approximately six months of service. In-house inspections include a thorough visual inspection of the tank exterior and interior. The inspector will note any defects on the exterior and interior tank lining or tank surface, including deterioration, blistering, pitting, chipping, or gouges. While inside the tank, the inspector will also test the high level/overfill alarm sensor. Any significant defects will be reported to an independent, qualified tank inspector or engineer for evaluation. Depending on the defects encountered during an inspection, a tank integrity assessment may be required to follow-up the inspection.

Tank integrity assessments, which are conducted by independent, qualified, professional inspectors or engineers, are performed on all new tanks during installation, and then at least once every five years thereafter. Integrity assessments include exterior and interior visual inspections. Tank wall thickness measurements will also be performed on unlined steel tanks. Tank inspection methods are based on American Petroleum Institute, Guide for Inspection of Refinery Equipment, 821 series, NACE tank inspection standards, or American Society of Testing Materials (ASTM) standards.

The frequency of tank integrity assessments may be increased at the request of the independent structural and corrosion engineers that have provided certifications for the tanks.

F2.5 Air Emission Control and Monitoring

Waste management systems at the facility are designed to reduce air emissions and minimize exposure of personnel to airborne contaminants. Wastes are stored in closed-roof tanks and sealed containers. Treatment of wastes occurs in tanks that are exhausted to a scrubber system, which is permitted by Nevada BAQ. Additionally, employees performing waste handling and transfer operations are directed to wear respirators to reduce exposure to airborne contaminants.

To further protect employees from potential exposure to toxic air contaminants, continuous air monitors are installed at various locations in the facility. Sensor types, locations, and alarm set points are listed in the table below, and shown on Figure G4-1, Location of Alarms and Monitoring Equipment.

Sensor Type	Location	Alarm Setting[1,2]
Hydrogen Sulfide	Main Scrubber	5 ppm
Hydrogen Sulfide	HVAC ducts between Detox and Storage Bay	5 ppm
Hydrogen Cyanide	Main Scrubber	5 ppm
Hydrogen Cyanide	HVAC ducts between Detox and Storage Bay	5 ppm
Hydrogen Cyanide	Storage Bay between tanks S-1 and S-2	5 ppm
Hydrogen Cyanide	Detox between tanks T-6 and T-7	5 ppm
Hydrogen Cyanide	Outside Truck Bay North Doors	5 ppm
Hydrogen Cyanide	Inside Truck Bay, in Cyanide Area	5 ppm

1 – Hydrogen Cyanide PEL_{twa8} is 10ppm, per 29 CFR Part 1910 Subpart Z, Table Z-1.

2 – Hydrogen Sulfide acceptable ceiling concentration is 20ppm, per Table Z-2.

Gas alarms are set to go off at a reading that is less than half the acceptable exposure concentration for each constituent, as defined by OSHA. A central gas alarm monitoring and control panel is located in the main hallway between the offices and the Detox Room. In the event of a cyanide or sulfide alarm, a siren will sound throughout the facility, notifying employees to evacuate immediately. Wind socks are located at the front and back of the facility so that employees can move upwind of any potential release of air contaminants. Additional details and information on responses to potential air releases can be found in Section G8.0, Contingency Plan Evacuation Plan.

Organic air emission controls are discussed in Section F6.0, Organic Air Emissions Plan.

F2.6 Unusual Occurrences

PSC - Fernley will document all occurrences of the following:

1. All Manifest Discrepancies – documented in Preview waste tracking system
2. All spills or discharges greater than 25 gallons whether within secondary containment or not – documented in Environmental, Health and Safety database

3. All implementations of the Contingency Plan – documented in Environmental, Health and Safety database
4. All accidents that occur onsite as a result of exposure to waste– documented in Environmental, Health and Safety database
5. All unsatisfactory findings found during any inspection of the permitted areas of the facility. – documented in Inspection Logs
6. All instances of setting off an alarm at the facility. – documented in Environmental, Health and Safety database

F3.0 PREPAREDNESS AND PREVENTION MEASURES

F3.1 Equipment Requirements

F3.1.1 Internal and External Communications

40 CFR 264.32(a),(b), 264.33

The plant is equipped with a facility-wide telephone system featuring intercom paging from phone-to-phone and via public address (PA) loudspeakers mounted inside buildings and outside near waste management areas. The telephone/intercom units are hardwired to the PA speakers. The system is capable of providing immediate instruction to personnel. Each telephone is capable of direct dialing to emergency response groups such as the Fernley police and fire departments. Intercom/paging numbers, PSC - Fernley phone numbers, and emergency response phone numbers for police, fire and ambulance services are posted at telephones. Communication and alarm systems are tested and checked in accordance with Table F2-1, Safety and Emergency Equipment Inspection Schedule.

Whenever hazardous waste is being poured, mixed, spread, or otherwise handled, all personnel involved in the operation will have immediate access to an internal alarm or emergency communication device, either directly or through visual or voice contact with another employee.

F3.1.2 Emergency Equipment

40 CFR 264.32 (c), 264.33

Equipment and supplies for spill and emergency response is readily available and inspected regularly (see Table F2-1) for access and operability in the event of an emergency situation. Equipment including absorbent materials, overpack drums, respirators, fire extinguishers, protective clothing and numerous hand tools are staged in various locations around the facility. Mobile equipment such as portable pumps and forklifts are also available for use. Table G5-1, Emergency Equipment List provides written descriptions and locations of all spill and emergency response equipment. Figures G7-1, Emergency Equipment Locations and G4-2, Fire Detection and Prevention Equipment, show the locations for each type of equipment. Section G, Contingency Plan, details emergency equipment use.

First response for major incidents/spills will be provided by the North Lyon County Fire Protection District (NLCFPD).

F3.1.3 Water and Fire Control

40 CFR 264.32(d), 264.33

Portable multi-use fire extinguishers are placed throughout the facility, in accordance with the Uniform Fire Code (UFC). The facility is also equipped with a heat-activated, overhead, wet fire suppression system throughout the covered portion of the facility. The system is tested and maintained annually by a contractor service.

At the curb in front of the facility is a City-owned and maintained fire hydrant. An additional facility-owned hydrant is located in front of the north entrance to Truck Bay. The city fire water system produces an adequate volume and pressure of water to supply the fire suppression system in the event of a fire.

F3.2 Aisle Space Requirements

40 CFR 264.35

The facility is inspected for adequate aisle space, allowing unobstructed movement of emergency vehicles, personnel, and fire control/spill response equipment, and access to facility exits and entrances. To help assure unobstructed access and movement in an emergency, only waste transportation vehicles, intra-facility equipment (forklifts) and service vehicles are allowed in the active area of the facility. Access lanes and areas are clearly marked throughout the facility. Containers are stacked such that the forklift traffic aisles are at least five feet wide. Inspection aisles in all container storage areas are at least 36 inches wide between stacks.

F4.0 PREVENTION PROCEDURES, STRUCTURES AND EQUIPMENT

F4.1 Unloading/Loading Operations

40 CFR 270.14(b)(8)(i)

Bulk waste materials are transported to and from the facility in tank trucks, tractor-trailers, and end-dumps, while containerized wastes are transported on flat beds and in vans. Unloading and loading operations of liquid hazardous wastes are conducted within containment areas. Facility personnel involved in the unloading/loading of waste are instructed in the proper operational procedures and use of equipment necessary to prevent hazards (see Section H, Personal Training).

The unloading/loading procedures used to prevent hazards and contain spills of bulk materials, such as liquids in tank trucks and solids in trucks (e.g., roll-off boxes, intermodals), are outlined in Section D2.4.1, Tank System Transfer Operations. Container unloading/loading procedures are outlined in Section D1.2, Container Management Practices.

Atmospheric releases are prevented by compatibility testing and bench-treat protocols prior to the transfer of any hazardous waste in the facility. Additionally all treatment tanks are exhausted to a fume scrubbing system permitted by BAQ.

F4.2 Run-off Prevention

40 CFR 270.14(b)(8)(ii)

Run-off prevention procedures and stormwater handling processes are described in Sections D2.3.2, Containment System Capacity and Drainage Control and D1.3 Secondary Containment System Design and Operation.

F4.3 Ground and Surface Water Protection

40 CFR 270.15 (b)(8)(iii)

Degradation of ground and surface water quality at the facility is prevented through proper operation of hazardous waste management units, including secondary containment systems, to prevent releases to the environment or endangerment of public health. Stormwater is handled through a system of sumps and a stormwater evaporation pond. On the west pad, sumps are sized to collect all liquids resulting from a spill of up to 10% of the containers plus the stormwater resulting from a 25-year/24-hour precipitation event. In the event of a spill, wastes will be collected in containers and disposed of in accordance with the appropriate designation and land disposal restrictions. Stormwater is collected from each containment system immediately after the precipitation event and is tested visually and for pH, TOC and total metals prior to pumping to the east stormwater evaporation pond. Stormwater collected from the east storage pad is drained to the stormwater evaporation pond. See Section D1.3, Secondary Containment System Design and Operation for additional details.

PSC - Fernley has procedures in place to mitigate, control, and clean-up releases to the environment and to prevent contamination of water supplies (see Section G, Contingency Plan).

F4.4 Equipment and Power Failure

40 CFR 270.14(b)(8)(iv)

In the event of a power failure, plant personnel are instructed to shut down all operations, including truck unloading/loading, tank and container transfer operations, and treatment processes until normal power is restored. An emergency generator is on site to provide emergency power, but will not be used as a primary power source. As part of shut down, valves are closed and transfer pumps turned off to eliminate possible spills. A power failure during non-operational hours would not impact the facility as all operations will have been shut down and secured.

Emergency lighting and alarm system activation is provided by the emergency generator. Liquids can be removed from containment areas and sumps utilizing an air diaphragm pump. Additional equipment is available from rental companies in the Fernley, Nevada area, should the power outage be prolonged.

F4.5 Personal Protective Equipment

40 CFR 270.14 (b)(8)(v)

Personal protective equipment (PPE) is provided to prevent undue exposure of facility personnel to hazardous waste. This is accomplished through plant layout and design, waste management equipment and practice, employee training, and use of proper protective clothing and equipment. A medical surveillance program is utilized to monitor the employee protection.

The waste management systems are designed to minimize exposure of personnel in handling wastes. Liquid waste is stored in closed-roof tanks. Treatment of waste occurs in tanks that are vented to a scrubber system, which is permitted by Nevada BAQ. To minimize employee exposure, all waste is transferred, within tank systems, using fixed-in-place piping systems and hoses, which are inspected before each use. Container lids are kept closed except when adding to, removing from, or sampling the waste.

Basic PPE used at the PSC - Fernley Facility is defined in Table F3-1, General PPE Requirements. Table F3-2, Process-specific PPE Requirements, summarizes the PPE requirements for specific hazardous waste management tasks and processes at the facility. Specific processes are indicated in the left column, and the required supplemental PPE for that process is then listed to the right.

All personnel are required to complete training in the proper management and safe handling of hazardous waste and in the use, selection, and proper fit of PPE. A complete listing of training programs is described in Section H, Personnel Training.

Each employee is provided with appropriate PPE. This equipment, which is kept at the facility, includes: hard hats with face shields, safety glasses/goggles, acid/organic cartridge respirators, ear protection (foam plugs), polyester/cotton and Tyvek coveralls or equivalent, Tychem suits, gloves (Neoprene, PVC), and steel-toed boots. Emergency equipment available at the facility includes: first aid kits, eye wash and shower stations, and spill response kits (see Table G5-1, Emergency Equipment List).

While engaged in loading, unloading, transfer, or cleaning operations, personnel are directed to wear steel-toed rubber boots, chemical-resistant gloves, eye/face protection, respirators as necessary, and PVC rainsuits where a splash hazard exists. All personnel within the active portion of the facility are required to wear hard hats and eye protection.

F5.0 PREVENTION OF REACTION OF IGNITABLE, REACTIVE, AND INCOMPATIBLE WASTES

Precautions to prevent the ignition or reaction of ignitable, reactive and incompatible wastes through proper handling, mixing, and treatment procedures, and the use of compatible equipment and systems, are described in the following sections.

F5.1 Precautions to Prevent Ignition or Reaction of Ignitable or Reactive Wastes

40 CFR 264.17(a), 270.14(b)(9)

Open flame and smoking restrictions, acceptable container management practices, process information, and a description of how UFC buffer zone requirements are satisfied for this material are described in Section D1.5, Prevention of Reaction of Ignitable, Reactive, and Incompatible Wastes in Containers.

Oxidizers, cyanide and sulfide reactive wastes will be the only type ignitable or reactive wastes stored in tanks. Compatibility testing as delineated in Section C2.7.2 is performed on all oxidizer, cyanide and sulfide bearing wastes prior to consolidation into storage tanks. Cyanide, sulfide and oxidizer wastes will be treated in treatment tanks. Treatment protocols are required for all treatments of these wastes. Section C2.7.3 delineates the requirements for bench treat protocols. Air is exhausted from all treatment tanks to an air scrubbing system, and gas sensors and alarm systems are in place to alert the facility should a cyanide or sulfide excursion take place. See Section F2.5, Air Emission Control and Monitoring for additional details on air monitoring systems.

Containerized reactive and ignitable wastes are controlled by segregation, isolation, and operational controls. Separate containment and segregation is required for all reactive and ignitable waste in containers

F5.2 General Precautions for Handling Ignitable or Reactive Waste and Mixing of Incompatible Waste

40 CFR 264.17(b), 270.14(b)(9)

Prior to acceptance for storage or treatment, wastes are subject to chemical and/or physical analysis to determine, based on operational constraints and permit limitations, if waste can be safely handled at the facility. The procedures for pre-acceptance and waste profiling are described in Section C2.3, Pre-Acceptance Procedures.

Before accepting and unloading a waste shipment at the facility, representative samples of the waste are analyzed to verify that the load matches its pre-approved profile. A compatibility screen (ASTM Method D5058A) is used to determine the compatibility and potential reactivity of bulk shipments to be consolidated with other wastes in a tank. Representative samples of the wastestreams (including any sludges that may be present) are mixed in a controlled procedure, as described in Section C. Noted reactions include changes in temperature, pH and color, gas evolution and precipitation (see Section C2.0, Waste Analysis Plan, for additional information regarding representative sampling and the applicability of the compatibility screen).

In conjunction with treatment activities, wastestreams are sampled and analyzed to verify safe treatment procedures, process tolerance limits, and to ensure the equipment is operated within design specifications. Sampling, analysis, treatment processes, and tolerance limits are described in Section C2.0, Waste Analysis Plan.

Tanks and containers are separated, based on compatibility, by secondary containment systems and appropriate distances as depicted in Table F5-1, Segregation Table for Hazardous Materials. Table F5-1 is based on UFC spacing and DOT requirements.

All employees are trained in the proper handling, operational methods, and emergency procedures of management of ignitable, reactive and incompatible wastes (see Section H, Personnel Training). In the event of an incident involving reactive materials, facility personnel will respond by staying clear of the incident until the nature of the hazard has been evaluated and the determination had been made that the area is safe to enter for response activities. Procedures outlined in Section G, Contingency Plan will be followed.

F6.0 ORGANIC AIR EMISSIONS PLAN

F6.1 Process Vent Monitoring Plan

40 CFR 264.1030, 270.24

At the PSC - Fernley facility, no hazardous wastes with volatile organic compounds (VOC) over 500 ppm are permitted for storage in any tank systems or container storage area, with the exception of the West Pad Container Storage Area, East Pad Container Storage Area, East Container Storage Area, and the Lab Pack Room. The requirements of 40 CFR 264 Subpart AA do not apply as the PSC - Fernley facility has no distillation units that manage hazardous waste or process vents associated with distillation, fractionation, thin-film evaporation, solvent extraction, or VOC air or steam stripping operations.

F6.2 Equipment Monitoring Plan

40 CFR 264 1050, 1063, 270.25

F6.2.1 Applicability and Definitions

Per Subpart BB, equipment (excluding tanks and containers) that contains or contacts hazardous wastestreams with ≥10 percent organics are monitored periodically according to the equipment type and service. All equipment subject to the requirements of 40 CFR 264 Subpart BB will be clearly marked and readily distinguishable from other equipment.

The organic concentration of a hazardous wastestream is determined by analytical methods or knowledge of the nature of the wastestream. Refer to Section C2.0, Waste Analysis Plan, for further information on how incoming wastestreams are fully characterized and designated.

Some terms used to describe compliance with 40 CFR 264 Subpart BB can be defined as follows:

- A "leak" is indicated by an instrument reading of $\geq$10,000 ppm organics.
- “In light liquid service” means any piece of equipment that contains or contacts a waste stream where 20% or greater (by weight) of the wastestream is a combination of components that have a vapor pressure >2.25 mm Hg at 20 C° (or 68° F).
- “Heavy liquid service” is any piece of equipment that is not in gas/vapor service or light liquid service.

At the PSC - Fernley facility, no hazardous wastes with volatile organic compounds (VOC) over 500 ppm are permitted for storage in any tank systems or container storage area, with the exception of the West Pad Container Storage Area, East Pad Container Storage Area, East Container Storage Area, and the Lab Pack Room.

Processing equipment, as described in Section D3.0, will not be used to manage materials with over 500 ppm VOCs.

In the West Pad Container Storage Area, one portable pump may be installed that will be in light liquid service. This pump will be uniquely marked “P-BB”. The purpose of this pump is to transfer light and heavy liquids from one DOT container to another DOT container. Waste transfers of this type may entail the use of pump P-BB or a tanker-mounted pump in vacuum (exempt) service. Fittings and hoses to and from this pump will be fitted with quick disconnect fittings and will not be uniquely marked. They will, however, be inspected and monitored for leakage at the same frequency as the pump.

F6.2.2 Monitoring and Monitoring Schedule

Inspection and monitoring of pump P-BB, including all hoses and quick disconnect fittings, will occur on a monthly basis. Monitoring will be conducted with a photo-ionization detection (PID) meter. Calibration standards and operation and maintenance standards for the PID will be submitted to NDEP before pump P-BB goes into service.

By definition, a leak is detected at a reading of 10,000 ppm on the meter. Calibration of a PID normally is based on detection levels of 5,000 ppm. For purposes of Subpart BB monitoring at the PSC - Fernley facility, a leak will be considered detected at PID meter readings greater than 5,000 ppm.

F6.2.3 Maintenance and Recordkeeping

When a leak is detected, the leaking piece of equipment (pump, hose, or fitting) will be immediately removed from service. The equipment will not be returned to service until the leak is repaired. A maintenance request form will be completed to document the repair. Inspection forms and maintenance request forms are incorporated in the facility operating record.

F6.3 Tank and Container Monitoring Plan

40 CFR 264.1080, 270.27

F6.3.1 Tank Monitoring Plan

Subpart CC is applicable to hazardous wastes containing greater than 500 ppm volatile organic compounds (VOCs). At the PSC - Fernley facility, no hazardous wastes with greater than 500 ppm VOCs are permitted for storage or treatment in tanks. Therefore no tanks at the facility are subject to this regulation.

F6.3.2 Container Monitoring Plan

At the PSC - Fernley facility, containerized hazardous wastes with greater than 500 ppm VOCs are permitted for storage only in the West Storage Pad, East Pad Container Storage Area, East Container Storage Area, and the Lab Pack Room. All container storage of hazardous wastes with greater than 500 ppm VOCs will occur in DOT containers. Under 40 CFR 264.1086 (b), containers at the facility meet the following definitions:

- For a container having a design capacity greater than 26 gallons and less than or equal to 119 gallons, the owner or operator shall control air pollutant emissions from the container in accordance with the Container Level 1 standards. These containers are generally 55 gallon drums.

- For a container having a design capacity greater than 119 gallons that is in light material service, the owner or operator shall control air pollutant emissions from the container in accordance with the Container Level 2 standards. The rail spur will accommodate tank cars that meet this definition.

The requirements of Level 1 and Level 2 containers, as specified in 264.1086(c) and 264.1086(d), respectively, are that the container must be a DOT approved container. 21st Century will immediately overpack in a DOT container any non-DOT container containing VOC levels in excess of 500 ppm.

The transfer of hazardous wastes containing greater than 500 ppm VOCs will occur between DOT containers. Waste transfers will occur in such a manner as to minimize exposure of the hazardous waste to the employee and to the atmosphere. The following container transfers are possible:

- Level One container to Level One Container: typically this would occur as part of a response to a leaking container. This may include overpacking and/or transferring of the liquid.

- Level Two container to Level Two Container: typically this would involve transfers from a bulk portable container to a tanker truck or railcar. Best engineering practices will be exercised during transfers. This will generally involve using a submerged pipe fill or bottom fill.

LIST OF TABLES

TABLE F2-1. SAFETY AND EMERGENCY EQUIPMENT INSPECTION SCHEDULE

EQUIPMENT/AREA	INSPECTION OBSERVATION	FREQUENCY
Absorbent Materials	Check for minimum stock quantities at storage location.	Daily
Overpack Drums	Check for minimum stock quantities at storage location.	Monthly
Spill Response Kits	Check that units are in place and complete.	Monthly
Equipment Storage	Check for minimum stock quantities of hand tools, protective clothing, (items, size), other.	Monthly
SCBA	Check pressure and volume of air supply, unit completeness, condition of hose and face mask.	Monthly
First Aid Kits	Check accessibility.	Daily
	Check for adequate stock, restock as needed.	Monthly
Emergency Showers and Eye Wash Stations	Check for pressure and flow, even flow/stream on eye wash, units turn on/off easily, adequate supply of eye wash fluid (where applicable), identification sign attached and legible.	Monthly
Fire Extinguishers	Check that the units are in place, accessible and charged.	Daily
	Annual servicing tags are attached and up	Monthly
Fire Suppression Systems	Head water pressure monitored by outside alarm company.	Continual
	Verify annual contractor services have been completed.	Annually
Alarm Horns	Verify that units are operational and audible, and replace as necessary.	Monthly
	Calibrate gas alarm sensors	Quarterly
Telephone/Intercom (PA)	Verify that phone units are capable of acquiring an outside line and activating the PA system. Verify that PA speakers are audible and working.	Monthly

TABLE F2-2 SECURITY EQUIPMENT INPSECTION SCHEDULE

EQUIPMENT/AREA	INSPECTION OBSERVATION	FREQUENCY
Fences	Check for holes, breaches, integrity.	Monthly
Gates	Check for operability, holes, breaches, integrity, unobstructed access.	Monthly
Lock (gates)	Verify locks are in place, operable, and not tampered with.	Monthly
Outdoor lighting	Verify lights turn on/off at dark and daylight, full brightness	Monthly
Faciliy Access	Check general access throughout facility for unobstructed movement of emergency vehicles, personnel and e	Monthly
Warning/Regulatory Signs	Verify signs are in place and legible throughout facility and on perimeter fence.	Monthly

TABLE F2-3 OPERATIONAL EQUIPMENT INSPECTION SCHEDULE

EQUIPMENT/AREA	INSPECTION OBSERVATION	FREQUENCY
Portable Transfer Pumps	Check for leaks and proper operation.	Before/during use
Portable Transfer Hoses	Check for wear, leaks in hose or at fittings.	Before/during use
	Check for adequate supply.	Daily
Fork Lifts	Check oil, hydraulic fluid, water, lights horn, back up alarm, general operation.	Before Use
	Full Service	Quarterly
Facility Air Compressor	Check oil level for oil leaks, temperature, pressure, drain condensate from tank.	Daily
	Check for oil leaks, test safety valves, clean air filter, cylinder fins and unit.	Monthly
Facility Pumps (mounted)	Check for leaks, noises, proper operation.	Before/During Use
	Empty strainers (where applicable), note any evidence of corrosion. Grease units, check packing and change as needed.	Quarterly
Electrical Control Panels	Check access to breaker panels and general condition of unit/area.	Daily
Alarms	Check for functionality.	Monthly

TABLE F2-4: CONTAINER STORAGE
INSPECTION SCHEDULE

EQUIPMENT/AREA	INSPECTION OBSERVATION	FREQUENCY
Containers	Check for leaks, swelling, deterioration, corrosion, and open containers.	Daily
	Verify labels are complete and legible.	Daily
	Check for proper stacking and incompatible storage.	Daily
Container Storage Areas (East Pad CSA, East CSA, West Pad CSA, Truck Bay, Lab Pack Area)	Check sumps and containment structures for evidence of leakage, spills or accumulated liquids.	Daily
	Verify aisle space, access to emergency equipment and to entrances/exits.	Daily
	Check pad, berms, and curbs, for evidence of cracks, gaps, integrity, deterioration and corrosion or erosion.	Monthly
Loading/Unloading and Staging Areas	Check pads and sumps for evidence of spills or accumulated liquids	Daily
	Check pads, berms, curbs, sumps and beneath dock levelers for cracks, gaps and integrity.	Monthly

TABLE F2-5. TANK SYSTEMS: INSPECTION SCHEDULE

EQUIPMENT/AREA	INSPECTION OBSERVATION	FREQUENCY
Hazardous Waste Tank Overfilling Control Equipment	Check function and reading of level indicating equipment before and during tank transfers and, test audible alarm	Daily, when in use.
	Manually test high-level/overfill sensor for proper function.	Annually, during in-house inspection.
Hazardous Waste Tank Monitoring Data	Test incoming waste loads in accordance with the WAP to determine proper storage/treatment tank and process	In accordance with WAP
	Check tank change logs and treatment/analysis records noting pH, sp.gr., ORP, and temperature (as applicable) to ensure safe operation and treatment of wastes	Daily during treatments
Hazardous Waste Tank Construction Materials	Check around tank base, tank walls, connection valves and fittings for signs of leakage, overflow, deterioration, damage.	Daily
	In-House interior and exterior inspection of each storage and treatment tank for signs of deterioration, corrosion, lining defects, damage.	Annually
	3rd Party tank integrity assessment for each storage and treatment tank.	At least once every five years.
Hazardous Waste Loading/Unloading	Check pad, berms, curbs, and sumps for evidence of leakage, spills, accumulated liquids, and erosion/deterioration of secondary containment surfaces.	Daily, when in use.
Hazardous Waste Tank System: Secondary Containment Systems	Check pad, berms, curbs, and sumps for evidence of leakage, spills, accumulated liquids, and erosion/deterioration of secondary containment surfaces.	Daily
Hazardous Waste Tank System: Piping and Controls	Check piping, valves, fittings, fixtures, and pipe supports for evidence of leakage, deterioration, or corrosion.	Daily
General Tank Areas	Walk perimeter of tank system secondary containment area and loading/unloading area for evidence of spillage or leakage, and accumulation of debris or vegetation.	Daily
Process Equipment	Check integrity of equipment, that equipment operates properly, that instrumentation is in working order.	Daily, when in use.
Hazardous Waste Tank System: Agitators	Check agitator shaft and impellors for deterioration or corrosion.	Annually, during in-house inspection

TABLE F2-6: OPERATIONAL EQUIPMENT: TESTING AND MAINTENANCE SCHEDULE

EQUIPMENT/AREA	MAINTENANCE/TESTING PERFORMED	FREQUENCY
Fire Extinguishers	Outside vendor inspects all extinguishers for condition, seals, and tags	Annually
Eye wash stations	Unobstructed access	Daily
Eye wash stations	Function check	Monthly
Alarm systems	Inspected by outside vendor. Pressure test sprinkler systems	Annually
Gas Sensors	Check system by release of calibrated gases - 5 ppm for CN and 5 ppm for H2S. Maintenance will do the calibrating.	Quarterly in conjunction with evacuation drill
Boiler	Lubricate boiler motor and feed pump bearings Clean port holes Open and inspect boiler and piping for leaks and scale build-up Test safety valves Lubricate condensate mover pump	Annually
Crystallizer	Change lubricant in crystallizer circulation pump Grease crystallizer fan shaft pedestal bearings and motor Inspect fan belts on fan system Open and inspect crystallizer cone and shell fan system integrity Open and inspect demister pad for condition and salt accumulation	Annually
Scrubbers	Change lubricant in pump motors Open, clean and inspect scrubber internals including demister screens Check fan motor and pump for noise and vibration Inspect system integrity including vessels and piping	Annually Monthly
Air Compressor	Check lube level and add as needed Grease motor bearings Clean radiators Clean scavenging screen and orifice Change coolant filter Test shutdown system	Annually

TABLE F2-6: OPERATIONAL EQUIPMENT: TESTING AND MAINTENANCE SCHEDULE

EQUIPMENT/AREA	MAINTENANCE/TESTING PERFORMED	FREQUENCY
Generator	Inspect and clean air cleaner Change fuel filter Change oil and filter Check battery and clean terminals Check antifreeze Inspect fan belt Start and run generator (conducted Monthly)	Annually
Reactors	Open and inspect reactor internals Check flow lines to and from tanks for integrity Inspect and lubricate mixers on tanks	Annually

TABLE F2-7 EMERGENCY SHUTDOWN PROCEDURES

In the event of an evacuation, the following procedures will be enforced:

LOCATION	IMMEDIATE ACTION
CRYSTALLIZER	evacuate
DEWATERING	Shutdown transfer pump, evacuate
STORAGE BAY	Shutdown transfer pump, evacuate
TRUCK BAY	Shutdown transfer pump, evacuate
LABPACK ROOM	Evacuate
WEST PAD CSA	Shutdown transfer pump, evacuate
EAST PAD CSA / EAST CSA	Evacuate
SOLIDS RECEIVING	Evacuate
LABORATORY	Evacuate
OFFICE	Evacuate
MAINTENANCE	Turn off power tools, if in use, evacuate

Basic Coverage	**Level D**	**Level C**	**Level B**	**Level A**
PSC has adopted the following as complying with OSHA personal protective equipment regulations: 29CFR1910.132	Work uniform affording minimal protection. Use for nuisance contamination only. The following constitutes Level D equipment and clothing:	For use when the concentrations and types of airborne substances are known. The following constitutes Level C equipment and clothing:	Used when the highest level of respiratory protection is necessary, but a lesser level of skin protection is needed. The following constitutes Level B protective equipment and clothing:	When the degree of skin, respiratory, and eye protection is necessary to properly protect employee. The following constitutes Level A equipment and clothing:
	a. Coveralls b. Gloves c. Boots, regular or chemical resistant, steel-toed d. Industrial safety glasses e. Hard hat f. Chemical splash goggles (optional) g. Face shield (optional, as applicable) h. Hearing protection must be worn around loud noises. (optional, as applicable)	Level D equipment and clothing plus the following: a. Full-face air purifying NIOSH-approved respirator with cartridges appropriate for hazardous material/waste involved b. Boots, chemical resistant c. Chemical resistant clothing, hooded if appropriate d. Gloves (outer), chemical resistant – 4 hours safe use e. Gloves (inner), chemical resistant with sweat absorbent liner f. Escape mask (5 minute air) appropriate for hazard (optional, as applicable g. 2-way radio worn under outside protective clothing (optional, as applicable) h. Coolant vest worn under outside protective clothing (optional, as applicable) i. Hearing protection must be worn around loud noises (optional, as applicable)	Level C equipment and clothing plus the following: a. Pressure-demand full-facepiece NIOSH-approved self contained breathing apparatus (SCBA) or supplied air with 5- to 15minute escape SCBA b. Hooded chemical-resistant clothing (coveralls, overalls, and long-sleeved jacket,; 1- to 2-piece chemical splash suit; or disposable coated or multi-layered chemical-resistant coveralls providing at least 4 hours safe use, appropriate to hazardous materials/wastes to be worked with) c. Hearing protection must be worn around loud noises. (optional, as applicable)	Level B equipment and clothing plus the following: a. Totally encapsulating chemical protective suit j. b. Hearing protection must be worn around loud noises. (optional, as applicable)

Table F3-2: Process-Specific PPE Requirements

PSC

PSC – ENVIRONMENTAL SERVICES DIVISON
FERNLEY FACILITY OPERATIONS
MANDATORY PERSONAL PROTECTIVE EQUIPMENT

Location/ Operation	Acid/Alk Tanker Loading & Offloading/ Storage Bay Operations	Cyanide Container and Tanker Sampling, Filling or pump-down	Drum Rinsing	Detox Operations	Dewatering	Solid Acid/Alk Consolidation	Pump Up of Acids/Alk	Check-in/ Sampling of Containers or Tankers	Crystallizer Operations	Heat Exchanger Clean-Out	Mixing Reagents, Acids, Alks or any Other Treatment	Drum Crushing & Cutting	Labpack	Oxidizer Reduction	Forklift Driving	Spill Clean-Up
Footwear	CHEM	CHEM	CHEM	CHEM	CHEM	CHEM	CHEM	CHEM	CHEM	CHEM	CHEM	CHEM	CHEM	CHEM	CHEM	CHEM
Eyewear																
Head																
Gloves – Chemical Resistant or PVC or Nitrile																
Gloves – Leather w/ Nitrile Liners																
Wire Mesh/ Kevlar Gloves		May Require Wire Mesh or Kevlar Gloves Upgrade if Cutting with Blades and/or Sharps														
Cotton Coveralls																
Rain Suit																
Tychem									OR			OR				
Tyvek Sleeves and Apron				May use Tyvek suit when dumping solids												
Respirator						W/ DUST FILTERS										
Supplied Air or SCBA							NITRIC OR FUMING ACIDS						NITRIC OR FUMING ACIDS			DEPENDENT UPON CHEMICAL
Hearing/ Face Protection																

TABLE F5-1: Segregation Table for Hazardous Materials (49 CFR 177.848)

Class or division		Notes	1.1 1.2	1.3	1.4	1.5	1.6	2.1	2.2	2.3 gas zone A	2.3 gas Zone B	3	4.1	4.2	4.3	5.1	5.2	6.1 liquids PG I zone A	7	8 liquids only
Explosives	1.1 and1.2	A	*	*	*	*	*	X	X	X	X	X	X	X	X	X	X	X	X	X
Explosives	1.3		*	*	*	*	*	X		X	X	X		X	X	X	X	X		X
Explosives	1.4		*	*	*	*	*	O		O	O	O		O				O		O
Very insensitive explosives	1.5	A	*	*	*	*	*	X	X	X	X	X	X	X	X	X	X	X	X	X
Extremely insensitive explosives	1.6		*	*	*	*	*													
Flammable gases	2.1		X	X	O	X				X	O							O	O	
Non-toxic, non-flammable gases	2.2		X			X														
Poisonous gas Zone A	2.3		X	X	O	X		X				X	X	X	X	X	X			X
Poisonous gas Zone B	2.3		X	X	O	X		O				O	O	O	O	O	O			O
Flammable liquids	3		X	X	O	X				X	O					O		X		
Flammable solids	4.1		X			X				X	O							X		O
Spontaneously combustible materials	4.2		X	X	O	X				X	O							X		X
Dangerous when wet materials	4.3		X	X		X				X	O							X		O
Oxidizers	5.1	A	X	X		X				X	O	O						X		O
Organic peroxides	5.2		X	X		X				X	O							X		O
Poisonous liquids PG I Zone A	6.1		X	X	O	X		O				X	X	X	X	X	X			X
Radioactive materials	7		X			X		O												
Corrosive liquids	8		X	X	O	X				X	O		O	X	O	O	O	X		

(e) Instructions for using the segregation table for hazardous materials are as follows:

(1) The absence of any hazard class or division or a blank space in the table indicates that no restrictions apply.

(2) The letter "X" in the table indicates that these materials may not be loaded, transported, or stored together in the same transport vehicle or storage facility during the course of transportation.

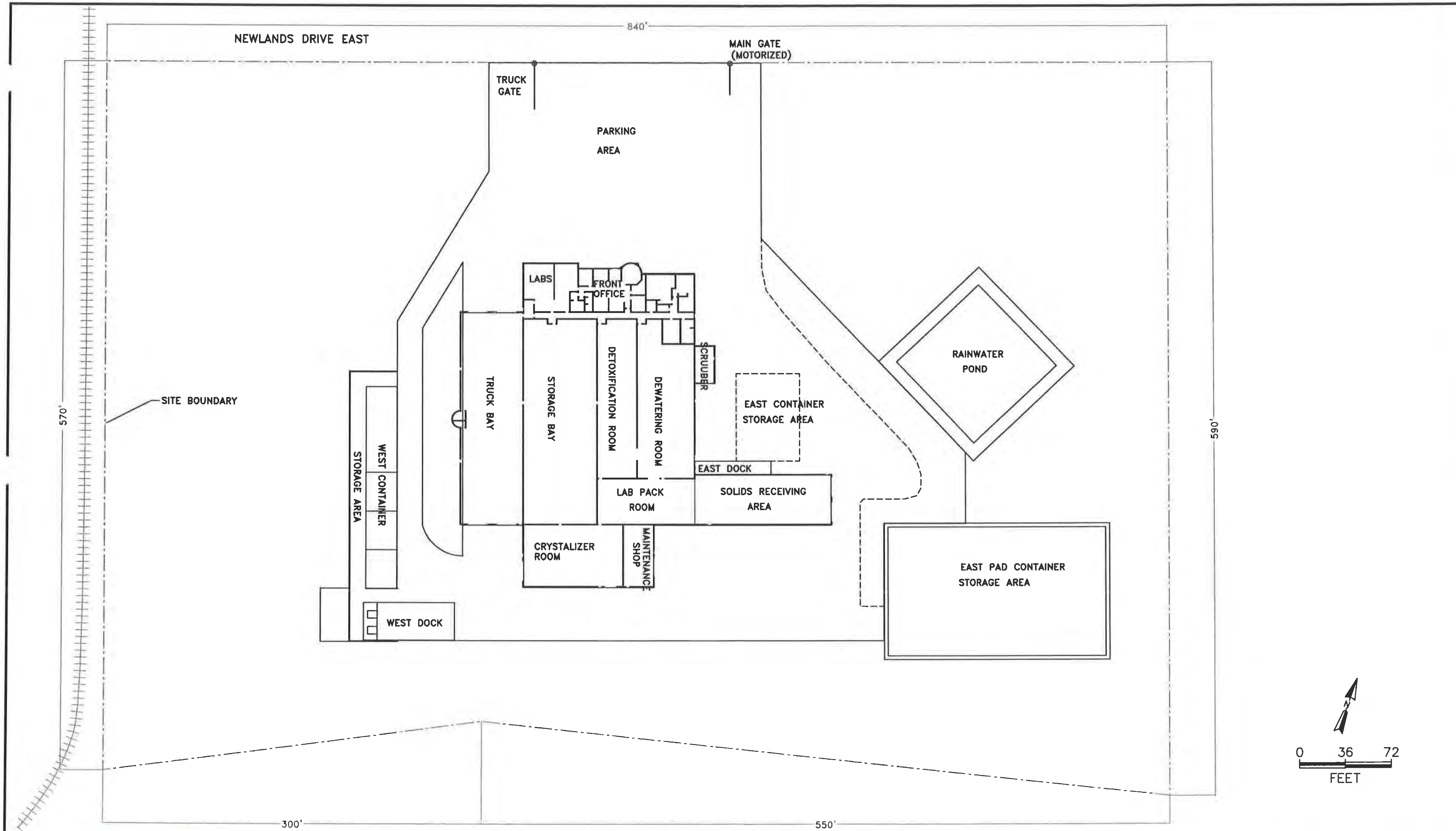
(3) The letter "O" in the table indicates that these materials may not be loaded, transported, or stored together in the same transport vehicle or storage facility during the course of transportation unless separated in a manner that, in the event of leakage from packages under conditions normally incident to transportation, commingling of hazardous materials would not occur. Notwithstanding the methods of separation employed, Class 8 (corrosive) liquids may not be loaded above or adjacent to Class 4 (flammable) or Class 5 (oxidizing) materials; except that shippers may load truckload shipments of such materials together when it is known that the mixture of contents would not cause a fire or a dangerous evolution of heat or gas.

(4) The "*" in the table indicates that segregation among different Class 1 (explosive) materials is governed by the compatibility table in paragraph (f) of this section.

(5) The note "A" in the second column of the table means that, notwithstanding the requirements of the letter "X", ammonium nitrate (UN 1942) and ammonium nitrate fertilizer may be loaded or stored with Division 1.1 (explosive) or Division 1.5 materials.

(6) When the §172.101 table or §172.402 of this subchapter requires a package to bear a subsidiary hazard label, segregation appropriate to the subsidiary hazard must be applied when that segregation is more restrictive than that required by the primary hazard. However, hazardous materials of the same class may be stowed together without regard to segregation required for any secondary hazard if the materials are not capable of reacting dangerously with each other and causing combustion or dangerous evolution of heat, evolution of flammable, poisonous, or asphyxiant gases, or formation of corrosive or unstable materials.

LIST OF FIGURES



PSC

TITLE:
Facility Site Plan
PSC Fernley Facility
Fernley, Nevada

DWN: dtb	DES.:	PROJECT NO.:
CHKD:	APPD:	FIGURE NO.: F1-1
DATE: 7/10/12	REV.:	

APPENDIX F-1

EXAMPLE INSPECTION FORMS

The forms included in this appendix are for example only. The information contained on these forms will be included on any version of the forms used for the same purposes, although the forms themselves may change in appearance.

Non-Operational Inspection

Daily Inspection Log

Inspector (Print)		Inspector (Sign)				Date	Time
Inspection Item	**Inspection Parameter(s)**	**S**	**U**	**If unsatisfactory, state problem and/or recommended action**		**Corrective Action Taken**	**Date Corrected**
Communication System	Telephone - Outside line?						
	PA working?						
HCN Alarm Panel	Alarm Conditions?						
Lab	Containers Covered?						
	Leaks?						
Truck Bay	Containers Covered?						
	Leaks?						
	Sumps empty?						
Storage Bay	Tank level alarm conditions?						
	Leaks?						
	Sumps empty?						
Detox	Leaks?						
	Sumps empty?						

Dewatering	Leaks?					
	Sumps empty?					
Lab Pack Room	Containers Covered?					
	Leaks?					
	Sumps & Containment Pallets empty?					
Crystallizer	Leaks?					
	Sumps empty?					
West Pad Container Storage & Check-In Areas	Containers Covered?					
	Leaks?					
	Containers within Containment?					
	Sumps empty?					
Solids Receiving	Area free of debris, containers, etc…					
East Pad CSA (drum pad)	Containers Covered?					
	Leaks?					

	Sump & Spill Containment Pallets Empty?					
	Containers within Containment?					
East CSA (Roll-off Area)	Roll-off Bins Covered?					
	Containers Covered?					
	Roll-off Bins Leaking?					
	Containers Leaking?					
	Spill Containment Pallets Empty?					
Stormwater Evaporation Pond	Contain Rainwater? If so, percentage.					
Front Gate	Closed/operating property?					
Facility Doors	Closed/operating property?					
General Facility & Property	Debris out of Containment areas					
	Lights off or on as appropriate?					
	Fuel turned off on Forklifts?					
	Unusual Occurrences?					

Monthly Inspection Log—General

	Inspector (Print)				Inspector (Sign)	Date (m/d/y	Time
#	Equipment/Area	Inspection Parameters(s)	S	U	If no , state problem &/or Remedial Action Recommendation*	Remedial Action Taken*	Date Corrected
Office Area							
1	Fire Extinguishers (office area, Lab, Hallway, Breakroom)	Filled/proper locations					
2	SCBA units – Office Closet	Pass Inspection?					
3	First Aid Station – Lab, Breakroom	Adequately supplied?					
4	Portable phone & megaphone	Operational?					
5	Alarms	Audible?					

*If more room needed, continue entry on the back of this form

Monthly Inspection Log –General

	Inspector (Print)				Inspector (Sign)	Date (m/d/y	Time
#	Equipment/Area	Inspection Parameters(s)	S	U	If no , state problem &/or Remedial Action Recommendation*	Remedial Action Taken*	Date Corrected

Fence Line and Misc.

1	Perimeter Fence	Intact, prevent inadvertent entry?					
2	Perimeter Gates	Intact locks function?					
3	Fence perimeter Warning signs	At gates, even intervals along fence?					
4	Contingency Plan Equipment – Along fence line	Good condition and functional?					

Monthly Inspection Log –General

	Inspector (Print)				Inspector (Sign)	Date (m/d/y	Time
#	Equipment/Area	Inspection Parameters(s)	S	U	If no , state problem &/or Remedial Action Recommendation*	Remedial Action Taken*	Date Corrected
					Truck Bay		
1	Truck Bay – Walls	Good Condition? Conduit and Electrical boxes in good condition?					
2	Truck Bay—Ceiling	Good Condition?					
3	Truck Bay—Floor	Good Condition?					
4	Truck Bay—Structural Steel	Good Condition					
5	5 min. Escape Pack	Full? Pull hood out, is it cracked?					
6	Eye Wash	Flush. Operating correctly? Filled out card?					
7	Fire Extinguisher	Full?					
8	Contingency Plan Equip.	Overpack drums - 20? Shovels? Pallet of Floor Dry?					

Monthly Inspection Log –General

	Inspector (Print)				Inspector (Sign)	Date (m/d/y	Time
#	Equipment/Area	Inspection Parameters(s)	S	U	If no , state problem &/or Remedial Action Recommendation*	Remedial Action Taken*	Date Corrected
					Storage Bay		
1	Storage Area-- Walls	Good Condition? Conduit and Electrical boxes in good condition?					
2	Storage Area – Ceiling	Good Condition?					
3	Storage Area – Tank Secondary containment	No continuous gaps, floor epoxy good?					
4	Storage Area— Structural Steel	Good Condition/					
5	5 min. Escape Pack	Full? Pull hood out, is it cracked?					
	Eye Wash	Flush. Operating correctly? Filled out card?					
6	Fire Extinguishers	Full?					

Monthly Inspection Log –General

	Inspector (Print)				Inspector (Sign)	Date (m/d/y	Time
#	Equipment/Area	Inspection Parameters(s)	S	U	If no , state problem &/or Remedial Action Recommendation*	Remedial Action Taken*	Date Corrected

					Detox Area		
1	Treatment Area – Walls	Good Condition?					
2	Treatment Area— Ceiling	Good Condition?					
3	Treatment Area – Tank Secondary containment	No continuous gaps, floor epoxy good?					
4	Treatment Area— Structural Steel	Good Condition?					
5	5 min. Escape Pack	Full? Pull hood out, is it cracked?					
6	Eye Wash	Flush. Operating correctly? Filled out card?					
7	Fire Extinguishers	Full?					

Monthly Inspection Log --General

	Inspector (Print)				Inspector (Sign)	Date (m/d/y)	Time
#	Equipment/Area	Inspection Parameters(s)	S	U	If no , state problem &/or Remedial Action Recommendation*	Remedial Action Taken*	Date Corrected
					Dewatering Area		
1	Dewatering-Walls	Good condition? Conduit and Electrical boxes in good condition?					
2	Dewatering-ceiling	Good condition?					
3	Dewatering—Tank Secondary containment	No continuous gaps, floor epoxy good?					
4	Dewatering—Structural Steel	Good condition?					
5	5 min. Escape Pack	Full? Pull hood out, is it cracked?					
6	Eye Wash	Flush. Operating correctly? Filled out card?					
7	Fire Extinguishers	Full?					

Monthly Inspection Log –General

	Inspector (Print)				Inspector (Sign)	Date (m/d/y	Time
#	Equipment/Area	Inspection Parameters(s)	S	U	If no , state problem &/or Remedial Action Recommendation*	Remedial Action Taken*	Date Corrected
	Lab Pack Room						
1	Lab Pack Room—Walls	Good condition? Conduit and Electrical boxes in good condition?					
2	Lab Pack Room -- Ceiling	Good condition?					
3	Lab Pack Room – Floor	Good condition?					
4	Lab Pack Room—Structural steel	Good condition?					
5	Eye Wash	Flush. Operating correctly? Filled out card?					
6	Fire Extinguishers	Full?					

Monthly Inspection Log –General

	Inspector (Print)				Inspector (Sign)	Date (m/d/y	Time
#	Equipment/Area	Inspection Parameters(s)	S	U	If no , state problem &/or Remedial Action Recommendation*	Remedial Action Taken*	Date Corrected
					Crystallizer Area		
1	Crystallizer—walls	Good condition? Conduit and Electrical boxes in good condition?					
2	Crystallizer—ceiling	Good condition?					
3	Crystallizer Area concrete floor	No continuous gaps? Good condition?					
4	Crystallizer—Structural Steel	Good condition?					
5	5 min. Escape Pack	Full? Pull hood out, is it cracked?					
6	Eye Wash	Flush. Operating correctly? Filled out card?					
7	Fire Extinguishers	Full?					

*If more room needed, continue entry on the back of this form

Monthly Inspection Log –General

	Inspector (Print)				Inspector (Sign)	Date (m/d/y	Time
#	Equipment/Area	Inspection Parameters(s)	S	U	If no , state problem &/or Remedial Action Recommendation*	Remedial Action Taken*	Date Corrected
			Solids Receiving Area & East Pad Area				
1	Solids Receiving—Walls	Good Condition?					
2	Solids Receiving—Ceiling	Good Condition?					
3	Solids Receiving—Floor	Good Condition?					
4	Solids Receiving – Structural Steel	Good Condition?					
5	5 min. Escape Pack	Full? Pull hood out, is it cracked?					
6	Eye Wash	Flush. Operating correctly? Filled out card?					
7	Fire Extinguishers	Full?					
8	First Aid Kit	Full?					

Monthly Inspection Log –General

	Inspector (Print)				Inspector (Sign)	Date (m/d/y	Time
#	Equipment/Area	Inspection Parameters(s)	S	U	If no , state problem &/or Remedial Action Recommendation*	Remedial Action Taken*	Date Corrected
				West Pad Container Storage Area			
1	West Pad – Concrete Containment	Good Condition? Free of cracks, deterioration					
2	West Pad – Sump Epoxy Coating	Good Condition?					
3	Fire Extinguishers	Full?					
4	Spill Kits	Cross check with inventory?					

Annual Inspection Log							
Inspector (Print)			Inspector (Signature)				
#	Equipement/Area	Inspection Parameter(s)	S	U	If no, state problem and/or remedial action recommendation*	Remedial Action Taken	Date
1	Fire Suppression System	System charged. Heads in working order. (outside contractor)					
2	Tank Overfill Sensor	Manually test sensor for proper function					
3	Tanks	Proceedure Outlined in F2.4					
		Tank_					
		Tank_					
		Tank_					
		Tank_					
		Tank_					
		Tank_					
		Tank_					
		Tank_					
		Tank_					
		Tank_					
4	Agitators	Check agitator shaft and impellors for deterioration or corrosion					
5	Fire Extinguishers	outside vendor inspection					
6	Boiler	See Table F2-6					
7	Crystallizer	See Table F2-6					
8	Scrubbers	change lubricant in pump motors					
9	Air Compressor	See Table F2-6					
10	Generator	See Table F2-6					
11	Reactors	See Table F2-6					

APPENDIX F-2

EXAMPLE MAINTENANCE REQUEST FORM

The form included in this appendix are for example only. The information contained on this form will be included on any version of the form used for the same purposes, although the form itself may change in appearance.

Maintenance Request

Fernley, NV

Request Number **001**

Name of Equipment/Hazard/Area	
Location of Equipment/Hazard/Area	
Describe Nature of Problem	
Corrective Action Already Taken	

Requested By		**Date**	

For Plant Managers Use

Return to operator	Yes	No	Date Received		
Priority Level 1 (urgent)			Date Sent to Maintenance		
Priority Level 2 (routine)			Noted on Daily Inspection	Yes	No
Priority Level 3 (long term)					

Maintenance Department

Scheduled Start Date		Actual Start Date	
Date Rcvd		Est. Completion Time	
Act. Completion Time & Date			

Material List	Material List

SECTION G

CONTINGENCY PLAN

SECTION G CONTINGENCY PLAN

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in separate sections following the main body of the text

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SECTION G. CONTINGENCY PLAN

Preface

In accordance with Title 40 of the Code of Federal Regulations 264, Subpart D, the following plan will be used in the event of an emergency involving hazardous materials and wastes at PSC Fernley.

Purpose of the Plan

The purpose of this plan is four-fold:

- Emergency Guidance: - To act as a guide during actual emergency situations.
- Hazard Minimization: - To minimize hazards to human health and the environment from fires, explosions, or any structures, or to the air or soil.
- Mutual Aid: - To familiarize local emergency response personnel (i.e., sheriff, fire, and rescue departments, hospital and government personnel) with the types or materials handled and internal emergency response procedures.
- Training: - To acts as a training guide for employees to familiarize them in proper procedures to implement during an actual emergency situation.

Several copies of this plan are maintained at the Fernley facility at all times for use during an emergency. In addition, a copy has been submitted to the following agencies:

Lyon County Sheriff
North Lyon County Fire Protection District (NLCFPD)
Lyon County Emergency Management Director
Renown Medical Center
Nevada Division of Environmental Protection (NDEP)

G1.0 GENERAL FACILITY DESCRIPTION

G1.1 Facility Identification, Location and Site Plan

PSC Fernley is located at 2095 Newlands Drive East, Fernley, Nevada. The Fernley facility is a hazardous waste storage and treatment facility engaged in the following functions:

G1.2 Facility Operations

1. Acceptance of hazardous and non-hazardous industrial waste from various generating industries.
2. Acceptance of metal containing wastes for reclamation.
3. Storage of hazardous materials and waste in tanks and containers. Organic material with greater than 500 ppm VOC or 100,000 ppm TOC will be accepted for storage (no treatment activities) on the West Pad Container Storage Area, East Pad Container Storage Area, East Container Storage Area, and the Lab Pack Room.
4. Treatment of aqueous liquid hazardous and non-hazardous industrial waste in tanks and other recovery equipment.
5. Acceptance of used batteries for storage and transportation.
6. Depacking, repacking, and consolidation of lab pack and loose pack materials.

G1.3 Hazardous Wastes Handled at the Facility

The general categories of hazardous waste accepted, stored and treated at PSC Fernley are presented in Table G1-1.

G2.0 EMERGENCY COORDINATOR RESPONSIBILITIES

The first step in responding to a spill, fire or explosion involving hazardous waste is an established, well-structured chain of command of trained, experienced personnel. Such a chain of command has been established at PSC Fernley and is described in this Section.

At all times, there will be at least one person, either on the facility premises or on call, who will be responsible for coordinating all emergency response measures. This person will be called the Emergency Coordinator (EC), and will have full authority to commit all resources needed to carry out the measures provided in this plan.

In case of an imminent or actual emergency at the facility, the Emergency Coordinator is thoroughly familiar with this Contingency Plan, all operations and activities at the facility, the location and characteristics of the materials and wastes handled, the location of all facility records, the facility layout, and the location of all emergency response and spill clean up equipment.

In the event of an emergency, the Emergency Coordinator must immediately:

1. Activate internal facility alarms or communication systems to notify all facility personnel.

2. Ensure that all personnel are accounted for and isolated from danger.

3. Arrange for emergency services for any injured personnel.

4. Notify state or local emergency response teams if their help is needed.

5. Decide whether an evacuation of the facility and/or surrounding areas is necessary.

Table G2-1 Emergency Coordinator List

Emergency Coordinators

Larry Wilson
General Manager
2095 Newlands Drive E.
Fernley, NV 89408
Cell: (775) 223-3451

Joe Ryan
Transportation Supervisor
2095 Newlands Drive E.
Fernley, NV 89408
Cell: (775) 315-4689

G3.0 IMPLEMENTATION OF THE CONTINGENCY PLAN

Where public health or the environment is threatened, the following emergencies would call for the implementation of the Contingency Plan:

a. Fire/explosion anywhere on premises.
b. On-site and off-site releases of hazardous wastes or hazardous waste constituents.
c. The occurrence of natural disasters.

Listed below are detailed examples of the emergency incidents described above.

a. Fire/Explosion

   - Any advanced stage of fire (beyond the incipient stage, as defined in 29 CFR §1910.155(c)(26)) that cannot be easily controlled or extinguished by portable fire extinguishers, or small hose systems.
   - A fire in which the use of water or chemical fire suppressant could result in contaminated runoff.
   - A fire that causes the release of toxic fumes.
   - A fire that spreads and could possibly ignite stored materials/chemicals in other locations on site.
   - A fire that could cause heat-induced explosions of materials/chemicals on site. The potential for explosion poses hazards of flying fragments, ignition of other hazardous materials and their release.

b. Material Release
   - A sudden or non-sudden release that poses a threat to public health or the environment or is an uncontrolled release of a reportable quantity of a hazardous substance.
   - A release from containment, resulting in soil or surface water or potential groundwater contamination.
   - An uncontrolled release originating from a damaged shipment that has arrived at the plant in such a condition.

- A release of gas to the air originating from an explosion or reaction of materials.

c. Natural Disaster
- A release or potential for release of hazardous materials caused by earthquake or severe flooding conditions that damage equipment, foundations, structures, or tanks.
- A release or potential for release of hazardous materials caused by a severe storm involving high velocity winds or lightning that damage or overturn containers.

G4.0 EMERGENCY RESPONSE PROCEDURES

G4.1 Employee Response

G4.1.1 Employee Response

Any employee, when faced with an actual or imminent emergency, will first attend to his/her own safety. The employee will first leave the area via the safest exit and either activate the alarm or notify an on-site supervisor. Then, if is safe to do so, he/she will attend to other employees requiring immediate assistance. Locations of telephones/intercoms are shown in Figure G4-1, and alarm signals are listed in Table G4-1. Table G1-2 identifies hazardous material characteristics and appropriate handling procedures. Practice emergency drills during which employees use the various alarms and alarm signals are held on a quarterly basis. These drills will be conducted as part of the Training Plan, as described in Section H. All employees on-site at the Fernley facility must participate in the emergency drills, and they will be documented in the operating record.

For newly hired employees training in Contingency Plan will be held prior to the employee working in the active areas of the facility. In all emergency situations (regardless of size or extent), the employee involved in or discovering the situation will first contact the Emergency Coordinator (EC) and provide information as to the location, nature, and extent of the incident. The names, addresses, and telephone numbers of the Primary and Alternate Emergency Coordinators are found in Table G2-1.

G4.1.2 Emergency Coordinator Response

When faced with an actual or imminent emergency, the emergency coordinator will first evacuate the affected portion of the facility, or, as necessary, the entire facility. The emergency coordinator will then account for all employees and notify the appropriate emergency responders.

Either through direct observation, review of operating records, manifests, waste analysis reports or chemical analysis, the Emergency Coordinator will identify the character, exact source, amount, or extent of released materials.

The Emergency Coordinator must also assess the possible hazards to human health or the environment that may result from any release, fire, or explosion (e.g. the effects of any toxic, irritating, or asphyxiating gases that are generated) or the effects of any hazardous surface water run off from water or chemical agents used to control fire. He/she must consider both direct and indirect effects of any release, fire or explosion. The Emergency Coordinator shall use his/her best professional judgment for the assessment of possible hazards. If the emergency threatens human health and/or the environment outside the facility, the Emergency Coordinator must provide the following information to responders:

1. Name and telephone number of reporter
2. Name and address of the facility
3. Time and type of incident (e.g. release, fire)
4. Name and quantity of material(s) involved
5. The extent of any injuries
6. The possible hazards to human health or the environment outside the facility.
7. Medium of release
8. In assessing whether the evacuation of local areas is necessary, the Emergency Coordinator will assess:

- The nature and toxicity of the material involved in the emergency
- Prevailing wind
- Potential for migration outside the facility
- Possibility of explosion and a pending release of toxic vapors, gases or mists.

During an Emergency

The Emergency Coordinator will take any and all measures he/she deems necessary (e.g. stop operations, isolate containers, etc.) To ensure that fires, explosions or releases do not occur, reoccur or spread to other hazardous waste areas of the facility.

If the facility stops operations, the Emergency Coordinator will monitor for leaks, pressure buildups, gas generation, or ruptures in pipes, valves, or other equipment.

Detention pond and sumps will be monitored during an emergency event.

After an emergency, the Emergency Coordinator will:

- Supervise cleanup efforts, and ensure that the recovered waste or contaminated material is properly treated, stored, or disposed of.
- Ensure that no waste that may be incompatible with the released material is treated, stored, or disposed of until cleanup procedures are completed.
- Make sure emergency and spill cleanup equipment is back in order before operations resume.
- Inspect all emergency equipment listed in the Contingency Plan and certify that said equipment is cleaned and fit for its intended use before operations are resumed.

G4.1.3 Security Personnel/Answering Service Response

A privately owned security response service is employed by the facility. In the event of an alarm from a release, the company calls the facility for confirmation. If no one answers the telephone, a call is initiated to the Emergency Coordinator. The

Emergency Coordinator will determine if outside assistance is required and will request the service call the NLCFPD. The service is responsive to fire, cyanide alarms, hydrogen sulfide alarms and medic alarms.

G4.2 Notification

Following an incident requiring implementation of the Contingency Plan, the following notifications will be made:

1. Within one (1) hour of event, call Nevada Department of Emergency Management at (775) 687-4240 (24hr phone number), and provide the following:

    - Report incident and receive State Incident Number. Write down State Incident Number, person contacted, date and time of day.

2. Within one (1) hour of event, call LCEM at (775) 463-6510 or 302-7088and:

    - Report incident and State incident number, note person contacted, date and time of day.

3. Additionally, the Nevada Division of Environmental Protection (telephone (888) 331-6337 nights/weekends) Air, Water, and/or Hazardous Waste divisions must be notified within 24 hours. Finally, if a reportable quantity is released, the USEPA National Response Center (telephone number (800) 424-8802) must be notified immediately.

4. Within 15 calendar days after an incident requiring Contingency Plan implementation or the release of a reportable quantity, the owner or operator will submit a written report to the Director of Nevada Division of Environmental Protection documenting the following:

    - Name, Address and Telephone Number of the Owner or Operator.
    - Name, Address, and phone number of the facility.
    - Date, Time and Type of Incident, including the name and quantity of materials involved.
    - The extent of injuries, if any.

- An assessment of actual or potential hazards to human health or the environment, where applicable.
- Estimated quantity and disposition of recovered material that resulted from the incident.

Also within 15 days, the written follow up report will be sent to the following agencies:

Nevada Department of Emergency Management
2525 South Carson Street
Carson City, NV 89710

Nevada Department of Environmental Protection
Bureau of Corrective Actions
Attn: Bureau Chief
901 S. Stewart Street, Suite 4001
Carson City, NV 89701

Nevada Division of Environmental Protection
Bureau of Waste Management
Attn: Permitting Supervisor
901 S. Stewart Street, Suite 4001
Carson City, NV 89701

Lyon County Emergency Management
Attn: EM Coordinator
18 Hwy. 95A North
Yerington, NV 89447

North Lyon County Fire Protection District
Attn: Fire Chief
195 E. Main Street
Fernley, NV 89408

Fernley Town Board
P.O. Box 1624
Fernley, NV 89408

G4.3 Containment and Control of Emergencies

This plan has been developed and organized in such a way as to afford maximum guidance during an incident of any magnitude. The Emergency Coordinator and personnel employed by PSC Fernley are thoroughly familiar with this document and will follow prescribed procedures in the event of an emergency.

Should an emergency situation arise, the Emergency Coordinator will be notified immediately. Concurrently, all facility personnel will be notified where required. Sheriff departments, federal, state or local agencies or contractors will be notified <u>if their assistance is required</u>.

Fire:
195 E. Main Street
Fernley, NV 89408
911

NV Dept. of Emergency Management
2525 South Carson Street
Carson City, NV 89710
(775) 687-4240

Police:
Lyon County Sheriff
925 Main Street
Fernley, NV 89408
(775) 575-2525 Sub Station
(775) 575-2321 Dispatch

Medical:
Renown Urgent Care
1343 West Newland Drive
Fernley, NV 89408
(775) 982-6529

Poison Control:
Northern Nevada Medical Center
2375 Prater Way
Sparks, NV 89434
(775) 356-4040

State Police:
Nevada Highway Patrol
555 Wright Way
Carson City, NV 89710
(775) 687-5300

Danger Outside Facility:
National Response Center
(800) 424-8802

Security Company
Stanley Security
734 Spice Islands Drive
Sparks, NV 89431
(775) 828-9544

Spill Clean-up:
PSC
(877) 577-2669

Lyon County Emergency Management
18 Highway 95A North
Yerington, NV 89447
(775) 463-6510

Spill Clean-up Alternate
H2O Environmental
390 Freeport Blvd. #12
Sparks, NV 89431
(775) 351-2387

Chemical Information:
Chemtrec
Chemical Transportation Emergency Center
Washington, D.C.
(800) 424-9300

G4.3.1 Injured or Endangered Employees

Various medical emergency and first aid equipment is maintained on-site. The general first aid response to medical emergencies and injuries is as follows:

- Move victim to fresh air; call emergency medical care – 911 for emergency ambulance dispatch.
- If not breathing, give artificial respiration.
- If breathing is difficult, give oxygen.
- In case of contact with material remove clothing if necessary, immediately flush skin and eyes with running water for at least 15 minutes and keep warm.
- Remove and isolate contaminated clothing and shoes.
- Administer additional specific first aid as appropriate.
- Keep victim warm and await the arrival of emergency medical response unit.
- Ensure that a description if the incident and the materials involved (provide MSDS or profile) accompanies the victim to the hospital. The MSDS or profile should be provided for the hazardous material.
- The Material Safety Data Sheets (MSDS) and the profiles are maintained at the Fernley facility.

G4.3.2 Fires and Explosions

Fire/Explosion – Emergency Procedures

Refer to Table G5-3 regarding Fire Classes and Fire Extinguishers. Refer to Table G1-2 for identification of hazardous material characteristics and appropriate handling procedures. Depending upon the magnitude of the fire incident and the amount of material involved, the following emergency procedures will be implemented.

Small Spill on Fire

1. Grab fire extinguisher and extinguish flames. If unable to immediately extinguish, sound alarm and leave area. If not extinguished, follow procedures in Section 4.3.2 for large fires.

2. Notify Emergency Coordinator. The Emergency coordinator will notify the local fire authorities if the Emergency coordinator deems the fire will require additional manpower to manage the situation by dialing 911 on any available phone.

3. If the Emergency Coordinator or one of the alternates is not immediately available to make this determination, the decision to call the fire department falls upon the shift lead or operations personnel in charge at the time of the incident.

4. Eliminate and continue to restrict all sources of ignition so the fire will not re-ignite.

5. Wearing boots, protective gloves, and eye protection, stop leak. Absorb spill with absorbent or pump to standby empty recovery drums.

6. Follow spill cleanup procedures described in Section 4.3.3

Oxidizers on Fire

1. (Employee) Leave the area via the safest exit, and notify the supervisor in charge of that portion of the facility, the Emergency Coordinator, or Facility Manager whichever supervisor is immediately available.

2. (Supervisor) If safe to do so, grab a water hose, DO NOT USE HALON, CO@, DRY CHEMICAL OR FOAMS TO EXTINGUISH FLAMES; oxidizers create their own oxygen. To put out a fire you have to remove the heat/ignition source or eliminate or reduce the flammability of the fuel source. If unable to immediately extinguish,

sound alarm and leave area. If not extinguished, follow procedures in Section 4.3.2 for large fires.

3. Notify Emergency Coordinator. The Emergency coordinator will notify the local fire authorities if the Emergency coordinator deems the fire will require additional manpower to manage the situation by dialing 911 on any available telephone.

4. If the Emergency coordinator or one of the alternates is not immediately available to make this determination, the decision to call the Fire Department falls upon the shift lead or operations personnel deems in charge at the time of the incident.

<u>Flammable Liquids on Fire (West Pad or East Pad Container Storage Area, Labpack Room)</u>

1. (Employee) Leave the area via the safest exit, and notify the Emergency Coordinator or supervisor in charge of that portion of the facility whichever is immediately available.

2. (Supervisor) If safe to do so, grab compatible fire extinguisher and extinguish flames following procedure outlined in section 4.3.2.1 for small fires. If unable to immediately extinguish, sound alarm, leave area and notify Emergency Coordinator.

3. If the Emergency Coordinator determines the fire will require additional manpower to manage the situation he will contact the fire department by dialing 911 on any available telephone. If the Emergency Coordinator determines the fire is controllable, he/she will contact trained employees. If fire does not extinguish, all personnel should evacuate the building and wait for the arrival of the fire department following the procedures outlined in section 4.3.2.4 for large fires.

4. If the Emergency Coordinator or one of the alternates is not immediately available to make this determination, the decision to call the Fire

Department falls upon the shift lead or operations personnel in charge at the time of the incident.

Large Fire or Large Spill on Fire (West Pad or East Container Storage Areas)

1. Sound Emergency Fire Alarm using pull box.

2. Office personnel call NLCLFPD upon sounding of emergency alarm by dialing 911 or calling (775) 575-3310.

3. Notify Emergency Coordinator (if not already aware of the situation).

4. All personnel will immediately evacuate the building via the nearest exit, whenever the fire alarm sounds. They will not return to their work place until cleared by the Emergency Coordinator.

5. In the event of a release of toxic gases or the potential for explosion, off-site evacuation may be advisable.

6. Determine the most accessible and safest route of approach to the fire. Consider flame migration potential, associated dangers and physical limitations. Attempt to determine nature of burning material using knowledge of tank and container contents.

7. When fire department arrives, delegate to them primary responsibility. Stand by for assistance.

8. Cool nearby tanks with water (being careful of any water reactions).

9. When fire is extinguished, remedy point source to stop flow if it can be done without risk.

10. Absorb spilled material or pump to available tank or empty containers. Use shovel to spread standard industrial absorbent over affected area.

11. Collect contaminated material (i.e., absorbent, dry chemical, rags, etc.) in recovery drums.

12. Decontaminate boots, gloves, goggles, face shields, self-contained breathing apparatus and other reusable emergency response equipment.

13. Cleanup, restore or replace emergency response equipment, and return it to its original location.

14. Inspect emergency equipment as specified in Section 5.0. See Equipment Inspection Form.

15. Label and mark recovery drums in accordance with all applicable hazardous waste rules and regulations.

G4.3.3 Spills and Releases

In the event of a spill, leak or release of any kind, the following general steps will be followed:

1. Notify Emergency Coordinator or Alternate (verbal communication).

2. Determine source of leak or spill (Section 3.3.2 of this Plan); immediately identify the character, exact source, amount and area affected by the release. Shut off pump(s) if possible without endangerment of personnel.

3. Eliminate and continue to restrict all sources of incompatible materials or ignition from spill area, and areas down-wind of the spill area.

4. Assessment: The Emergency Coordinator will assess possible hazards to human health and the environment by considering both direct and indirect effects of released material.

Uncontrolled Spills

Follow General Spill Procedures identified above.

1. Don appropriate PPE. Type of respirator will be determined by the Emergency Coordinator using published OSHA and NIOSH standards for the materials identified.

2. Identify, remedy and stop point source where possible.

3. Dike spill with Standard Industrial Absorbent as required.

4. Once flow is stopped, pump spilled material to empty tank or recovery drums, or absorb spilled material with Standard Industrial Absorbent. Use shovel to uniformly disperse absorbent over affected area.

5. Collect contaminated material (i.e., absorbent rags, etc.)

6. Decontaminate boots, protective clothing, gloves, and face shield. Dispose of TYVEK suits into a recovery drum with contaminated absorbent.

7. Cleanup, restore or replace spill response equipment, and return it to its original location.

8. Physical inspection of all emergency equipment is required as listed in the Contingency Plan by the Emergency Coordinator to insure the equipment is cleaned and fit for its intended use as specified in the Equipment Manufacturer's Operating Procedures. See Equipment Inspection Form.

9. Label recovery drums in accordance with all applicable hazardous waste rules and regulations.

10. Observe proper hygiene procedures during decontamination of personnel.

Contained Spills

Spills within Diked Tank Storage/Treatment Areas:

1. Immediately notify Emergency Coordinator. He will determine whether toxic or irritating fumes may be formed. The Emergency Coordinator will prescribe appropriate respiratory protection using published OSHA and NIOSH guidelines for the identified material. Activation of the contingency plan is at the prerogative of the Emergency Coordinator based on criteria defined in Section G3.0, Implementation of the Contingency.

2. Emergency coordinator will summon outside assistance as required.

3. Contact laboratory personnel to determine which tanks are available and/or compatible with spilled materials.

4. Pump to appropriate storage tank.

5. All tanks are in bermed containment areas with berms designed to contain 110 percent of the total volume of the largest tank within the berm; escape from the berm is a low probability.

6. Each berm has a sump with a level alarm. The sumps are designed to allow pump out using portable air or electric operated pumps. There are no drains associated with the sump, thus eliminating underground piping that might leak.

7. In the event of a leak or spill, the spilled material is washed into the sump and pumped to the appropriate storage tanks or reactor at the direction of

the Emergency Coordinator in conjunction with the laboratory personnel and outside assistance as required.

8. The maximum estimated cleanup time required for such an emergency is one hour for up to the first 300 gallons and an additional hour for each additional 1,000 gallons.

9. Clean and repair spill area thoroughly.

10. The estimated repair time for tanks will vary with the specific flow; however, tanks will not be returned to service until repaired.

Spills within Truck Unloading Area:

1. Immediately notify Emergency Coordinator. He will determine whether toxic of irritating fumes may be formed. The possibility of hazardous vapors always exists from a spill of hazardous materials. The Emergency Coordinator will prescribe appropriate respirators. Activation for the contingency plan is the prerogative of the Emergency Coordinator based on criteria defined in Section G3.0, Emergency Coordinator based on criteria defined in Section G3.0, Implementation of the Contingency Plan.

2. Emergency Coordination will summon outside assistance, such as a spill cleanup contractor, as required.

3. The Emergency Coordinator will determine whether or not the spilled material will remain within the spill control area, and use absorbent material to contain the spill if necessary.

4. Contact laboratory personnel to determine which tanks are available and/or compatible with spilled materials.

5. Pump to appropriate storage tanks.

6. Clean spill area thoroughly.

Spills on West Pad Container Storage Area, East Pad Container Storage Area, East Container Storage Area, and Lab Pack Room

1. Immediately notify Emergency Coordinator. He will determine whether toxic or irritating fumes may be formed. The possibility of hazardous vapors always exists from a spill of hazardous materials. The Emergency Coordinator based on criteria defined in Section G3.0, Implementation of the Contingency Plan.

2. Emergency Coordinator will summon outside assistance, such as a spill cleanup contractor, as required.

3. The Emergency Coordinator will determine whether or not the spilled material will remain within the spill control area, and use absorbent material to contain spill if necessary.

4. Portable tanks or drums will be maintained to recover any spilled material and wash water.

5. Clean spill area thoroughly.

Spills in Solids Receiving Area

1. Immediately notify Emergency Coordinator. Activation for the contingency plan is the prerogative of the Emergency Coordinator based on criteria defined in Section G3.0, Implementation of the Contingency Plan.

2. Emergency Coordinator will summon outside assistance, such as a spill cleanup contractor, as required.

3. The Emergency Coordinator will determine whether or not the spilled material will remain within the spill control area, and use absorbent material to contain spill if necessary. Containment in the Solids Receiving Area is adequate to fully contain the largest possible spill.

4. Clean spill area thoroughly.

G4.3.4 Damaged Shipments

Damaged shipments leaking through the vehicle bed will be immediately placed in secondary containment. Refer to Section G4.3.3 for this portion of the response. The vehicle route will be retraced to determine if waste was released off-site. Mass balance computations will be conducted, if feasible.

G4.4 Prevention of Recurrence

The EC will take all necessary steps to ensure that a secondary release, fire, or explosion does not recur after the initial incident. The EC will ensure that no wastes that may be incompatible with the released material will be treated or stored in the affected area. Waste compatibility is determined in accordance with Section C2.0, Waste Analysis Plan.

If the facility stops operations in response to a fire, explosion or release, the EC will monitor associated tanks for leaks, pressure build up, gas generation, or leaks and for ruptures in valves, pipes, or other equipment until the emergency has ended and normal operations can resume.

The EC together with the assistance of PSC - Fernley Engineering, Operations, and Environmental, Health and Safety Departments will evaluate the incident to understand why and how the incident occurred and what future modifications can be initiated to prevent a recurrence of the same or a similar situation. Evaluations will include equipment design, operational procedures, response tactics and personnel safety.

G5.0 EMERGENCY EQUIPMENT

40 CFR 264.52(e) 40 C.F.R. requires that the Fernley facility maintain a list of all emergency equipment at the facility.

In addition, the location of each piece of equipment must be specified along with a brief outline of its capabilities. At a minimum, this equipment must include:

- An internal communications or alarm system capable of providing immediate emergency instruction (voice or signal) to facility personnel.

- A device, such as a telephone (immediately available at the scene of operations) or a hand held two-way radio, capable of providing immediate emergency instruction (voice or signal) to facility personnel.

- Portable pumps, fire extinguisher, fire control equipment (including special extinguishing equipment, such as that using foam, inert gas or dry chemicals), spill control equipment and decontamination equipment.

- Water at adequate volume and pressure to supply water hose streams, or foam-producing equipment, or automatic sprinklers, or water spray systems.

With regard to preparedness and prevention, the following emergency response equipment is maintained at PSC - Fernley:

<u>Communications Equipment and Alarms</u>

- Telephones are available near the scene of operations. Each department has a phone with a list of emergency telephone numbers.

- A phone operated public address system is maintained at this facility to provide immediate instruction to all personnel.

- A manually operated air horn is maintained in a cabinet near the entrance to the offices in the event the PA system is or becomes inoperative.

Fire Control Equipment

The following fire fighting equipment is available:

- Fire Hydrants are located on the premises for fire truck link-up and use.
- 12,20 pound ABC-rated Fire Extinguishers are located in the plant (See Figure G4-2)
- Main building has a fire sprinkler system throughout.
- Fire alarms are automatically activated when the sprinkler system is activated.

The following spill control equipment is available:

- The following spill control equipment is available on-site in the northwest section of the truck bay:
- 20 empty open-top drums;
- 5 shovels.
- 200 pounds of industrial absorbent.

An emergency generator is located on the east side of the facility. This generator is a back up source of electrical power to the facility. The primary usage of the emergency back-up generator is for lighting, scrubber operation, and safety requirements.

The West Pad Container Storage Area has 2 spill kits (Figure G7-1).

<u>Personnel Protective Equipment</u>

All facility operators and potential emergency responders are issued the following personal protective equipment:

Hard hat, glove liners, heavy-duty gloves, steel toed chemical resistant boots, coveralls and full-face respirators. These PPE items are inspected by the operator each day and replaced as needed. A list of these items is maintained at Table G5-1 of this section.

G6.0 POST EMERGENCY PROCEDURES

Following an emergency or evacuation, the Emergency Coordinator will instruct employees to conduct a daily inspection of all areas. Section F, Procedure to Prevent Hazards, delineates all items for inspection. Only upon completion of these inspections will the facility return to normal operations.

G6.1 Storage and Treatment of Released Materials

<u>Potential Flammable or Toxic Gases</u>

Table G1-3 is a list of flammable or toxic gases with a potential of being formed from chemicals used at the facility, the method of detection, and possible methods to remedy, neutralize, capture, or control the gas. All possible combinations or gases may not be included on this list.

G6.2 Equipment Decontamination and Maintenance

All facility communication or alarm systems, fire protection equipment, spill control equipment, and decontamination, where required is tested and maintained as necessary to assure its proper operation in case of an actual emergency.

G6.3 Reactivation of Activities in the affected Area

Prior to resuming normal operations, the Emergency Coordinator will ensure that all emergency equipment is inspected and returned to operating condition. See Equipment Inspection Form.

The Emergency Coordinator shall take the following precautions for the prevention of incompatible waste from being treated, stored, or located in the affected areas:

1. No new waste will be introduced into the affected area until a total cleanup is accomplished.

2. Following the spill cleanup operation, an assessment shall be made as to the proper handling of recovered materials.
   - If the exact source of the leaked or spilled material can be determined, the cleanup residue will be identified accordingly.
   - If the exact source of the leaked or spilled material cannot be determined or if two or more materials have mixed and subsequently been cleaned up, a sample will be collected and analyzed. Spill cleanup residues of listed hazardous wastes are automatically considered as the same hazardous waste.
   - Whenever two or more wastes are mixed as the result of a spill, the components will be reviewed to ensure that they are not incompatible with any material with which they might be combined.
   - Tests shall be made necessary to ensure proper handling and disposal of all material.

The Emergency Coordinator will inspect all emergency equipment listed in the Contingency Plan and certify that it is clean and fit for its intended use per the manufacturer's specification. The Equipment Inspection Form will document this inspection.

Prior to the resumptions of operations in the affected area(s) of the facility, the Emergency Coordinator or designee shall contact the Nevada Division of Environmental

Protection, Waste Management Division, and the EPA Regional Director and notify them of the impending resumption of operations.

G6.4 Personnel Debriefing

The EC, together with the assistance of the PSC – Fernley Operations, and the Environmental, Health and Safety Departments, will conduct debriefings of plant personnel and local authorities to assess the effectiveness of the preparedness and prevention measures, response activities, control, and evacuation procedures related to the incident. Based on the review, the Contingency Plan will be evaluated and updated as needed.

G7.0 COORDINATION AGREEMENTS

Title 40 of the Code of Federal Regulations, Section 264.52 (c) requires arrangements to be agreed to by the local sheriff and fire departments, hospitals, contractors, and State and local emergency response teams. In fulfillment of the requirements of this part, the Fernley Facility has made agreements that include:

1. The North Lyon County Fire Protection District (NLCFPD);
2. The Lyon County Emergency Management Director
3. The Nevada Highway Patrol to provide support as needed during an actual emergency.
4. Renown Urgent Care, 1343 West Newlands Drive, Fernley NV to familiarize their personnel with the properties of hazardous materials and wastes handled at the facility and the types of injuries or illnesses, which could result form fire, explosions, or releases at the facility.
5. The local police department will provide traffic control and site security as needed during the emergency.

Additionally, arrangements with the Lyon County Sheriff and NLCFPD have been made to familiarize their personnel with:

1. The layout of the facility

2. Properties and hazards associated with the materials and wastes handled at the facility.
3. Places where facility personnel would normally be working.
4. Entrances to the facility.
5. Evacuation routes.

Each of the above agencies has been contacted and sent copies of PSC Fernley's Contingency Plan. The following arrangements have been requested:

<u>Lyon County Sheriff Department</u>

Lyon County Sheriff Department will receive a copy of the Contingency Plan, and has been asked to provide the following assistance during an emergency:

- Immediate Response
- Crowd Control Assistance
- Communications Support
- Security to the Affected Area
- Evacuation of Surrounding Areas if Required

<u>North Lyon County Fire Protection District</u>

NLCFPD will receive a copy of the Contingency Plan and will be asked to provide:

- Primary Emergency Authority
- Immediate Response
- Primary Fire Fighting Services
- Rescue and Emergency Transport Services
- Rescue Services

<u>Renown Urgent Care</u>

Renown Urgent Care will receive a copy of the Contingency Plan and will be asked to provide:

- Primary Medical Services

<u>Provisions for Adequate Aisle Space</u>

PSC Fernley has designed its facility with adequate aisle space to allow unobstructed movement of personnel, fire protection equipment and decontamination equipment to any area of the facility operation in an emergency. This has been accomplished through the provisions of aisles between all tanks and processing equipment. Main access walkways are indicated on Figure G5-1 that shows evacuation routes.

G8.0 EVACUATION PLAN

In the event that an incident poses an actual or serious potential threat to human health or safety, the Emergency Coordinator will evacuate the facility, or, at minimum, the affected area. If the evacuation of the outlying areas is deemed necessary, the Emergency Coordinator will advise the local Sheriff and Fire Departments (dial 911 for emergency dispatch) and the Nevada Division of Environmental Protection of the potential threat to human health.

Evacuation plan implementation requires prompt and deliberate action. The plan of action described in this section will be strictly adhered to unless, in the opinion of the on-scene Emergency Coordinator, minor modifications during an actual emergency would constitute a better evacuation.

The following policy is applicable in the event of a facility alarm condition.

1. When a gas or fire alarm sounds, all persons will evacuate through the nearest exit and proceed to the front of the plant and upwind from any smoke or fumes. Do not walk through other parts of the plant.

2. The Emergency Coordinator or designee shall account for all personnel on the plant. Everyone will assemble at a location up wind of the plant based on the direction of the windsocks and/or flags located in the front and back of the building.

3. The command area, for assessment and setting tactical priorities, will be the assembly area and the front offices. The Emergency Coordinator will utilize all resources available for data collection and risk (hazard) characterization.

4. The Emergency Coordinator will determine the people who will enter the plant to respond to the event. The individuals that are responding to the emergency are chosen form their past training, experience, skills, and knowledge of the situation. These individuals will assess the situation and gather information. This information may include the following items:

   A. Turn over sheets and log books
   B. Tank Treatment Records
   C. Scrubbers condition and pH readings
   D. Signs of visible reactions
   E. Drager Tube readings of gasses suspected
   F. Monitor readings and conditions

5. After entry contact the Emergency Coordinator and relay information and current status alarms. The Emergency Coordinator will determine the course of action to take.

6. Notify Alarm Company that you are aware of the alarm and are working to correct conditions. The alarm company telephone number is (775) 828-9544.

7. If toxic gases are not present, the area will be rechecked, and the results given to the Emergency Coordinator, who may release the areas for re-entry.

8. Before employees return to work, all equipment used should be in proper working order and returned to their proper storage area. The Emergency Coordinator shall certify on the Equipment Inspection Form that all emergency equipment is clean and fit for its intended use per the manufacturer's specifications.

9. Alarms will be rest and the Alarm Company notified that the alarm condition has been corrected.

10. Reporting Requirements: In the event of an alarm condition results from a release of substances to the environment, the Nevada Department of Emergency Management and Lyon County Emergency Management Director must be notified within one hour of the actual release. Additionally, the Nevada Division of Environmental Protection Air, Water, and/or Hazardous Waste divisions must be notified within 24 hours. Finally, if a reportable quantity is released, the USEPA National Response Center must be notified immediately.

Facility Evacuation

The objective of an evacuation plan is to minimize the health hazards to employees or visitors from imminent or potential hazards associated with a spill or fire.

Alarm Signals

The facility emergency alarms or paging system (air horn if alarms are inactive) will be used to signal partial or total facility evacuation. Verbal warning by an appointed runner may be used if necessary.

The following describes the emergency alarms' sounds and procedures associated with each (see Section 4.0 Emergency Procedures).

1. Fire Alarm – Buzzer or Bell

Immediately proceed by the evacuation route to the Assembly area. The Emergency Coordinator will provide additional instructions.

2. Gas Monitor Alarms – Siren

Immediately proceed by the evacuation route to the assembly area. Check wind direction and move up wind at least 100 feet if the assembly area is downwind. Return to work area only after permission is given by the Emergency Coordinator.

3. Medical Alert Alarm – Intermittent Whistle

Immediately proceed by the evacuation route to the assembly area. The Emergency Coordinator will check panel to determine area of alarm activation and proceed to that area with a first aid kit. Evacuated staff will perform role call to account for all personnel.

4. High Level Alarm – Beep Tone

Laboratory personnel will notify the truck bay operator of the condition and to cease pumping to the tank with the high level alarm.

The Emergency Coordinator makes his decision to evacuate based on the incident and threat to human health or the environment. In the event of a total facility evacuation and the site personnel are unable to respond to the emergency, the Lyon County Sheriff and NLCFPD will be immediately notified.

Decision to Evacuate

The Emergency Coordinator will make the decision to evacuate. This decision will be based upon his experience in the field and those criteria identified in the Contingency Plan.

All personnel will immediately evacuate whenever a fire or gas alarm sounds. They will not return to their work place until cleared by the Emergency Coordinator.

Evacuation Procedures

1. The on-scene Emergency Coordinator will direct the evacuation.

2. In each occurrence of an evacuation emergency, it is the responsibility of the section's leads to take charge of their personnel and property in his department.

3. Supervisors who are away from their base work area when an emergency occurs are urged to return to it as quickly as possible to take charge.

4. Operators must move their vehicles so they do not obstruct aisles. This will allow emergency vehicles to pass.

5. When the building is being evacuated, operators should shut down their operations, if possible.

6. All employees, visitors and contractors will leave the facility in an orderly manner, via exits shown in Facility Evacuation Plan in Figure G5-1 of this Plan.

7. Immediately end all telephone conversations.

8. Do not attempt to obtain personal belongings, unless otherwise authorized.

9. Do not run or make unnecessary noise.

10. During the evacuation, the Emergency Coordinator and appointed aids will ensure that all unauthorized personnel be prevented form entering the evacuated area.

11. When evacuating the building, all employees will proceed to the assembly area, as shown in the Evacuation Plan (see Figure G5-1) and muster with their department supervisor. They will remain in the assembly area as far from the building as possible so as not to interfere with emergency personnel and equipment. It is the responsibility of department supervisors to muster their employees in an expeditious manner and report any unaccounted for personnel to the Emergency Coordinator.

12. The Emergency Coordinator will account for all personnel to ensure that no one has been left behind.

13. The decision to re-enter the facility will be made by the Emergency Coordinator. When appropriate, the Emergency Coordinator will determine the proper protective equipment for the employees. The factors

for determination of the PPE include the potential exposures and hazards from both chemical and physical materials. For each situation, the equipment and clothing will be selected to provide and adequate level of protection.

14. The Emergency Coordinator will obtain rescue services for injured people where required.

If the emergency situation requires the evacuation of areas surrounding the facility, the Emergency Coordinator will immediately inform the Lyon County Sheriff and NLCFPD (Dial 911), the Nevada Department of Emergency Management, the Nevada Division of Environmental, and the National Response Center of such a condition. This decision will be based upon:

A. The nature and toxicity of the material involved in the emergency.
B. Prevailing wind direction.
C. Migration potential outside the facility.
D. Possibility of an explosion.
E. Possibility of a pending release of toxic vapors, gases or mists.

Evacuation Signal and Notification

The signal to evacuate surrounding areas will be given directly to the Lyon County Sheriff and NLCFPD.

Under direction of the Sheriff and Fire Departments calls will be placed to facilities immediately surrounding PSC Fernley, advising them of the nature of the situation and the advisability to evacuate.

In all cases of surrounding area evacuation, all personnel so notified will be directed as to the best roads to use and direction(s) to proceed along, as decided by the Emergency Coordinator in conjunction with the Lyon County Sheriff and the NLCFPD.

Whenever the Emergency Coordinator determines that evacuation of local areas may be advisable, he must immediately notify the NLCFPD (Dial 911) and the Lyon County

Sheriff Department. He must be available to help appropriate officials decide whether local areas should be evacuated. In addition, the following agencies must be notified:

1. The Emergency Coordinator must immediately notify the Nevada Department of Emergency Management, the Nevada Division of Environmental Protection (NDEP) using the emergency spill response information in Section 3.3.1 of this Plan and provide that information.

2. The Emergency Coordinator must also immediately notify the National Response Center. The report must include:

   - Name and telephone number of reporter;
   - Name and address of facility;
   - Time and Type of incident (e.g., release, fire);
   - Name and quantity of material(s) involved;
   - The extent of any injuries;
   - The possible hazards to human health, or the environment, outside the facility.

G9.0 INCIDENT REPORTS

The Comprehensive Environmental Response, Compensation, and Liability Act's Superfund Amendments and Reauthorization Act of 1986, Title III, Section 304 requires immediate local notification when an accidental or unplanned release of a hazardous substance occurs. IN addition to local emergency responders, notification will also be provided immediately to the following agencies.

- Lyon County Department of Emergency Management
- Nevada Department of Emergency Management
- Nevada Division of Environmental Protection
- EPA National Response Center

The information required includes: identification of the substance; location of the release; time the release started; duration; estimate of the quantity of the substance released into the environment; medium of the environment receiving the release (soil, water, air, pavement, etc.); known or anticipated acute or chronic health risks associated with the release; when appropriate, advice regarding medical attention for treatment of exposed individuals; precautions to be taken, including evacuation and other considerations; and name and telephone number of contact for further information.

G10.0 AMENDMENTS TO THE CONTINGENCY PLAN

Periodically, PSC Fernley's Contingency Plan and Emergency Procedures Plan will be reviewed and updated as necessary. The plan will be immediately amended whenever:

1. The plan fails in an emergency.

2. The facility makes changes in its design, construction, operation, maintenance, or security system or other circumstances which would increase the potential for fires, explosions, or releases of hazardous waste constituents, or which may affect emergency response procedures.

3. There are changes in the amount or type of emergency equipment.

4. There are changes in Emergency Coordinators

5. The facility permit is revised.

If changes are made in the Contingency Plan and Emergency Procedures Plan, updated copies showing these changes will be distributed to local authorities and the Nevada Division of Environmental Protection.

LIST OF TABLES

Table G1-1. Hazardous Waste Accepted at PSC-Fernley

Waste Type	Hazards	EPA Waste Code(s)
Ignitable	Flash point of less than 140°F *or* ignitable compressed gas *or* is an oxidizer	D001
Corrosive	pH <2 or >12.5	D002
Reactive	Reactive – possible water reactive or Cyanide or Sulfide waste that is capable of releasing toxic gasses	D003
Toxic	Toxicity	D004-D043
Waste from Non-Specific Sources	Potentially Toxic/Reactive/Acutely Hazardous	F001-F012, F019-F028, F032, F034, F035, F037-F039
Waste from Specific Sources	Corrosive, Toxic	K001-K011, K013- K052, K060-K062, K069, K071, K073, K083-K088, K093-K098, K100-K118, K123-K126, K131, K132, K136, K140-K145, K147-K150, K156-K159, K161, K169-K172, K174-K178, K181
Acutely Hazardous Commercial Chemical Products	Toxic	P001-P018, P020-P024, P026-P030, P033-P034, P036-P051, P054, P056-P060, P062, P064-P078, P081, P082, P084, P085, P087-P089, P092-P094, P097-P099, P101-06, P108-P116, P118-P123, P127, P128, P185, P188-P192, P194, P196-P199, P201-P205
Toxic Commercial Chemical Products	Toxic	U001-U012, U014-U039, U041-U053, U055-U064, U066-U099, U101-U138, U140-U174, U176-U194, U196, U197, U200-U211, U213-U223, U225-U228, U234-U240, U243, U244, U246-U249, U271, U278, U279, U280, U328, U353, U359, U364, U367, U372, U373, U387, U389, U394, U395, U404, U409-U411

A description of both Federal and State-Regulated Hazardous Wastes is provided on following pages.

EPA HW No.	Contaminant	CAS No.	Regulatory Level (mg/L)
D004	Arsenic	7440-38-2	5.0
D005	Barium	7440-39-3	100.0
D006	Cadmium	7440-43-9	1.0
D007	Chromium	7440-47-3	5.0
D008	Lead	7439-92-1	5.0
D009	Mercury	7439-97-6	0.2
D010	Selenium	7782-49-2	1.0
D011	Silver	7440-22-4	5.0
D012	Endrin	72-20-8	0.02
D013	Lindane	58-89-9	0.4
D014	Methoxychlor	72-43-5	10.0
D015	Toxaphene	8001-35-2	0.5
D016	2,4-D	94-75-7	10.0
D017	2,4,5-TP (Silvex)	93-72-1	1.0
D018	Benzene	71-43-2	0.5
D019	Carbon tetrachloride	56-23-5	0.5
D020	Chlordane	57-74-9	0.03
D021	Chlorobenzene	108-90-7	100.0
D022	Chloroform	67-66-3	6.0
D023	o-Cresol	95-48-7	200.0
D024	m-Cresol	108-39-4	200.0
D025	p-Cresol	106-44-5	200.0
D026	Cresol		200.0
D027	1,4-Dichlorobenzene	106-46-7	7.5
D028	1,2-Dichloroethane	107-06-2	0.5
D029	1,1-Dichloroethylene	75-35-4	0.7
D030	2,4-Dinitrotoluene	121-14-2	0.13
D031	Heptachlor (and its epoxide)	76-44-8	0.008
D032	Hexachlorobenzene	118-74-1	0.13
D033	Hexachlorobutadiene	87-68-3	0.5
D034	Hexachloroethane	67-72-1	3.0
D035	Methyl ethyl ketone	78-93-3	200.0
D036	Nitrobenzene	98-95-3	2.0
D037	Pentrachlorophenol	87-86-5	100.0
D038	Pyridine	110-86-1	5.0
D039	Tetrachloroethylene	127-18-4	0.7
D040	Trichloroethylene	79-01-6	0.5
D041	2,4,5-Trichlorophenol	95-95-4	400.0
D042	2,4,6-Trichlorophenol	88-06-2	2.0
D043	Vinyl chloride	75-01-4	0.2

Ignitable Waste	(I)
Corrosive Waste	(C)
Reactive Waste	(R)
Toxicity Characteristic Waste	(E)
Acute Hazardous Waste	(H)
Toxic Waste	(T)

EPA HW No.	Hazardous waste	Hazard code
F001	The following spent halogenated solvents used in degreasing: Tetrachloroethylene, trichloroethylene, methylene chloride, 1,1,1-trichloroethane, carbon tetrachloride, and chlorinated fluorocarbons; all spent solvent mixtures/blends used in degreasing containing, before use, a total of ten percent or more (by volume) of one or more of the above halogenated solvents or those solvents listed in F002, F004, and F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures	(T)
F002	The following spent halogenated solvents: Tetrachloroethylene, methylene chloride, trichloroethylene, 1,1,1-trichloroethane, chlorobenzene, 1,1,2-trichloro-1,2,2-trifluoroethane, ortho-dichlorobenzene, trichlorofluoromethane, and 1,1,2-trichloroethane; all spent solvent mixtures/blends containing, before use, a total of ten percent or more (by volume) of one or more of the above halogenated solvents or those listed in F001, F004, or F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures	(T)
F003	The following spent non-halogenated solvents: Xylene, acetone, ethyl acetate, ethyl benzene, ethyl ether, methyl isobutyl ketone, n-butyl alcohol, cyclohexanone, and methanol; all spent solvent mixtures/blends containing, before use, only the above spent non-halogenated solvents; and all spent solvent mixtures/blends containing, before use, one or more of the above non-halogenated solvents, and, a total of ten percent or more (by volume) of one or more of those solvents listed in F001, F002, F004, and F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures	(I)*
F004	The following spent non-halogenated solvents: Cresols and cresylic acid, and nitrobenzene; all spent solvent mixtures/blends containing, before use, a total of ten percent or more (by volume) of one or more of the above non-halogenated solvents or those solvents listed in F001, F002, and F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures	(T)
F005	The following spent non-halogenated solvents: Toluene, methyl ethyl ketone, carbon disulfide, isobutanol, pyridine, benzene, 2-ethoxyethanol, and 2-nitropropane; all spent solvent mixtures/blends containing, before use, a total of ten percent or more (by volume) of one or more of the above non-halogenated solvents or those solvents listed in F001, F002, or F004; and still bottoms from the recovery of these spent solvents and spent solvent mixtures	(I,T)
F006	Wastewater treatment sludges from electroplating operations except from the following processes: (1) Sulfuric acid anodizing of aluminum; (2) tin plating on carbon steel; (3) zinc plating (segregated basis) on carbon steel; (4) aluminum or zinc-aluminum plating on carbon steel; (5) cleaning/stripping associated with tin, zinc and aluminum plating on carbon steel; and (6) chemical etching and milling of aluminum	(T)
F007	Spent cyanide plating bath solutions from electroplating operations	(R, T)
F008	Plating bath residues from the bottom of plating baths from electroplating operations where cyanides are used in the process	(R, T)
F009	Spent stripping and cleaning bath solutions from electroplating operations where cyanides are used in the process	(R, T)
F010	Quenching bath residues from oil baths from metal heat treating operations where cyanides are used in the process	(R, T)

EPA HW No.	Hazardous waste	Hazard code
F011	Spent cyanide solutions from salt bath pot cleaning from metal heat treating operations	(R, T)
F012	Quenching waste water treatment sludges from metal heat treating operations where cyanides are used in the process	(T)
F019	Wastewater treatment sludges from the chemical conversion coating of aluminum except from zirconium phosphating in aluminum can washing when such phosphating is an exclusive conversion coating process. Wastewater treatment sludges from the manufacturing of motor vehicles using a zinc phosphating process will not be subject to this listing at the point of generation if the wastes are not placed outside on the land prior to shipment to a landfill for disposal and are either: disposed in a Subtitle D municipal or industrial landfill unit that is equipped with a single clay liner and is permitted, licensed or otherwise authorized by the state; or disposed in a landfill unit subject to, or otherwise meeting, the landfill requirements in §258.40, §264.301 or §265.301. For the purposes of this listing, motor vehicle manufacturing is defined in paragraph (b)(4)(i) of this section and (b)(4)(ii) of this section describes the recordkeeping requirements for motor vehicle manufacturing facilities	(T)
F020	Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production or manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tri- or tetrachlorophenol, or of intermediates used to produce their pesticide derivatives. (This listing does not include wastes from the production of Hexachlorophene from highly purified 2,4,5-trichlorophenol.)	(H)
F021	Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production or manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of pentachlorophenol, or of intermediates used to produce its derivatives	(H)
F022	Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tetra-, penta-, or hexachlorobenzenes under alkaline conditions	(H)
F023	Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production of materials on equipment previously used for the production or manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tri- and tetrachlorophenols. (This listing does not include wastes from equipment used only for the production or use of Hexachlorophene from highly purified 2,4,5-trichlorophenol.)	(H)
F024	Process wastes, including but not limited to, distillation residues, heavy ends, tars, and reactor clean-out wastes, from the production of certain chlorinated aliphatic hydrocarbons by free radical catalyzed processes. These chlorinated aliphatic hydrocarbons are those having carbon chain lengths ranging from one to and including five, with varying amounts and positions of chlorine substitution. (This listing does not include wastewaters, wastewater treatment sludges, spent catalysts, and wastes listed in §261.31 or §261.32.)	(T)
F025	Condensed light ends, spent filters and filter aids, and spent desiccant wastes from the production of certain chlorinated aliphatic hydrocarbons, by free radical catalyzed processes. These chlorinated aliphatic hydrocarbons are those having carbon chain lengths ranging from one to and including five, with varying amounts and positions of chlorine substitution	(T)
F026	Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production of materials on equipment previously used for the manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tetra-, penta-, or hexachlorobenzene under alkaline conditions	(H)
F027	Discarded unused formulations containing tri-, tetra-, or pentachlorophenol or discarded unused formulations containing compounds derived from these chlorophenols. (This listing does not include formulations containing Hexachlorophene sythesized from prepurified 2,4,5-trichlorophenol as the sole component.)	(H)

EPA HW No.	Hazardous waste	Hazard code
F028	Residues resulting from the incineration or thermal treatment of soil contaminated with EPA Hazardous Waste Nos. F020, F021, F022, F023, F026, and F027	(T)
F032	Wastewaters (except those that have not come into contact with process contaminants), process residuals, preservative drippage, and spent formulations from wood preserving processes generated at plants that currently use or have previously used chlorophenolic formulations (except potentially cross-contaminated wastes that have had the F032 waste code deleted in accordance with §261.35 of this chapter or potentially cross-contaminated wastes that are otherwise currently regulated as hazardous wastes (i.e., F034 or F035), and where the generator does not resume or initiate use of chlorophenolic formulations). This listing does not include K001 bottom sediment sludge from the treatment of wastewater from wood preserving processes that use creosote and/or pentachlorophenol	(T)
F034	Wastewaters (except those that have not come into contact with process contaminants), process residuals, preservative drippage, and spent formulations from wood preserving processes generated at plants that use creosote formulations. This listing does not include K001 bottom sediment sludge from the treatment of wastewater from wood preserving processes that use creosote and/or pentachlorophenol	(T)
F035	Wastewaters (except those that have not come into contact with process contaminants), process residuals, preservative drippage, and spent formulations from wood preserving processes generated at plants that use inorganic preservatives containing arsenic or chromium. This listing does not include K001 bottom sediment sludge from the treatment of wastewater from wood preserving processes that use creosote and/or pentachlorophenol	(T)
F037	Petroleum refinery primary oil/water/solids separation sludge-Any sludge generated from the gravitational separation of oil/water/solids during the storage or treatment of process wastewaters and oil cooling wastewaters from petroleum refineries. Such sludges include, but are not limited to, those generated in oil/water/solids separators; tanks and impoundments; ditches and other conveyances; sumps; and stormwater units receiving dry weather flow. Sludge generated in stormwater units that do not receive dry weather flow, sludges generated from non-contact once-through cooling waters segregated for treatment from other process or oily cooling waters, sludges generated in aggressive biological treatment units as defined in §261.31(b)(2) (including sludges generated in one or more additional units after wastewaters have been treated in aggressive biological treatment units) and K051 wastes are not included in this listing. This listing does include residuals generated from processing or recycling oil-bearing hazardous secondary materials excluded under §261.4(a)(12)(i), if those residuals are to be disposed of.	(T)
F038	Petroleum refinery secondary (emulsified) oil/water/solids separation sludge-Any sludge and/or float generated from the physical and/or chemical separation of oil/water/solids in process wastewaters and oily cooling wastewaters from petroleum refineries. Such wastes include, but are not limited to, all sludges and floats generated in: induced air flotation (IAF) units, tanks and impoundments, and all sludges generated in DAF units. Sludges generated in stormwater units that do not receive dry weather flow, sludges generated from non-contact once-through cooling waters segregated for treatment from other process or oily cooling waters, sludges and floats generated in aggressive biological treatment units as defined in §261.31(b)(2) (including sludges and floats generated in one or more additional units after wastewaters have been treated in aggressive biological treatment units) and F037, K048, and K051 wastes are not included in this listing	(T)
F039	Leachate (liquids that have percolated through land disposed wastes) resulting from the disposal of more than one restricted waste classified as hazardous under subpart D of this part. (Leachate resulting from the disposal of one or more of the following EPA Hazardous Wastes and no other Hazardous Wastes retains its EPA Hazardous Waste Number(s): F020, F021, F022, F026, F027, and/or F028.)	(T)

EPA HW No.	Hazardous waste	Hazard code
K001	Bottom sediment sludge from the treatment of wastewaters from wood preserving processes that use creosote and/or pentachlorophenol	(T)
K002	Wastewater treatment sludge from the production of chrome yellow and orange pigments	(T)
K003	Wastewater treatment sludge from the production of molybdate orange pigments	(T)
K004	Wastewater treatment sludge from the production of zinc yellow pigments	(T)
K005	Wastewater treatment sludge from the production of chrome green pigments	(T)
K006	Wastewater treatment sludge from the production of chrome oxide green pigments (anhydrous and hydrated)	(T)
K007	Wastewater treatment sludge from the production of iron blue pigments	(T)
K008	Oven residue from the production of chrome oxide green pigments	(T)
K009	Distillation bottoms from the production of acetaldehyde from ethylene	(T)
K010	Distillation side cuts from the production of acetaldehyde from ethylene	(T)
K011	Bottom stream from the wastewater stripper in the production of acrylonitrile	(R, T)
K013	Bottom stream from the acetonitrile column in the production of acrylonitrile	(R, T)
K014	Bottoms from the acetonitrile purification column in the production of acrylonitrile	(T)
K015	Still bottoms from the distillation of benzyl chloride	(T)
K016	Heavy ends or distillation residues from the production of carbon tetrachloride	(T)
K017	Heavy ends (still bottoms) from the purification column in the production of epichlorohydrin	(T)
K018	Heavy ends from the fractionation column in ethyl chloride production	(T)
K019	Heavy ends from the distillation of ethylene dichloride in ethylene dichloride production	(T)
K020	Heavy ends from the distillation of vinyl chloride in vinyl chloride monomer production	(T)
K021	Aqueous spent antimony catalyst waste from fluoromethanes production	(T)
K022	Distillation bottom tars from the production of phenol/acetone from cumene	(T)
K023	Distillation light ends from the production of phthalic anhydride from naphthalene	(T)
K024	Distillation bottoms from the production of phthalic anhydride from naphthalene	(T)
K025	Distillation bottoms from the production of nitrobenzene by the nitration of benzene	(T)
K026	Stripping still tails from the production of methy ethyl pyridines	(T)
K027	Centrifuge and distillation residues from toluene diisocyanate production	(R, T)
K028	Spent catalyst from the hydrochlorinator reactor in the production of 1,1,1-trichloroethane	(T)
K029	Waste from the product steam stripper in the production of 1,1,1-trichloroethane	(T)
K030	Column bottoms or heavy ends from the combined production of trichloroethylene and perchloroethylene	(T)
K031	By-product salts generated in the production of MSMA and cacodylic acid	(T)
K032	Wastewater treatment sludge from the production of chlordane	(T)
K033	Wastewater and scrub water from the chlorination of cyclopentadiene in the production of chlordane	(T)
K034	Filter solids from the filtration of hexachlorocyclopentadiene in the production of chlordane	(T)
K035	Wastewater treatment sludges generated in the production of creosote	(T)
K036	Still bottoms from toluene reclamation distillation in the production of disulfoton	(T)
K037	Wastewater treatment sludges from the production of disulfoton	(T)
K038	Wastewater from the washing and stripping of phorate production	(T)
K039	Filter cake from the filtration of diethylphosphorodithioic acid in the production of phorate	(T)
K040	Wastewater treatment sludge from the production of phorate	(T)
K041	Wastewater treatment sludge from the production of toxaphene	(T)
K042	Heavy ends or distillation residues from the distillation of tetrachlorobenzene in the production of 2,4,5-T	(T)
K043	2,6-Dichlorophenol waste from the production of 2,4-D	(T)
K044	Wastewater treatment sludges from the manufacturing and processing of explosives	(R)

EPA HW No.	Hazardous waste	Hazard code
K045	Spent carbon from the treatment of wastewater containing explosives	(R)
K046	Wastewater treatment sludges from the manufacturing, formulation and loading of lead-based initiating compounds	(T)
K047	Pink/red water from TNT operations	(R)
K048	Dissolved air flotation (DAF) float from the petroleum refining industry	(T)
K049	Slop oil emulsion solids from the petroleum refining industry	(T)
K050	Heat exchanger bundle cleaning sludge from the petroleum refining industry	(T)
K051	API separator sludge from the petroleum refining industry	(T)
K052	Tank bottoms (leaded) from the petroleum refining industry	(T)
K060	Ammonia still lime sludge from coking operations	(T)
K061	Emission control dust/sludge from the primary production of steel in electric furnaces	(T)
K062	Spent pickle liquor generated by steel finishing operations of facilities within the iron and steel industry (SIC Codes 331 and 332)	(C,T)
K069	Emission control dust/sludge from secondary lead smelting. (Note: This listing is stayed administratively for sludge generated from secondary acid scrubber systems. The stay will remain in effect until further administrative action is taken. If EPA takes further action effecting this stay, EPA will publish a notice of the action in theFederal Register)	(T)
K071	Brine purification muds from the mercury cell process in chlorine production, where separately prepurified brine is not used	(T)
K073	Chlorinated hydrocarbon waste from the purification step of the diaphragm cell process using graphite anodes in chlorine production	(T)
K083	Distillation bottoms from aniline production	(T)
K084	Wastewater treatment sludges generated during the production of veterinary pharmaceuticals from arsenic or organo-arsenic compounds	(T)
K085	Distillation or fractionation column bottoms from the production of chlorobenzenes	(T)
K086	Solvent washes and sludges, caustic washes and sludges, or water washes and sludges from cleaning tubs and equipment used in the formulation of ink from pigments, driers, soaps, and stabilizers containing chromium and lead	(T)
K087	Decanter tank tar sludge from coking operations	(T)
K088	Spent potliners from primary aluminum reduction	(T)
K093	Distillation light ends from the production of phthalic anhydride from ortho-xylene	(T)
K094	Distillation bottoms from the production of phthalic anhydride from ortho-xylene	(T)
K095	Distillation bottoms from the production of 1,1,1-trichloroethane	(T)
K096	Heavy ends from the heavy ends column from the production of 1,1,1-trichloroethane	(T)
K097	Vacuum stripper discharge from the chlordane chlorinator in the production of chlordane	(T)
K098	Untreated process wastewater from the production of toxaphene	(T)
K099	Untreated wastewater from the production of 2,4-D	(T)
K100	Waste leaching solution from acid leaching of emission control dust/sludge from secondary lead smelting	(T)
K101	Distillation tar residues from the distillation of aniline-based compounds in the production of veterinary pharmaceuticals from arsenic or organo-arsenic compounds	(T)
K102	Residue from the use of activated carbon for decolorization in the production of veterinary pharmaceuticals from arsenic or organo-arsenic compounds	(T)
K103	Process residues from aniline extraction from the production of aniline	(T)
K104	Combined wastewater streams generated from nitrobenzene/aniline production	(T)
K105	Separated aqueous stream from the reactor product washing step in the production of chlorobenzenes	(T)
K106	Wastewater treatment sludge from the mercury cell process in chlorine production	(T)
K107	Column bottoms from product separation from the production of 1,1-dimethylhydrazine (UDMH) from carboxylic acid hydrazides	(C,T)
K108	Condensed column overheads from product separation and condensed reactor vent gases from the production of 1,1-dimethylhydrazine (UDMH) from c	(I,T)

EPA HW No.	Hazardous waste	Hazard code
K109	Spent filter cartridges from product purification from the production of 1,1-dimethylhydrazine (UDMH) from carboxylic acid hydrazides	(T)
K110	Condensed column overheads from intermediate separation from the production of 1,1-dimethylhydrazine (UDMH) from carboxylic acid hydrazides	(T)
K111	Product washwaters from the production of dinitrotoluene via nitration of toluene	(C,T)
K112	Reaction by-product water from the drying column in the production of toluenediamine via hydrogenation of dinitrotoluene	(T)
K113	Condensed liquid light ends from the purification of toluenediamine in the production of toluenediamine via hydrogenation of dinitrotoluene	(T)
K114	Vicinals from the purification of toluenediamine in the production of toluenediamine via hydrogenation of dinitrotoluene	(T)
K115	Heavy ends from the purification of toluenediamine in the production of toluenediamine via hydrogenation of dinitrotoluene	(T)
K116	Organic condensate from the solvent recovery column in the production of toluene diisocyanate via phosgenation of toluenediamine	(T)
K117	Wastewater from the reactor vent gas scrubber in the production of ethylene dibromide via bromination of ethene	(T)
K118	Spent adsorbent solids from purification of ethylene dibromide in the production of ethylene dibromide via bromination of ethene	(T)
K123	Process wastewater (including supernates, filtrates, and washwaters) from the production of ethylenebisdithiocarbamic acid and its salt	(T)
K124	Reactor vent scrubber water from the production of ethylenebisdithiocarbamic acid and its salts	(C, T)
K125	Filtration, evaporation, and centrifugation solids from the production of ethylenebisdithiocarbamic acid and its salts	(T)
K126	Baghouse dust and floor sweepings in milling and packaging operations from the production or formulation of ethylenebisdithiocarbamic acid and its salts	(T)
K131	Wastewater from the reactor and spent sulfuric acid from the acid dryer from the production of methyl bromide	(C, T)
K132	Spent absorbent and wastewater separator solids from the production of methyl bromide	(T)
K136	Still bottoms from the purification of ethylene dibromide in the production of ethylene dibromide via bromination of ethene	(T)
K141	Process residues from the recovery of coal tar, including, but not limited to, collecting sump residues from the production of coke from coal or the recovery of coke by-products produced from coal. This listing does not include K087 (decanter tank tar sludges from coking operations)	(T)
K142	Tar storage tank residues from the production of coke from coal or from the recovery of coke by-products produced from coal	(T)
K143	Process residues from the recovery of light oil, including, but not limited to, those generated in stills, decanters, and wash oil recovery units from the recovery of coke by-products produced from coal	(T)
K144	Wastewater sump residues from light oil refining, including, but not limited to, intercepting or contamination sump sludges from the recovery of coke by-products produced from coal	(T)
K145	Residues from naphthalene collection and recovery operations from the recovery of coke by-products produced from coal	(T)
K147	Tar storage tank residues from coal tar refining	(T)
K148	Residues from coal tar distillation, including but not limited to, still bottoms	(T)
K149	Distillation bottoms from the production of alpha- (or methyl-) chlorinated toluenes, ring-chlorinated toluenes, benzoyl chlorides, and compounds with mixtures of these functional groups, (This waste does not include still bottoms from the distillation of benzyl chloride.)	(T)

EPA HW No.	Hazardous waste	Hazard code
K150	Organic residuals, excluding spent carbon adsorbent, from the spent chlorine gas and hydrochloric acid recovery processes associated with the production of alpha- (or methyl-) chlorinated toluenes, ring-chlorinated toluenes, benzoyl chlorides, and compounds with mixtures of these functional groups	(T)
K151	Wastewater treatment sludges, excluding neutralization and biological sludges, generated during the treatment of wastewaters from the production of alpha- (or methyl-) chlorinated toluenes, ring-chlorinated toluenes, benzoyl chlorides, and compounds with mixtures of these functional groups	(T)
K156	Organic waste (including heavy ends, still bottoms, light ends, spent solvents, filtrates, and decantates) from the production of carbamates and carbamoyl oximes. (This listing does not apply to wastes generated from the manufacture of 3-iodo-2-propynyl n-butylcarbamate.)	(T)
K157	Wastewaters (including scrubber waters, condenser waters, washwaters, and separation waters) from the production of carbamates and carbamoyl oximes. (This listing does not apply to wastes generated from the manufacture of 3-iodo-2-propynyl n-butylcarbamate.)	(T)
K158	Bag house dusts and filter/separation solids from the production of carbamates and carbamoyl oximes. (This listing does not apply to wastes generated from the manufacture of 3-iodo-2-propynyl n-butylcarbamate.)	(T)
K159	Organics from the treatment of thiocarbamate wastes	(T)
K161	Purification solids (including filtration, evaporation, and centrifugation solids), bag house dust and floor sweepings from the production of dithiocarbamate acids and their salts. (This listing does not include K125 or K126.)	(R,T)
K169	Crude oil storage tank sediment from petroleum refining operations	(T)
K170	Clarified slurry oil tank sediment and/or in-line filter/separation solids from petroleum refining operations	(T)
K171	Spent Hydrotreating catalyst from petroleum refining operations, including guard beds used to desulfurize feeds to other catalytic reactors (this listing does not include inert support media)	(I,T)
K172	Spent Hydrorefining catalyst from petroleum refining operations, including guard beds used to desulfurize feeds to other catalytic reactors (this listing does not include inert support media)	(I,T)
K174	Wastewater treatment sludges from the production of ethylene dichloride or vinyl chloride monomer (including sludges that result from commingled ethylene dichloride or vinyl chloride monomer wastewater and other wastewater), unless the sludges meet the following conditions: (i) they are disposed of in a subtitle C or non-hazardous landfill licensed or permitted by the state or federal government; (ii) they are not otherwise placed on the land prior to final disposal; and (iii) the generator maintains documentation demonstrating that the waste was either disposed of in an on-site landfill or consigned to a transporter or disposal facility that provided a written commitment to dispose of the waste in an off-site landfill. Respondents in any action brought to enforce the requirements of subtitle C must, upon a showing by the government that the respondent managed wastewater treatment sludges from the production of vinyl chloride monomer or ethylene dichloride, demonstrate that they meet the terms of the exclusion set forth above. In doing so, they must provide appropriate documentation (e.g., contracts between the generator and the landfill owner/operator, invoices documenting delivery of waste to landfill, etc.) that the terms of the exclusion were met	(T)
K175	Wastewater treatment sludges from the production of vinyl chloride monomer using mercuric chloride catalyst in an acetylene-based process	(T)
K176	Baghouse filters from the production of antimony oxide, including filters from the production of intermediates (e.g., antimony metal or crude antimony oxide)	(E)

EPA HW No.	Hazardous waste	Hazard code
K177	Slag from the production of antimony oxide that is speculatively accumulated or disposed, including slag from the production of intermediates (e.g., antimony metal or crude antimony oxide)	(T)
K178	Residues from manufacturing and manufacturing-site storage of ferric chloride from acids formed during the production of titanium dioxide using the chloride-ilmenite process	(T)
K181	Nonwastewaters from the production of dyes and/or pigments (including nonwastewaters commingled at the point of generation with nonwastewaters from other processes) that, at the point of generation, contain mass loadings of any of the constituents identified in paragraph (c) of this section that are equal to or greater than the corresponding paragraph (c) levels, as determined on a calendar year basis. These wastes will not be hazardous if the nonwastewaters are: (i) disposed in a Subtitle D landfill unit subject to the design criteria in §258.40, (ii) disposed in a Subtitle C landfill unit subject to either §264.301 or §265.301, (iii) disposed in other Subtitle D landfill units that meet the design criteria in §258.40, §264.301, or §265.301, or (iv) treated in a combustion unit that is permitted under Subtitle C, or an onsite combustion unit that is permitted under the Clean Air Act. For the purposes of this listing, dyes and/or pigments production is defined in paragraph (b)(1) of this section. Paragraph (d) of this section describes the process for demonstrating that a facility's nonwastewaters are not K181. This listing does not apply to wastes that are otherwise identified as hazardous under §§261.21-261.24 and 261.31-261.33 at the point of generation. Also, the listing does not apply to wastes generated before any annual mass loading limit is met	(T)

EPA HW No.	CAS No.	Substance
P001	[1]81-81-2	2H-1-Benzopyran-2-one, 4-hydroxy-3-(3-oxo-1-phenylbutyl)-, & salts, when present at concentrations greater than 0.3%
P001	[1]81-81-2	Warfarin, & salts, when present at concentrations greater than 0.3%
P002	591-08-2	Acetamide, N-(aminothioxomethyl)-
P002	591-08-2	1-Acetyl-2-thiourea
P003	107-02-8	Acrolein
P003	107-02-8	2-Propenal
P004	309-00-2	Aldrin
P004	309-00-2	1,4,5,8-Dimethanonaphthalene, 1,2,3,4,10,10-hexa- chloro-1,4,4a,5,8,8a,-hexahydro-, (1alpha,4alpha,4abeta,5alpha,8alpha,8abeta)-
P005	107-18-6	Allyl alcohol
P005	107-18-6	2-Propen-1-ol
P006	20859-73-8	Aluminum phosphide (R,T)
P007	2763-96-4	5-(Aminomethyl)-3-isoxazolol
P007	2763-96-4	3(2H)-Isoxazolone, 5-(aminomethyl)-
P008	504-24-5	4-Aminopyridine
P008	504-24-5	4-Pyridinamine
P009	131-74-8	Ammonium picrate (R)
P009	131-74-8	Phenol, 2,4,6-trinitro-, ammonium salt (R)
P010	7778-39-4	Arsenic acid H_3AsO_4
P011	1303-28-2	Arsenic oxide As_2O_5
P011	1303-28-2	Arsenic pentoxide
P012	1327-53-3	Arsenic trioxide
P012	1327-53-3	Arsenic oxide As_2O_3
P013	542-62-1	Barium cyanide
P014	108-98-5	Benzenethiol
P014	108-98-5	Thiophenol
P015	7440-41-7	Beryllium powder
P016	542-88-1	Dichloromethyl ether
P016	542-88-1	Methane, oxybis[chloro-
P017	598-31-2	Bromoacetone
P017	598-31-2	2-Propanone, 1-bromo-
P018	357-57-3	Brucine
P018	357-57-3	Strychnidin-10-one, 2,3-dimethoxy-
P020	88-85-7	Dinoseb
P020	88-85-7	Phenol, 2-(1-methylpropyl)-4,6-dinitro-
P021	592-01-8	Calcium cyanide
P021	592-01-8	Calcium cyanide $Ca(CN)_2$
P022	75-15-0	Carbon disulfide
P023	107-20-0	Acetaldehyde, chloro-
P023	107-20-0	Chloroacetaldehyde
P024	106-47-8	Benzenamine, 4-chloro-
P024	106-47-8	p-Chloroaniline
P026	5344-82-1	1-(o-Chlorophenyl)thiourea
P026	5344-82-1	Thiourea, (2-chlorophenyl)-
P027	542-76-7	3-Chloropropionitrile
P027	542-76-7	Propanenitrile, 3-chloro-
P028	100-44-7	Benzyl chloride
P028	100-44-7	Benzene, (chloromethyl)-
P029	544-92-3	Copper cyanide
P029	544-92-3	Copper cyanide Cu(CN)

EPA HW No.	CAS No.	Substance
P030		Cyanides (soluble cyanide salts), not otherwise specified
P033	506-77-4	Cyanogen chloride
P033	506-77-4	Cyanogen chloride (CN)Cl
P034	131-89-5	2-Cyclohexyl-4,6-dinitrophenol
P034	131-89-5	Phenol, 2-cyclohexyl-4,6-dinitro-
P036	696-28-6	Arsonous dichloride, phenyl-
P036	696-28-6	Dichlorophenylarsine
P037	60-57-1	Dieldrin
P037	60-57-1	2,7:3,6-Dimethanonaphth[2,3-b]oxirene, 3,4,5,6,9,9-hexachloro-1a,2,2a,3,6,6a,7,7a-octahydro-, (1aalpha,2beta,2aalpha,3beta,6beta,6aalpha,7beta, 7aalpha)-
P038	692-42-2	Arsine, diethyl-
P038	692-42-2	Diethylarsine
P039	298-04-4	Disulfoton
P039	298-04-4	Phosphorodithioic acid, O,O-diethyl S-[2-(ethylthio)ethyl] ester
P040	297-97-2	O,O-Diethyl O-pyrazinyl phosphorothioate
P040	297-97-2	Phosphorothioic acid, O,O-diethyl O-pyrazinyl ester
P041	311-45-5	Diethyl-p-nitrophenyl phosphate
P041	311-45-5	Phosphoric acid, diethyl 4-nitrophenyl ester
P042	51-43-4	1,2-Benzenediol, 4-[1-hydroxy-2-(methylamino)ethyl]-, (R)-
P042	51-43-4	Epinephrine
P043	55-91-4	Diisopropylfluorophosphate (DFP)
P043	55-91-4	Phosphorofluoridic acid, bis(1-methylethyl) ester
P044	60-51-5	Dimethoate
P044	60-51-5	Phosphorodithioic acid, O,O-dimethyl S-[2-(methylamino)-2-oxoethyl] ester
P045	39196-18-4	2-Butanone, 3,3-dimethyl-1-(methylthio)-, O-[(methylamino)carbonyl] oxime
P045	39196-18-4	Thiofanox
P046	122-09-8	Benzeneethanamine, alpha,alpha-dimethyl-
P046	122-09-8	alpha,alpha-Dimethylphenethylamine
P047	[1]534-52-1	4,6-Dinitro-o-cresol, & salts
P047	[1]534-52-1	Phenol, 2-methyl-4,6-dinitro-, & salts
P048	51-28-5	2,4-Dinitrophenol
P048	51-28-5	Phenol, 2,4-dinitro-
P049	541-53-7	Dithiobiuret
P049	541-53-7	Thioimidodicarbonic diamide $[(H_2N)C(S)]_2NH$
P050	115-29-7	Endosulfan
P050	115-29-7	6,9-Methano-2,4,3-benzodioxathiepin, 6,7,8,9,10,10-hexachloro-1,5,5a,6,9,9a-hexahydro-, 3-oxide
P051	[1]72-20-8	2,7:3,6-Dimethanonaphth [2,3-b]oxirene, 3,4,5,6,9,9-hexachloro-1a,2,2a,3,6,6a,7,7a-octahydro-, (1aalpha,2beta,2abeta,3alpha,6alpha,6abeta,7beta, 7aalpha)-, & metabolites
P051	72-20-8	Endrin
P051	72-20-8	Endrin, & metabolites
P054	151-56-4	Aziridine
P054	151-56-4	Ethyleneimine
P056	7782-41-4	Fluorine
P057	640-19-7	Acetamide, 2-fluoro-
P057	640-19-7	Fluoroacetamide
P058	62-74-8	Acetic acid, fluoro-, sodium salt
P058	62-74-8	Fluoroacetic acid, sodium salt

EPA HW No.	CAS No.	Substance
P059	76-44-8	Heptachlor
P059	76-44-8	4,7-Methano-1H-indene, 1,4,5,6,7,8,8-heptachloro- 3a,4,7,7a-tetrahydro-
P060	465-73-6	1,4,5,8-Dimethanonaphthalene, 1,2,3,4,10,10-hexa- chloro-1,4,4a,5,8,8a-hexahydro-, (1alpha,4alpha,4abeta,5beta,8beta,8abeta)-
P060	465-73-6	Isodrin
P062	757-58-4	Hexaethyl tetraphosphate
P062	757-58-4	Tetraphosphoric acid, hexaethyl ester
P064	624-83-9	Methane, isocyanato-
P064	624-83-9	Methyl isocyanate
P065	628-86-4	Fulminic acid, mercury(2+) salt (R,T)
P065	628-86-4	Mercury fulminate (R,T)
P066	16752-77-5	Ethanimidothioic acid, N-[[(methylamino)carbonyl]oxy]-, methyl ester
P066	16752-77-5	Methomyl
P067	75-55-8	Aziridine, 2-methyl-
P067	75-55-8	1,2-Propylenimine
P068	60-34-4	Hydrazine, methyl-
P068	60-34-4	Methyl hydrazine
P069	75-86-5	2-Methyllactonitrile
P069	75-86-5	Propanenitrile, 2-hydroxy-2-methyl-
P070	116-06-3	Aldicarb
P070	116-06-3	Propanal, 2-methyl-2-(methylthio)-, O-[(methylamino)carbonyl]oxime
P071	298-00-0	Methyl parathion
P071	298-00-0	Phosphorothioic acid, O,O,-dimethyl O-(4-nitrophenyl) ester
P072	86-88-4	alpha-Naphthylthiourea
P072	86-88-4	Thiourea, 1-naphthalenyl-
P073	13463-39-3	Nickel carbonyl
P073	13463-39-3	Nickel carbonyl $Ni(CO)_4$, (T-4)-
P074	557-19-7	Nickel cyanide
P074	557-19-7	Nickel cyanide $Ni(CN)_2$
P075	[1]54-11-5	Nicotine, & salts
P075	[1]54-11-5	Pyridine, 3-(1-methyl-2-pyrrolidinyl)-, (S)-, & salts
P076	10102-43-9	Nitric oxide
P076	10102-43-9	Nitrogen oxide NO
P077	100-01-6	Benzenamine, 4-nitro-
P077	100-01-6	p-Nitroaniline
P078	10102-44-0	Nitrogen dioxide
P078	10102-44-0	Nitrogen oxide NO_2
P081	55-63-0	Nitroglycerine (R)
P081	55-63-0	1,2,3-Propanetriol, trinitrate (R)
P082	62-75-9	Methanamine, N-methyl-N-nitroso-
P082	62-75-9	N-Nitrosodimethylamine
P084	4549-40-0	N-Nitrosomethylvinylamine
P084	4549-40-0	Vinylamine, N-methyl-N-nitroso-
P085	152-16-9	Diphosphoramide, octamethyl-
P085	152-16-9	Octamethylpyrophosphoramide
P087	20816-12-0	Osmium oxide OsO_4, (T-4)-
P087	20816-12-0	Osmium tetroxide
P088	145-73-3	Endothall
P088	145-73-3	7-Oxabicyclo[2.2.1]heptane-2,3-dicarboxylic acid
P089	56-38-2	Parathion

EPA HW No.	CAS No.	Substance
P089	56-38-2	Phosphorothioic acid, O,O-diethyl O-(4-nitrophenyl) ester
P092	62-38-4	Mercury, (acetato-O)phenyl-
P092	62-38-4	Phenylmercury acetate
P093	103-85-5	Phenylthiourea
P093	103-85-5	Thiourea, phenyl-
P094	298-02-2	Phorate
P094	298-02-2	Phosphorodithioic acid, O,O-diethyl S-[2-(ethylthio)ethyl] ester
P097	52-85-7	Famphur
P097	52-85-7	Phosphorothioic acid, O-[4-[(dimethylamino)sulfonyl]phenyl] O,O-dimethyl ester
P098	151-50-8	Potassium cyanide
P098	151-50-8	Potassium cyanide K(CN)
P099	506-61-6	Argentate(1-), bis(cyano-C)-, potassium
P099	506-61-6	Potassium silver cyanide
P101	107-12-0	Ethyl cyanide
P101	107-12-0	Propanenitrile
P102	107-19-7	Propargyl alcohol
P102	107-19-7	2-Propyn-1-ol
P103	630-10-4	Selenourea
P104	506-64-9	Silver cyanide
P104	506-64-9	Silver cyanide Ag(CN)
P105	26628-22-8	Sodium azide
P106	143-33-9	Sodium cyanide
P106	143-33-9	Sodium cyanide Na(CN)
P108	[1]57-24-9	Strychnidin-10-one, & salts
P108	[1]57-24-9	Strychnine, & salts
P109	3689-24-5	Thiodiphosphoric acid, tetraethyl ester
P109	3689-24-5	Tetraethyldithiopyrophosphate
P110	78-00-2	Plumbane, tetraethyl-
P110	78-00-2	Tetraethyl lead
P111	107-49-3	Diphosphoric acid, tetraethyl ester
P111	107-49-3	Tetraethyl pyrophosphate
P112	509-14-8	Methane, tetranitro- (R)
P112	509-14-8	Tetranitromethane (R)
P113	1314-32-5	Thallic oxide
P113	1314-32-5	Thallium oxide Tl_2O_3
P114	12039-52-0	Selenious acid, dithallium(1+) salt
P114	12039-52-0	Thallium(I) selenite
P115	7446-18-6	Sulfuric acid, dithallium(1+) salt
P115	7446-18-6	Thallium(I) sulfate
P116	79-19-6	Hydrazinecarbothioamide
P116	79-19-6	Thiosemicarbazide
P118	75-70-7	Methanethiol, trichloro-
P118	75-70-7	Trichloromethanethiol
P119	7803-55-6	Ammonium vanadate
P119	7803-55-6	Vanadic acid, ammonium salt
P120	1314-62-1	Vanadium oxide V_2O_5
P120	1314-62-1	Vanadium pentoxide
P121	557-21-1	Zinc cyanide
P121	557-21-1	Zinc cyanide $Zn(CN)_2$

EPA HW No.	CAS No.	Substance
P122	1314-84-7	Zinc phosphide Zn_3P_2, when present at concentrations greater than 10% (R,T)
P123	8001-35-2	Toxaphene
P127	1563-66-2	7-Benzofuranol, 2,3-dihydro-2,2-dimethyl-, methylcarbamate.
P127	1563-66-2	Carbofuran.
P128	315-8-4	Mexacarbate.
P128	315-18-4	Phenol, 4-(dimethylamino)-3,5-dimethyl-, methylcarbamate (ester).
P185	26419-73-8	1,3-Dithiolane-2-carboxaldehyde, 2,4-dimethyl-, O- [(methylamino)- carbonyl]oxime.
P185	26419-73-8	Tirpate.
P188	57-64-7	Benzoic acid, 2-hydroxy-, compd. with (3aS-cis)-1,2,3,3a,8,8a-hexahydro-1,3a,8-trimethylpyrrolo[2,3-b]indol-5-yl methylcarbamate ester (1:1).
P188	57-64-7	Physostigmine salicylate.
P189	55285-14-8	Carbamic acid, [(dibutylamino)- thio]methyl-, 2,3-dihydro-2,2-dimethyl- 7-benzofuranyl ester.
P189	55285-14-8	Carbosulfan.
P190	1129-41-5	Carbamic acid, methyl-, 3-methylphenyl ester.
P190	1129-41-5	Metolcarb.
P191	644-64-4	Carbamic acid, dimethyl-, 1-[(dimethyl-amino)carbonyl]- 5-methyl-1H- pyrazol-3-yl ester.
P191	644-64-4	Dimetilan.
P192	119-38-0	Carbamic acid, dimethyl-, 3-methyl-1- (1-methylethyl)-1H- pyrazol-5-yl ester.
P192	119-38-0	Isolan.
P194	23135-22-0	Ethanimidothioic acid, 2-(dimethylamino)-N-[[(methylamino) carbonyl]oxy]-2-oxo-, methyl ester.
P194	23135-22-0	Oxamyl.
P196	15339-36-3	Manganese, bis(dimethylcarbamodithioato-S,S')-,
P196	15339-36-3	Manganese dimethyldithiocarbamate.
P197	17702-57-7	Formparanate.
P197	17702-57-7	Methanimidamide, N,N-dimethyl-N'-[2-methyl-4-[[(methylamino)carbonyl]oxy]phenyl]-
P198	23422-53-9	Formetanate hydrochloride.
P198	23422-53-9	Methanimidamide, N,N-dimethyl-N'-[3-[[(methylamino)-carbonyl]oxy]phenyl]-, monohydrochloride.
P199	2032-65-7	Methiocarb.
P199	2032-65-7	Phenol, (3,5-dimethyl-4-(methylthio)-, methylcarbamate
P201	2631-37-0	Phenol, 3-methyl-5-(1-methylethyl)-, methyl carbamate.
P201	2631-37-0	Promecarb
P202	64-00-6	m-Cumenyl methylcarbamate.
P202	64-00-6	3-Isopropylphenyl N-methylcarbamate.
P202	64-00-6	Phenol, 3-(1-methylethyl)-, methyl carbamate.
P203	1646-88-4	Aldicarb sulfone.
P203	1646-88-4	Propanal, 2-methyl-2-(methyl-sulfonyl)-, O-[(methylamino)carbonyl] oxime.
P204	57-47-6	Physostigmine.
P204	57-47-6	Pyrrolo[2,3-b]indol-5-ol, 1,2,3,3a,8,8a-hexahydro-1,3a,8-trimethyl-, methylcarbamate (ester), (3aS-cis)-.
P205	137-30-4	Zinc, bis(dimethylcarbamodithioato-S,S')-,
P205	137-30-4	Ziram.

EPA HW No.	CAS No.	Substance
U001	75-07-0	Acetaldehyde (I)
U001	75-07-0	Ethanal (I)
U002	67-64-1	Acetone (I)
U002	67-64-1	2-Propanone (I)
U003	75-05-8	Acetonitrile (I,T)
U004	98-86-2	Acetophenone
U004	98-86-2	Ethanone, 1-phenyl-
U005	53-96-3	Acetamide, -9H-fluoren-2-yl-
U005	53-96-3	2-Acetylaminofluorene
U006	75-36-5	Acetyl chloride (C,R,T)
U007	79-06-1	Acrylamide
U007	79-06-1	2-Propenamide
U008	79-10-7	Acrylic acid (I)
U008	79-10-7	2-Propenoic acid (I)
U009	107-13-1	Acrylonitrile
U009	107-13-1	2-Propenenitrile
U010	50-07-7	Azirino[2',3':3,4]pyrrolo[1,2-a]indole-4,7-dione, 6-amino-8-[[(aminocarbonyl)oxy]methyl]-1,1a,2,8,8a,8b-hexahydro-8a-methoxy-5-methyl-, [1aS-(1aalpha, 8beta,8aalpha,8balpha)]-
U010	50-07-7	Mitomycin C
U011	61-82-5	Amitrole
U011	61-82-5	1H-1,2,4-Triazol-3-amine
U012	62-53-3	Aniline (I,T)
U012	62-53-3	Benzenamine (I,T)
U014	492-80-8	Auramine
U014	492-80-8	Benzenamine, 4,4'-carbonimidoylbis[N,N-dimethyl-
U015	115-02-6	Azaserine
U015	115-02-6	L-Serine, diazoacetate (ester)
U016	225-51-4	Benz[c]acridine
U017	98-87-3	Benzal chloride
U017	98-87-3	Benzene, (dichloromethyl)-
U018	56-55-3	Benz[a]anthracene
U019	71-43-2	Benzene (I,T)
U020	98-09-9	Benzenesulfonic acid chloride (C,R)
U020	98-09-9	Benzenesulfonyl chloride (C,R)
U021	92-87-5	Benzidine
U021	92-87-5	[1,1'-Biphenyl]-4,4'-diamine
U022	50-32-8	Benzo[a]pyrene
U023	98-07-7	Benzene, (trichloromethyl)-
U023	98-07-7	Benzotrichloride (C,R,T)
U024	111-91-1	Dichloromethoxy ethane
U024	111-91-1	Ethane, 1,1'-[methylenebis(oxy)]bis[2-chloro-
U025	111-44-4	Dichloroethyl ether
U025	111-44-4	Ethane, 1,1'-oxybis[2-chloro-
U026	494-03-1	Chlornaphazin
U026	494-03-1	Naphthalenamine, N,N'-bis(2-chloroethyl)-
U027	108-60-1	Dichloroisopropyl ether
U027	108-60-1	Propane, 2,2'-oxybis[2-chloro-
U028	117-81-7	1,2-Benzenedicarboxylic acid, bis(2-ethylhexyl) ester
U028	117-81-7	Diethylhexyl phthalate
U029	74-83-9	Methane, bromo-
U029	74-83-9	Methyl bromide

EPA HW No.	CAS No.	Substance
U030	101-55-3	Benzene, 1-bromo-4-phenoxy-
U030	101-55-3	4-Bromophenyl phenyl ether
U031	71-36-3	1-Butanol (I)
U031	71-36-3	n-Butyl alcohol (I)
U032	13765-19-0	Calcium chromate
U032	13765-19-0	Chromic acid H_2CrO_4, calcium salt
U033	353-50-4	Carbonic difluoride
U033	353-50-4	Carbon oxyfluoride (R,T)
U034	75-87-6	Acetaldehyde, trichloro-
U034	75-87-6	Chloral
U035	305-03-3	Benzenebutanoic acid, 4-[bis(2-chloroethyl)amino]-
U035	305-03-3	Chlorambucil
U036	57-74-9	Chlordane, alpha & gamma isomers
U036	57-74-9	4,7-Methano-1H-indene, 1,2,4,5,6,7,8,8-octachloro-2,3,3a,4,7,7a-hexahydro-
U037	108-90-7	Benzene, chloro-
U037	108-90-7	Chlorobenzene
U038	510-15-6	Benzeneacetic acid, 4-chloro-alpha-(4-chlorophenyl)-alpha-hydroxy-, ethyl ester
U038	510-15-6	Chlorobenzilate
U039	59-50-7	p-Chloro-m-cresol
U039	59-50-7	Phenol, 4-chloro-3-methyl-
U041	106-89-8	Epichlorohydrin
U041	106-89-8	Oxirane, (chloromethyl)-
U042	110-75-8	2-Chloroethyl vinyl ether
U042	110-75-8	Ethene, (2-chloroethoxy)-
U043	75-01-4	Ethene, chloro-
U043	75-01-4	Vinyl chloride
U044	67-66-3	Chloroform
U044	67-66-3	Methane, trichloro-
U045	74-87-3	Methane, chloro- (I, T)
U045	74-87-3	Methyl chloride (I,T)
U046	107-30-2	Chloromethyl methyl ether
U046	107-30-2	Methane, chloromethoxy-
U047	91-58-7	beta-Chloronaphthalene
U047	91-58-7	Naphthalene, 2-chloro-
U048	95-57-8	o-Chlorophenol
U048	95-57-8	Phenol, 2-chloro-
U049	3165-93-3	Benzenamine, 4-chloro-2-methyl-, hydrochloride
U049	3165-93-3	4-Chloro-o-toluidine, hydrochloride
U050	218-01-9	Chrysene
U051		Creosote
U052	1319-77-3	Cresol (Cresylic acid)
U052	1319-77-3	Phenol, methyl-
U053	4170-30-3	2-Butenal
U053	4170-30-3	Crotonaldehyde
U055	98-82-8	Benzene, (1-methylethyl)-(I)
U055	98-82-8	Cumene (I)
U056	110-82-7	Benzene, hexahydro-(I)
U056	110-82-7	Cyclohexane (I)
U057	108-94-1	Cyclohexanone (I)
U058	50-18-0	Cyclophosphamide

EPA HW No.	CAS No.	Substance
U058	50-18-0	2H-1,3,2-Oxazaphosphorin-2-amine, N,N-bis(2-chloroethyl)tetrahydro-, 2-oxide
U059	20830-81-3	Daunomycin
U059	20830-81-3	5,12-Naphthacenedione, 8-acetyl-10-[(3-amino-2,3,6-trideoxy)-alpha-L-lyxo-hexopyranosyl)oxy]-7,8,9,10-tetrahydro-6,8,11-trihydroxy-1-methoxy-, (8S-cis)-
U060	72-54-8	Benzene, 1,1'-(2,2-dichloroethylidene)bis[4-chloro-
U060	72-54-8	DDD
U061	50-29-3	Benzene, 1,1'-(2,2,2-trichloroethylidene)bis[4-chloro-
U061	50-29-3	DDT
U062	2303-16-4	Carbamothioic acid, bis(1-methylethyl)-, S-(2,3-di chloro-2-propenyl) ester
U062	2303-16-4	Diallate
U063	53-70-3	Dibenz[a,h]anthracene
U064	189-55-9	Benzo[rst]pentaphene
U064	189-55-9	Dibenzo[a,i]pyrene
U066	96-12-8	1,2-Dibromo-3-chloropropane
U066	96-12-8	Propane, 1,2-dibromo-3-chloro-
U067	106-93-4	Ethane, 1,2-dibromo-
U067	106-93-4	Ethylene dibromide
U068	74-95-3	Methane, dibromo-
U068	74-95-3	Methylene bromide
U069	84-74-2	1,2-Benzenedicarboxylic acid, dibutyl ester
U069	84-74-2	Dibutyl phthalate
U070	95-50-1	Benzene, 1,2-dichloro-
U070	95-50-1	o-Dichlorobenzene
U071	541-73-1	Benzene, 1,3-dichloro-
U071	541-73-1	m-Dichlorobenzene
U072	106-46-7	Benzene, 1,4-dichloro-
U072	106-46-7	p-Dichlorobenzene
U073	91-94-1	[1,1'-Biphenyl]-4,4'-diamine, 3,3'-dichloro-
U073	91-94-1	3,3'-Dichlorobenzidine
U074	764-41-0	2-Butene, 1,4-dichloro-(I,T)
U074	764-41-0	1,4-Dichloro-2-butene (I,T)
U075	75-71-8	Dichlorodifluoromethane
U075	75-71-8	Methane, dichlorodifluoro-
U076	75-34-3	Ethane, 1,1-dichloro-
U076	75-34-3	Ethylidene dichloride
U077	107-06-2	Ethane, 1,2-dichloro-
U077	107-06-2	Ethylene dichloride
U078	75-35-4	Ethene, 1,1-dichloro-
U079	156-60-5	1,2-Dichloroethylene
U079	156-60-5	Ethene, 1,2-dichloro-, (E)-
U080	75-09-2	Methane, dichloro-
U080	75-09-2	Methylene chloride
U081	120-83-2	2,4-Dichlorophenol
U081	120-83-2	Phenol, 2,4-dichloro-
U082	87-65-0	2,6-Dichlorophenol
U082	87-65-0	Phenol, 2,6-dichloro-
U083	78-87-5	Propane, 1,2-dichloro-
U083	78-87-5	Propylene dichloride
U084	542-75-6	1,3-Dichloropropene
U084	542-75-6	1-Propene, 1,3-dichloro-

EPA HW No.	CAS No.	Substance
U085	1464-53-5	2,2'-Bioxirane
U085	1464-53-5	1,2:3,4-Diepoxybutane (I,T)
U086	1615-80-1	N,N'-Diethylhydrazine
U086	1615-80-1	Hydrazine, 1,2-diethyl-
U087	3288-58-2	O,O-Diethyl S-methyl dithiophosphate
U087	3288-58-2	Phosphorodithioic acid, O,O-diethyl S-methyl ester
U088	84-66-2	1,2-Benzenedicarboxylic acid, diethyl ester
U088	84-66-2	Diethyl phthalate
U089	56-53-1	Diethylstilbesterol
U089	56-53-1	Phenol, 4,4'-(1,2-diethyl-1,2-ethenediyl)bis-, (E)-
U090	94-58-6	1,3-Benzodioxole, 5-propyl-
U090	94-58-6	Dihydrosafrole
U091	119-90-4	[1,1'-Biphenyl]-4,4'-diamine, 3,3'-dimethoxy-
U091	119-90-4	3,3'-Dimethoxybenzidine
U092	124-40-3	Dimethylamine (I)
U092	124-40-3	Methanamine, N-methyl- (I)
U093	60-11-7	Benzenamine, N,N-dimethyl-4-(phenylazo)-
U093	60-11-7	p-Dimethylaminoazobenzene
U094	57-97-6	Benz[a]anthracene, 7,12-dimethyl-
U094	57-97-6	7,12-Dimethylbenz[a]anthracene
U095	119-93-7	[1,1'-Biphenyl]-4,4'-diamine, 3,3'-dimethyl-
U095	119-93-7	3,3'-Dimethylbenzidine
U096	80-15-9	alpha,alpha-Dimethylbenzylhydroperoxide (R)
U096	80-15-9	Hydroperoxide, 1-methyl-1-phenylethyl-(R)
U097	79-44-7	Carbamic chloride, dimethyl-
U097	79-44-7	Dimethylcarbamoyl chloride
U099	540-73-8	1,2-Dimethylhydrazine
U099	540-73-8	Hydrazine, 1,2-dimethyl-
U101	105-67-9	2,4-Dimethylphenol
U101	105-67-9	Phenol, 2,4-dimethyl-
U102	131-11-3	1,2-Benzenedicarboxylic acid, dimethyl ester
U102	131-11-3	Dimethyl phthalate
U103	77-78-1	Dimethyl sulfate
U103	77-78-1	Sulfuric acid, dimethyl ester
U105	121-14-2	Benzene, 1-methyl-2,4-dinitro-
U105	121-14-2	2,4-Dinitrotoluene
U105	121-14-2	Benzene, 1-methyl-2,4-dinitro-
U105	121-14-2	2,4-Dinitrotoluene
U106	606-20-2	Benzene, 2-methyl-1,3-dinitro-
U106	606-20-2	2,6-Dinitrotoluene
U106	606-20-2	Benzene, 2-methyl-1,3-dinitro-
U106	606-20-2	2,6-Dinitrotoluene
U107	117-84-0	1,2-Benzenedicarboxylic acid, dioctyl ester
U107	117-84-0	Di-n-octyl phthalate
U107	117-84-0	1,2-Benzenedicarboxylic acid, dioctyl ester
U107	117-84-0	Di-n-octyl phthalate
U108	123-91-1	1,4-Diethyleneoxide
U108	123-91-1	1,4-Dioxane
U109	122-66-7	1,2-Diphenylhydrazine
U109	122-66-7	Hydrazine, 1,2-diphenyl-
U110	142-84-7	Dipropylamine (I)
U110	142-84-7	1-Propanamine, N-propyl- (I)

EPA HW No.	CAS No.	Substance
U111	621-64-7	Di-n-propylnitrosamine
U111	621-64-7	1-Propanamine, N-nitroso-N-propyl-
U112	141-78-6	Acetic acid ethyl ester (I)
U112	141-78-6	Ethyl acetate (I)
U113	140-88-5	Ethyl acrylate (I)
U113	140-88-5	2-Propenoic acid, ethyl ester (I)
U114	[1]111-54-6	Carbamodithioic acid, 1,2-ethanediylbis-, salts & esters
U114	[1]111-54-6	Ethylenebisdithiocarbamic acid, salts & esters
U115	75-21-8	Ethylene oxide (I,T)
U115	75-21-8	Oxirane (I,T)
U116	96-45-7	Ethylenethiourea
U116	96-45-7	2-Imidazolidinethione
U117	60-29-7	Ethane, 1,1'-oxybis-(I)
U117	60-29-7	Ethyl ether (I)
U118	97-63-2	Ethyl methacrylate
U118	97-63-2	2-Propenoic acid, 2-methyl-, ethyl ester
U119	62-50-0	Ethyl methanesulfonate
U119	62-50-0	Methanesulfonic acid, ethyl ester
U120	206-44-0	Fluoranthene
U121	75-69-4	Methane, trichlorofluoro-
U121	75-69-4	Trichloromonofluoromethane
U122	50-00-0	Formaldehyde
U123	64-18-6	Formic acid (C,T)
U124	110-00-9	Furan (I)
U124	110-00-9	Furfuran (I)
U125	98-01-1	2-Furancarboxaldehyde (I)
U125	98-01-1	Furfural (I)
U126	765-34-4	Glycidylaldehyde
U126	765-34-4	Oxiranecarboxyaldehyde
U127	118-74-1	Benzene, hexachloro-
U127	118-74-1	Hexachlorobenzene
U128	87-68-3	1,3-Butadiene, 1,1,2,3,4,4-hexachloro-
U128	87-68-3	Hexachlorobutadiene
U129	58-89-9	Cyclohexane, 1,2,3,4,5,6-hexachloro-, (1alpha,2alpha,3beta,4alpha,5alpha,6beta)-
U129	58-89-9	Lindane
U130	77-47-4	1,3-Cyclopentadiene, 1,2,3,4,5,5-hexachloro-
U130	77-47-4	Hexachlorocyclopentadiene
U131	67-72-1	Ethane, hexachloro-
U131	67-72-1	Hexachloroethane
U132	70-30-4	Hexachlorophene
U132	70-30-4	Phenol, 2,2'-methylenebis[3,4,6-trichloro-
U133	302-01-2	Hydrazine (R,T)
U134	7664-39-3	Hydrofluoric acid (C,T)
U134	7664-39-3	Hydrogen fluoride (C,T)
U135	6/4/7783	Hydrogen sulfide
U135	6/4/7783	Hydrogen sulfide H_2S
U136	75-60-5	Arsinic acid, dimethyl-
U136	75-60-5	Cacodylic acid
U137	193-39-5	Indeno[1,2,3-cd]pyrene
U138	74-88-4	Methane, iodo-
U138	74-88-4	Methyl iodide

EPA HW No.	CAS No.	Substance
U140	78-83-1	Isobutyl alcohol (I,T)
U140	78-83-1	1-Propanol, 2-methyl- (I,T)
U141	120-58-1	1,3-Benzodioxole, 5-(1-propenyl)-
U141	120-58-1	Isosafrole
U142	143-50-0	Kepone
U142	143-50-0	1,3,4-Metheno-2H-cyclobuta[cd]pentalen-2-one, 1,1a,3,3a,4,5,5,5a,5b,6-decachlorooctahydro-
U143	303-34-4	2-Butenoic acid, 2-methyl-, 7-[[2,3-dihydroxy-2-(1-methoxyethyl)-3-methyl-1-oxobutoxy]methyl]-2,3,5,7a-tetrahydro-1H-pyrrolizin-1-yl ester,[1S-[1alpha(Z),7(2S*,3R*),7aalpha]]-
U143	303-34-4	2-(1-methoxyethyl)-3-methyl-1-oxobutoxy]methyl]-
U144	301-04-2	2,3,5,7a-tetrahydro-1H-pyrrolizin-1-yl ester,
U144	301-04-2	[1S-[1alpha(Z),7(2S*,3R*),7aalpha]]-
U145	7446-27-7	Lead phosphate
U145	7446-27-7	Phosphoric acid, lead(2+) salt (2:3)
U146	1335-32-6	Lead, bis(acetato-O)tetrahydroxytri-
U146	1335-32-6	Lead subacetate
U147	108-31-6	2,5-Furandione
U147	108-31-6	Maleic anhydride
U148	123-33-1	Maleic hydrazide
U148	123-33-1	3,6-Pyridazinedione, 1,2-dihydro-
U149	109-77-3	Malononitrile
U149	109-77-3	Propanedinitrile
U150	148-82-3	Melphalan
U150	148-82-3	L-Phenylalanine, 4-[bis(2-chloroethyl)amino]-
U151	7439-97-6	Mercury
U152	126-98-7	Methacrylonitrile (I, T)
U152	126-98-7	2-Propenenitrile, 2-methyl- (I,T)
U153	74-93-1	Methanethiol (I, T)
U153	74-93-1	Thiomethanol (I,T)
U154	67-56-1	Methanol (I)
U154	67-56-1	Methyl alcohol (I)
U155	91-80-5	1,2-Ethanediamine, N,N-dimethyl-N'-2-pyridinyl-N'-(2-thienylmethyl)-
U155	91-80-5	Methapyrilene
U156	79-22-1	Carbonochloridic acid, methyl ester (I,T)
U156	79-22-1	Methyl chlorocarbonate (I,T)
U157	56-49-5	Benz[j]aceanthrylene, 1,2-dihydro-3-methyl-
U157	56-49-5	3-Methylcholanthrene
U158	101-14-4	Benzenamine, 4,4'-methylenebis[2-chloro-
U158	101-14-4	4,4'-Methylenebis(2-chloroaniline)
U159	78-93-3	2-Butanone (I,T)
U159	78-93-3	Methyl ethyl ketone (MEK) (I,T)
U160	1338-23-4	2-Butanone, peroxide (R,T)
U160	1338-23-4	Methyl ethyl ketone peroxide (R,T)
U161	108-10-1	Methyl isobutyl ketone (I)
U161	108-10-1	4-Methyl-2-pentanone (I)
U161	108-10-1	Pentanol, 4-methyl-
U162	80-62-6	Methyl methacrylate (I,T)
U162	80-62-6	2-Propenoic acid, 2-methyl-, methyl ester (I,T)
U163	70-25-7	Guanidine, N-methyl-N'-nitro-N-nitroso-
U163	70-25-7	MNNG
U164	56-04-2	Methylthiouracil

EPA HW No.	CAS No.	Substance
U164	56-04-2	4(1H)-Pyrimidinone, 2,3-dihydro-6-methyl-2-thioxo-
U165	91-20-3	Naphthalene
U166	130-15-4	1,4-Naphthalenedione
U166	130-15-4	1,4-Naphthoquinone
U167	134-32-7	1-Naphthalenamine
U167	134-32-7	alpha-Naphthylamine
U168	91-59-8	2-Naphthalenamine
U168	91-59-8	beta-Naphthylamine
U169	98-95-3	Benzene, nitro-
U169	98-95-3	Nitrobenzene (I,T)
U170	100-02-7	p-Nitrophenol
U170	100-02-7	Phenol, 4-nitro-
U171	79-46-9	2-Nitropropane (I,T)
U171	79-46-9	Propane, 2-nitro- (I,T)
U172	924-16-3	1-Butanamine, N-butyl-N-nitroso-
U172	924-16-3	N-Nitrosodi-n-butylamine
U173	1116-54-7	Ethanol, 2,2'-(nitrosoimino)bis-
U173	1116-54-7	N-Nitrosodiethanolamine
U174	55-18-5	Ethanamine, N-ethyl-N-nitroso-
U174	55-18-5	N-Nitrosodiethylamine
U176	759-73-9	N-Nitroso-N-ethylurea
U176	759-73-9	Urea, N-ethyl-N-nitroso-
U177	684-93-5	N-Nitroso-N-methylurea
U177	684-93-5	Urea, N-methyl-N-nitroso-
U178	615-53-2	Carbamic acid, methylnitroso-, ethyl ester
U178	615-53-2	N-Nitroso-N-methylurethane
U179	100-75-4	N-Nitrosopiperidine
U179	100-75-4	Piperidine, 1-nitroso-
U180	930-55-2	N-Nitrosopyrrolidine
U180	930-55-2	Pyrrolidine, 1-nitroso-
U181	99-55-8	Benzenamine, 2-methyl-5-nitro-
U181	99-55-8	5-Nitro-o-toluidine
U182	123-63-7	1,3,5-Trioxane, 2,4,6-trimethyl-
U182	123-63-7	1,3,5-Trioxane, 2,4,6-trimethyl-
U182	123-63-7	Paraldehyde
U183	608-93-5	Benzene, pentachloro-
U183	608-93-5	Pentachlorobenzene
U184	76-01-7	Ethane, pentachloro-
U184	76-01-7	Pentachloroethane
U185	82-68-8	Benzene, pentachloronitro-
U185	82-68-8	Pentachloronitrobenzene (PCNB)
U186	504-60-9	1-Methylbutadiene (I)
U186	504-60-9	1,3-Pentadiene (I)
U187	62-44-2	Acetamide, N-(4-ethoxyphenyl)-
U187	62-44-2	Phenacetin
U188	108-95-2	Phenol
U189	1314-80-3	Phosphorus sulfide (R)
U189	1314-80-3	Sulfur phosphide (R)
U190	85-44-9	1,3-Isobenzofurandione
U190	85-44-9	Phthalic anhydride
U191	109-06-8	2-Picoline
U191	109-06-8	Pyridine, 2-methyl-

EPA HW No.	CAS No.	Substance
U192	23950-58-5	Benzamide, 3,5-dichloro-N-(1,1-dimethyl-2-propynyl)-
U192	23950-58-5	Pronamide
U193	1120-71-4	1,2-Oxathiolane, 2,2-dioxide
U193	1120-71-4	1,3-Propane sultone
U194	107-10-8	1-Propanamine (I,T)
U194	107-10-8	n-Propylamine (I,T)
U196	110-86-1	Pyridine
U197	106-51-4	p-Benzoquinone
U197	106-51-4	2,5-Cyclohexadiene-1,4-dione
U200	50-55-5	Reserpine
U200	50-55-5	Yohimban-16-carboxylic acid, 11,17-dimethoxy-18-[(3,4,5-trimethoxybenzoyl)oxy]-, methyl ester, (3beta,16beta,17alpha,18beta,20alpha)-
U201	108-46-3	1,3-Benzenediol
U201	108-46-3	Resorcinol
U202	[1]81-07-2	Saccharin, & salts
U202	181-07-2	1,2-Benzisothiazol-3(2H)-one, 1,1-dioxide, & salts
U203	94-59-7	Safrole
U204	7783-00-8	Selenious acid
U204	7783-00-8	Selenium dioxide
U205	7488-56-4	Selenium sulfide
U205	7488-56-4	Selenium sulfide SeS_2(R,T)
U206	18883-66-4	Glucopyranose, 2-deoxy-2-(3-methyl-3-nitrosoureido)-, D-
U206	18883-66-4	D-Glucose, 2-deoxy-2-[[(methylnitrosoamino)-carbonyl]amino]-
U206	18883-66-4	Streptozotocin
U207	95-94-3	Benzene, 1,2,4,5-tetrachloro-
U207	95-94-3	1,2,4,5-Tetrachlorobenzene
U208	630-20-6	Ethane, 1,1,1,2-tetrachloro-
U208	630-20-6	1,1,1,2-Tetrachloroethane
U209	79-34-5	Ethane, 1,1,2,2-tetrachloro-
U209	79-34-5	1,1,2,2-Tetrachloroethane
U210	127-18-4	Ethene, tetrachloro-
U210	127-18-4	Tetrachloroethylene
U211	56-23-5	Carbon tetrachloride
U211	56-23-5	Methane, tetrachloro-
U213	109-99-9	Furan, tetrahydro-(I)
U213	109-99-9	Tetrahydrofuran (I)
U214	563-68-8	Acetic acid, thallium(1+) salt
U214	563-68-8	Thallium(I) acetate
U215	6533-73-9	Carbonic acid, dithallium(1+) salt
U215	6533-73-9	Thallium(I) carbonate
U216	7791-12-0	Thallium(I) chloride
U216	7791-12-0	thallium chloride TlCl
U217	10102-45-1	Nitric acid, thallium(1+) salt
U217	10102-45-1	Thallium(I) nitrate
U218	62-55-5	Ethanethioamide
U218	62-55-5	Thioacetamide
U219	62-56-6	Thiourea
U220	108-88-3	Benzene, methyl-
U220	108-88-3	Toluene
U221	25376-45-8	Benzenediamine, ar-methyl-

EPA HW No.	CAS No.	Substance
U221	25376-45-8	Toluenediamine
U222	636-21-5	Benzenamine, 2-methyl-, hydrochloride
U222	636-21-5	o-Toluidine hydrochloride
U223	26471-62-5	Benzene, 1,3-diisocyanatomethyl- (R,T)
U223	26471-62-5	Toluene diisocyanate (R,T)
U225	75-25-2	Bromoform
U225	75-25-2	Methane, tribromo-
U226	71-55-6	Methyl chloroform
U226	71-55-6	1,1,1-Trichloroethane
U226	71-55-6	Ethane, 1,1,1-trichloro-
U227	79-00-5	Ethane, 1,1,2-trichloro-
U227	79-00-5	1,1,2-Trichloroethane
U228	79-01-6	Ethene, trichloro-
U228	79-01-6	Trichloroethylene
U234	99-35-4	Benzene, 1,3,5-trinitro-
U234	99-35-4	1,3,5-Trinitrobenzene (R,T)
U235	126-72-7	1-Propanol, 2,3-dibromo-, phosphate (3:1)
U235	126-72-7	Tris(2,3-dibromopropyl) phosphate
U236	72-57-1	2,7-Naphthalenedisulfonic acid, 3,3'-[(3,3'- dimethyl[1,1'-biphenyl]-4,4'-diyl)bis(azo)bis[5-amino-4-hydroxy]-, tetrasodium salt
U236	72-57-1	Trypan blue
U237	66-75-1	2,4-(1H,3H)-Pyrimidinedione, 5-[bis(2- chloroethyl)amino]-
U237	66-75-1	Uracil mustard
U238	51-79-6	Carbamic acid, ethyl ester
U238	51-79-6	Ethyl carbamate (urethane)
U239	1330-20-7	Benzene, dimethyl- (I,T)
U239	1330-20-7	Xylene (I)
U240	[1]94-75-7	Acetic acid, (2,4-dichlorophenoxy)-, salts & esters
U240	[1]94-75-7	2,4-D, salts & esters
U243	1888-71-7	Hexachloropropene
U243	1888-71-7	1-Propene, 1,1,2,3,3,3-hexachloro-
U244	137-26-8	Thioperoxydicarbonic diamide $[(H_2N)C(S)]_2S_2$, tetramethyl-
U244	137-26-8	Thiram
U246	506-68-3	Cyanogen bromide (CN)Br
U247	72-43-5	Benzene, 1,1'-(2,2,2-trichloroethylidene)bis[4- methoxy-
U247	72-43-5	Methoxychlor
U248	[1]81-81-2	2H-1-Benzopyran-2-one, 4-hydroxy-3-(3-oxo-1-phenyl-butyl)-, & salts, when present at concentrations of 0.3% or less
U248	[1]81-81-2	Warfarin, & salts, when present at concentrations of 0.3% or less
U249	1314-84-7	Zinc phosphide Zn_3P_2, when present at concentrations of 10% or less
U271	17804-35-2	Benomyl.
U271	17804-35-2	Carbamic acid, [1-[(butylamino)carbonyl]-1H-benzimidazol-2-yl]-, methyl ester.
U278	22781-23-3	Bendiocarb.
U278	22781-23-3	1,3-Benzodioxol-4-ol, 2,2-dimethyl-, methyl carbamate.
U279	63-25-2	Carbaryl.
U279	63-25-2	1-Naphthalenol, methylcarbamate.
U280	101-27-9	Barban.
U280	101-27-9	Carbamic acid, (3-chlorophenyl)-, 4-chloro-2-butynyl ester.
U328	95-53-4	Benzenamine, 2-methyl-

EPA HW No.	CAS No.	Substance
U328	95-53-4	o-Toluidine
U359	110-80-5	Ethanol, 2-ethoxy-
U359	110-80-5	Ethylene glycol monoethyl ether
U364	22961-82-6	Bendiocarb phenol.
U364	22961-82-6	1,3-Benzodioxol-4-ol, 2,2-dimethyl-,
U367	1563-38-8	7-Benzofuranol, 2,3-dihydro-2,2-dimethyl-
U367	1563-38-8	Carbofuran phenol.
U372	10605-21-7	Carbamic acid, 1H-benzimidazol-2-yl, methyl ester.
U372	10605-21-7	Carbendazim.
U373	122-42-9	Carbamic acid, phenyl-, 1-methylethyl ester.
U373	122-42-9	Propham.
U387	52888-80-9	Prosulfocarb.
U389	2303-17-5	Carbamothioic acid, bis(1-methylethyl)-, S-(2,3,3-trichloro-2-propenyl) ester
U389	2303-17-5	Triallate
U394	30558-43-1	Ethanimidothioic acid, 2-(dimethylamino)-N-hydroxy-2-oxo-, methyl ester.
U394	30558-43-1	A2213
U395	5952-26-1	Diethylene glycol, dicarbamate.
U395	5952-26-1	Ethanol, 2,2'-oxybis-, dicarbamate.
U404	121-44-8	Ethanamine, N,N-diethyl-
U404	121-44-8	Triethylamine.
U409	23564-05-8	Carbamic acid, [1,2-phenylenebis (iminocarbonothioyl)]bis-, dimethyl ester.
U409	23564-05-8	Thiophanate-methyl.
U410	59669-26-0	Ethanimidothioic acid, N,N'- [thiobis[(methylimino)carbonyloxy]]bis-, dimethyl ester
U410	59669-26-0	Thiodicarb.
U411	114-26-1	Phenol, 2-(1-methylethoxy)-, methylcarbamate.
U411	114-26-1	Propoxur.

Table G1-1 (cont.) Descriptions of State-Regulated Hazardous Wastes

State	Description
CA	
121	Alkaline solution (pH <= 12.5) with metals (antimony, arsenic, barium, beryllium, cadmium, chromium, cobalt, copper, lead, mercury, molybdenum, nickel, selenium, silver, thallium, vanadium, and zinc)
122	Alkaline solution without metals (pH > 12.5)
123	Unspecified alkaline solution
131	Aqueous solution (2 < pH < 12.5) containing reactive anions (azide, bromate, chlorate, cyanide, fluoride, hypochlorite, nitrite, perchlorate, and sulfide anions)
132	Aqueous solution with metals (restricted levels and see waste code 121 for a list of metals)
133	Aqueous solution with 10% or more total organic residues
134	Aqueous solution with less than 10% total organic residues
135	Unspecified aqueous solution
141	Off-specification, aged, or surplus inorganics
151	Asbestos-containing waste
161	Fluid-cracking catalyst (FCC) waste
162	Other spent catalyst
171	Metal sludge (see 121)
172	Metal dust (see 121) and machining waste
181	Other inorganic solid waste
211	Halogenated solvents (chloroform, methyl chloride, perchloroethylene, etc.)
212	Oxygenated solvents (acetone, butanol, ethyl acetate, etc.)
213	Hydrocarbon solvents (benzene, hexane, Stoddard, etc.)
214	Unspecified solvent mixture
215	Waste oil and mixed oil
222	Oil/water separation sludge
223	Unspecified oil-containing waste
231	Pesticide rinse water
232	Pesticides and other waste associated with pesticide production
241	Tank bottom waste
251	Still bottoms with halogenated organics
252	Other still bottom waste
271	Organic monomer waste (includes unreacted resins)
272	Polymeric resin waste

281	Adhesives
291	Latex waste
311	Pharmaceutical waste
321	Sewage sludge
322	Biological waste other than sewage sludge
331	Off-specification, aged, or surplus organics
341	Organic liquids (nonsolvents) with halogens
342	Organic liquids with metals (see 121)
343	Unspecified organic liquid mixture
351	Organic solids with halogens
352	Other organic solids
411	Alum and gypsum sludge
421	Lime sludge
431	Phosphate sludge
441	Sulfur sludge
451	Degreasing sludge
461	Paint sludge
471	Paper sludge/pulp
481	Tetraethyl lead sludge
491	Unspecified sludge waste
511	Empty pesticide containers 30 gallons or more
512	Other empty containers 30 gallons or more
513	Empty containers less than 30 gallons
521	Drilling mud
531	Chemical toilet waste
541	Photochemicals/photoprocessing waste
551	Laboratory waste chemicals
561	Detergent and soap
571	Fly ash, bottom ash, and retort ash
581	Gas scrubber waste
591	Baghouse waste
611	Contaminated soil from site clean-ups
612	Household waste
613	Auto shredder waste
614	Treated wood waste
711	Liquids with cyanides >= 1000 mg/l

721	Liquids with arsenic >= 500 mg/l
722	Liquids with cadmium >= 100 mg/l
723	Liquids with chromium (VI) >= 500 mg/l
724	Liquids with lead >= 500 mg/l
725	Liquids with mercury >= 20 mg/l
726	Liquids with nickel >= 134 mg/l
727	Liquids with selenium >= 100 mg/l
728	Liquids with thallium >= 130 mg/l
731	Liquids with polychlorinated biphenyls >= 50 mg/l
741	Liquids with halogenated organic compounds >= 1000 mg/l
751	Solids or sludges with halogenated organic compounds >= 1000mg/kg
791	Liquids with pH <= 0> 2
792	Liquids with pH <= 0> 2 with metals
801	Waste potentially containing dioxins

WA

WSC2	Solid corrosive
WT01	Toxic Extremely Hazardous Waste (EHW)
WT02	Toxic Dangerous Waste (DW)
WP01	Persistent Halogenated Organic Compounds (EHW)
WP02	Persistent Halogenated Organic Compounds (DW)
WP03	Polycyclic Aromatic Hydrocarbons (EHW)

OR

X001	Waste pesticide residue
X007	Waste received in OR from out of state that are only regulated in the state of origin

MO

MH02	2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD)
D098	Used oil that cannot be or is not intended to be recycled

SC

K900	Waste residues from the manufacture of organotin compounds which contain tri-(organo) substituted tin compounds, to include tributyltin and its analogs
5555	Any solid waste the Department determines constitutes a hazard and requires greater control
7777	Non-hazardous waste received by a hazardous waste facility

RI

R001	Toxic waste
R002	Reactive waste
R003	Flammable waste
R004	Corrosive waste
R005	Special hazardous waste
R006	Extremely hazardous waste

VT

VT02	Waste containing greater than 5% by weight of petroleum distillates with melting points of less than 100o Fahrenheit, including but not limited to kerosene, fuel oil, hydraulic oils, lubricating oils, etc.
VT03	Water-based metal-removal fluid waste
VT06	Pesticidal wastes and obsolete pesticidal products
VT08	Waste coolants, antifreezes and solutions containing greater than 700 ppm of ethylene glycol
VT20	Non-aqueous waste which when mixed 50% by weight with distilled water, or a gaseous material which when mixed with distilled water to form a 2 molar solution, yields a pH ≤ 2 or ≥ 12.5
VT99	Non-hazardous waste. Note: This hazardous waste number is to be used only for non-hazardous waste shipped using a hazardous waste manifest

TX

Class 1	Regulated asbestos containing material; Materials containing specific toxic chemical consituents which exceed regulated concentration levels, although not enough to be considered hazardous; Liquids which are ignitable at levels above 150 degrees F, or are solids and semi-solids and contain chemicals considered to be ignitable under certain conditions incidental to storage, disposal or treatment; Semi-solids and solids which when combined with water exhibit corrosive properties; Empty containers which held hazardous substances or a Class 1 waste, unless the residue has been completely removed through certain processes; Waste associated with exploration, development and production of crude oil, natural gas or geothermal energy which contain more than 1,500 parts per million total petroleum hydro-carbon (TPH); All non-hazardous industrial solid waste generated outside Texas and transported into or through Texas for storage, processing or disposal.
Class 2	Containers which held hazardous or Class 1 industrial waste where the residue has been completely removed and the container made unusable; Containers of less than 5 gallon capacity which held Class 1 waste; Depleted aerosol cans; Paper, cardboard, linings, wrappings, paper packaging materials or absorbants which do not meet hazardous, radioactive or industrial Class 1 criteria; Food waste, glass, aluminum foil, plastics, styrofoam and food packaging that result from plant production, manufacturing or laboratory operations.

Class 3	Waste not meeting the conditions of Class 1 or 2, including chemically inert and insoluble substances, samples without detectable levels of PCBs or hydrocarbons, and waste which poses no threat to human health and/or the environment; Inert, insoluble solid waste materials such as rock, brick, glass, dirt and some rubbers and plastics.

MI

001S	Aflatoxin
002S	2,3,7,8-Tetrachlorodibenzo-p-dioxin
003S	1,2,3,7,8-Pentachlorodibenzo-p-dioxin
004S ,	2,3,4,7,8-Hexachlorodibenzo-p-dioxin
005S	1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin
006S	1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin
007S	2,3,7,8-Tetrachloridibenzo furan
001K	Residues, including emission control sludges, from the production process and packaging of 4,4'-Methylenebis (2-chloroaniline)
002K	Wash acids generated after the effective date of these rules from the production of 3,3'-Dichlorobenzidine and still bottoms from the recovery of these acids, excluding wash acids that are recycled or any materials that are reclaimed from the wash acids and used beneficially
001U	Actinomycin D
002U	Allyl chloride
003U	2-aminoanthraquinone
004U	Aminoazobenzene
005U	aminoazotoluene
006U	aminobiphenyl
007U	3-amino-9-ethyl carbazole
157U	3-amino-9-ethyl carbazole hydrochloride
008U	1-amino-2-methyl anthraquinone
009U	Anilazine
158U	Aniline hydrochloride
011U	Anisidine
012U	Anisidine hydrochloride
013U	Antimony (when in the form of particles 100 microns or less)
014U	Antimycin A
147U	Azinphos-ethyl
148U	Azinphos-methyl
159U	Azobenzene
015U	Barban

016U	Bendiocarb
017U	Benomyl
020U	Bromoxynil
160U	1,3-Butadiene
161U	Butyl benzl phthalate
022U	Captafol
023U	Captan
024U	Carbaryl
025U	Carbofuran
027U	Carbophenothion
028U	Chloramines
152U	Chlorfenuinphos
029U	Chloropyrifos
030U	Chlorinated dibenzofurans (other than those listed in Table 202)
031U	Chlorinated dioxins (other than those listed in Table 202)
032U	Chlorine gas
033U	Chloroethanol
034U	3-(Chloromethyl) pyridine hydrochloride
150U	p-chlorophenol
162U	1-chloro-4-phenoxybenzene
036U	4-chloro-m-phenylenediamine
037U	4-chloro-o-phenylenediamine
038U	Chloroprene
163U	1-chloropropene
151U	5-chloro-o-toluidene
040U	Clonitralid
041U	Cobalt (when in the form of particles 100 microns or less)
042U	Coumasphos
043U	p-Cresidine
044U	Crotoxyphos
046U	Cycloheximide
164U	P,P' DDE
048U	2,4-Diaminoanisole sulfate
049U	4,4'-Diaminodiphenyl ether
050U	2,4-Diaminotoluene
051U	Diazinon

052U	Dichlone
054U	Dichlorvos
055U	Dichrotophos
056U	Diethyl sulfate
165U	N,N'-Diethylthiourea
057U	Dinocap
058U	Dioxathion
059U	EPN
166U	1,2-Epoxybutane
061U	Ethion
063U	Fensulfothion
064U	Fenthion
065U	Fluchloralin
068U	Hexamethyl phosphoramide
070U	Hydroquinone
071U	N-(2-Hydroxyethyl) ethyleneimine
072U	Hypochlorite
073U	Isonicotinic acid hydrazine
167U	Kanechlor C
074U	Ketene
075U	Lactonitril
076U	Leptophos
077U	Lithium and compounds
078U	Malachite green
079U	Malathion
082U	4,4'-Methylenebis(2-methylaniline)
083U	4,4'-Methylenebis(N,N-dimethylaniline)
086U	1-Methylnaphthalene
088U	Mevinphos
089U	Mexacarbate
090U	Mirex
092U	Monocrotophos
093U	Mustard gas
094U	Naled
095U	1,5-Napthalenediamine
096U	Nickel (when in the form of particles 100 microns or less)

097U	Niridazole
098U	Nithiazide
099U	5-Nitroacenaphthene
100U	Nitro-o-anisidine
101U	4-Nitrobiphenyl
102U	Nitrofen
103U	N-(4-(5-nitro-2-furanyl)-2-thiazolyl)-acetamide
104U	Nitrogen mustard
106U	p-Nitrosodiphenylamine
168U	N-Nitrosomethylvinylamine
108U	N-nitroso-N-phenylhydroxylamine, ammonium salt
169U	Octachlorostyrene
110U	Oxydemeton-methyl
111U	Paraquat dichloride
112U	Peroxyacetic acid
113U	Phenazopyridine hydrochloride
115U	Phenobarbitol
116U	Phenytoin
117U	Phenytoin sodium
118U	Phosazetim
119U	Phosmet
120U	Phosphamidon
121U	Piperonyl sulfoxide
122U	Polybrominated biphenyls (PBB)
124U	Propiolactone
127U	Propylthiouracil
128U	Rotenone
129U	Semicarbazide
170U	Semicarbazide hydrochloride
153U	Sodium fluoroacetate
131U	Styrene
132U	Sulfallate
134U	TDE
135U	TEPP
136U	Terbufos
137U	Tetrachlorvinphos

138U	4,4'-Thiodianiline
139U	o-Toluidine
140U	Triaryl phosphate esters
154U	Bis(tri-n-butyl tin) oxide
171U	Tributyltin (and other salts and esters)
172U	1,2,3-Trichlorobenzene
173U	1,2,4-Trichlorobenzene
141U	Trichlorfon
142U	Trifluralin
143U	2,4,5-Trimethylaniline
174U	Urethane
175U	Vinyl bromide

Substance	Life Hazards	Personal Protective Equipment	Storage	Fire Fighting
Concentrated Acids & wastes (commonly plating or stripping solutions) Tank Storage Area West Pad CSA East Pad Labpack Room	Extremely toxic DO NOT HANDLE WITH BARE HANDS. Can cause sever deep burns; avoid contact. Breathing of concentrated mists can damage upper respiratory tract and lung tissue.	Wear full protective clothing (acid resistant) including safety goggles. Upon any contact with skin or eyes, the material should be washed off immediately. Remove contaminated clothing immediately. Wear self contained breathing apparatus in the presence of mists or vapors, or for cleaning up spills.	Store away from cyanide and sulfide materials or combustible materials.	Material is not normally flammable. Use large amounts of water or smother with suitable powder. Fire fighters must be protected from contact with the material. Wear SCBA to protect against corrosive vapors which may be given off.
Cyanide solutions Tank Storage Area West Pad CSA East Pad Labpack Room	Extremely toxic. DO NOT HANDLE WITH BARE HANDS. Releases highly toxic and flammable hydrogen cyanide gas on contact with acids. Very toxic through inhalation or ingestion. Also can be absorbed through the skin.	Wear full protective clothing including safety goggles. Upon any contact with skin or eyes, the material should be washed off immediately. Wear self contained breathing apparatus when cleaning up spills.	Separate from acids and oxidizing materials.	Water, dry chemical, alcohol foam or carbon dioxide may be used to fight a fire in an area containing cyanides. IN advanced or massive fires, fire fighting should be done from a safe distance or from protected location. Fire fighters should wear protective clothing and SCBA
Metal sludges (hydroxide) West Pad CSA East Pad	Ingestion of large amounts can cause intestinal disorders and even death. Toxicity primarily due to metals. Hydrogen sulfide can be released upon contact with acids and powerful oxidizers.	Wear full protective clothing including safety goggles. Self contained breathing apparatus should be worn if hydrogen sulfide presence is suspected (rotten egg smell).	Keep separate from strong Oxidizers	Essentially nonflammable, however, if ignited must treat as a metal fire. Normal fire extinguishers, water, CO2, foam, may not be effective. Dry sand, ultra-sorb may be required to blanket fire.
Acid Solutions Tank Storage Area West Pad Container Storage area Lab Pack Room East Pad	Corrosive. Contact can cause burns, damaged sight. Can be toxic if ingested. Breathing of concentrated mists can damage upper respiratory tract and lung tissue.	Wear full protective (acid resistant) clothing including safety goggles. Upon any contact with skin or eyes, the material should be washed off immediately. Remove contaminated clothing. Wear self contained breathing apparatus if mists or vapors are present.	Store away from cyanide and sulfide materials or combustible materials.	Material is not normally flammable. Use extinguishing agent appropriate for surrounding fire. If this material comes in contact with cyanide solutions, toxic cyanide gas may be released. Fire fighters should wear self contained breathing apparatus. Explosive hydrogen gas may be released on contacting metals.

Substance	Life Hazards	Personal Protective Equipment	Storage	Fire Fighting
Alkaline Solutions Tank Storage Area West Pad Container Storage Area Lab Pack Room East Pad	Toxic. A severe eye hazard concentrated solution destroys tissue on contact.	Wear full protective clothing (splash resistant), including goggles and face shield.	Separate from acids, metals, explosives, organic peroxides, and easily ignitable materials.	Material is not normally flammable. Use extinguishing agent appropriate for surrounding fires. Fire fighters should wear protective clothing and avoid contact with material
Oxidizers Liquids and Solids West Pad Container Storage Area Lab Pack Room East Pad	Oxidizer: Capable of supplying oxygen to a fire, making extinguishing difficult.	Wear full protective (acid resistant) clothing including safety goggles. Upon any contact with skin or eyes, the material should be washed off immediately. Remove contaminated clothing including goggles.	Separate from strong reducing agents, metals, flammables and combustibles, and easily ignitable materials.	Use water only, attempt to remove heat and fuel source.
Flammable Liquids West Pad Container Storage Area Lab Pack Room East Pad	Material with a flashpoint below 140	Wear full protective clothing, including goggles.	Separate from oxidizers, corrosive acids and bases, water reactive compounds and poisons.	Use dry chemical or CO_2 fire extinguishers.
Water Reactive Liquids and Solids West Pad Container Storage Area Lab Pack Room East Pad	Reactive: Capable of becoming spontaneously flammable or produce toxic or flammable gases	Wear full protective clothing, including goggles	Separate from, flammables, oxidizers, organic peroxides, concentrated acids and bases, cyanides and sulfides	Use dry chemical or CO_2 fire extinguishers. DO NOT USE WATER

Table G1-3 Potential Vapors and Gases

Vapor/Gas	PEL/IDLH	Cause of Formation	Detected By	Remedy, Capture, Neutralization Techniques
Ammonia	30/300	Raising pH above 9.0 when ammonium species are present in solution	Odor, NH_3 Dräger Tube	Lower pH of solution to <9.0. Recover ammonia with a mildly acidic Hydrochloric acid solution in an air scrubber.
Carbon Disulfide	20/500	Mixing or dosing with acid to solutions containing Dithiocarbamate 9DTC0 to pHs less than 7.0.	Odor, CS_2 Dräger Tube	Raise the pH of the solution to >9.0. Capture gas with an alkaline scrubber.
Chlorine gas	1/10	Decomposition of Sodium hypochlorite (Bleach) from mixing with acid, metal, or other impurities	Odor, Cl_2 Dräger Tube	Raise the pH of the solution >9.0. Capture gas by running through an alkaline air scrubber with a slight Sodium metabisulfite excess.
Hydrogen cyanide	10/50	Mixing cyanide waste solutions with acids to a pH <8.0.	HCN Drager Tube, HCN Monitors	Raise the pH of the solution > 12.5. Capture gas by running through an alkaline/caustic air scrubber with a slight Sodium hypochlorite excess.
Hydrogen Gas	N/A	Acidification of Sodium borohydride solutions, strong acids on elemental zinc, cadmium. Lab reagent.	Combustible gas meter	Avoid sparks and flames, ventilate area well, eliminate source of gas by neutralizing acidic solutions.
Hydrogen sulfide	20/100	Acidification of Sodium borohydride solutions, strong acids on elemental zinc, cadmium. Lab reagent	Combustible gas meter.	Avoid sparks and flames, ventilate area well, eliminate source of gas by neutralizing acidic solutions.
Hydrogen sulfide	20/100	Acidification of solution containing reactive or amenable sulfides.	H_2S Drager, H_2S Monitors	Raise the pH of the solution > 12.5. Capture gas by running through an alkaline/caustic air scrubber with a slight Sodium hypchlorite excess.
Nitrogen oxides	5/20	Mixing Nitric acid with a reducing agent such as Sodium metabisulfite, Nickel solutions, trivalent chrome	NOx Drager Tube	Add an oxidizer such as Potassium permanganate or hexavalent chromic acid. Alternatively, raise the pH of the solution >4.0. Capture gas with an alkaline air scrubber.
Sulfur dioxide	5/100	Mixing acids with Sodium metabisulfite, dilution or neutralization of conc. H_2SO_4	SO_2 Drager Tube	Raise the pH of the solution to >3.0 or add hexavalent chromic acid. Capture gas with an alkaline air scrubber.

REMEMBER: During an emergency situation, the concentration of the gaseous release is unknown. There also could be more than one gas present depending on the solution generating the gas. Always approach an emergency situation the maximum amount of respiratory protection; SCBA

Table G4-1: Alarm Signals

There are three main types of emergency alarms that will sound throughout the plant and laboratory areas.

1. Fire Alarm – Buzzer or Bell

Immediately proceed by the evacuation route to the Assembly area. The Emergency Coordinator will provide additional instruction.

2. Gas Monitor Alarms – Siren

Immediately proceed by the evacuation route to the assembly area.

Check wind direction and move up wind at least 100 feet if the assembly area is downwind. Return to work only after permission is given by the Emergency Coordinator.

3. Medical Alert Alarm – Intermittent Whistle

Immediately proceed by the evacuation route to the assembly area. The Emergency Coordinator will check panel to determine area of alarm activation and proceed to that area with a first aid kit. Evacuated staff will perform role call to account for all personnel.

Table G5-1 Emergency Equipment List

COMMUNICATIONS AND ALARMS		
Item	Locations	Capability
Telephones	All office Areas, Detox, Truck Bay, Maintenance, Solids Receiving	Public Address
Manually Operated Air Horn	Entrance to Office Area	Back-up Evacuation Alarm
Fire Alarms	SE Corner of Truck Bay, SW Wall of Truck Bay, NW Wall of Truck Bay, West Wall of Storage Bay, East Wall of Storage Bay, west Wall of Utility Room, West Wall of the Lobby, NW Corner of Detox, North Wall of Dewatering, North Wall of Hallway at the East Exit, SE Corner of Dewatering, SW Corner of Detox, SW Corner of the Lab Pack Room	Fire Notification
Man-Down Alarms	SW Ramp of Storage Bay, North Wall of Crystallizer Area, SW of Wet Lab, SE Corner of Instrument Lab, North Wall of Boiler Area, NW corner of Dewatering, SW Corner of locker Room, East Wall of Break room, NW Corner of Detox, NW Ramp of Storage Bay	Casualty Notification
Cyanide Alarm Sensors	Storage Bay in between Tank S-1 and S-2, Detox between T-6 and T-7, HVAC between Detox and Storage Bay. Truck Bay Receiving Door, Scrubber Room	Provide Notification of CN Release and Evacuation
Hydrogen Sulfide	Scrubber Room, HVAC between Detox and Storage Bay	Provide Notification of Hydrogen Sulfide Release and Evacuation
FIRE CONTROL EQUIPMENT		
Fire Hydrants	NE Corner of Plant, East Side of Plant	Water Capacity for Fire Dept
Sprinkler System	Throughout Building	Automatic Fire Suppression System
Fire Extinguishers	East side of check-in pad, East Side of West Storage Pad, NE Corner of Truck Bay, NW Wall of Truck Bay, SE Corner of Truck Bay, West Wall of Storage Bay, North Wall of Crystallizer Room, South Wall of Storage Bay, SW Corner of Detox, SW Wall of Dewatering, SE Corner of the Lab Pack Room, East Wall of Maintenance Shop, NW Corner of solids Receiving, NW Wall of Detox, East Wall of Storage Bay, Storage Bay Entry, SW Corner of Wet Lab, SE Wall of Instrument Lab, Detox Entry, Lobby Entrance, East Wall of Electrical Room, Wet Wall of Men’s Locker Room, SE Corner of Break Room	

Table G5-1 Emergency Equipment List (continued)

SPILL CONTROL EQUIPMENT		
20 Open Top Drums	NW corner of Truck Bay	Mitigate released, provide containers for release
Shovels	NW corner of Truck Bay	Mitigate releases, provide means of cleaning up spills on solid matrix
Spill Kit	South end of west pad, truck bay	Mitigate releases, provide means of cleaning up spills on solid matrix
2,000 pounds of Absorbent	NW corner of Truck Bay	Mitigate releases, provide means of absorbing liquid spills
FIRST AID EQUIPMENT		
First Aid Kit	Break Room, Wet Lab, Office, Lab Pack Room	Application of immediate medical response
Calcium Gluconate	Lab, Lab Pack Room, Truck Bay	For response to hydrofluoric acid contamination
PERSONAL PROTECTIVE EQUIPMENT		
SCBA	Four in office area	Provide Respiratory Protection for Release
See Table G5-2		
PERSONAL DECONTAMINATION EQUIPMENT		
Emergency Showers/Eye Washes	South end of west pad, Instrument Lab, East Side of Solids Receiving, SW Wall of Detox, North Wall of Crystallizer Room, NW Corner of Dewatering, SW Corner of Men’s Locker Room, SW Corner of Detox, Lab Pack Room	Provide mitigation of personal contamination

Table G5-2 Emergency Response PPE

Equipment	**Number**
Protective Masks ➢ Full Face mask with hook up for canister	5
Cartridges for Masks NIOSH AM/CD/CL/FM/HC/HF/(ESC)/MAA/OV/SD	60
Self-Contained breathing Apparatus (SCBA)	4
Disposable Tyvek and Tychem suits and lightweight gloves	12
Heavy duty gloves and boots (pairs)	2
Hard hats	2
Acid Resistant suits	2

Table G5-3 Fire Types and Fire Extinguishers

Fire Types and Fire Extinguishers		
Fire Class	**Fire Description**	**Use Fire Extinguisher Class**
A	Ordinary Combustibles – Wood, paper, plastics	Multi-purpose (ABC) rated, water, fire foams (AFFF/ATC) **DO NOT USE CO_2 OR DRY CHEMICAL**
B	Flammable Liquids, Greases or Gases	Dry Chemical (BC)
C	Energized Electrical Equipment – Live wires	CO_2, Halon, (ABC), (BC) rated **DO NOT USE WATER**
D	Elemental Metal Fires – Magnesium, Lithium	Class D rated extinguishers only.

Fire Extinguishers		
Extinguisher	**Class**	**Description**
Water, Pressurized Water	A	Extinguish by cooling, soaking and penetrating solid combustible hazards. Good for oxidizers.
Multi-purpose	ABC	Contains a silconized mono-ammonium phosphate, forming vapor barriers and displacing oxygen.
Foam	AB	AFFF – Aqueous Film Forming Foam → effective vapor barrier cutting off fuel source.
CO_2 – Carbon dioxide	BC	Extinguishing by displacing oxygen. Good for liquid flammables and electrical fires.
Dry Chemical	BC	Contains a siliconized sodium bicarbonate. Suitable for use on all types of electrical and flammable liquid and gas fires. Forms vapor barriers and displaces oxygen.
Clean Streaming Agents Halon 1211	BC	These agents are stored as a liquid and discharged under pressure as a vapor, causing no cold or static shock. The unit extinguishes fire by chemically interacting. Good for flammables and electrical fires.
Powder Type	D	Contains Sodium chloride based dry powder. Heat from the fire causes it to cake and form a crust excluding air and dissipating the heat from the burning metal. Copper powder units smother fires.

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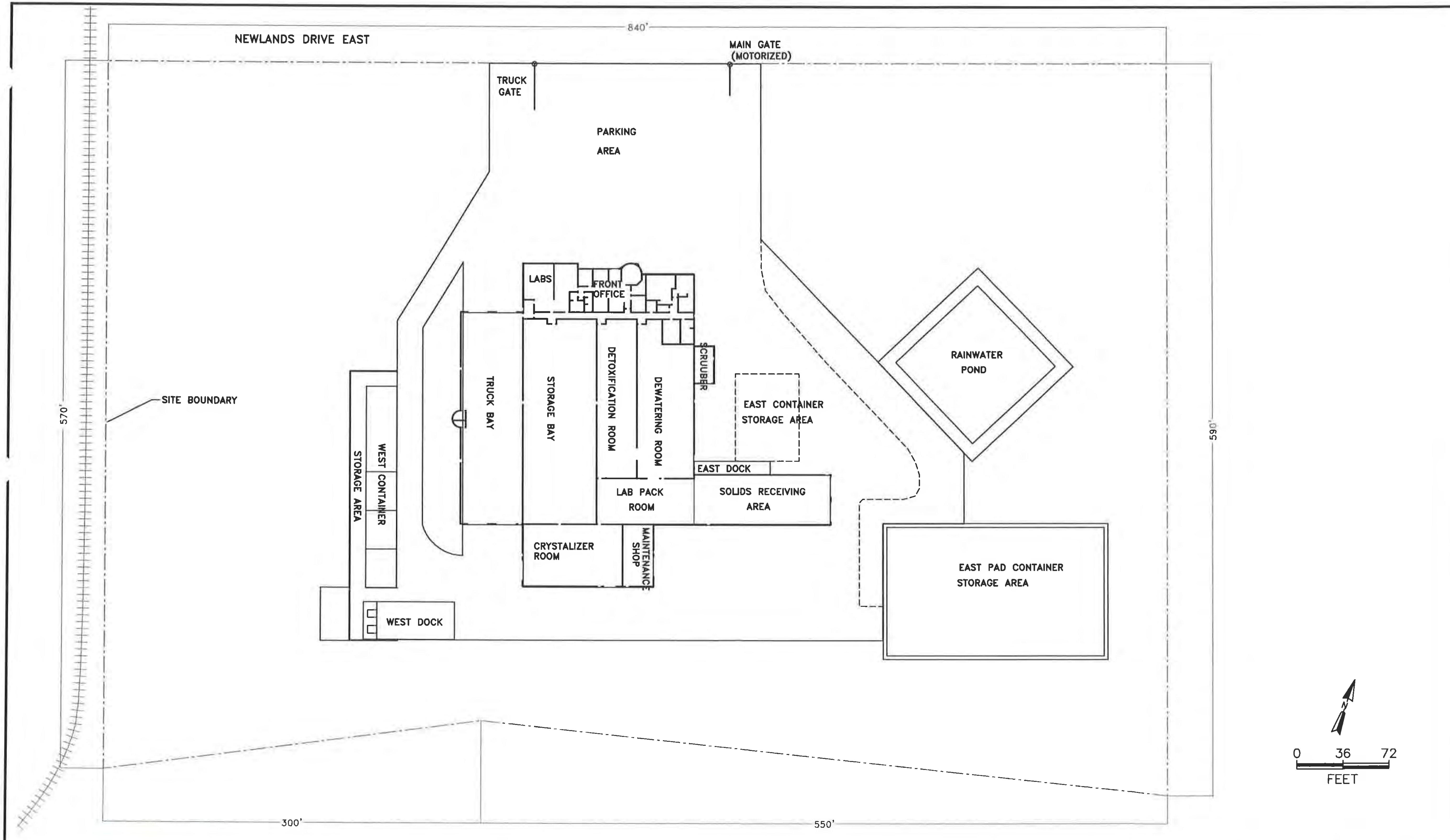
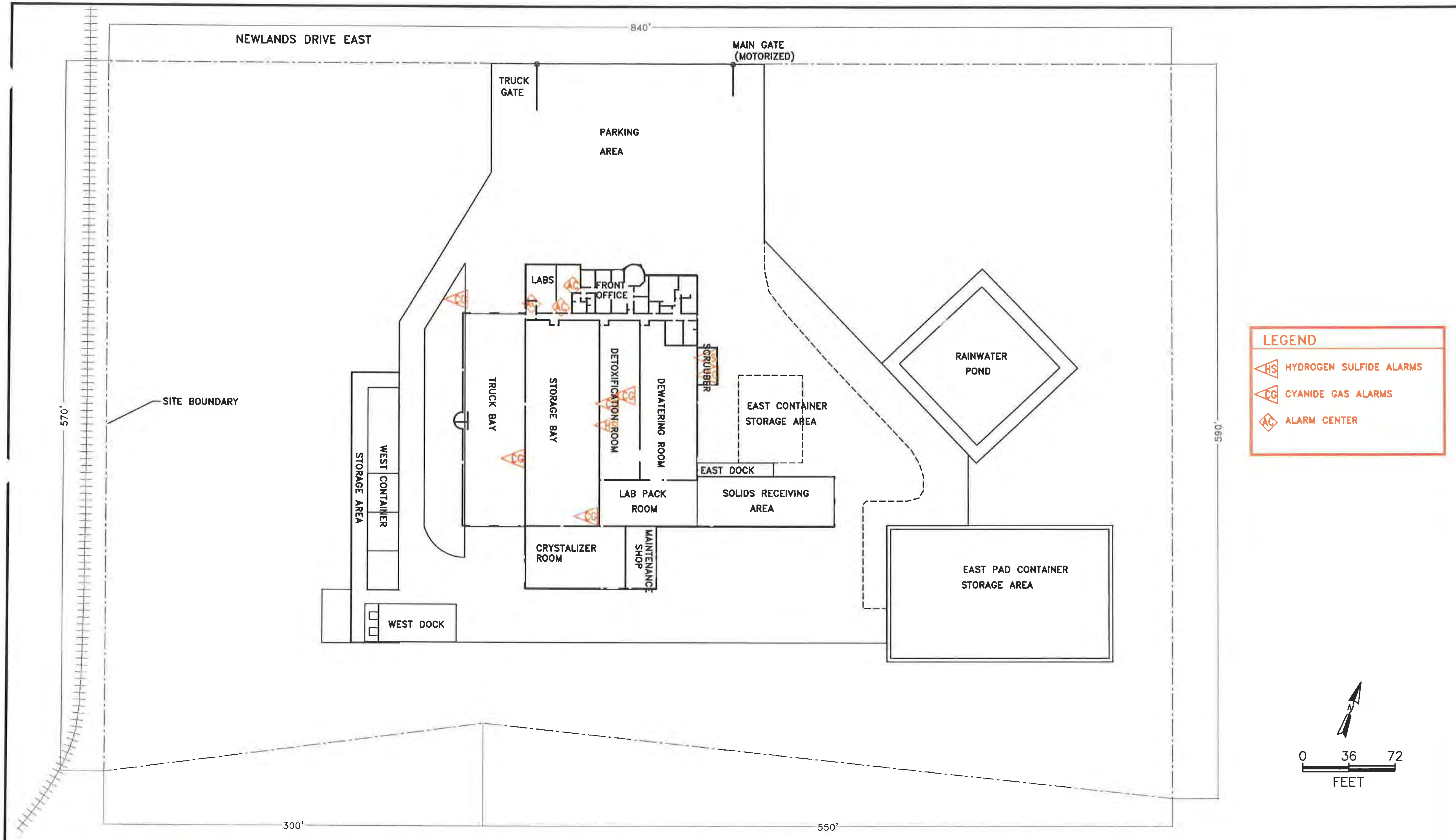


PSC

TITLE:
Facility Site Plan
PSC Fernley Facility
Fernley, Nevada

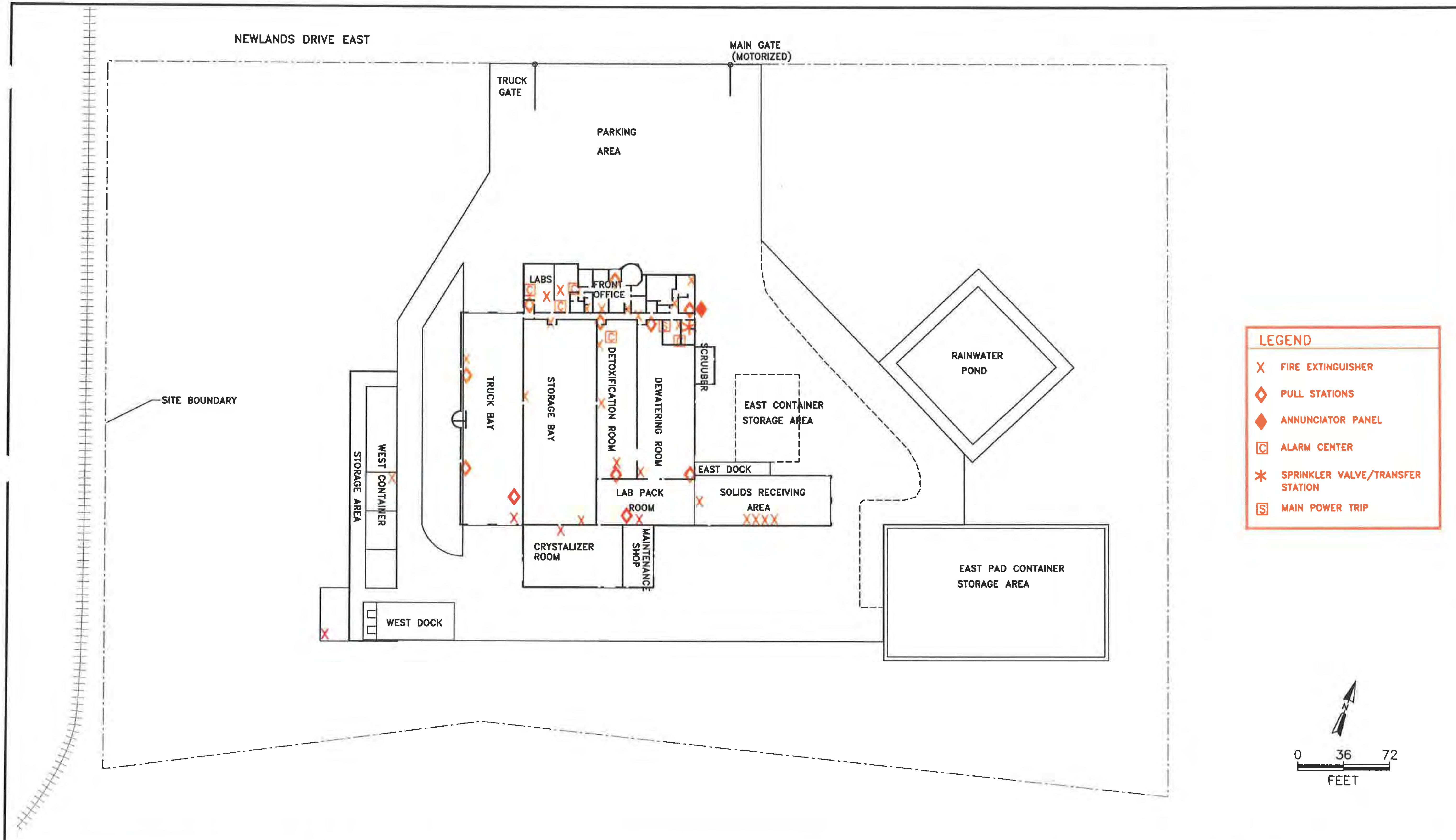
DWN: dtb	DES.:	PROJECT NO.:
CHKD:	APPD:	FIGURE NO.: G1-2
DATE: 7/10/12	REV.:	



PSC

TITLE: Location of Alarms and Monitoring Equipment
PSC Fernley Facility
Fernley, Nevada

DWN: dtb	DES.:	PROJECT NO.:
CHKD:	APPD:	FIGURE NO.: G4-1
DATE: 7/10/12	REV.:	

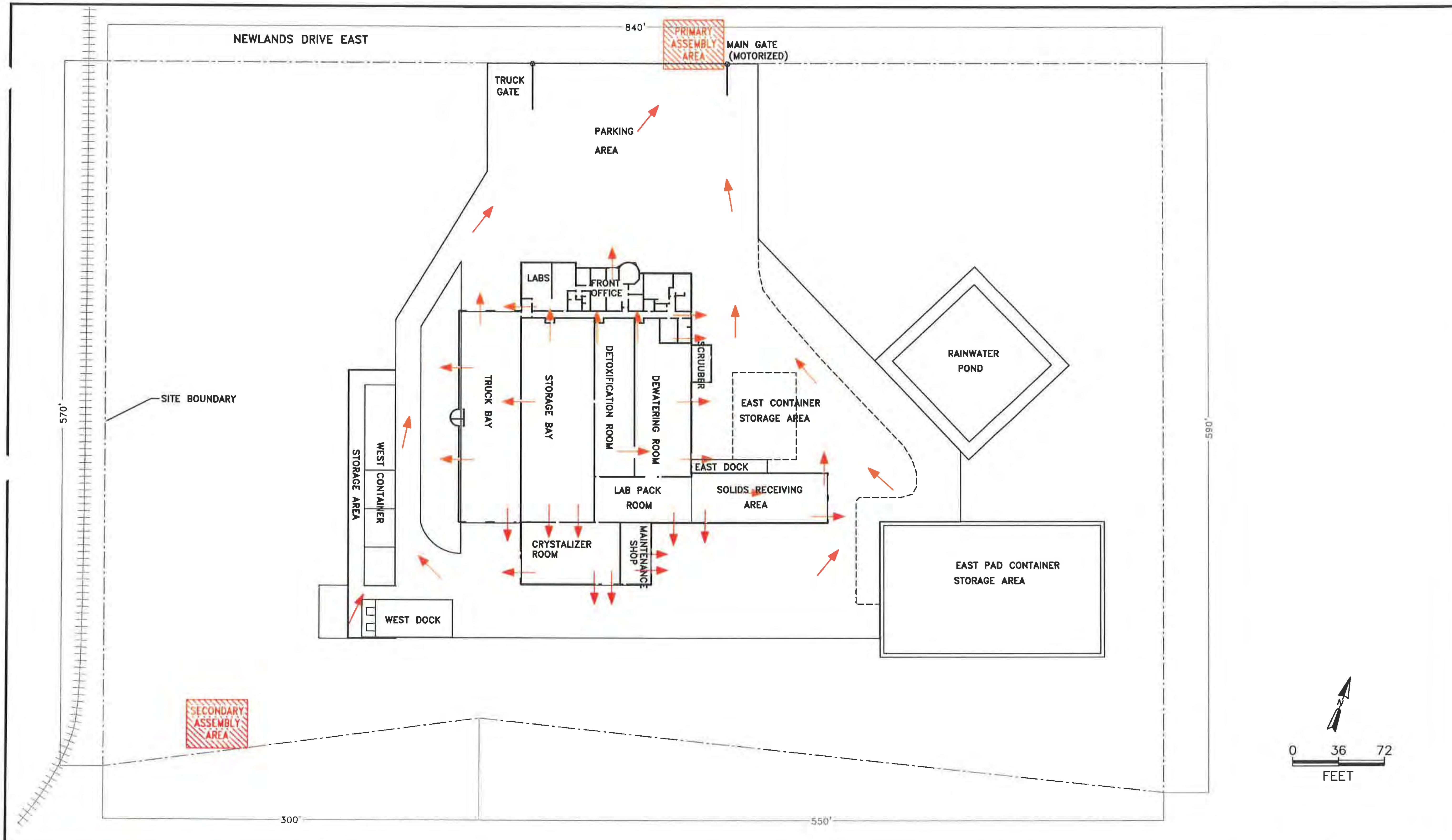


PSC

TITLE:

Fire Detection and Prevention Equipment
PSC Fernley Facility
Fernley, Nevada

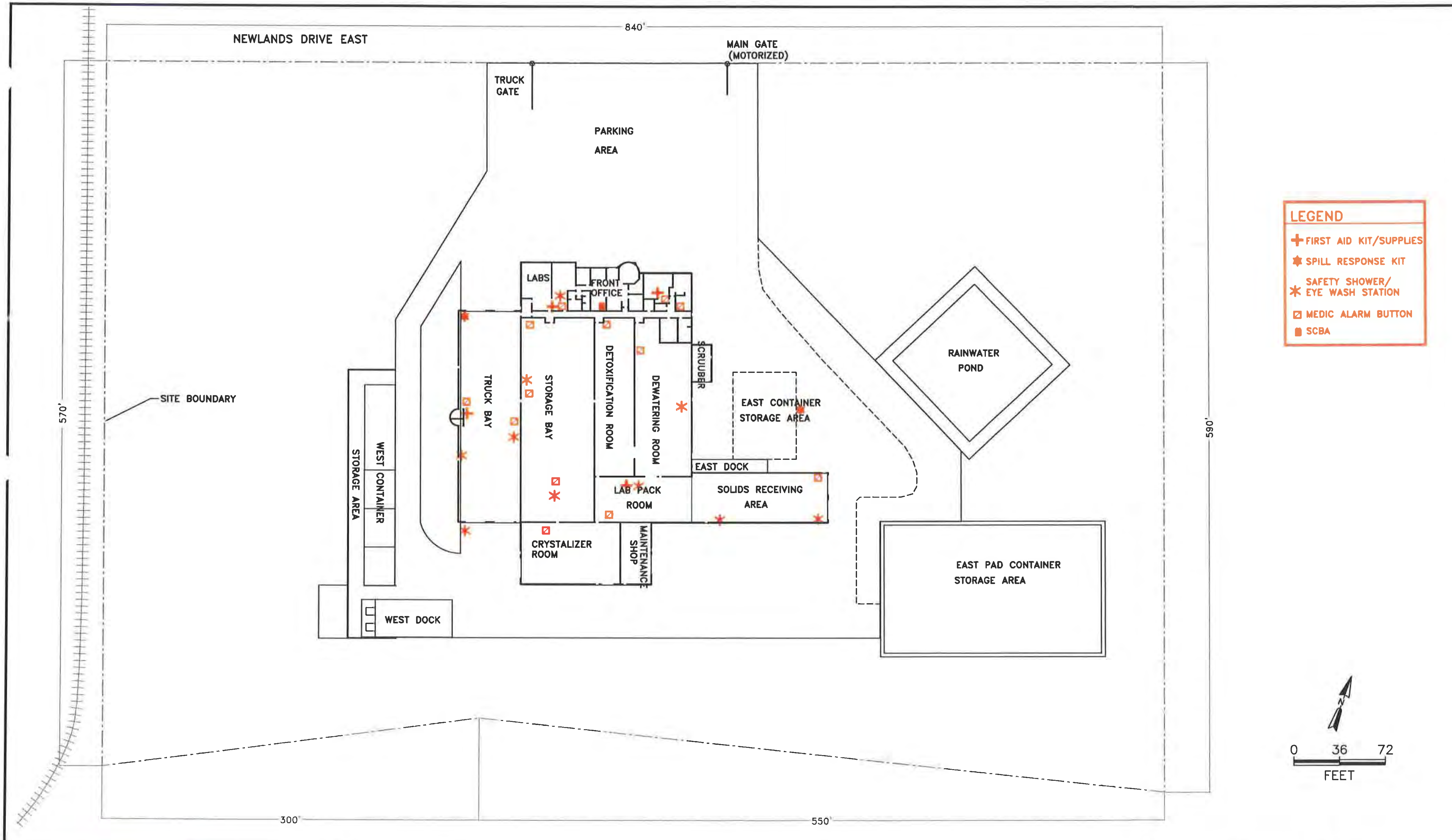
DWN: dtb	DES.:	PROJECT NO.:
CHKD:	APPD:	
DATE: 7/10/12	REV.:	FIGURE NO.: G4-2



PSC

TITLE:
Facility Exits and Assembly Areas
PSC Fernley Facility
Fernley, Nevada

DWN: dtb	DES.:	PROJECT NO.:
CHKD:	APPD:	
DATE: 7/10/12	REV.:	FIGURE NO.: G5-1



PSC

TITLE:
Emergency Equipment Locations
PSC Fernley Facility
Fernley, Nevada

DWN: dtb	DES.:	PROJECT NO.:
CHKD:	APPD:	FIGURE NO.: G7-1
DATE: 7/10/12	REV.:	

SECTION H

PERSONNEL TRAINING

SECTION H. PERSONNEL TRAINING

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H1.0 INTRODUCTION AND GENERAL DESCRIPTION

PSC-Fernley has developed this training plan for its employees to provide assurances that their job assignments will be conducted in a manner that will minimize the potential for adverse impact to the environment and to human health. The plan provides that personnel will complete a program of formal classroom and on the job training that teaches them to perform their duties in a way that will ensure the facility's compliance with regulatory requirements, permit conditions and company policies. Employees will be thoroughly trained in the procedures applicable to their waste management and emergency response duties. They will also be instructed concerning the hazards associated with these duties and the substances to which they may be exposed.

The objectives of this training program are:

- Thoroughly train all employees in the proper performance of their waste management responsibilities.

- Ensure that facility personnel are able to respond effectively to emergencies by training them in the use of emergency procedures, emergency equipment and emergency systems.

- Train all personnel in the use of appropriate safety measures and personal protective equipment.

- Inform employees of the hazard potential posed by waste materials, their treatment, treatment chemicals, waste processing equipment and material handling equipment.

- Educate personnel on the importance of compliance with environmental and occupational health & safety regulations.

To accomplish the training program goals, its curriculum is divided into three broad categories:

- General Orientation (Initial) Training to comply with RCRA and OSHA training standards for employees working with hazardous waste.

- Job Specific Training to update employees on changes in regulations, permits, company policies, process equipment etc. This training will be done on an as needed basis.

- Continuing Training to periodically review Initial Training material.

All employees directly involved in the handling and management of wastes receive general orientation training (Section H2.0) which introduces an employee to the management and operations of 21 EMI and provides an understanding of health and safety principles, applicable permit requirements and environmental regulations. General orientation training is given

In addition, every employee involved in the operations of the facility will participate in regularly scheduled continuing training (Section H4.0). Employees receive continuing training to maintain proficiency, learn new techniques and procedures, reinforce safety, quality, and compliance consciousness, and retain accumulated knowledge. For general orientation and continuing training, refer to Table H4-1, Training Matrix, for a summary of the training requirements applicable to each job title, and training frequency schedules applicable to each training module.

The training program is designed to provide employees with training relevant for correct performance of their respective job activities, as summarized in Section H7.0, Personnel Duties, Job Descriptions, and Requisite Qualifications. Documentation to demonstrate that employees have completed training sessions is maintained using procedures described in Section H6.0. Training program administration is discussed in Section H5.0. Refer to Table H4-1, Training Matrix, for a summary of the training requirements applicable to each job title.

H2.0 GENERAL ORIENTATION TRAINING

PSC-Fernley has developed a general orientation training program which meets both the OSHA Hazardous Waste Operations and Emergency Response training regulations (1910.120) and the RCRA training requirements (264.16) for treatment, storage, and disposal facilities (TSDF) employees. Under OSHA, employees involved in hazardous waste operations at TSDFs regulated by RCRA are required to complete 24 hours of introductory training and three days of supervised work experience prior to working without direct supervision. Under RCRA, employees must successfully complete a program of classroom instruction or on-the-job training in hazardous waste management procedures and emergency response. At a minimum, employees must be trained in:

-Procedures for using, inspecting, repairing and replacing facility emergency and monitoring equipment;
-Key parameters for waste feed cut-off operations;
-Communications or alarm systems;
-Response to fires or explosions;
-Response to spills or groundwater contamination incidents; and
-Shutdown of operations.

Employees will not be exposed to hazardous situations in the workplace and will work under direct supervision until they have completed these initial training requirements. This training will be completed within six months after the date of their employment or reassignment. Employees not trained to the specific requirements of a position will not work unsupervised in that position.

An outline of the general orientation training modules are provided in Figures H2-1 through H2-9. Refer to Table H4-1, Training Matrix, for a summary of the training requirements applicable to each job title.

General orientation training is designed to teach employees to perform hazardous waste management procedures and, when necessary, emergency response procedures, in a safe and healthful manner so as not to endanger themselves or other employees.

H3.0 JOB SPECIFIC TRAINING REQUIREMENTS

A common and successful method for personnel training is on the job training (OJT). It provides each employee with training pertinent to normal daily operation at the facility. The training provided will be based on the requirements of the tasks and will be conducted by qualified managers, supervisors, foremen, and equipment representatives. Because of the open-ended nature of this type of training, it is conducted on an as needed basis.

New technology training will be conducted whenever new equipment is introduced into the plant operation. This training will be conducted by a qualified instructor/operator of the new equipment. This may include factory representatives or design personnel. This training will be documented as described in Section 5.0. Job Specific refresher training will be conducted on an as needed basis.

H4.0 CONTINUING TRAINING

All PSC-Fernley facility personnel will take part in a periodic refresher of the subjects covered in the General Orientation Training program as well as an annual 8-hour refresher course to meet OSHA training requirements in accordance with 29 CRF 1910.120 (e)(2,4). The refresher training is designed to remind employees of the critical elements covered in the initial training, and to communicate new regulatory or facility requirements. In addition, review of the facility contingency plan (including a simulated emergency evacuation drill) will occur on a quarterly basis. All on-site employees must take part in these drills, and it must be documented in the operating record.

As changes in pertinent regulations are identified, and/or changes in operations procedures occur, current compliance status and procedures are reviewed. If necessary, training modules are revised and employees are retrained on the pertinent topics. At a minimum, refresher training materials will be evaluated each year and updated as needed to ensure that information is current. Refresher training will be documented for each employee.

H5.0 TRAINING PROGRAM ADMINISTRATION

H5.1 Training Personnel Qualifications

Training will be conducted by on-site personnel and/or outside consultants who have academic credentials and/or demonstrated expertise in the subject matter being presented. These in-house experts may include supervisory personnel. Outside experts may include, safety specialists, engineers, chemists or other professionals. PSC will ensure that training will be directed by a person who is competent to teach compliance with the regulations of 40 CFR 260 through 270 and 29 CFR 1910.120(p), and such person will teach facility personnel hazardous waste management procedures relevant to their employment positions.

H5.2 Training Format

Training is conducted in meetings, small discussion groups, classroom settings or at the employee's work-site. Lectures, plant tours and field demonstrations are also used as training methods. Much of the training is on-the-job training performed at the site, using actual equipment under actual job conditions with close supervision. Programmed instruction such as videotapes or printed materials may be used. For some training, courses and teaching materials developed by experts in the field are used. In addition, some of this training is accomplished by attending seminars, short-courses or college courses.

PSC-Fernley will maintain a list of active employees, their position title (Figure H3-1 is an example) and a job description (Figure H3-2 – H3-12) for each position. The job description describes the essential components of the position relative to managing hazardous waste. PSC also maintains a matrix which correlates the initial OSHA/RCRA training modules (Table H4-1 is an example) to the job description.

H5.3 Training Effectiveness Evaluation

Qualitative evaluation techniques are used to measure a trainee's proficiency level. Examples of evaluation techniques are performance in written and oral exams and careful observation of on-the-job performance. The supervisor determines whether the trainee has mastered the skills necessary to perform the tasks described in the job description.

H6.0 TRAINING DOCUMENTATION

Training records of employees working at the facility are maintained at the facility by the Facility Manager or appointed designee. Training records of former employees are kept at least three years from the date the employee last worked at the facility. Training records of current personnel are kept on- site until closure of the facility.

A sign-in sheet is distributed during each meeting which records attendance at training sessions. The sign-in sheet contains a written description of the training topic, the instructor, date and hours of training and a list of attendants and their signatures.

A personal training log for each facility employee is kept at the facility. All orientation, on-the-job, and continuing training is logged on this form by the facility manager or appointed designee.

In addition to the personal training log, training records include copies of certificates of attendance at seminars, tests and documentation that the required training for each employee has been satisfactorily completed.

H7.0 PERSONNEL DUTIES, JOB DESCRIPTIONS, AND REQUISITE QUALIFICATIONS

PSC - Fernley will maintain a list of active employees, their position title (Figure H3-1 is an example) and a job description (Figure H3-2 – H3-12) for each position. The job description describes the essential components of the position relative to managing hazardous waste. PSC also maintains a matrix (Table H4-1) which correlates the OSHA/RCRA training modules to the job description.

Figure H2-1 Training Module Outline: Facility Orientation

FACILITY ORIENTATION

1. New Employee Orientation
   - **Facility Description**
   - **Locations of Emergency Equipment**
   - **Procedures to Enter and Leave Facility**
   - **Plant Tour**
   - **Organization Structure**

2. Contractor Facility Orientation
   - **Restricted Areas**
   - **Procedures to Enter and Leave Facility**

3. Employee Facility Orientation
   - **Policy and Procedures Manual**
   - **Medical Surveillance Program**
   - **Hazardous Communication/Right to Know**
   - **Industrial Hygiene**
   - **Toxicology**
   - **Accident Reporting & Investigation**
   - **24 hour HAZWOPER**
   - **8- Hr HAZWOPER refresher**

Figure H2-2 Training Module Outline: Basic Chemical Concepts and Health Effects

BASIC CHEMICAL CONCEPTS AND HEALTH EFFECTS

1. Toxicology
2. Chemistry of Hazardous Substances
3. Health Effects and Toxic Substances

Figure H2-3 Training Module Outline: Waste Identification, Required Recordkeeping, and Regulatory Overview

WASTE IDENTIFICATION, REQUIRED RECORDKEEPING, AND REGULATORY OVERVIEW

1. Use of Manifest System
2. Use of 21 EMI internal Tracking System
3. Labeling and Placarding of Hazardous Materials
4. EPA Waste Codes, Nevada Waste Definitions, EPA Definitions and Notification
5. RCRA Part B permit
6. OSHA Recordkeeping Requirements and Forms
7. RCRA Recordkeeping Requirements and Forms

Figure H2-4 Training Module Outline: Hazardous Waste Management

HAZARDOUS WASTE MANAGEMENT

1. Waste Processing Procedures (truck bay, storage bay, detox, dewater, evaporation dryer, solids storage)
2. Hazardous Waste Transportation Procedures
3. Hazardous Waste Handling (drum handling, tank storage, container management, boiler, scrubbers, baghouse)
4. Shipping/Receiving
5. DOT Hazardous Materials

Figure H2-5 Training Module Outline: Lab Procedures and Protocols

LAB PROCEDURES AND PROTOCOLS

1. Sampling Procedures (waste receipt, tanks, reactors, dewatering)
2. Analytical Protocols
3. Process Development Methodologies (waste treatment protocols)
4. QA/QC Program
5. Waste Analysis Plan
6. Chemical Hygiene Plan

Figure H2-6 Training Module Outline: Release Prevention and Emergency Response

RELEASE PREVENTION AND EMERGENCY RESPONSE

1. Release Prevention, Waste Feed Cutoffs, Secondary Containment
2. Inspection Program
3. Procedures for Using, Replacing, Inspecting, and Repairing Emergency Equipment and Monitoring Systems
4. Communication and Alarms Systems, Tank Level Alarms, H2S/HCN Monitors, Fire Alarms, Phones, Man Down Alarms
5. Contingency Plan Implementation Drill (Quarterly)
6. Response to Fires, Spills, and/or Groundwater Contamination Incidents
7. Evacuation and Notification Procedures
8. Operation Shutdown Procedures

Figure H2-7 Training Module Outline: OSHA Standards

OSHA STANDARDS

1. Forklift (hands on)
2. Confined Space Entry program and permits
3. Lockout/Tagout Procedures and permits
4. Hearing Conservation
5. Hot Work program and Permits

Figure H2-8 Training Module Outline: Personal Protective Equipment

PERSONAL PROTECTIVE EQUIPMENT

1. Personal Protective Equipment
    - **Job-specific personal protective equipment requirements**
2. Respiratory Protection
3. Respiratory Fit Test
4. Personal and Equipment Decontamination
    - **Location and use of safety showers and eyewashes**
    - **Decontamination and Clean-up Procedures**

Figure H2-9 Training Module Outline: Miscellaneous

MISCELLANEOUS

1. Basic First Aid and CPR Training
2. Basic Fire Safety/Fire Extinguisher Training
3. Fire Safety/Fire Extinguisher Training II

Figure H3-1 Example of Employee Titles and Staffing

EXAMPLE OF EMPLOYEE TITLES AND STAFFING

Position Title	Number of Employees
Facility Manager	1
Operations Supervisor	1
Administrative Manager	1
Materials Manager	1
Maintenance Supervisor	1
Hazardous Waste Technician	20
Laboratory Technician	2
Maintenance Mechanic	2
Driver	4
AP/AR Clerk	2

Figure H3-2 Job Title: Facility Manager

JOB TITLE: Facility Manager

REPORTS TO: Vice President, Western Region

FUNCTION: Manage the business aspects of the plant and directly supervise the department managers to ensure the plant operates safely, efficiently and in compliance with company policy and all applicable local, state and federal regulations.

DUTIES:

- Oversight responsibility for the entire facility and its personnel
- Stay current with all applicable State, Federal, and local regulations and permit issues
- Enforce proper safety practices
- Stay current on status of facility processing systems
- Participate as an instructor in employee Training Program
- Develop thorough knowledge of facility operations and emergency procedures
- Primary or alternate emergency coordinator (as assigned)

REQUISITE QUALIFICATIONS:

Must possess three to five years relevant management experience, working knowledge of regulatory processes, compliance and permitting, must qualify for and pass an OSHA 24-hour course.

Figure H3-3 Job Title: Operations Supervisor

JOB TITLE: Operations Supervisor

REPORTS TO: Facility Manager

FUNCTION: Manage the day-to-day operations of the plant to ensure the plant operates safely, efficiently and in compliance with company policy and all applicable local, state and federal regulations.

DUTIES:

- Direct management responsibility for the operations and maintenance departments
- Stay current with all applicable State, Federal, and local regulations and permit issues
- Enforce proper safety practices
- Stay current on status of facility processing systems
- Participate as an instructor in employee Training Program
- Develop thorough knowledge of facility operations and emergency procedures
- Primary or alternate emergency coordinator (as assigned).

REQUISITE QUALIFICATIONS:

Working knowledge of State and Federal environmental, transportation, and OSHA regulations as they pertain to the processing of hazardous waste, must keep accurate records, process and complete forms and reports on time, must be able to dress in PPE, including respirator, without suffering undue stress, and must qualify for and pass an OSHA 24 hour course.

Figure H3-4 Job Title: Administrative Manager

JOB TITLE: Administrative Manager

REPORTS TO: Facility Manager

FUNCTION: Manage Facility Administrative functions and assist Facility Manager with administrative activities.

DUTIES:

- Must effectively interact, support and communicate with facility personnel, visitors, contractors and vendor personnel
- Review regulatory documents
- Maintain Regulatory Files
- Work with Customers to Profile Waste
- Participate as an instructor in employee Training Program

REQUISITE QUALIFICATIONS:

Must be computer literate; possess a minimum of 3 plus years general office experience with proven management or supervisory experience. Must qualify for and pass an OSHA 24 hour course.

Figure H3-5 Job Title: Materials Manager

JOB TITLE: Materials Manager

REPORTS TO: Facility Manager

FUNCTION: Managing the laboratory, sampling, analysis, data reporting and treatment recommendations based on analytical results.

DUTIES:

- Manage all aspects for the Waste Analysis Plan that pertains to the laboratory
- Aggressively enforce proper safety practices
- Prepare and update QA/QC procedures for the Lab
- Participate as an instructor in employee Training Program
- Provide additional training to all laboratory personnel to keep them current with updated analytical and regulatory requirements

REQUISITE QUALIFICATIONS:

Must possess a BS or BA degree in Chemistry, Chemical Engineering or Science Major requiring extensive studies in chemistry or equivalent experience, three or more years of experience as a Laboratory Technician exhibiting thorough understanding of laboratory methods and procedures.

Figure H3-6 Job Title: Maintenance Supervisor

JOB TITLE: Maintenance Supervisor

REPORTS TO: Operations Supervisor

FUNCTION: Manage and Maintain, install and repair all plant facilities, machinery and equipment and supervise maintenance personnel.

DUTIES:

- Enforce proper safety practices
- Manage maintenance personnel and coordinate maintenance activities for the facility
- Prioritize work with support of Facility Manager and Operations Supervisors
- Implement and direct a preventative maintenance program
- Maintain a working level or critical spare repair parts and consumables
- Provide necessary specialized training for maintenance personnel
- Ensures the accuracy of maintenance records

REQUISITE QUALIFICATIONS:

Maintenance supervisory experience necessary, should have strong background in mechanical, electrical and hydraulic repair, must be able to dress in PPE, including respirator, without suffering undue stress and must qualify for and pass an OSHA 24 hour course.

Figure H3-7 Job Title: Hazardous Waste Technician

JOB TITLE: Hazardous Waste Technician

REPORTS TO: Operations Supervisor

FUNCTION: Perform a variety of duties related to processing and shipping hazardous materials.

DUTIES:

- Ship and receive materials in compliance with operational procedures and regulatory requirements. Report discrepancies to supervisor.

- Sample all materials, as required to verify wastestream identification and assure safe and appropriate consolidation, transfer and shipment for disposal operations.

- Distribute materials to proper storage and treatment areas. This includes operating industrial mobile equipment such as forklifts, sweepers, etc. and selecting, inspecting and operating pumps, hoses, fittings, gaskets, compressors.

- Perform segregation, transfer and compacting procedures according to company policies, job safe practices, quality assurance guidelines and in compliance with all applicable regulatory requirements.

- Conform to all job safety operating procedures including keeping equipment and work area in a clean and orderly condition, using proper chemical storage, labeling and handling techniques and using personal protective equipment.

- Inspect work area for proper storage, labeling, leaks, equipment and material deficiencies and process malfunctions. Report discrepancies to supervisor.

- Report and respond to plant emergencies, as needed, and in accordance with the Contingency Plan.

Figure H3-7 Job Title: Hazardous Waste Technician (continued)

REQUISITE QUALIFICATIONS:

Prior chemical plant experience desirable. Must be able to dress in PPE, including respirator, without suffering undue stress and must qualify for and pass an OSHA 24 hour course.

Figure H3-8 Job Title: Laboratory Technician

JOB TITLE: Laboratory Technician

REPORTS TO: Materials Manager

FUNCTION: Sampling, analysis, data reporting and treatment recommendations based on analytical results.

DUTIES:

- Perform analytical testing on waste stream samples and process samples
- Record and document all data necessary to support Waste Analysis Plan
- Follow all site safety and health requirements
- Maintain instrumentation to perform QA requirements for specific analysis performed

REQUISITE QUALIFICATIONS:

Must have some Chemistry in background, must demonstrate ability to keep accurate records, process forms and complete reports, must be able to dress in PPE, including respirator, without suffering undue stress and must qualify for and pass an OSHA 24 hour course.

Figure H3-9 Job Title: Administrative Assistant

JOB TITLE: Administrative Assistant/Receptionist

REPORTS TO: Administration Manager

FUNCTION: Assist Administration Manager in running an efficient and productive office.

DUTIES:

- Schedule incoming waste shipments
- Enter Waste Tracking information in to computer
- Review regulatory documents
- Answer phone calls, and relay messages to appropriate personnel
- Greet and direct walk-in customers

REQUISITE QUALIFICATIONS:

Must keep accurate records, process forms and complete forms punctually, must be computer literate and must qualify for and complete forms punctually, and must qualify for and pass an OSHA 24-hour course.

Figure H3-10 Job Title: Maintenance Mechanic

JOB TITLE: Maintenance Mechanic

REPORTS TO: Maintenance Supervisor

FUNCTION: Maintain, install and repair all plant facilities, machinery and equipment.

DUTIES:

- Maintain, inspect, test, install, adjust, remove, disassemble, repair and replace plant facilities, machinery and equipment. Report any deficiencies or malfunctions to supervisor.

- Maintain inventory of repair supplies and requisition materials as needed.

- Perform routine service and repairs on mobile equipment including checking oil, fuel, water, tires, brakes, lights, horns. Report defects to supervisor.

- Perform routine maintenance on all equipment including oiling and lubrication of all motors and pumps/agitators and packing on agitator shafts.

- Maintain logs, records and all required forms including daily maintenance log in a current, accessible and orderly manner.

- Conform to all safe operating procedures including keeping equipment and work area in a clean and orderly condition, using personal protective equipment, and proper chemical handling, storage and labeling.

- Report and respond to emergencies, as needed and in accordance with the Contingency Plan.

REQUISITE QUALIFICATIONS:

Previous experience in welding, machine shop or other industrial maintenance preferred. Chemical plant experience desirable. Must qualify for and pass an OSHA 24 hour course.

Figure H3-11 Job Title: Driver

JOB TITLE: Driver

REPORTS TO: Transportation Manager

FUNCTION: To transport client waste in compliance with all State and Federal Safety Regulations.

DUTIES:

- Pick up client waste and transport to designated facility
- Utilize safe driving practices and procedures
- Complete and keep accurate records

REQUISITE QUALIFICATIONS:

Must have a valid Class A driver's license and a good driving record, must have required certificates to haul Hazardous Waste. Keep accurate records, punctually process and complete reports, must be able to dress in PPE, including respirator, without suffering undue stress and must qualify for and pass an OSHA 24 hour course.

Figure H3-12 Job Title: AP/AR Clerk

JOB TITLE: AP/AR Clerk

REPORTS TO: Controller

FUNCTION: Assist Controller in handling financial requirements.

DUTIES:

- Process accounts receivable and payable information
- Process invoicing in order to bill customers
- Contact customers regarding information needed to complete account status
- Keep inventory of materials needed for facility and purchase material as directed

REQUISITE QUALIFICATIONS:

Accounting background desired and must be computer literate.

	Training Module	Initial Schedule (Days)	Refresher Schedule (Days)	Facility Manager	Operations Supervisor	Administrative Manager	Materials Manager	Maintenance Supervisor	Hazardous Waste Technician	Laboratory Technician	Administrative Assistant	Maintenance Mechanic	Driver	AP/AR Clerk
	Facility Orientation													
1	New Employee Orientation	90	N/A	X	X	X	X	X	X	X	X	X	X	X
2	General Facility Health and Safety	90	365	X	X	X	X	X	X	X	X	X	X	X
3	Policy and Procedures Manual	90	365	X	X	X	X	X	X	X	X	X	X	X
4	Medical Surveillance Program	90	365	X	X		X	X	X	X		X	X	
5	Hazardous Communication/Right to Know	90	365	X	X		X	X	X	X		X	X	
7	Accident Reporting & Investigation	90	365	X	X	X	X	X	X	X	X	X	X	X
8	24-Hour HAZWOPER	90	N/A	X	X		X	X	X	X		X	X	
9	8-Hour HAZWOPER Refresher	90	365	X	X		X	X	X	X		X	X	
	Waste Identification, Required Recordkeeping, and Regulatory Overview													
14	Use of 21 EMI Internal Tracking System	180	365	X	X	X	X			X	X			
15	Labeling and Placarding of Hazardous Materials	180	365	X	X		X		X	X			X	
16	EPA waste codes, Nevada waste definitions	180	730	X	X		X		X	X			X	
17	RCRA Part B Permit	180	365	X	X	X	X	X						
18	OSHA Recordkeeping Requirements and Forms	180	365	X	X									
19	RCRA Recordkeeping Requirements and Forms	180	365	X	X									
	Hazardous Waste Management													
20	Waste Processing Procedures	180	365	X	X				X					
24	DOT Training/HM 181 & 262	180	1095	X	X	X	X	X	X	X	X	X	X	
	Lab Procedures and Protocols													
25	Sampling Procedures	180	365	X	X		X		X	X				
29	Waste Analysis Plan	180	365	X	X		X			X				
30	Chemical Hygiene Plan	180	365	X	X		X			X				
	Release Prevention and Emergency Response													
35	Contingency Plan Implementation Drill (Quarterly)	90	90	X	X	X	X	X	X	X	X	X	X	X
36	Emergency Response Procedures	90	365	X	X	X	X	X	X	X	X	X	X	X
	OSHA Standards													
39	Forklift	180	1095		X			X	X			X	X	
40	Confined Space Entry program and permits	180	365	X	X			X	X			X		
41	Lockout/Tagout Procedures and permits	180	365	X	X		X	X	X	X		X	X	

	Training Module	*Initial Schedule (Days)*	*Refresher Schedule (Days)*	*Facility Manager*	*Operations Supervisor*	*Administrative Manager*	*Materials Manager*	*Maintenance Supervisor*	*Hazardous Waste Technician*	*Laboratory Technician*	*Administrative Assistant*	*Maintenance Mechanic*	*Driver*	*AP/AR Clerk*
42	Hearing Conservation	180	365	X	X			X	X			X	X	
43	Hot Work program and Permits	180	365	X	X			X				X	X	
	Personal Protective Equipment													
44	Personal Protective Equipment	90	365	X	X		X	X	X	X		X	X	
45	Respiratory Protection	90	365	X	X		X	X	X	X		X	X	
46	Respiratory Fit Test	90	365	X	X		X	X	X	X		X	X	
47	Personal and Equipment Decontamination	90	365	X	X		X	X	X	X		X	X	
	Miscellaneous													
48	Basic First Aid and CPR Training	180	730	X	X		X	X	X	X		X	X	
49	Fire Safety/Fire Extinguisher Training	180	365	X	X	X	X	X	X	X	X	X	X	X

N/A Not Applicable. Courses for these topics are not refreshed, initial course only.

SECTION I

CLOSURE PLAN AND COST ESTIMATES

SECTION I CLOSURE PLAN AND COST ESTIMATES

LIST OF TABLES

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SECTION I. CLOSURE PLAN AND CLOSURE COST ESTIMATES

40 CFR 264 Subparts G & H

I1.0 CLOSURE PLAN

40 CFR 270.14 (b)(13), 264.112

This closure plan describes the procedures that 21st Century Environmental Management of Nevada, LLC (hereinafter referred to as the PSC Fernley facility, or Fernley facility) will follow to close existing and planned hazardous waste management units. Closure activities will be performed in accordance with 40 CFR 264 Subparts G and H. Closure requirements for waste piles, surface impoundments, land treatment, landfills, or incinerators do not apply to the PSC Fernley Facility.

This closure cost estimate will be updated as necessary as new waste management units are constructed, or when existing waste management units are closed. This document will also be updated when regulations or regulatory guidance dictates new closure requirements that may affect the cost of closing the facility.

The Fernley Facility closure plan contains the following:

- Section I1.1 Facility Description
- Section I1.2 Closure Performance Standards
- Section I1.3 Maximum Waste Inventory
- Section I1.4 Closure Schedule
- Section I1.5 Closure Activities (including inventory elimination, decontamination procedures and sampling and analysis).

I1.1 Facility Description

USEPA/NDEP Facility Identification Number: NVD980895338

Operator's Name: 21st Century Environmental Management of Nevada, LLC

Address: 2095 Newlands Drive
Fernley, Nevada 89408
Telephone Number: (775) 575-2760

The PSC Fernley Facility is located on a 10-acre site at 2095 Newlands Drive, Fernley, in Lyon County, Nevada. Land use for the facility is permitted and zoned as Heavy Industrial.

Treatment processes generally include the processing and treatment of cyanide liquids, corrosives, sludges, and aqueous and non-aqueous metal-bearing wastes. The facility typically manages the following wastestreams:

- Organic Solvents
- Waste Oil and Coolants
- Miscellaneous Solids and Sludges
- Industrial Wastewater
- Cyanide Waste Treatment
- Miscellaneous Containerized Materials

The facility's waste management units and corresponding capacities are discussed in Section I1.3, Maximum Waste Inventory. Hazardous waste management units and operations are discussed in detail in Section B, Facility Description, and in Section D, Process Information. Also, refer to Figure I1-1, Facility Site Plan.

I1.2 Closure Performance Standards

40 CFR 264.111, 264.115, 264.178, 264.197

Closure activities at the PSC Fernley Facility are designed to meet Federal and State closure performance standards. The closure activities will accomplish the following:

- Minimize the need for further maintenance;
- Control, minimize, or eliminate to the extent necessary to protect human health and the environment, post-closure escape of hazardous waste, hazardous constituents, leachate, contaminated run-off, or hazardous waste

decomposition products to the ground, surface water, ground water, or atmosphere; and

- Return the land to the appearance and use of surrounding land areas to the degree possible given the nature of the previous hazardous waste activity.

Where removal or decontamination of hazardous waste management units, equipment, soils, hazardous wastes or residues, or other materials is done, the removal or decontamination will assure that the levels of hazardous waste or waste residues do not exceed:

1) For soils, ground water, surface water, and air, the numeric cleanup levels shall be set by NDEP using EPA Region IX guidance for industrial site clean up standards; and
2) For structures, equipment, bases, liners, etc. clean closure standards shall be the Alternate Treatment Standards defined in 40 CFR 268.45.

Generally, these standards will be met by removing all regulated waste from the facility and by decontaminating or removing all contaminated equipment, containment system components, structures, and soil. Decontamination of tanks will achieve a “clean debris surface” using an appropriate treatment method in Table 1 of 40 CFR 268.45 (Alternative Treatment Standards for Hazardous Debris).

Other closure policies and procedures to be followed include:

- A copy of the approved Closure Plan, and subsequent authorized amendments, will be maintained at the facility until closure is complete and certified.
- Changes in facility plans, operations or scheduling may result in an amended Closure Plan. Amended versions will be submitted to NDEP with a written request for a change to the approved Closure Plan.
- The PSC Fernley facility will notify NDEP in writing at least 45 days prior to the date final closure is expected to begin.
- Sequential closure of the hazardous waste management units will be followed for closing the entire facility. Refer to Section 1.5, Closure Activities, for a

description of the closure procedures for individual waste management units and Section I1.4, Closure Schedule, for the timing of these activities.

- All hazardous wastes within the facility and hazardous waste management units will be processed in the same manner as they would be under normal operating circumstances.
- During closure, hazardous wastes and process residues will continue to be segregated and stored according to their compatibility in the waste storage tanks and container storage areas.
- The PSC Fernley facility intends to use trained employees for closing the various units. However, facility closure cost estimates are based on third party costs (see Section I3.2, Unit Costs for Closure Activities).
- All required daily, weekly, and monthly facility inspections will continue to be performed during closure activities up until the final closure date arrives.
- At all times during closure activities, the required and applicable standard operating procedures for proper waste management will be followed.
- At all times during closure activities, the appropriate standard operating procedures for worker health, safety, and site security will be followed.
- All mobile or fixed equipment that has been used to process or handle hazardous wastes will be cleaned, decontaminated and re-used, or salvaged, or if necessary disposed off site at a RCRA-permitted facility.
- All hazardous waste storage and treatment tanks and associated equipment, piping and instrumentation will either be decontaminated and salvaged for scrap or re-use, or dismantled and disposed off site at a RCRA-permitted facility.
- Decontamination residues and contaminated soil generated from closure activities will be handled as required by 40 CFR 264.114.
- The requirements of the U.S. Department of Transportation (USDOT) 49 CFR will be followed for transporting any wastes or other equipment or materials off site.
- An independent, registered professional engineer will monitor all closure activities to ensure they are conducted in accordance with the approved closure plan. Closure activities to be monitored by the independent, engineer

include tank system decontamination, secondary containment decontamination, and concrete and soil sampling and analysis. The engineer will visit the facility at least weekly. These inspections will be part of the facility's operating record.

- Upon completion, the PSC Fernley facility will submit to NDEP certification that the final closure of the facility has been conducted in accordance with the specifications of the approved closure plan. This certification will be signed by management of the PSC Fernley facility and by an independent, professional engineer. This certification will be submitted to NDEP within 60 days of completion of final closure activities. The certification letter will include the following language:

  I certify under of penalty of the law that this document and all attachments were prepared under my direct supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based upon my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations.

I1.3 Maximum Waste Inventory

40 CFR 264.112(b)(2) & (3)

The maximum waste inventory includes all existing and proposed hazardous waste management units. It is based on the storage capacities for all waste container storage areas as well as all waste storage and treatment tanks. Tank capacities are typically expressed in gallons, and container capacities may be in 55-gallon drum equivalents or cubic yards. The capacities used for calculating the maximum waste inventory are individually listed in Table I1-1, Units Included in Maximum Waste Inventory.

The capacities of all sumps and of tanks that are exempt from Resource Conservation and Recovery Act (RCRA) regulation are not included in the maximum waste inventory.

The Hazardous Waste Storage Tank System consists of 34 storage and treatment tanks segregated in bermed secondary containment areas. The maximum waste inventory for the Hazardous Waste Storage Tank System is 219,835 gallons (see Table I1-1).

Containers of hazardous waste are stored in the East Pad Container Storage Area, East Container Storage Area, Truck Bay Container Storage Area, Lab Pack Room Container Storage Area, and the West Pad Container Storage Area. Total container storage for these areas is 2,569 cubic yards (or approximately 9,428 drums).

I1.4 Closure Schedule

40 CFR 264.112(b)(6), (7)

This section discusses schedules for final closure of the facility. The PSC Fernley facility uses closure insurance as authorized under 40 CFR 264.143(e). This financial mechanism requires no final year of closure, but the Fernley Facility is not expected to close prior to expiration of this permit cycle.

Sequential closure within the container storage areas, the hazardous waste tank system, and the Solids Receiving Area operation is planned to allow for use of some waste management units during inventory elimination and decontamination. Due to the variety and quantity of wastes handled, and the sizes of areas to be closed, closure activities are expected to take longer than 180 days; therefore, the PSC Fernley facility will require an extension of the 180-day closure time allowed by regulations.

Figures I1-2 and I1-3, found at the back of the section, present time schedules for each closure activity. Figure I1-2, Final Closure Schedule without Tank, Containment Pad, or Soil Removal, indicates the time required in weeks to complete closure activities in all container storage areas, waste storage and treatment tank systems, and processing areas provided that sample analysis indicates that no removal of containment pads and/or sub-soils is required. Figure I1-3, Final Closure Schedule with Tank, Containment Pad, or Soil Removal, picks up where the schedule in Figure I1-2 leaves off and takes into account the additional time needed in weeks should removal of containment pads and/or sub-soils be required. Section I1.5.3, Sampling and Analysis, describes methods for evaluating whether removal of containment pads and/or soil will be required.

The schedule for closure of each of the hazardous waste management areas is described below. The PSC Fernley facility will notify NDEP in writing at least 45 days prior to the date final closure is expected to begin, and at least seven days prior to any background or closure performance sampling events.

During the life of this permit, Individual tanks within the hazardous waste tank system that are deemed unfit for use or which do not pass tank assessments will be emptied and either decontaminated using the closure procedures and policies described in this plan or rinsed out, cut up, and disposed of as a hazardous waste.

Closure Schedule - Container Storage Areas

The proposed schedule for closing container storage areas at the Fernley Facility is shown below. The schedule covers closure of all container storage areas. Waste elimination will occur simultaneously in many of the areas. Because of the variety and quantities of containerized waste stored at the PSC Fernley facility, it will take an estimated 20 weeks to complete elimination of all inventories. Associated secondary containment and sump closure will occur after inventory elimination. This closure schedule is based on highest permitted quantities of hazardous waste.

Container Storage/Loading Areas

Closure Step	Est. Time Required
Notification to NDEP of Closure Initiation Date (CID)	1 day
Last Receipt of Waste	1 day
Inventory Elimination	20 weeks
Soil Sampling and Analysis	12 weeks

Pad Decontamination	10 weeks

If sampling and analysis indicate that containment pad or soil removal is required, closure of the container storage areas will take an additional 20 to 34 weeks, as detailed below and as indicated in Figure I1-3, Final Closure Schedule with Tank, Containment Pad or Soil Removal. Section I1.5.3, Sampling and Analysis, describes methods for evaluating whether containment pad or soil removal will be required.

Container Storage/Loading Areas – Additional Work

Closure Step	Est. Time Required	Completion Date
Containment Pad Removal	9 weeks	Week 41
Soil Removal	14 weeks	Week 55
Soil Sampling and Analysis	10 weeks	Week 65

Closure Schedule - Hazardous Waste Tank System

The proposed schedule for closure of the hazardous waste tank system at the Fernley Facility is summarized below, based on information shown in Figure I1-2, Final Closure Schedule without Tank, Containment Pad, or Soil Removal. This system includes all waste tanks within the containment areas, the secondary containment pads, the Hazardous Waste Loading/Unloading Pad, and associated sumps. The closure schedule is based on estimated quantities of hazardous waste under maximum inventory conditions. With some overlap between activities, and assuming removal of containment pads and/or soils is not required, closure of the hazardous waste tank system is estimated to take 224 days, or 34 weeks.

Hazardous Waste Tank System Closure

Closure Step	Est. Time Required
Inventory Elimination	20 weeks
Tank Decontamination	16 weeks
Soil Sampling and Analysis	8 weeks

Pad Decontamination 8 weeks

If sampling and analysis indicate that tank, containment pad, or soil removal is required, closure of the waste tank system will take an additional 15 to 44 weeks, as detailed below and as indicated in Figure I1-3, Final Closure Schedule with Tank, Containment Pad or Soil Removal. Section I1.5.3, Sampling and Analysis, describes methods for evaluating whether containment pad or soil removal will be required.

Hazardous Waste Tank System Closure – Additional Work

Closure Step	Est. Time Required
Tank Removal	15 weeks
Pad Removal	9 weeks
Soil Removal	12 weeks
Soil Sampling and Analysis	8 weeks

I1.5 Closure Activities

40 CFR 264.112(b)(1),(3) & (4)

This section describes closure activities for the hazardous waste management units at the PSC Fernley facility. A summary of the closure procedures by unit type is followed by a description of the inventory elimination processes. Decontamination procedures are described in Section I1.5.2. Finally, Section I1.5.3 contains the sampling and analysis plan. Any partial closures will follow the described procedures for that particular type of unit.

Container Storage Areas Closure Procedure

40 CFR 264.178

The waste inventory will be removed within 20 weeks after receiving the final volume of regulated waste in the container storage areas. All containerized waste will be processed for disposal at an off-site RCRA-permitted facility or treated as described in Section I1.5.1, Inventory Elimination. The types of waste stored in the Fernley Facility's container storage areas are listed in the Part A permit. Empty drums will be salvaged, reconditioned, or disposed at an off-site RCRA-permitted facility.

Once all containers have been removed, decontamination of the containment pads, loading/unloading areas, curbing, drains, and sumps will be performed and verified as described in Section I1.5.2 (Decontamination Procedures) and Section I1.5.3 (Sampling and Analysis). An alternate procedure will be to break up the pads prior to any decontamination and dispose of them at an off-site RCRA-permitted facility. If a containment pad cannot successfully be decontaminated, it will be removed and sent to an off-site RCRA-permitted facility.

After the containment pads have been decontaminated or removed, foundation soils will be sampled and analyzed for contamination as described in Section I1.5.3 (Sampling and Analysis). Any soils found to be contaminated will be removed and disposed at an off-site RCRA-permitted facility.

<u>Hazardous Waste Tank System Closure Procedure</u>

40 CFR 264.197

Inventory contained within the hazardous waste storage and treatment tank system will be eliminated within 24 weeks of receiving the final volume of waste. The waste inventory in tanks will be removed as described in Section I1.5.1, Inventory Elimination. The types of hazardous wastes handled in the tanks are described in the Part A permit.

As each tank is emptied, decontamination will be performed and verified as described in Section I1.5.2, Decontamination Procedures. An alternate procedure will be to cut up the tank prior to any decontamination and dispose of the pieces at an off-site RCRA-permitted facility. If a tank cannot successfully be decontaminated, it will be cut up and sent to an off-site RCRA-permitted facility for disposal.

After the tanks are removed, the surface of the containment pad will be decontaminated. If the containment pad cannot be successfully decontaminated, it will be removed and sent to an off-site RCRA-permitted facility. An alternate procedure will be to break up the pad prior to any decontamination and dispose of it at an off-site RCRA-permitted facility.

After the containment pad is decontaminated or removed, foundation soil will be sampled and analyzed for contamination as described in Section I1.5.3, Sampling and Analysis. Any soils found to be contaminated will be removed and disposed at an off-site RCRA-permitted facility.

I1.5.1 Inventory Elimination

40 CFR 264.112(3)

This section is a summary of the various treatment options that may be used to eliminate hazardous waste inventory at closure. Detailed descriptions of the treatment processes and of the facility are found in Section B, Facility Description.

It is anticipated that wastes processed during closure will be processed in the same manner as they would be under normal facility operating circumstances. This would certainly be the case of a voluntary, orderly closure using PSC Fernley facility personnel. However, if facility closure is being conducted by a third party that is unfamiliar with normal operations at the facility, the third party may elect to load and ship the unprocessed wastes off-site for processing, treatment, and disposal by others. It is this closure scenario that is accounted for in the closure cost estimate. See Section I3.0, Closure Cost Estimates, for more details.

Hazardous waste treatment at the facility includes the following processes:

Existing Processes:

- Decanting
- Sedimentation

- Cyanide Destruction
- Chemical Oxidation
- Chemical Precipitation
- Chemical Reduction
- Neutralization
- Dewatering

Wastes that require treatment and/or disposal include:

- Organic Solvents
- Waste Oil and Coolants
- Miscellaneous Solids and Sludges
- Industrial Wastewater
- Industrial Corrosives
- Cyanides
- Miscellaneous Containerized Materials

Inventory elimination for miscellaneous containerized materials, including paints, cements, sealers, resins, and miscellaneous containerized materials for consolidation will be managed using the most appropriate disposal or treatment option available, including the following:

- Organic solvents, waste oils, and coolants will be used as hazardous waste fuel at an off-site RCRA-permitted facility or to an off-site RCRA-permitted incinerator.

- Solids and sludges may be consolidated for transport off site to a RCRA-permitted facility for incineration or disposal.

- Industrial wastewater may be treated on site for ultimate evaporation, or shipped offsite for treatment and disposal.

Remaining treatment chemicals will be sold for beneficial re-use, or may be transported for use at another PSC Facility. Any wastes generated as a result of decontamination procedures will be handled in accordance with all applicable requirements of 40 CFR 261.10 through 261.35 and 40 CFR 268 Subparts C and D.

I1.5.2 Decontamination Procedures

40 CFR 264.112(b)(4), 264.114

This section describes the decontamination procedures to be used for closure activities at the PSC Fernley facility. The decontamination policies and/or requirements listed below are based on federal and state regulations, EPA closure guidance manuals, and the PSC Fernley facility company policies and standard operating procedures. The decontamination policies and/or requirements are designed to ensure that all federal and state requirements for decontamination during closure will be met. Decontamination procedures to be used during closure activities at the Fernley Facility are as follows:

- No equipment used in closure activities will be removed from the site until it has been decontaminated, unless it is removed for disposal as a hazardous waste.

- All equipment, including mobile equipment and earth moving equipment, which has come in contact with hazardous waste constituents during closure activities will be decontaminated before use outside the contaminated area.

- During closure, contaminated equipment, containment system components, structures, and soils will be decontaminated for salvage or beneficial use, or disposed at an off-site RCRA-permitted facility.

- Any residues generated during decontamination activities will be handled in accordance with all applicable requirements of 40 CFR 261.10 through 261.35. Decontamination rinsate may be appropriately treated on site using methods described in Section I1.5.1, Inventory Elimination or shipped off site for treatment and disposal.

Sequence of Decontamination

The sequence of decontamination is crucial to prevent recontamination of surfaces and to ensure that rinsates can be handled at the facility in an expeditious manner. The general flow of rinsate will coincide with the flow of treated wastes as it progresses through the treatment processes. Decontamination will begin with elimination of the waste inventory in each respective area. Table I1-2, Decontamination Sequence, reflects the general sequence that will be followed during closure of the facility:

Tank System Decontamination

The decontamination procedures discussed in this section will be used for all hazardous waste storage and treatment tanks and associated pumps and piping. These procedures will also be used to decontaminate the Subpart X units (crystallizer and filter presses).

Decontamination of tanks, piping, Subpart X units, and ancillary equipment may be performed to meet the treatment standards for contaminated debris. All tank decontamination will be done by scraping followed by cleaning with high-pressure water and an appropriate cleaning solution (if necessary) until equipment and materials show no visible evidence of contamination. The type of cleaning solution used will be selected based on the tank's previous contents and physical condition at the time of decontamination. Based on EPA guidance, rinsate is estimated to be generated at approximately 4 gallons per square foot for tanks and 50 gallons per pump for pumps and feedlines. Tanks, piping, Subpart X units and ancillary equipment that cannot be decontaminated to the standards of 40 CFR 268.45 will be sent off-site for macroencapsulation.

Rinsate and cleaning residue from all washings will be managed as hazardous waste. All rinsate will be collected and removed using pumps, a vacuum truck or equivalent means. The collected rinsate will be treated appropriately on-site using methods described in Section I1.5.1, Inventory Elimination, or sent off site for treatment and disposal at a RCRA-permitted facility.

An alternate procedure will be to cut up tanks, Subpart X units, and/or pumps, piping and ancillary equipment prior to any decontamination and dispose of the pieces at an off-site RCRA-permitted facility. Any tanks or equipment sent off site for macroencapsulation will be rendered unusable prior to leaving the facility. This will be accomplished by cutting at least one end off the tank or processing unit. Tanks and equipment that have been successfully decontaminated will not be removed from the facility until written proof of decontamination has been obtained from the independent professional engineer monitoring closure activities.

Decontamination of Interior Wall/Ceiling Surfaces

Interior wall and ceiling surfaces will be decontaminated after removal of the tank system and prior to decontamination of container storage areas. This decontamination will be accomplished using high-pressure water and is anticipated to use approximately one gallon of water per 5 square feet. The rinsate will be collected, sampled and characterized for disposal. Treatment of the rinsate will be accomplished by evaporation on-site or at a permitted off-site treatment facility.

Decontamination of Containment Storage Areas

The decontamination procedures discussed here cover all containment surfaces including, but not limited to, the container storage areas and the loading/unloading pads. These procedures also apply to sump systems throughout the facility.

Soil sampling will be performed prior to containment structure decontamination (see Section I1.5.3, Sampling and Analysis). If soil is not contaminated, the surface of the containment pads will be decontaminated to meet the treatment standards for contaminated debris, using methods described below. If the soils are found to be contaminated, the concrete will be demolished and disposed as hazardous waste at an off-site RCRA-permitted landfill. Concrete meeting the treatment standards for contaminated debris may be disposed of in a Subtitle C landfill. The concrete may also be excluded from Subtitle C regulation by either (1) the NDEP's determination that the debris no longer contains hazardous waste, or (2) by compliance with the debris treatment standards for extraction or destruction technologies, as provided in Table 1 of 40 CFR 268.45 (and provided the concrete does not exhibit a hazardous characteristic after treatment).

At the time of closure, all containment pads will be inspected prior to decontamination. Cracks or gaps where run-off could carry rinsate to the underlying soil will be filled and sealed to avoid contamination of the underlying soil. The crack sealants used will be resistant to both water and any cleanser designated for use in each area.

Concrete secondary containment may be decontaminated by either high-pressure washing followed by conformational chip sampling, or by scarification, sandblasting, and/or ball blasting to meet the treatment standards for contaminated debris as provided in Table 1 of 40 CFR 268.45. An alternative procedure in lieu of decontamination would be to demolish and remove the concrete or asphalt containment system for disposal as hazardous waste.

High-pressure washing will occur at a rate of approximately four gallons of rinsate per square foot of concrete. This rate is the standard under EPA's Final Report Guidance Manual: All rinsate will be collected in existing sump systems and removed between each rinse by pumps, a vacuum truck or equivalent means. The collected rinsate will be treated appropriately on-site using methods described in Section I1.5.1, Inventory Elimination, or when necessary sent off-site for treatment and disposal at a RCRA-permitted facility. If conformational sampling results indicate that decontamination has not been achieved, then the concrete will either be scarified and/or ball blasted as indicated below or it will be removed and sent to an off-site RCRA-permitted facility

Scarification, sandblasting, and/or ball blasting may be utilized to meet the treatment standards for contaminated debris as provided in Table 1 of 40 CFR 268.45. Approximately 0.60cm will be removed from all concrete surfaces. All concrete dust collected from scarification, sandblasting, and/or ball blasting will be characterized and sent for appropriate treatment and disposal.

The last secondary containment area(s) to be decontaminated within the tank system or container storage area(s) will be decontaminated as described below.

Final decontamination efforts will be timed to occur after successful decontamination of secondary containment areas on site has been confirmed. To be sure that at least one decontamination staging area, the Solids Receiving Area will be set aside and undergo decontamination last.

Visqueen or equivalent protective material will be placed in a strip at least ten feet wide around the perimeter of the exterior secondary containment area. This will protect against overspray during decontamination and provide a working surface during the final decontamination steps. The Visqueen will be lapped over the inside edge of the containment area to prevent releases between the Visqueen and the containment area. Any additional sheets of Visqueen required to surround a containment area will be overlapped at least 1 foot, in a manner that prevents releases due to liquid flow across the overlapped sheets

The final decontamination rinsate from high-pressure washing will be collected by vacuum truck and sent off-site to a RCRA-permitted facility for treatment or disposal. After the final high-pressure washing has been completed and decontamination rinsate collected, the Visqueen or equivalent material will be removed for disposal at an off-site RCRA-permitted facility.

During the final decontamination stage, a small temporary decontamination area (approximately 20 feet by 30 feet) may be established on site once all concrete containment areas have been decontaminated. This area will be used for decontamination of sampling equipment, personal protective equipment, and other miscellaneous small equipment used during decontamination and sampling efforts. Releases from the temporary decontamination area will be prevented through use of a Visqueen (or equivalent material) ground cover placed as described above, and through proper management of decontamination rinsate and other materials to be sent off site for treatment or disposal at a RCRA-permitted facility.

Equipment Decontamination

All equipment used for closure will be decontaminated via scraping and rinsing with high-pressure water before transport off site or reuse elsewhere on site.

Table I1-3 lists equipment potentially requiring decontamination. Equipment decontamination will be performed in a specific decontamination staging area with adequate containment. All rinsate from decontamination will be collected and treated appropriately at the facility or, when necessary, sent off site to a RCRA-permitted facility. If equipment cannot be decontaminated, it will be disposed as hazardous waste at an off-site RCRA-permitted facility.

Decontamination Rinsate Management

It is anticipated that rinsate from closure decontamination activities will be collected and treated on site whenever possible. Closure and decontamination of hazardous waste management units and secondary containment areas will be phased to maximize treatment capabilities. Rinsing of tanks will take place within secondary containment systems.

Detoxification Area Clean Up

On February 19, 2001 a report detailing an on-site release of chromium and cyanide was forwarded to NDEP. This report delineated the loss of containment and defined the extent of contamination. This loss of containment of the detoxification area secondary containment was caused by expansion joint seal failure. To achieve closure objectives, the following steps will be taken in this area to ensure completeness of clean up:

- Remove 18 inches of concrete on either side of the compromised expansion joint.
- Excavate soil to a depth of three feet below grade.
- Sample to ensure completeness of clean up.
- Repour concrete to provide a covering for the area.

I1.5.3 Sampling and Analysis

40 CFR 264.112(b)(4), 264.114

This section describes sampling and analysis procedures to be used for closure activities at the PSC Fernley Facility.

Where removal of soils under waste management units (or removal of other materials) is done, the removal will assure that the levels of hazardous waste or hazardous waste residues do not exceed:

1) For soils, ground water, surface water, and air, the numeric cleanup levels based on EPA Region IX guidance for clean up of industrial sites and agreed to by NDEP and the PSC Fernley facility.

2) For structures, equipment, bases, liners, etc. clean closure standards shall be set by the NDEP on a case by case basis in accordance with the closure performance standards (40 CFR 264.601) and in a manner that minimizes or eliminates post-closure escape of hazardous waste constituents.

Soil Sampling and Analysis: Hazardous Waste Management Areas

The soil underlying secondary containment pads will be sampled and analyzed to confirm that no residual contamination is present. Soil samples will be obtained by coring through the concrete pads, except in those areas where the concrete or asphalt containment surfaces were removed in lieu of decontamination activities. Soil samples will be taken at a total of 80 locations during closure, consisting of 54 biased and 26 random sampling locations under hazardous waste management units.

Samples will be collected at a depth of up to six inches beneath the soil surface, through holes bored in the overlying containment systems. Samples will be collected using either hand augers or shallow test pits. Sample collection, documentation, and handling will be in accordance with standard procedures described in SW-846.

Soils beneath all sumps in secondary containment areas will be sampled as biased sampling locations, since the sumps would be the most likely location for collection and longer-term residence of any contaminants. Table I-4 outlines the sump sample numbers and locations.

Locations of cracks or stains in the secondary containment system also will be priority locations for biased sampling. Visual observation of past repair locations and repair records maintained as part of the facility's operating log will be used to determine selective locations for soil sampling during closure. For the purposes of estimating closure costs, it is assumed that soils under cracks or stains will be sampled at a total of 16 locations: Seven locations under the tank system containment areas, one under the Solids Receiving Area Building, two each under the storage bay, dewatering area, detoxification area, crystallizer, truck bay and Lab Pack room and six locations under the container storage areas containment.

A random sampling procedure consistent with SW-846 will be used to select random soil sampling locations, with equal probability of sampling at a given location under the secondary containment areas. Random sampling locations within five feet of the biased sampling locations beneath sumps will be reassigned using a technique consistent with the method used to assign all random sampling locations, in accordance with procedures described in Test Methods for Evaluating Solid Waste, SW-846, U.S. EPA, November 1986 (and subsequent revisions and updates).

To select random sample locations, a grid pattern will be superimposed over the tank system secondary containment areas and the container storage areas to divide them into sampling areas of roughly equal size. Each load/unload area (including the Solids Receiving Area) will also be counted as one grid area for random sampling. As indicated in Table I1-4, Soil Sampling and Analysis Plan Summary, a total of 76 locations will be selected for random sampling, using methods previously described above. An additional four samples will be taken from the detox area to ensure completion of clean up from the December 2000 joint failure.

Biased samples from the soils under sumps in the west container storage areas will be analyzed for analytes in Appendix I-4 of this section. This analysis was selected due to the variety of wastes handled in these areas.

All other soil samples from biased sample locations and all of the random soil samples will be analyzed for constituents of waste historically managed on site, using analytical methods described in SW-846. Table I1-4 shows the constituents for which each of the samples will be analyzed. Random samples will be analyzed separately. Soils from each west container storage area random sampling location will be tested for the presence of volatile organic compounds. Analytical data for random samples will be reported and evaluated apart from data for discrete biased samples.

Analytical results from soil samples taken during unit closure will be compared to NDEP established cleanup levels to determine whether contamination is present in soils under hazardous waste management units. NDEP will be provided with all analytical results and included in discussions to determine when closure has been successfully completed.

<u>Containment Pad Sampling and Analysis</u>

As an alternative to meeting the treatment performance standards for contaminated debris by scarification, sandblasting and/or ball blasting, concrete and/or asphalt surfaces may be decontaminated by high-pressure washing. After washing, the concrete surface of the containment pads and related sumps would be sampled and analyzed to verify decontamination. If this alternative is chosen, concrete chips will be collected to a depth of ½ inch from the containment pad surface at biased and random sampling locations, as described below. Sample collection, documentation, and handling will be in accordance with standard procedures described in SW-846.

If sampling for volatile organic constituents in the concrete is necessary, (West Pad and Lab Pack container storage areas only), a large chunk of concrete (larger than the chip samples) will be obtained and chilled. A chip sample will be taken from the chilled chunk and subjected to immediate analysis.

All sumps in secondary containment areas will be selected as biased sampling locations. Location of cracks or stains in the secondary containment system will also be priority locations for biased sampling. Visual observation of past repair locations and repair records maintained as part of the facility operating log will be used to determine selective locations for concrete sampling during closure.

Random sampling will be performed within each subdivided secondary containment area on site. Random sample locations will be selected in accordance with procedures described in Test Methods for Evaluating Solid Waste, SW-846 (current revision), U.S. Environmental Protection Agency, November 1986. Random sampling locations within five feet of the biased sampling locations for sumps will be reassigned to new locations, using the same procedures.

Concrete chip samples will be analyzed for constituents of waste historically managed within each particular containment area, using analytical methods described in SW-846. Generally, samples will be analyzed for materials described in Table I1-4. Appendix I-4 lists specific analytes and analytical test methods.

The analytical results for the concrete chip samples will be evaluated for evidence of incomplete decontamination (e.g., detection of constituents that are not commonly associated with the concrete itself). If analyses indicate contamination is still present in a segregated containment area after completion of the steps described above, high-pressure washing may be repeated for that area until concrete chip sample analyses indicate sufficient decontamination of the containment pad. Steam cleaning, a blasting technique or scarification may be used as an alternate method for additional cleaning to decontaminate secondary containment areas.

Areas where analysis of concrete samples indicates contamination is still present will be resampled after additional decontamination is complete. Other areas not failing the closure demonstration will not be resampled. Analysis of the extra concrete samples taken after additional decontamination efforts will include only those constituents that failed closure in the initial sample set for that area.

As an alternative to further decontamination, sampling, or analysis, secondary containment pads may be disposed as hazardous waste at an off-site RCRA-permitted facility. The containment pads also may be demolished prior to any decontamination, and disposed as hazardous waste at an off-site RCRA-permitted facility.

If the levels of hazardous waste constituents in the pad do not exceed designation levels for hazardous wastes under 40 CFR, the off-site disposal facility may be a sanitary landfill rather than a RCRA-permitted facility if 1) the landfill operator and the County Health Department provide written approval, and 2) the landfill complies with the minimum functional standards of having a liner and a leachate collection system. Off site RCRA-permitted facilities will be acceptable for off site disposal for any level of residual contamination of the secondary containment pads.

Soil sampling will be performed on the West Pad Container Storage Area prior to concrete containment pad decontamination or removal to minimize volatilization of organic constituents from the soil sample. If soil is contaminated and the containment pad is removed, a plastic cover will be placed over the exposed soil to prevent dissipation of any volatile organic compounds that may be present and to prevent contact with rainwater or other moisture that could promote leaching of contaminants through soil.

If decontamination and verification sampling of secondary containment pads is chosen as an alternative to meeting the treatment performance standards for contaminated debris, NDEP will be notified and the closure plan and closure cost estimates will be revised accordingly.

I2.0 POST-CLOSURE PLAN

40 CFR 270.14(b)(13), 264.118(a), 264.197(c)(2) and (c)(5), 264.228(b) and (c)(1)(ii), 264.258(b) and (c)(1)(ii), 264.280(c), 264.310(b)

If it is determined that it is not practicable for the PSC Fernley facility to clean close the facility in accordance with the closure plan, then the Fernley facility is to prepare a contingent closure and/or post-closure plan, and provide to the Administrator a detailed written estimate, in current dollars, of the annual cost of post-closure monitoring and maintenance of the facility in accordance with the applicable post-closure regulations in §§264.117 through 264.120, 264.228, 264.258, 264.280, 264.310, and 264.603.

I3.0 CLOSURE COST ESTIMATES

40 CFR 270.14(b)(15), 264.142

This section presents closure cost estimates for the PSC Fernley facility. The cost estimates are based on current unit costs for inventory elimination, decontamination activities, and sampling as described in Section I1.0, Closure Plan. Included are closure costs for each hazardous waste management unit described in the facility's Part B Permit Application.

I3.1 Regulatory Requirements

The Fernley facility shall maintain onsite a written estimate, in current dollars, of the cost of closing the facility in accordance with the Closure Plan meeting the requirements in §§264.111 through 264.115 and applicable closure requirements in §§264.178, 264.197, 264.228, 264.258, 264.280, 264.310, 264.351, 264.601 through 264.603, and 264.1102.

The closure cost estimate will equal the cost of final closure at the point in the facility's active life when the extent and manner of its operation would make closure the most expensive, as indicated by its Closure Plan (see §264.112(b)). This "maximum waste inventory" includes all of the units identified in Table I1-1 (Units Included in Maximum Waste Inventory). The costs are broken down further in Sections I3.3 through I3.5 and in Appendix I-2. Background cost data to support these estimates is provided in Appendix I-1, Unit Costs and Assumptions, and Appendix I-2, Closure Cost Calculations for Maximum Waste Inventory.

The PSC Fernley facility will adjust the closure cost estimate for inflation within 60 days prior to the anniversary date of the establishment of the financial instrument(s) used to comply with §264.143. The adjustment may be made by recalculating the maximum costs of closure in current dollars, or by using an inflation factor derived from the most recent Implicit Price Deflator for Gross National Product published by the U.S. Department of Commerce in its Survey of Current Business. The inflation factor is the result of dividing the latest published annual Deflator by the Deflator for the previous year. The first adjustment will be made by multiplying the closure cost estimate by the inflation factor. The result is the adjusted closure cost estimate. Subsequent adjustments are made by multiplying the latest adjusted closure cost estimate by the latest inflation factor.

The Fernley facility will revise the closure cost estimate no later than 30 days after the Administrator has approved the request to modify the closure plan, if the change in the closure plan increases the cost of closure. The revised closure cost estimate will be adjusted for inflation as specified in §264.142(b).

I3.2 Units Costs for Closure Activities

The unit costs associated with closure of the Fernley Facility are based on the following:

- The closure cost estimate is based on costs to the PSC Fernley facility of hiring a third party to close the facility. A third party is a party who is neither a parent nor a subsidiary of the Fernley facility. Further, the unit costs used assume no onsite treatment or evaporation of wastes, or commingling of containerized wastes into bulk containers. During a voluntary facility closure or other closure that uses trained site personnel these processes and capabilities would be used to maximize efficiencies to the greatest extent possible and minimize transportation, treatment, and disposal costs.

- Unit costs were obtained, where possible, from actual operating costs and experience. Other sources used include data from EPA's CostPro closure cost software program, EPA's Final Report Guidance Manual: Cost Estimates for Closure and Post-Closure Plans (Subparts G and H), November, 1986, and contractor estimates.

- Treatment costs, where used, are rates presently estimated for existing and proposed waste management units.

- The estimate will not incorporate any salvage value that may be realized with the sale of hazardous wastes, or non-hazardous wastes if applicable under §264.113(d), facility structures or equipment, land, or other assets associated with the facility at the time of partial or final closure.

- The PSC Fernley will not incorporate a zero cost for hazardous wastes, or non-hazardous wastes if applicable under §264.113(d), that might have economic value.

Unit costs for facility decontamination and sample collection, as well as specific information regarding the assumptions and procedures used to develop the unit costs, are provided in Appendix I-1.

I3.3 Inventory Elimination Costs

The costs for treating, disposing off site, and transporting remaining inventory after wastes are no longer accepted at the facility are included in this section. Inventory elimination cost estimates are based on the maximum waste inventory and are summarized in Tables I1-1. Costs for inventory elimination are summarized in Table I3-1. Calculations for these costs are presented in Appendix I-2, Closure Cost Calculations for Maximum Waste Inventory.

Wastes which are expected to be commonly received at the facility and which will require treatment and/or disposal include:

- Organic Solvents
- Waste Oil and Coolants
- Miscellaneous Solids and Sludges
- Industrial Wastewater
- Corrosives
- Cyanide Wastes
- Miscellaneous Containerized Materials

The assumptions involved in determining the unit costs for the elimination of these wastes are discussed below along with other identified means for determining unit costs.

For the purposes of the closure cost estimate, it is assumed that all wastestreams at the facility at the time that closure is initiated will be will be sent off-site for treatment and disposal “as-is”: No further treatment of the wastes will occur on-site, no evaporation of treated effluents will occur, no commingling of containerized wastes into bulk containers. Drums of waste will be designated by type, loaded into boxvans, and shipped off-site for treatment and disposal. Similarly, roll-off boxes of waste will be designated, loaded and shipped off-site for treatment and disposal. Liquids will be designated by type, drained from tanks into tanker trucks, and shipped off-site for treatment and disposal.

Transportation, treatment and disposal costs used for estimating inventory elimination costs are based on actual costs at off-site RCRA-permitted disposal facilities in Clive, Utah, Beatty, Nevada, and Phoenix, AZ. Should these locations become unavailable for waste treatment and disposal, the closure plan and closure cost estimate will be revised to include the next closest waste disposal options. In the event of a facility closure using trained PSC Fernley personnel, all available waste transportation, treatment and disposal options will be considered.

I3.4 Facility Decontamination Costs

The closure costs for decontamination of facility equipment and waste management units are included in this section. Specifically, cost estimates are included for decontamination and/or demolition and removal of the following:

- tanks/treatment units and Subpart X units
- pumps and piping
- secondary containment structures
- heavy equipment used during closure

Cost estimates for management of decontamination residuals have also been included in this section.

For the purposes of the closure cost estimate, it is assumed that a third party would opt to cut up and dispose of the storage and treatment tanks, piping, pump systems and other ancillary equipment, and Subpart X units as hazardous wastes rather than attempt decontamination. For concrete secondary containment structures, it is assumed that scarification, sandblasting and/or ball blasting will be used rather than high pressure washing since this cost is higher. For forklifts, backhoes, and other heavy equipment, it is assumed that cleaning and rinsing with a high-pressure washer and an appropriate cleaner (where applicable) will be utilized for decontamination.

In the event of a facility closure using trained PSC Fernley personnel, decisions as to whether (and how) to decontaminate tank and containment systems during closure will be made within the parameters laid out in this Closure Plan and based on time and total cost.

Costs for facility decontamination are summarized in Table I3-1. Calculations for cost estimates are presented in Appendix I-2, Closure Cost Calculations for Maximum Waste Inventory.

I3.5 Sampling and Analytical Costs

Items that will require sampling and analysis include soils under hazardous waste management units. Costs for sample collection and analysis are summarized in Table I3-1. Detailed cost estimates are included in Appendix I-2, Closure Cost Calculations for Maximum Waste Inventory. Plans for sample collection and analysis are summarized below, and are described in detail in Section I1.5.3 (Sampling and Analysis).

Samples of soil underlying secondary containment pads and sumps will be collected by coring through the pads, except where the containment surface has been removed in lieu of decontamination activities. Soil samples will be taken at a total of 80 locations during closure: 54 biased and 26 random sampling locations.

Biased samples from soils under all sumps in the container storage areas will be analyzed for pertinent constituents. Other soil samples from biased sample locations and all of the composited random soil samples will be analyzed for constituents of waste historically managed on site, using analytical methods described in SW-846.

I4.0 POST-CLOSURE COST ESTIMATE REQUIREMENTS

40 CFR 270.14(b)(16), 264.144, 264.197(c)(3)

If it is determined that it is not practicable for the PSC Fernley facility to clean close the facility in accordance with the closure plan, then the Fernley facility is to prepare a contingent closure and/or post-closure plan, and provide to the Administrator a detailed written estimate, in current dollars, of the annual cost of post-closure monitoring and maintenance of the facility in accordance with the applicable post-closure regulations in §§264.117 through 264.120, 264.228, 264.258, 264.280, 264.310, and 264.603.

I4.1 Regulatory Requirements

The post-closure cost estimate shall be calculated by multiplying the annual post-closure cost estimate by the number of years of post-closure care required under §264.117.

The PSC Fernley facility will adjust the post-closure cost estimate for inflation within 60 days prior to the anniversary date of the establishment of the financial instrument(s) used to comply with §264.145. The adjustment may be made by recalculating the post-closure cost estimate in current dollars or by using an inflation factor derived from the most recent Implicit Price Deflator for Gross National Product published by the U.S. Department of Commerce in its Survey of Current Business as specified in §264.145(b)(1) and (2). The inflation factor is the result of dividing the latest published annual Deflator by the Deflator for the previous year.

The first adjustment will be made by multiplying the post-closure cost estimate by the inflation factor. The result is the adjusted post-closure cost estimate. Subsequent adjustments are made by multiplying the latest adjusted post-closure cost estimate by the latest inflation factor. The PSC Fernley facility will revise the post-closure cost estimate within 30 days after the Administrator has approved the request to modify the post-closure plan, if the change in the post-closure plan increases the cost of post-closure care. The revised post-closure cost estimate will be adjusted for inflation as specified in §264.144(b).

The PSC Fernley facility will keep the following at the facility during the operating life of the facility:

-The latest post-closure cost estimate prepared in accordance with §264.144 (a) and (c); and
-When this estimate has been adjusted in accordance with §264.144(b), the latest adjusted post-closure cost estimate.

The post-closure cost estimate will be based on the costs to the Fernley facility of hiring a third party to conduct post-closure care activities. A third party is a party who is neither a parent nor a subsidiary of the PSC Fernley facility.

I5.0 NOTICE IN DEED REQUIREMENTS AND SURVEY PLAT REQUIREMENTS

40 CFR 270.14(b)(14), 264.116, 264.117(c), 264.119

The PSC Fernley facility has not operated hazardous waste disposal units at the facility. Tank systems at the facility include adequate secondary containment, and thus will not be subject to the contingent post-closure care requirements of 40 CFR 264.197(c)(2) and (c)(5).

No regulated units containing hazardous wastes will remain at the site after closure; therefore, a notice in deed regarding restrictions on the use of land used to manage dangerous wastes will not be necessary. Similarly, a survey plat indicating the location of landfill cells or other dangerous waste disposal units remaining on site will not be required.

I6.0 FINANCIAL ASSURANCE MECHANISM

40 CFR 270.14(b)(15) and (16), 264.143, 264.145, 264.197(c)(4) and (c)(5)

The PSC Fernley facility will demonstrate continuous compliance with 40 CFR 264.143 by providing documentation of financial assurance, as required by 40 CFR 264.151, in at least the amount of the current cost estimate. A copy of the current financial assurance mechanism is provided in Appendix I-3. Changes in the financial assurance mechanism must be approved by the Director or their designee pursuant to 40 CFR 264.143.

I7.0 LIABILITY REQUIREMENTS

40 CFR 270.14(b)(17), 264.147

The PSC Fernley facility will demonstrate continuous compliance with the requirements of 40 CFR 264.147(a) to have and maintain liability coverage for sudden accidental occurrences in the amount of at least $1 million per occurrence, with an annual aggregate of at least $2 million, exclusive of legal defense costs. A copy of the required documentation is provided in Appendix I-5.

The PSC Fernley facility shall comply with 40 CFR 264.148, whenever necessary.

LIST OF TABLES

Table I1-1. Units Included in Maximum Waste Inventory

Cylindrical Tanks			Inside		Tank Body		Cone		Working	Nominal	Inside	Maximum
Tank	Tank	Tank	Diameter		Height		Height		Volume	Volume	Surface	Specific
Number	Service	Status	ft	in	ft	in	ft	in	gallons	gallons	Area (ft2)	Gravity
101	Acid Storage	Existing	9	10.3	11	0	0	0	6,000	6,280	371	1.90
102	Acid Storage	Existing	9	10.3	11	0	0	0	6,000	6,280	371	1.90
103	Acid Storage	Existing	9	10.3	11	0	0	0	6,000	6,280	371	1.90
104	Acid Storage	Existing	9	10.3	11	0	0	0	6,000	6,280	371	1.90
105	Acid Storage	Existing	9	10.3	11	0	0	0	6,000	6,280	371	1.90
106	Acid Storage	Existing	9	10.3	11	0	0	0	6,000	6,280	371	1.90
107	Acid Storage	Existing	9	10.3	11	0	0	0	6,000	6,280	371	1.90
108	Acid Storage	Existing	9	10.3	11	0	0	0	6,000	6,280	371	1.90
109	Acid Storage	Existing	9	10.3	11	0	0	0	6,000	6,280	371	1.90
110	Acid Storage	Existing	9	10.3	11	0	0	0	6,000	6,280	371	1.90
111	Acid Storage	Existing	9	10.3	11	0	0	0	6,000	6,280	371	1.90
201	Alk./Cyanide	Existing	9	10.3	11	0	0	0	6,000	6,280	371	1.90
202	Alk./Cyanide	Existing	9	10.3	11	0	0	0	6,000	6,280	371	1.90
203	Alk./Cyanide	Existing	9	10.3	11	0	0	0	6,000	6,280	371	1.90
204	Alk./Cyanide	Existing	9	10.3	11	0	0	0	6,000	6,280	371	1.90
205	Alk./Cyanide	Existing	9	10.3	11	0	0	0	6,000	6,280	371	1.90
206	Alk./Cyanide	Existing	9	10.3	11	0	0	0	6,000	6,280	371	1.90
207	Alkaline Stor.	Existing	9	10.3	11	0	0	0	6,000	6,280	371	1.90
208	Alkaline Stor.	Existing	9	10.3	11	0	0	0	6,000	6,280	371	1.90
301	Post-Treatment	Existing	11	10	8	6	5	0	7,400	7,794	477	1.50
302	Post-Treatment	Existing	11	10	8	6	5	0	7,400	7,794	477	1.50
303	Post-Treatment	Existing	11	10	16	6	0	0	12,500	12,750	650	1.50
304	Post-Treatment	Existing	11	10	16	6	0	0	12,500	12,750	650	1.50
305	Post-Treatment	Existing	11	10	16	6	0	0	12,500	12,750	650	1.50
306	Post-Treatment	Existing	11	10	16	6	0	0	12,500	12,750	650	1.50
307	Post-Treatment	Existing	10	0	13	2	0	0	6,500	7,100	445	1.50

Table I1-1. Units Included in Maximum Waste Inventory

Rectangular Tanks				*Inside Width*			*Inside Length*			*Working Height*			*Working Volume*	*Nominal Volume*	*Inside Surface*	*Maximum Specific*
Tank Number	*Tank Service*	*Tank Status*		*ft*	*in*		*ft*	*in*		*ft*	*in*		*gallons*	*gallons*	*Area (ft2)*	*Gravity*
T-1	Treatment Tank	Existing		6	6		18	0		7	0		6,125	7,000	289	1.50
T-2	Treatment Tank	Existing		6	6		18	0		7	0		6,125	7,000	289	1.50
T-3	Treatment Tank	Existing		6	6		18	0		7	0		6,125	7,000	289	1.50
T-4	Treatment Tank	Existing		8	6		9	10		0	0		3,750	4,170	289	1.25
T-5	Treatment Tank	Existing		8	6		9	10		0	0		3,750	4,170	289	1.25
T-6	Treatment Tank	Existing		8	0		16	0		7	11		7,580	8,100	318	1.40
T-7	Treatment Tank	Existing		8	0		16	0		7	11		7,580	8,100	318	1.40

Hazardous Waste Container Storage Areas	*Storage Volume (cyds)*
East Pad Container Storage Area	1,200
East Container Storage Area	896
Truck Bay Container Storage Area	145
Lab Pack Container Storage Area	14
West Pad Container Storage Area	314

Existing Waste Storage/Treatment Capacity in gallons	226,335
Total Haz Waste Storage/Treatment Capacity in gallons	226,335
Total Waste Container Storage Capacity in cubic yards	2,569

Table I1-2. Decontamination Sequence

PRIORITY	ITEM FOR DECONTAMINATION	METHOD OF DECON	RESIDUE DESTINATION
1	West Cont. Storage Pad	High pressure water, or sand/ball blast, or scarification	Storage Bay Tanks (liquid), Roll-off Box (blast residue)
2	West Storage Pad Sumps	High pressure water, or sand/ball blast, or scarification	Storage Bay Tanks (liquid), Roll-off Box (blast residue)
3	Truck Bay Walls and Ceiling	High pressure water	Storage Bay Tanks
4	Truck Bay Piping	High pressure water or macroencapsulation	Storage Bay Tanks Or Offsite RCRA Facility
5	Truck Bay Containment	High pressure water, or sand/ball blast, or scarification	Storage Bay Tanks (liquid), Roll-off Box (blast residue)
6	Truck Bay Sumps	High pressure water, or sand/ball blast, or scarification	Storage Bay Tanks (liquid), Roll-off Box (blast residue)
7	All Acid Storage Tanks, except Tanks 109, 110, and 111	High pressure water or macroencapsulation	Acid Storage Tanks 109, 110, and 111
8	All CN^-/Alkaline Storage Tanks, except Tanks 201 and 202	High pressure water or macroencapsulation	Alkaline/Cyanide Storage Tanks 201 and 202
9	Storage Bay Walls and Ceiling	High pressure water	Storage Tanks 109, 110, 111, or 201, 202 (pH dependent)
10	Storage Bay Piping from Truck Bay	High pressure water or macroencapsulation	Storage Tanks 109, 110, 111, or 201, 202 (pH dependent)
11	Storage Bay Containment	High pressure water, or sand/ball blast, or scarification	Storage Tanks 109, 110, 111, or 201, 202 (pH dependent)
12	Storage Bay Sumps	High pressure water, or sand/ball blast, or scarification	Storage Tanks 109, 110, 111, or 201, 202 (pH dependent)
13	Acid Storage Tanks 109, 110, and 111	High pressure water or macroencapsulation	Treatment Tank T-1
14	Alkaline/Cyanide Storage Tanks 201 and 202	High pressure water or macroencapsulation	Treatment Tank T-6
15	Treatment Tanks T-2 and T-3	High pressure water or macroencapsulation	Treatment Tank T-1
16	Treatment Tanks T-4, T-5, and T-7	High pressure water or macroencapsulation	Treatment Tank T-6
17	Detox Area Piping	High pressure water or macroencapsulation	Treatment Tank T-1 and T-6
18	Detox Area Room Walls and Ceiling	High pressure water	Treatment Tank T-1 and T-6

Table I1-2. Decontamination Sequence

PRIORITY	ITEM FOR DECONTAMINATION	METHOD OF DECON	RESIDUE DESTINATION
19	Detox Area Containment and Sumps	High pressure water, or sand/ball blast, or scarification	Treatment Tank T-1 and T-6
20	Treatment Tank T-1	High pressure water or macroencapsulation	Post-Treatment Tank 302
21	Treatment Tank T-6	High pressure water or macroencapsulation	Post-Treatment Tank 302
22	Post Treatment Tanks 304-307	High pressure water or macroencapsulation	Post-Treatment Tanks 301 and 302
23	East Pad Container Storage Area	High pressure water, or sand/ball blast, or scarification	Post-Treatment Tanks 301 and 302 (liquids), Roll-off Box (blast residue)
24	East Pad Container Storage Area Sump	High pressure water, or sand/ball blast, or scarification	Post-Treatment Tanks 301 and 302 (liquids), Roll-off Box (blast residue)
25	East Container Storage Area	High pressure water, or sand/ball blast, or scarification	Post-Treatment Tanks 301 and 302 (liquids), Roll-off Box (blast residue)
26	East Container Storage Area Sump	High pressure water, or sand/ball blast, or scarification	Post-Treatment Tanks 301 and 302 (liquids), Roll-off Box (blast residue)
27	Rain Water Evaporation Pond	High pressure water	Post-Treatment Tanks 301 and 302
28	Pond Liner	None	Offsite RCRA Facility
29	Solids Receiving Walls and Ceiling	High pressure water	Post-Treatment Tanks 301 and 302
30	Crystallizer Room Walls and Ceiling	High pressure water, or macroencapsulation	Post-Treatment Tanks 301 and 302
31	Dewatering Room Walls and Ceiling	High pressure water	Post-Treatment Tanks 301 and 302
32	Lab Pack Room Walls and Containment Pallets	High pressure water, or macroencapsulation	Post-Treatment Tanks 301 and 302
33	Dewatering Room Piping	High pressure water, or macroencapsulation	Post-Treatment Tanks 301 and 302
34	Post Treatment Tank 301	High pressure water, or macroencapsulation	Post-Treatment Tank 302
35	Post-Treatment Tank 302	High pressure water, or macroencapsulation	Through small Filter Press to Tank 303
36	Dewatering Filter Presses (less small press)	High pressure water, or macroencapsulation	Post-Treatment Tank 303
37	Small Filter Press	High pressure water, or macroencapsulation	Post-Treatment Tank 303
38	Post-Treatment Tank 303	High pressure water, or macroencapsulation	Crystallizer or Offsite RCRA facility

Table I1-2. Decontamination Sequence

PRIORITY	ITEM FOR DECONTAMINATION	METHOD OF DECON	RESIDUE DESTINATION
39	Dewatering Room Containment and Sumps	High pressure water, or sand/ball blast, or scarification	Crystallizer (liquids) or Roll-off Box (blast residue)
40	Crystallizer, piping, and heat exchangers	High pressure water, or macroencapsulation	Offsite RCRA Facility
41	Crystallizer Containment and Sump	High pressure water, or sand/ball blast, or scarification	Offsite RCRA Facility
42	Solids Receiving containment and sumps	High pressure water, or sand/ball blast, or scarification	Offsite RCRA Facility
43	Portable equipment	High pressure water, or macroencapsulation	Offsite RCRA Facility

Table I1-3. Equipment Potentially Requiring Decontamination[1]

Trucks	Drilling Equipment
Fork Lifts	Hand Augers
Safety Equipment	Sampling Equipment
Hoses	Pumps
Decontamination Equipment (brushes, buckets, etc.)	Water Containment Systems (sumps, drains, piping, etc.)
Steam Cleaning Equipment	Pump Connections
High-Pressure Wash Equipment	Valve Connections
Jackhammers	Transfer Piping
Hand and Power Tools	Concrete Scarifying Equipment
Tanks	Portable Containment Pads
(1) Decon by high-pressure washing - Rinsate generated at a rate of 4 gallons/ft^2 of surface area, per estimates provided in EPA's Final Report Guidance Manual: Cost Estimates for Closure and Post-Closure Plans (Subparts G and H) Volume III - Unit Costs, November 1986.	

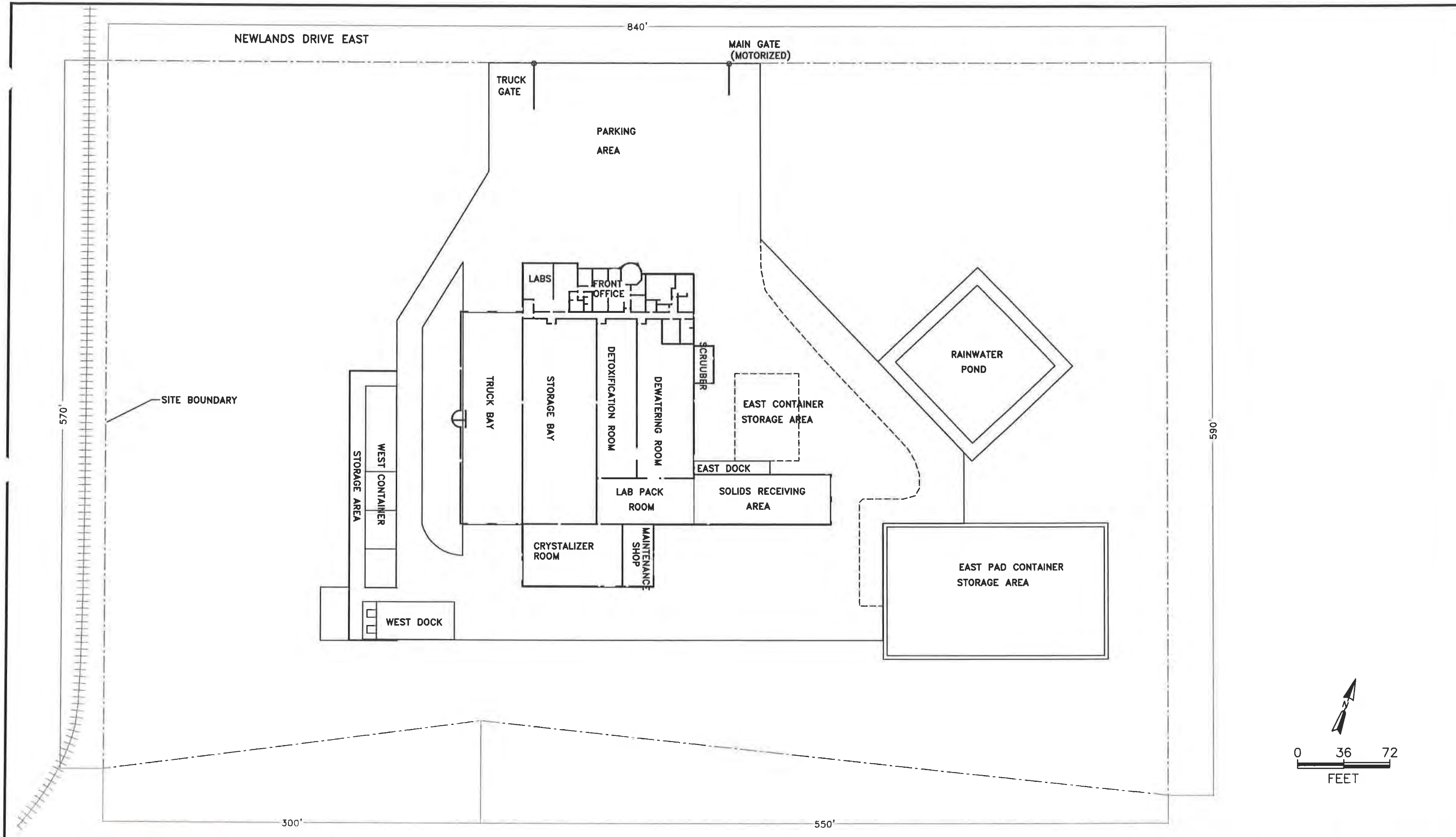
Table I1-4. SUMMARY: Soil Sampling and Analysis Plan

AREA DESCRIPTION	SAMPLE QUANTITY	ANALYSIS PERFORMED
West Pad	1 sample per sump (biased) (6 total)	Volatiles, semi-volatiles, total metals, pesticides, and pH
	6 random samples	Volatiles, semi-volatiles, total metals, pesticides, and pH
	3 samples under cracks or stains (biased)	Volatiles, semi-volatiles, total metals, pesticides, and pH
Solids Receiving	2 random samples	Total metals, cyanide, sulfide, TPH and pH
East Pad	2 random samples	Total metals, cyanide, sulfide, and pH
East Container Storage Area	1 sample per sump (biased) (1 total)	Total metals, cyanide, sulfide, and pH
	2 random samples	Total metals, cyanide, sulfide, and pH
Truck Bay Container Storage Area	1 sample per sump (biased) (3 total)	Total metals, cyanide, sulfide, and pH
	2 random samples	Total metals, cyanide, sulfide, and pH
Detox Container Storage Area	1 sample per sump (biased) (3 total)	Total metals, cyanide, sulfide, and pH
	2 random samples	Total metals, cyanide, sulfide, and pH
	4 crack samples	Total metals, cyanide, sulfide, and pH
Dewatering Container Storage Area	1 sample per sump (biased) (6 total)	Total metals, cyanide, sulfide, and pH
	2 random samples	Total metals, cyanide, sulfide, and pH
Lab Pack Room	1 sample per sump (biased) (1 total)	Volatiles, semi-volatiles, total metals, pesticides, and pH
	2 random samples	
Tank Storage Bay Area	1 sample per sump (biased) (10 total)	Total metals, cyanide, sulfide, and pH
	2 random samples	Total metals, cyanide, sulfide, and pH
East Loading/ unloading pad	2 random samples	Total metals, cyanide, sulfide, and pH
West Loading/ Unloading Pad	1 sample per sump (biased) (1 total)	Volatiles, semi-volatiles, total metals, pesticides, and pH
	2 random samples	Volatiles, semi-volatiles, total metals, pesticides, and pH
Selected cracks or stains (estimated, under tank system, interior facility & container storage containment areas)	16 biased samples	Total metals, cyanide, sulfide, and pH
Detox Containment Crack	4 biased samples	Total metals, cyanide, sulfide, and pH
TOTALS	**26 Random samples** **54 Biased soil samples**	
	80 TOTAL SAMPLING LOCATIONS	

TABLE I3-1. SUMMARY OF COST ESTIMATES FOR CLOSURE AT MAXIMUM WASTE INVENTORY

Activity Description	Cost (2011 $)
Removal of Waste - Includes costs for removal of containerized wastes from storage areas and removal of bulk wastes from storage and treatment tanks (Costs to load onto Boxvans, Tankers).	$42,785
Elimination of Maximum Waste Inventory - Includes costs for transportation, treatment, and disposal of all wastes at the facility assuming maximum permitted inventory levels.	$1,449,931
Decontamination Activities - May include costs for decontamination or disassembly and removal of contaminated equipment and containment systems for disposal as hazardous wastes. See detailed descriptions of activities for each waste management area.	$456,720
Elimination of Wastes Generated during Decontamination Activities - Includes costs for transportation, treatment and disposal of rinsate waters, sandblast residuals, contaminated equipment, and other residuals. See spreadsheet for details.	$217,503
Soil Sampling and Analysis - Includes costs for random and biased sampling, and analysis of samples per Table I1-4.	$41,303
Equipment Rentals - Includes cost allowances for rental of backhoes, loaders, boom lifts, power tools, and other equipment as needed during closure activities.	$50,000
Personal Protective Equipment - Includes costs for PPE and other consummable supplies for up to 25 workers for up to six months.	$7,500
Sub-Total	$2,265,742
Engineering Expenses - Includes costs for engineering oversight, analysis, and assessment as needed, costs for review of reports, analytical results, and other documentation, and generation of Clean Closure Certifications. Estimated cost is 10% of subtotal.	$226,574
Sub-Total	$2,492,316
Contingency Allowance at 15%	$373,847
Total Cost of Closure	**$2,866,164**

LIST OF FIGURES:



PSC

TITLE:
Facility Site Plan
PSC Fernley Facility
Fernley, Nevada

DWN: dtb	DES.:	PROJECT NO.:
CHKD:	APPD:	FIGURE NO.: 11-1
DATE: 7/10/12	REV.:	

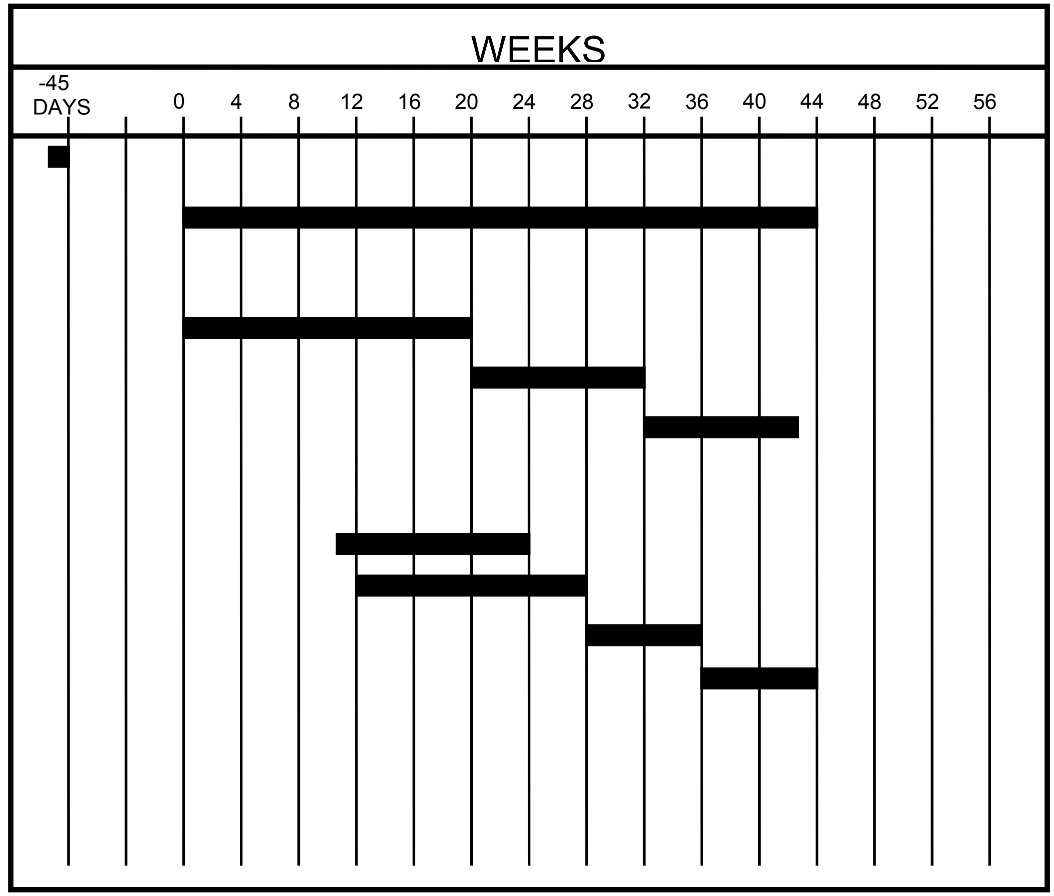
Figure I1-2. Final Closure Schedule without Tank, Containment Pad or Soil Removal - Fernley Facility

Notification

Monitoring by P.E.*

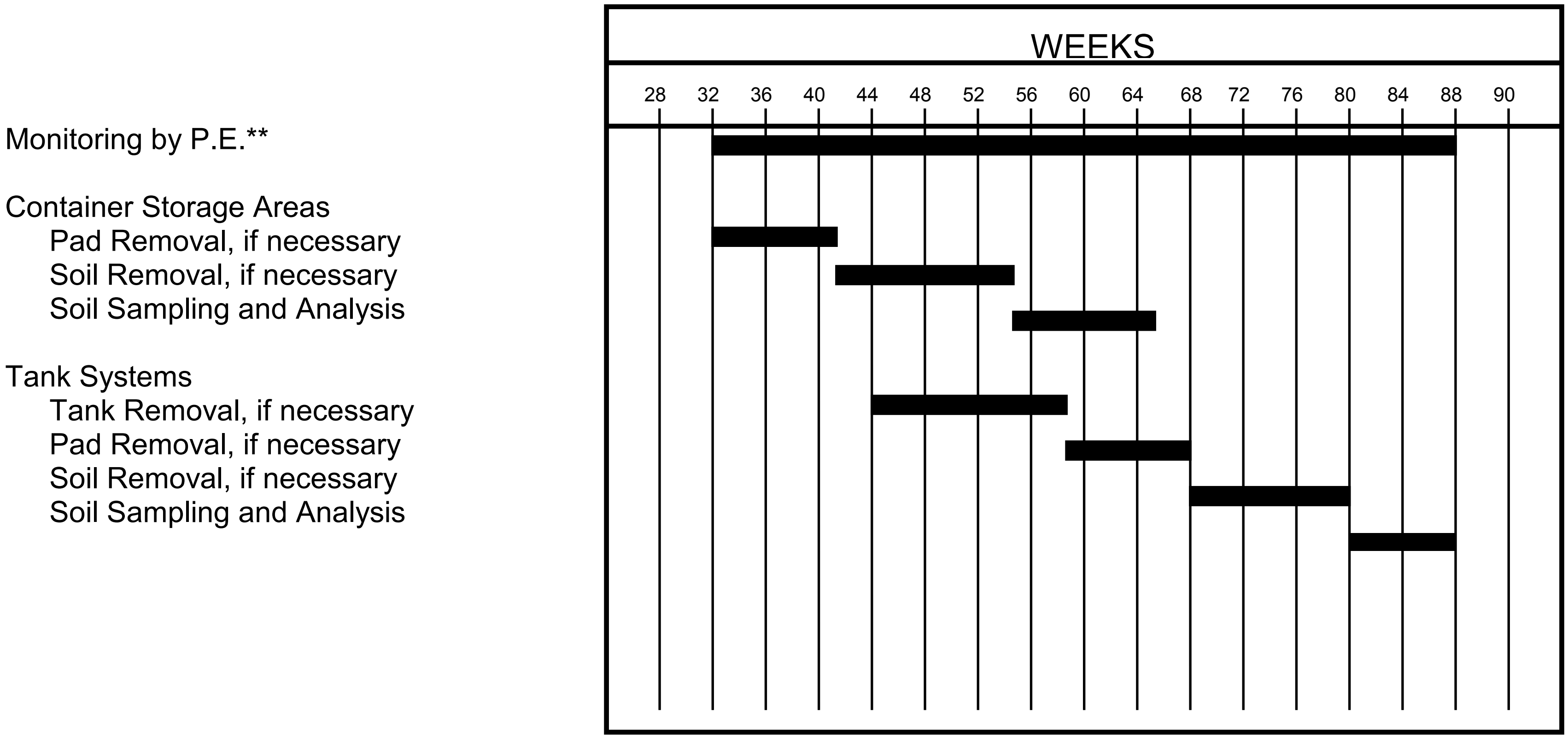
Container Storage Areas
- Inventory Elimination
- Soil Sampling and Analysis
- Pad Decontamination

Tank Systems
- Inventory Elimination
- Tank Decontamination
- Soil Sampling and Analysis
- Pad Decontamination



*Independent registered professional engineer will be on-site 6 - 8 hours per week to monitor closure activities. See Section I1.3 for more information.

Figure I1-3. Final Closure Schedule with Tank, Containment Pad or Soil Removal* - Fernley Facility



* Figure I1-2 identifies the schedule for closure steps prior to containment pad removal. Containment pad or soil removal will only be undertaken if necessary. See Section I1.5.3 for more information.

** Independent registered professional engineer will be on-site 6 - 8 hours per week to monitor closure activities. See Section I1.3 for more information.

APPENDIX I-1

UNIT COSTS AND ASSUMPTIONS

APPENDIX I-1

UNIT COSTS AND ASSUMPTIONS

The assumptions and unit costs used to develop the closure cost estimate are as follows:

1. Closure cost estimate includes all activities associated with closure of the hazardous waste management units and the general facility.

2. The closure cost estimate developed accounts for a “worst case facility closure scenario” – a third part closure of the facility at maximum waste inventory levels. This scenario assumes <u>no</u> onsite treatment or evaporation of wastes, or commingling of containerized wastes into bulk containers for cheaper disposal.

3. The closure plan is written and intended such that in the event of a voluntary facility closure or closure of the facility using PSC Fernley technicians – the use of onsite treatment and evaporation capabilities and commingling of wastes may be used where permitted and practical.

4. Sequential closure of the hazardous waste management units and operations will be followed for closing the entire facility. The wastes will be processed through the individual waste management units in a logical and orderly fashion.

5. The cost of removing non-RCRA regulated units is included where removal is required to allow complete closure of RCRA units to continue.

6. Supplies and equipment may be salvaged to the extent possible. However, salvage value has not been incorporated into the closure cost estimate.

7. It is assumed that PSC Fernley facility on-site equipment (tankers, roll-off boxes, backhoe, forklifts, pressure washers, power tools, etc.) will be used where possible to close the facility. A cost allowance for equipment rental is included in the closure cost estimate.

8. The cost for decontaminating sampling equipment between samples is considered to be negligible.

9. Estimated man-hours needed to perform closure activities and unit cost estimates are based on PSC facility operating experience, the CostPro closure cost analysis, contractor estimates, and on the 1986 EPA guidance document: Final Report Guidance Manual: Cost Estimates for Closure and Post-Closure Plans (Subparts G and H) Volume III - Unit Costs. Costs obtained from this document were adjusted to current dollars by an inflation factor.

10. Table 1, Unit Costs for Closure Activities, lists the unit costs used in estimating the costs for tank, concrete, and equipment decontamination, waste transportation and disposal, and for soil sampling.

APPENDIX I-1 Table 1. UNIT COSTS FOR CLOSURE ACTIVITIES

ITEM DESCRIPTION	2010 UNIT COST	SOURCE
Waste Tech Labor	$60/Hr	Env. Contractor Rate Sheet
Vacuum Truck Labor & Equipment	$175.95/Hr	CostPro Analysis
Tank Drawdown Work Rate	0.0003 Hrs/Gal	CostPro Analysis
Backhoe Operator Labor	$79.00/Hr	Env. Contractor Rate Sheet
Soil/Concrete Removal Work Rate	0.25 Hrs/Cyd	Operating Experience
Asphalt Removal Work Rate	450 Ft^2/Hr	Operating Experience
Sandblast Labor & Equipment	$65.77/Hr	CostPro Analysis
Sandblast Work Rate	0.029 Hrs/Ft^2	CostPro Analysis
Plastic Pipe Removal Rate	40 Ft/Hr	Operating Experience
Metal Pipe Removal Rate	10 Ft/Hr	Operating Experience
Plastic Tank Cut/Remove Rate	0.04 Tank/Hr	Operating Experience
Metal Tank Cut/Remove Rate	0.02 Tank/Hr	Operating Experience
High-pressure washing equipment	$1.50/sq ft	Guidance Manual[1]
Rinsate generated from pressure washing	4 gals/sq ft	Guidance Manual[2]
Equipment decontamination (forklift)	$104/forklift	Guidance Manual[3]
Soil sample collection	$25/sample	CostPro Analysis (avg)
Personal Protective Equipment	$300/person	Operating experience
Professional Engineer	$125/hour	Actual Cost
Loading Drums to Boxvan	$3.57/Drum	CostPro Analysis
Loading R.O. Boxes onto Trucks	$14.26/Box	CostPro Analysis
Drum transport by Boxvan to Clive, UT	$1,350/Load	Actual Cost
Bulk transport by Truck to Clive, UT	$1,600/Load	Actual Cost
Drum transport by Boxvan to Beatty, NV	$1,700/Load	Actual Cost
Bulk transport by truck to Beatty, NV	$1,700/Load	Actual Cost
Drum transport by Boxvan to Phoenix, AZ	$1,500/Load	Actual Cost
DW Fuel (drummed solids, liquids) t & d	$35/drum	Operating experience
Liquids for Incineration - t & d	$165/drum	Operating experience
Solids for Incineration - t & d	$92.50/drum	Operating experience
Reactive Cyanide Liquids - t & d	$5.75/gal	Operating experience
Oxidizer Liquids – t & d	$187/drum	Operating experience
Oxidizer Liquids – t & d	$3.40/gal	Operating experience
Oxidizer Solids – t & d	$364/drum	Operating experience
Stabilization (drums) treat/disposal	$70/drum	Operating experience
Stabilization (bulk solids) treat/disposal	$95/ton	Operating experience
Metal-Bearing Sludges Processing	$65/drum	Operating experience
Metal-Bearing Sludges Processing (bulk)	$80/ton	Operating experience
Direct landfill disposal	$50/drum	Operating experience
Direct landfill disposal	$75/ton	Operating experience
Corrosives treatment (bulk liquids) t & d	$1.67/gal	Operating experience
Corrosives treatment (drum liquids) t & d	$99/drum	Operating experience
Batteries (drum solids) t & d	$45/drum	Operating experience
Macroencapsulation of debris	$105/ton	Operating Experience
Water for Evaporation	$1.00/gal	Operating Experience

<u>EPA Guidance Manual Notes:</u>

1) High-pressure washing cost is shown on p. 5-3: ($0.88/sq. ft.) x 1.71 inflation factor = $1.50
2) High-pressure washing rate and rinsate generated is shown on p. 5-3.
3) Forklift decontamination cost is shown on p. 5-2: ($26/forklift) x 1.71 inflation factor = $44.00. Assuming one unit per hour is cleaned (at $60/hr) = total cost of $104/forklift.

APPENDIX I-2

CLOSURE COST CALCULATIONS FOR MAXIMUM WASTE INVENTORY

TABLE I3-1. SUMMARY OF COST ESTIMATES FOR CLOSURE AT MAXIMUM WASTE INVENTORY

Activity Description	Cost (2011 $)
Removal of Waste - Includes costs for removal of containerized wastes from storage areas and removal of bulk wastes from storage and treatment tanks (Costs to load onto Boxvans, Tankers).	$42,785
Elimination of Maximum Waste Inventory - Includes costs for transportation, treatment, and disposal of all wastes at the facility assuming maximum permitted inventory levels.	$1,449,931
Decontamination Activities - May include costs for decontamination or disassembly and removal of contaminated equipment and containment systems for disposal as hazardous wastes. See detailed descriptions of activities for each waste management area.	$456,720
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Soil Sampling and Analysis - Includes costs for random and biased sampling, and analysis of samples per Table I1-4.	$41,303
Equipment Rentals - Includes cost allowances for rental of backhoes, loaders, boom lifts, power tools, and other equipment as needed during closure activities.	$50,000
Personal Protective Equipment - Includes costs for PPE and other consummable supplies for up to 25 workers for up to six months.	$7,500
Sub-Total	$2,265,742
Engineering Expenses - Includes costs for engineering oversight, analysis, and assessment as needed, costs for review of reports, analytical results, and other documentation, and generation of Clean Closure Certifications. Estimated cost is 10% of subtotal.	$226,574
Sub-Total	$2,492,316
Contingency Allowance at 15%	$373,847
Total Cost of Closure	**$2,866,164**

APPENDIX I-3

FINANCIAL ASSURANCE FOR CLOSURE

PSC

May 31, 2012

CERTIFIED MAIL
(7011 0110 0002 2199 6046)

Ms. Maureen Godbout
RCRA Facilities Branch - Bureau of Waste Management
Nevada Division of Environmental Protection
901 South Stewart Street, Suite 4001
Carson City, Nevada 89701-5249

RE: Demonstration of Financial Assurance for Facility Closure Cost Estimate

Dear Ms. Godbout:

Enclosed is the original Increase Rider to Surety Bond #1014654 that provides demonstration of financial assurance for the closure cost estimate applicable to the 21st Century Environmental Management, LLC (PSC) Fernley facility (EPA ID# NVD980895338). The bond amount of $2,959,327 reflects the revised cost estimate submitted to NDEP-BWM on November 2, 2011.

Thank you for your attention to this matter, and please call me at 425-227-6120 if you need additional information.

Sincerely,

Keith Lund
Director of Permitting, EHS West Region
PSC - Environmental Services Division

Attachment (Original Increase Rider)

INCREASE RIDER

To be attached to and form part of Bond Number 1014654 effective October 31st, 2011 issued by the Lexon Insurance Company in the amount of One Million Four Hundred Sixty Thousand Four Hundred Sixty Dollars And Zero Cents DOLLARS ($ 1,460,460.00), on behalf of 21st Century Environmental Management of Nevada, LLC, as Principal and in favor of Nevada Director of the Department of Environmental Quality ("The Director"), as Obligee:

Now therefore, it is agreed that:

We, Lexon Insurance Company, Surety on the above bond, hereby stipulate and agree that from and after the effective date of this Stipulation, the Penalty of said Bond shall be Increased

FROM: One Million Four Hundred Sixty Thousand Four Hundred Sixty Dollars And Zero Cents ($ 1,460,460.00)

TO: Two Million Nine Hundred Fifty-nine Thousand Three Hundred Twenty-seven Dollars And Zero Cents ($ 2,959,327.00)

It is further understood and agreed that all other terms and conditions of this bond shall remain unchanged.

This rider is to be effective the 23rd Day of May, 2012.

Signed, Sealed and Dated this 23rd Day of May, 2012.

21st Century Environmental Management of Nevada, LLC (Principal)

By: Deborah S. Huston, Secretary

Lexon Insurance Company (Surety)

By: Rhesa F. Boulton Attorney-In-Fact

S-2126/GE 9/98

XDP

POWER OF ATTORNEY

Lexon Insurance Company

LX - 051423

KNOW ALL MEN BY THESE PRESENTS, that **LEXON INSURANCE COMPANY**, a Texas Corporation, with its principal office in Louisville, Kentucky, does hereby constitute and appoint: Scott D. Chapman, Rhesa F. Boulton, Elaine Lewis, ***********
Rosalyn D. Hassell, Martha Silvas, Kevin McQuain, Justin McQuain ********************

its true and lawful Attorney(s)-In-Fact to make, execute, seal and deliver for, and on its behalf as surety, any and all bonds, undertakings or other writings obligatory in nature of a bond.

This authority is made under and by the authority of a resolution which was passed by the Board of Directors of **LEXON INSURANCE COMPANY** on the 1st day of July, 2003 as follows:

Resolved, that the President of the Company is hereby authorized to appoint and empower any representative of the Company or other person or persons as Attorney-In-Fact to execute on behalf of the Company any bonds, undertakings, policies, contracts of indemnity or other writings obligatory in nature of a bond not to exceed $ 6,500,000.00 Six million five hundred thousand dollars ** dollars, which the Company might execute through its duly elected officers, and affix the seal of the Company thereto. Any said execution of such documents by an Attorney-In-Fact shall be as binding upon the Company as if they had been duly executed and acknowledged by the regularly elected officers of the Company. Any Attorney-In-Fact, so appointed, may be removed for good cause and the authority so granted may be revoked as specified in the Power of Attorney.

Resolved, that the signature of the President and the seal of the Company may be affixed by facsimile on any power of attorney granted, and the signature of the Assistant Secretary, and the seal of the Company may be affixed by facsimile to any certificate of any such power and any such power or certificate bearing such facsimile signature and seal shall be valid and binding on the Company. Any such power so executed and sealed and certificate so executed and sealed shall, with respect to any bond of undertaking to which it is attached, continue to be valid and binding on the Company.

IN WITNESS THEREOF, **LEXON INSURANCE COMPANY** has caused this instrument to be signed by its President, and its Corporate Seal to be affixed this 21st day of September, 2009.

LEXON INSURANCE COMPANY A TEXAS INSURANCE COMPANY

LEXON INSURANCE COMPANY

BY ____________________

David E. Campbell
President

ACKNOWLEDGEMENT

On this 21st day of September, 2009, before me, personally came David E. Campbell to me known, who being duly sworn, did depose and say that he is the President of **LEXON INSURANCE COMPANY**, the corporation described in and which executed the above instrument; that he executed said instrument on behalf of the corporation by authority of his office under the By-laws of said corporation.

"OFFICIAL SEAL"
MAUREEN K. AYE
Notary Public, State of Illinois
My Commission Expires 09/21/13

Maureen K. Aye
Notary Public

CERTIFICATE

I, the undersigned, Assistant Secretary of **LEXON INSURANCE COMPANY**, A Texas Insurance Company, DO HEREBY CERTIFY that the original Power of Attorney of which the foregoing is a true and correct copy, is in full force and effect and has not been revoked and the resolutions as set forth are now in force.

Signed and Sealed at Woodridge, Illinois this 23rd Day of May, 2012.

LEXON INSURANCE COMPANY A TEXAS INSURANCE COMPANY

Philip G. Lauer
Assistant Secretary

"WARNING: Any person who knowingly and with intent to defraud any insurance company or other person, files an application for insurance or statement of claim containing any materially false information, or conceals for the purpose of misleading, information concerning any fact material thereto, commits a fraudulent insurance act, which is a crime and subjects such person to criminal and civil penalties."

Lexon Insurance Company

Please send all notices of claim on this bond to:

Lexon Insurance Company
Attn: Claims Dept.
256 Jackson Meadows Drive, Suite 201
Hermitage, TN 37076
(615) 250-3040

PSC

CERTIFIED MAIL: 7006 3450 0001 6673 7968

November 25, 2008

Mike Leigh, P.E
Supervisor, RCRA Facilities Branch
Bureau of Waste Management
Nevada Division of Environmental Protection
901 S. Stewart Street, Suite 4001
Carson City, NV 89701

Re: Original Trust Agreement for Closure Bond No 1014654

Dear Mr Leigh:

Enclosed is the original Trust Agreement for the above referenced closure bond for the 21st Century Environmental Management of Nevada, LLC facility located at 2095 Newlands Drive, Fernley, NV 89408 (EPA ID No. NVD980895338).

If you need additional information, please feel free to call me at 425-227-6120

Sincerely,

Keith Lund
Regional Director, EHS

Enclosure (original trust agreement)

Amendment No. 1

The Trust Agreement entered into as of 6/6/2005 by and between 21st Century Environmental Management Inc., of Nevada, a Nevada Corporation and Amegy Bank National Association, a national bank is hereby terminated effective 10/31/2008 and replaced by the Trust Agreement entered into as of 10/31/2008 by and between 21st Century Environmental Management of Nevada, LLC, a Nevada Limited Liability Company and Amegy Bank National Association, a national bank.

Attest:

Rebecca Bostick

Rebecca Bostick

Title Assistant Vice President

Trustee:
Amegy Bank N.A. by:
R. Sells Neuhaus, Senior V.P.

R Sells Neuhaus

11/20/08

Attest:

Tarsha B Boykin

Tarsha B. Boykin

Title Notary Public

Grantor:
David Andrews, Treasurer

David V Andrews

TRUST AGREEMENT

Trust Agreement, the "Agreement," entered into as of ***10/31/2008*** by and between **21st Century Environmental Management of Nevada, LLC,** a Nevada Limited Liability Company, the "Grantor," and **Amegy Bank National Association**, a national bank, the "Trustee."

Whereas, the Nevada Division of Environmental Protection (NDEP), an agency within the Nevada Department of Conservation and Natural Resources, a department of the State of Nevada, has established certain regulations applicable to the Grantor, requiring that an owner/operator of a hazardous waste management facility shall provide assurance that funds will be available when needed for closure and/or post-closure care of the facility,

Whereas, the Grantor has elected to establish a trust to provide all or part of such financial assurance for the facilities identified herein,

Whereas, the Grantor, acting through its duly authorized officers, has selected the Trustee to be the trustee under this agreement, and the Trustee is willing to act as trustee,

Now, Therefore, the Grantor and the Trustee agree as follows:

<u>Section 1. Definitions.</u>
As used in this Agreement:

(a) The term "Grantor" means the owner/operator who enters into this Agreement and any successors or assigns of the Grantor.

(b) The term "Trustee" means the Trustee who enters into this Agreement and any successor Trustee.

<u>Section 2. Identification of Facilities and Cost Estimates.</u>
This Agreement pertains to the facilities and cost estimates identified on attached **Schedule A**.

<u>Section 3. Establishment of Fund.</u>
The Grantor and the Trustee hereby establish a trust fund, the "Fund," for the benefit of NDEP. The Grantor and the Trustee intend that no third party have access to the Fund except as herein provided. The Fund is established initially as consisting of the property, which is acceptable to the Trustee, described in **Schedule B** attached hereto. Such property and any other property subsequently transferred to the Trustee is referred to as the Fund, together with all earnings and profits thereon, less any payments or distributions made by the Trustee pursuant to this Agreement. The Fund shall be held by the Trustee, IN TRUST, as hereinafter provided. The Trustee shall not be responsible nor shall it undertake any responsibility for the amount or adequacy of, nor any duty to collect from the Grantor, any payments necessary to discharge any liabilities of the Grantor established by NDEP.

Section 4. Payment for Closure and Post-Closure Care.
The Trustee shall make payments from the Fund as the Director of NDEP shall direct, in writing, to provide for the payment of the costs of closure and/or post-closure care of the facilities covered by this Agreement. The Trustee shall reimburse the Grantor or other persons as specified by the Director of NDEP from the Fund for closure and post-closure expenditures in such amounts as the Director of NDEP shall direct in writing. In addition, the Trustee shall refund to the Grantor such amounts as the Director of NDEP specifies in writing. Upon refund, such funds shall no longer constitute part of the Fund as defined herein.

Section 5. Payments Comprising the Fund.
Payments made to the Trustee for the Fund shall consist of cash or securities acceptable to the Trustee.

Section 6. Trustee Management.
The Trustee shall invest and reinvest the principal and income of the Fund and keep the Fund invested as a single fund, without distinction between principal and income, in accordance with general investment policies and guidelines which the Grantor may communicate in writing to the Trustee from time to time, subject, however, to the provisions of this Section. In investing, reinvesting, exchanging, selling, and managing the Fund, the Trustee shall discharge his duties with respect to the trust fund solely in the interest of the beneficiary and with the care, skill, prudence, and diligence under the circumstances then prevailing which persons of prudence, acting in a like capacity and familiar with such matters, would use in the conduct of an enterprise of a like character and with like aims; except that:

(i) Securities or other obligations of the Grantor, or any other owner/operator of the facilities, or any of their affiliates as defined in the Investment Company Act of 1940, as amended, 15 U.S.C. 80a-2.(a), shall not be acquired or held, unless they are securities or other obligations of the Federal or a State government;

(ii) The Trustee is authorized to invest the Fund in time or demand deposits of the Trustee, to the extent insured by an agency of the Federal or State government; and

(iii) The Trustee is authorized to hold cash awaiting investment or distribution uninvested for a reasonable time and without liability for the payment of interest thereon.

Section 7. Commingling and Investment.
The Trustee is expressly authorized in its discretion:

(a) To transfer from time to time any or all of the assets of the Fund to any common, commingled, or collective trust fund created by the Trustee in which the Fund is eligible to participate, subject to all of the provisions thereof, to be commingled with the assets of other trusts participating therein; and

(b) To purchase shares in any investment company registered under the Investment Company Act of 1940, 15 U.S.C. 80a-1 et seq., including one which may be created, managed, underwritten, or to which investment advice is rendered or the shares of which are sold by the Trustee. The Trustee may vote such shares in its discretion.

Section 8. Express Powers of Trustee.
Without in any way limiting the powers and discretion conferred upon the Trustee by the other provisions of this Agreement or by law, the Trustee is expressly authorized and empowered:

(a) To sell, exchange, convey, transfer, or otherwise dispose of any property held by it, by public or private sale. No person dealing with the Trustee shall be bound to see the application of the purchase money or to inquire into the validity or expediency of any such sale or other disposition;

(b) To make, execute, acknowledge, and deliver any and all documents of transfer and conveyance and any and all other instruments that may be necessary or appropriate to carry out the powers herein granted;

(c) To register any securities held in the Fund in its own name or in the name of a nominee and to hold any security in bearer form or in book entry, or to combine certificates representing such securities with certificates of the same issue held by the Trustee in other fiduciary capacities, or to deposit or arrange for the deposit of such securities in a qualified central depositary even though, when so deposited, such securities may be merged and held in bulk in the name of the nominee of such depositary with other securities deposited therein by another person, or to deposit or arrange for the deposit of any securities issued by the United States Government, or any agency or instrumentality thereof, with a Federal Reserve bank, but the books and records of the Trustee shall at all times show that all such securities are part of the Fund;

(d) To deposit any cash in the Fund in interest-bearing accounts maintained or savings certificates issued by the Trustee, in its separate corporate capacity, or in any other banking institution affiliated with the Trustee, to the extent insured by an agency of the Federal or State government; and

(e) To compromise or otherwise adjust all claims in favor of or against the Fund.

Section 9. Taxes and Expenses.
All taxes of any kind that may be assessed or levied against or in respect of the Fund and all brokerage commissions incurred by the Fund shall be paid from the Fund. All other expenses incurred by the Trustee in connection with the administration of this Trust, including fees for legal services rendered to the Trustee, the compensation of the Trustee to the extent not paid directly by the Grantor, and all other proper charges and disbursements of the Trustee shall be paid from the Fund.

Section 10. Annual Valuation.
The Trustee shall annually, at least 30 days prior to the anniversary date of establishment of the Fund, furnish to the Grantor and to the Director of NDEP a statement confirming the value of the Trust. Any securities in the Fund shall be valued at market value as of no more than 60 days prior to the anniversary date of establishment of the Fund. The failure of the Grantor to object in writing to the Trustee within 90 days after the statement has been furnished to the Grantor and the Director of NDEP shall constitute a conclusively binding assent by the Grantor, barring the Grantor from asserting any claim or liability against the Trustee with respect to matters disclosed in the statement.

Section 11. Advice of Counsel.
The Trustee may from time to time consult with counsel, who may be counsel to the Grantor, with respect to any question arising as to the construction of this Agreement or any action to be taken hereunder. The Trustee shall be fully protected, to the extent permitted by law, in acting upon the advice of counsel.

Section 12. Trustee Compensation.
The Trustee shall be entitled to reasonable compensation for its services as agreed upon in writing from time to time with the Grantor.

Section 13. Successor Trustee.
The Trustee may resign or the Grantor may replace the Trustee, but such resignation or replacement shall not be effective until the Grantor has appointed a successor trustee and this successor accepts the appointment. The successor trustee shall have the same powers and duties as those conferred upon the Trustee hereunder. Upon the successor trustee's acceptance of the appointment, the Trustee shall assign, transfer, and pay over to the successor trustee the funds and properties then constituting the Fund. If for any reason the Grantor cannot or does not act in the event of the resignation of the Trustee, the Trustee may apply to a court of competent jurisdiction for the appointment of a successor trustee or for instructions. The successor trustee shall specify the date on which it assumes administration of the trust in a writing sent to the Grantor, the Director of NDEP, and the present Trustee by certified mail 10 days before such change becomes effective. Any expenses incurred by the Trustee as a result of any of the acts contemplated by this Section shall be paid as provided in Section 9.

Section 14. Instructions to the Trustee.
All orders, requests, and instructions by the Grantor to the Trustee shall be in writing, signed by such persons as are designated in the attached **Exhibit A** or such other designees as the Grantor may designate by amendment to Exhibit A. The Trustee shall be fully protected in acting without inquiry in accordance with the Grantor's orders, requests, and instructions. All orders, requests, and instructions by the Director of NDEP to the Trustee shall be in writing, signed by the Director, or his designee, and the Trustee shall act and shall be fully protected in acting in accordance with such orders, requests, and instructions. The Trustee shall have the right to assume, in the absence of written notice to the contrary, that no event constituting a change or a termination of the authority of any person to act on the behalf of the Grantor or NDEP hereunder has occurred. The Trustee shall have no duty to act in the absence of such orders, requests, and instructions from the Grantor and/or NDEP, except as provided for herein.

Section 15. Notice of Nonpayment.
The Trustee shall notify the Grantor and the Director of NDEP by certified mail within 10 days following the expiration of the 30 day period after the anniversary of the establishment of the Trust, if no payment is received from the Grantor during that period. After the pay-in period is completed, the Trustee shall not be required to send a notice of nonpayment.

Section 16. Amendment of Agreement.
This Agreement may be amended by an instrument in writing executed by the Grantor, the Trustee, and the Director of NDEP, or by the Trustee and the Director of NDEP if the Grantor ceases to exist.

Section 17. Irrevocability and Termination.
Subject to the right of the parties to amend this Agreement as provided in Section 16, this Trust shall be irrevocable and shall continue until terminated at the written agreement of the Grantor, the Trustee, and the Director of NDEP, or by the Trustee and the Director of NDEP, if the Grantor ceases to exist. Upon termination of the Trust, all remaining trust property, less final trust administration expenses, shall be delivered to the Grantor.

Section 18. Immunity and Indemnification.
The Trustee shall not incur personal liability of any nature in connection with any act or omission, made in good faith, in the administration of this Trust, or in carrying out any directions by the Grantor or the Director of NDEP issued in accordance with this Agreement. The Trustee shall be indemnified and saved harmless by the Grantor or from the Trust Fund, or both, from and against any personal liability to which the Trustee may be subjected by reason of any act or conduct in its official capacity, including all expenses reasonably incurred in its defense in the event the Grantor fails to provide such defense.

Section 19. Choice of Law.
This Agreement shall be administered, construed, and enforced according to the laws of the State of Nevada.

Section 20. Interpretation.
As used in this Agreement, words in the singular include the plural and words in the plural include the singular. The descriptive headings for each Section of this Agreement shall not affect the interpretation or the legal efficacy of this Agreement.

In Witness Whereof the parties have caused this Agreement to be executed by their respective officers duly authorized and their corporate seals to be hereunto affixed and attested as of the date first above written: The parties below certify that the wording of this Agreement is identical to the wording specified in 40 CFR 264.151(a)(1) as such regulations were constituted on the date first above written.

David V. Andrews

David V. Andrews, Treasurer

Attest:
Title Notary Public
Seal

R Sells Neuhaus

R. Sells Neuhaus 11/20/08

Attest:
Title
Seal

State of Texas
County of Harris

On this October 31, 2008, before me personally came David V. Andrews to me known, who being by me duly sworn, did depose and say that she/he resides at Houston, TX, that she/he is Treasurer of 21st Century Environmental Management of Nevada, LLC a Nevada Limited Liability Company, the described in and which executed the above instrument; that she/he knows the seal of said limited liability company; that the seal affixed to such instrument is such corporate seal; that it was so affixed by order of Board of Directors of said corporation and that she/he signed her/his name thereto by like order.

Signature of Notary Public

TARSHA B. BOYKIN
Notary Public, State of Texas
My Commission Expires
August 06, 2011

SCHEDULE A

EPA ID Number: NVD980895338
21st Century Environmental Management, LLC
2095 Newlands Drive
Fernley, NV 89408

Closure Amount: $1,281,199.49

Schedule B

Bond Number: 1014654
Lexon Insurance Company
Amount: $1,281,199.49

Exhibit A

David V. Andrews
VP and Treasurer
PSC, LLC
5151 San Felipe, Suite 1600
Houston, Texas
77056

or

Elisa Martinez
Director of Treasury Management
PSC, LLC
5151 San Felipe, Suite 1600
Houston, Texas
77056

SURETY RIDER

To be attached to and form a part of

Bond No. **1014654**

Type of
Bond: Performance Bond

dated
effective 10/31/2005
(MONTH-DAY-YEAR)

executed by 21st Century Environmental Management Inc. of Nevada ,as Principal,
(PRINCIPAL)

and by Lexon Insurance Company ,as Surety,

in favor of Director of the Department of Conservation & Natural Resources
(OBLIGEE)

in consideration of the mutual agreements herein contained the Principal and the Surety hereby consent to changing

The Principal name to: 21st Century Environmental Management of Nevada, LLC

Nothing herein contained shall vary, alter or extend any provision or condition of this bond except as herein expressly stated.

This rider
is effective 04/01/2008
(MONTH-DAY-YEAR)

Signed and Sealed 04/01/2008
(MONTH-DAY-YEAR)

21st Century Environmental Management Inc. of Nevada
(PRINCIPAL)

By: David V Andrews
(PRINCIPAL)

Lexon Insurance Company
(SURETY)

By: Scott D. Chap
(ATTORNEY-IN-FACT) Scott D. Chapman, Sr VP of Brown & Brown Insurance Services of Texas, Inc.

S-0443/GE 7/04

FRP

POWER OF ATTORNEY

LX - 34733

Lexon Insurance Company

KNOW ALL MEN BY THESE PRESENTS, that **LEXON INSURANCE COMPANY**, a Texas Corporation, with its principal office in Louisville, Kentucky, does hereby constitute and appoint: Michael A. Garguilo, Scott D. Chapman, Elaine Lewis, Sandra Langford

****

its true and lawful Attorney(s)-In-Fact to make, execute, seal and deliver for, and on its behalf as surety, any and all bonds, undertakings or other writings obligatory in nature of a bond.

This authority is made under and by the authority of a resolution which was passed by the Board of Directors of **LEXON INSURANCE COMPANY** on the 1st day of July, 2003 as follows:

Resolved, that the President of the Company is hereby authorized to appoint and empower any representative of the Company or other person or persons as Attorney-In-Fact to execute on behalf of the Company any bonds, undertakings, policies, contracts of indemnity or other writings obligatory in nature of a bond not to exceed $2,500,000.00, Two-million five hundred thousand dollars, which the Company might execute through its duly elected officers, and affix the seal of the Company thereto. Any said execution of such documents by an Attorney-In-Fact shall be as binding upon the Company as if they had been duly executed and acknowledged by the regularly elected officers of the Company. Any Attorney-In-Fact, so appointed, may be removed for good cause and the authority so granted may be revoked as specified in the Power of Attorney.

Resolved, that the signature of the President and the seal of the Company may be affixed by facsimile on any power of attorney granted, and the signature of the Vice President, and the seal of the Company may be affixed by facsimile to any certificate of any such power and any such power or certificate bearing such facsimile signature and seal shall be valid and binding on the Company. Any such power so executed and sealed and certificate so executed and sealed shall, with respect to any bond of undertaking to which it is attached, continue to be valid and binding on the Company.

IN WITNESS THEREOF, **LEXON INSURANCE COMPANY** has caused this instrument to be signed by its President, and its Corporate Seal to be affixed this 2nd day of July, 2003.

LEXON INSURANCE COMPANY A TEXAS INSURANCE COMPANY

LEXON INSURANCE COMPANY

BY ________________

David E. Campbell
President

ACKNOWLEDGEMENT

On this 2nd day of July, 2003, before me, personally came David E. Campbell to me known, who being duly sworn, did depose and say that he is the President of **LEXON INSURANCE COMPANY**, the corporation described in and which executed the above instrument; that he executed said instrument on behalf of the corporation by authority of his office under the By-laws of said corporation.

"OFFICIAL SEAL"
MAUREEN K. AYE
Notary Public, State of Illinois
My Commission Expires 09/21/09

Maureen K. Aye
Notary Public

CERTIFICATE

I, the undersigned, Secretary of **LEXON INSURANCE COMPANY**, A Texas Insurance Company, DO HEREBY CERTIFY that the original Power of Attorney of which the foregoing is a true and correct copy, is in full force and effect and has not been revoked and the resolutions as set forth are now in force.

Signed and Sealed at Lombard, Illinois this 1 Day of April, 20 08.

LEXON INSURANCE COMPANY A TEXAS INSURANCE COMPANY

Donald D. Buchanan
Secretary

APPENDIX I-4

DEMONSTRATION FOR CLOSURE ANALYSES

Demonstration for Fernley Facility Part B Closure Analyses

Overview

The PSC Fernley facility is a unique facility. Severe restrictions are in place for the location and storage of the various waste streams received at the facility. Almost all indoors areas are restricted to solid and liquid inorganic metal, cyanide and sulfide bearing hazardous wastes. The only indoor area able to stage or store waste materials containing greater than 10% TOC or volatile organic compounds in concentrations greater than 500ppm is the Lab Pack Room, and all containers there are required to be placed on secondary containment pallets. The East Pad and East Container Storage Area are likewise restricted and further limited to solid wastes and containers of liquids on secondary containment pallets. The West Container Storage Area is the only waste storage area where storage of organic hazardous wastes on concrete is permitted. With these restrictions rigorously followed, the analyte list is dramatically shortened.

Fernley Facility Part B Permit List of Closure Analyses

The Fernley Facility Part B Permit Closure Plan currently indicates that Volatile, Semi-Volatile, Total Metals, Pesticides and pH analyses will be performed on the concrete and soil samples taken from the Lab Pack and West Container Storage Areas only. The methods which will be used for analyzing these parameters are the following EPA SW-846 Methods: 8260 (Volatiles), 8270 (Semi-Volatiles), 8081/8082 (Pesticides), 6010 and/or 7000 series (Total Metals), and 9040 (pH). The remainder of the facility will be analyzed for 9040 (pH), 6010 and/or 7000 (Total Metals), 9010 (Cyanide), 9030 (Sulfide). Soil samples taken in the Solids Receiving Area will also be analyzed for Total Recoverable Petroleum Hydrocarbons (TPH) per EPA Method 1664.

The following table delineates analytes and methods to be used for the appropriate areas:

List of Analytes for the Fernley Part B Closure Plan

Analyte	SW-846 Method	Detection Limit of Liquid after Distillation, Digestion or Extraction (µg/l)
Antimony (Sb)	7041	3
Arsenic (As)	7060	1
Barium (Ba)	6010	2
Beryllium (Be)	6010	0.3
Cadmium (Cd)	6010	4
Chromium (Cr)	6010	7
Copper (Cu)	6010	6
Lead (Pb)	7421	1
Mercury (Hg)	7470 or 7471	0.2
Nickel (Ni)	6010	15
Selenium (Se)	7740	2
Silver (Ag)	6010	7
Thallium (Tl)	7841	1
Zinc (Zn)	6010	2
Sulfide	9030	(see Method)
Cyanide	9010	(see Method)
Volatiles (see attached method list of analytes)	8260	(see Method)
Semi-Volatiles (see attached method list of analytes)	8270	(see Method)

Note: The liquid detection limits listed above for metals can be converted to soil detection limits by multiplying by a factor. This factor will be affected by the dry weight determination for each sample, but is generally 50 for all metals except mercury, where the factor is 500. Multiplying by the factor also changes the units from µg/l to µg/kg.

SECTION J

OTHER FEDERAL AND STATE LAWS

SECTION J. OTHER FEDERAL AND STATE LAWS

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SECTION J. OTHER FEDERAL AND STATE LAWS

40 CFR 270.14(b)(20)

J1.0 FEDERAL REQUIREMENTS

40 CFR 270.3

United States Environmental Protection Agency (USEPA) regulations require that USEPA follow procedures under certain federal laws before granting or denying a Resource Conservation and Recovery Act (RCRA) permit. The discussion which follows provides a description of how these laws currently apply to existing and future operations at 21st Century Environmental Management of Nevada, LLC (the PSC Fernley Facility).

J1.1 Wild and Scenic Rivers Act

40 CFR 270.3(a)

The Fernley Facility does not affect any rivers designated under the Wild and Scenic Rivers Act.

J1.2 National Historic Preservation Act of 1966

40 CFR 270.3(b)

The Fernley Facility is neither listed nor eligible for listing on the national or local Registers of Historic Places.

J1.3 Endangered Species Act

40 CFR 270.3(c)

No threatened or endangered species are known to exist on the plant site or in areas adjacent to the site. Facility operations are not expected to affect other critical habitat areas where endangered species might be present.

J1.4 Coastal Zone Management Act

40 CFR 270.3(d)

The Fernley facility is not located within a designated shoreline area.

J1.5 Fish and Wildlife Coordination Act

40 CFR 270.3(e)

The PSC Fernley facility does not propose to impound, divert, control, or modify any body of water in the vicinity of the Fernley facility site as part of existing or planned facility operations. Consultation with state agencies having authority over wildlife resources potentially affected by such actions is not anticipated to be necessary.

J1.6 RCRA Corrective Action Program

40 CFR 264.101; RCRA Hazardous and Solid Waste Amendments (HSWA) 1984 Section 3004(u), 3004(v), 3008(h), and 3013

The Corrective Action Program outlined in the regulations listed above requires corrective action for all releases of hazardous waste or constituents from hazardous waste treatment, storage, or disposal facilities, where necessary to protect human health and the environment. To date, the PSC Fernley facility has no identified releases requiring the implementation of a corrective action program.

J1.7 Toxic Substances Control Act

40 CFR 761

Section 6(e) of the Toxic Substances Control Act directs the promulgation of rules governing the manufacturing, processing, distribution in commerce, use, and disposal of polychlorinated biphenyls (PCBs). These rules are established in 40 CFR Part 761, PCB manufacturing, processing, distribution in commerce, and use prohibitions. At this time the PSC Fernley facility does not receive for treatment PCB materials or waste.

J2.0 STATE REQUIREMENTS

NAC 444.842 through 444.8746

Nevada Division of Environmental Protection (NDEP) regulations require that a facility which stores or handles dangerous waste comply with all applicable federal, state, and local environmental protection laws and regulations. In addition to the federal laws cited above, NDEP requires compliance with other state and local laws and regulations before approving a RCRA permit. The discussion which follows provides a description of how these laws currently apply to operations at the PSC Fernley facility.

J2.1 National Emission Standard for Asbestos

NDEP regulations [NAC 444.965 – 444.976] require that all waste material containing asbestos be disposed at a facility operated in accordance with 40 CFR Part 61 Subpart M, National Emission Standard for Asbestos. Waste material containing asbestos is not disposed at the PSC Fernley facility. The storage of asbestos-contaminated waste material may occur at the facility. All federal, state, and local requirements regarding the handling and storage of this material are observed. Asbestos which may be stored on site is sent off site to an approved disposal facility operated in accordance with 40 CFR Part 61 Subpart M.

J3.0 LIST OF PERMITS

Table J3-1 lists major permits issued to the PSC Fernley facility by state and local regulatory agencies. Additional permits and registrations are and will be obtained as needed for activities such as construction on site or installation of additional treatment tanks and equipment.

TABLE J3-1 FERNLEY FACILITY PERMITS

AGENCY	PERMIT TITLE	PERMIT NUMBER(S)
NDEP	RCRA Hazardous Waste Treatment & Storage	NEVHW0018
City of Fernley	Business License	BL01-1266
County of Lyon	Special Use Permit	636
County of Lyon	Certificate of Occupancy	21-251-06-B7272
State of Nevada	Business License	1007427469
State of Nevada Bureau of Air Quality	Air Permit	AP4953-2235
State of Nevada Bureau of Water Pollution Control	Stormwater	NVR050000

SECTION K

CERTIFICATION

SECTION K. CERTIFICATION

40 CFR 270.11

21st Century Environmental Management of Nevada, LLC (PSC Fernley) provides the following certification statement for this permit renewal application for their facility in Fernley, Nevada.

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision according to a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Doug Bryson
Regional Vice President

07/10/2012
Date

SECTION L

CORRECTIVE ACTION

SECTION L CORRECTIVE ACTION

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L1.0 CORRECTIVE ACTION FOR SOLID WASTE MANAGEMENT UNITS AND AREAS OF CONCERN

The objective of corrective action at the PSC Fernley facility is to evaluate the nature and extent of releases of hazardous waste and/or constituents, and as necessary, implement corrective measures to protect human health and the environment. PSC Fernley facility will implement corrective action in accordance with the Permit, and in general accordance with applicable guidance, including Results Based Approaches and Tailored Oversight Guidance, EPA 530-R-03-012, and Handbook of Groundwater Protection and Cleanup Policies for RCRA Corrective Action, EPA 530-R-04-030.

L1.1 Background

A Preliminary Assessment (PA) of the PSC Fernley facility was completed by EPA in 1992, and was determined to meet the substantive requirements of a RCRA Facility Assessment (RFA). The PA identified nine Solid Waste Management Units (SWMUs), but did not recommend that corrective action be implemented at any of the SWMUs.

At the direction of NDEP, PSC conducted a supplemental RFA (SRFA) in November 2001. As part of the SRFA, fourteen soil samples were collected in the vicinity of SWMUs 1, 5, 8, and 9. While concentrations of arsenic, cadmium, chromium, and nickel exceeded applicable PRGs at some locations, NDEP concurred that none of the concentrations pose a threat to human health and the environment. The SRFA did not identify any additional SWMUs, but did recommend periodic inspections for SWMUs 8 and 9, and also recommended installation of a sump alarm at SWMU 5. Both of these recommendations have been implemented.

The SRFA also recommended that confirmation soil samples be collected following excavation of a stormwater containment pond near SWMU 8. Sampling and analysis of soil samplings collected from the floor of the excavation confirmed that no release has occurred in the area.

In summary, nine SWMUs have been identified at the PSC Fernley facility. While releases from some of these SWMUs have occurred, NDEP has concluded that no further action is required for any of the nine SWMUs.

L2.0 CORRECTIVE ACTION PROCESS

This section outlines the identification, notification, assessment, and cleanup process PSC Fernley facility will follow in the event of a release from an existing SWMU, or if PSC Fernley facility identifies additional SWMU(s).

L2.1 Notification and Assessment of Newly Identified SWMUs and AOCs

PSC Fernley facility will notify NDEP in writing within fifteen calendar days of discovery of any additional SWMUs or AOCs. The notification will include, at a minimum, the location of the SWMU or AOC, a unique sequential identification number, and all available information pertaining to the nature of the release.

Within 90 calendar days of written notification to NDEP of any newly discovered SWMU or AOC, PSC Fernley facility will submit an Assessment Report (AR) to NDEP. The AR will contain sufficient information to allow NDEP to determine if additional corrective action for that SWMU or AOC is required.

NDEP may determine that an Assessment Report Work Plan (ARWP) is required for NDEP approval prior to PSC Fernley facility implementing the AR. If NDEP determines that an ARWP is required, NDEP will notify PSC Fernley facility within 21 calendar days of receiving the release notification. PSC Fernley facility will submit the ARWP to NDEP within 45 calendar days of such notification, and will implement the ARWP within 60 calendar days of NDEP approval.

L2.2 Notification and Assessment of Newly Discovered Releases at Previously Identified SWMUs or AOCs

PSC Fernley facility will notify NDEP in writing within fifteen calendar days of discovery of previously unidentified releases from existing SWMUs or AOCs. Such discovery may be based on groundwater monitoring, field investigation, environmental audits, or other means.

Within 90 calendar days of written notification to NDEP of any newly discovered release from an existing SWMU or AOC, PSC Fernley facility will submit an Assessment Report (AR) to NDEP. The AR will contain sufficient information to allow NDEP to determine if additional corrective action for that SWMU or AOC is required.

NDEP may determine that an Assessment Report Work Plan (ARWP) is required for NDEP approval prior to PSC Fernley facility implementing the AR. If NDEP determines that an ARWP is required, NDEP will notify PSC Fernley facility within 21 calendar days of receiving the release notification. PSC Fernley facility will submit the ARWP to NDEP within 45 calendar days of such notification, and will be implement the ARWP within 60 calendar days of NDEP approval.

L2.3 RCRA Facility Investigation (RFI)

If NDEP determines that a release from a SWMU or AOC has not been or cannot be adequately addressed using the AR process outlined in L2.2, PSC Fernley facility will prepare and submit an RFI Workplan within 120 calendar days of written notification of such requirement by NDEP. The RFI Work plan will be prepared in general conformance with applicable guidance, and in general conformance with the Scope of Work provided in Appendix L-1. The primary purpose of the RFI is to provide sufficient information to determine if the release poses a significant threat to human health and the environment, and to support a Corrective Measures Study (CMS), if necessary.

PSC Fernley facility will implement the RFI Workplan within 90 calendar days of receiving written approval of the RFI Workplan from NDEP. Implementation of the RFI Workplan will follow the schedule provided in the RFI Workplan. If the RFI requires more than 180 calendar days to complete, PSC Fernley facility will prepare and submit RFI Progress Reports semi-annually. The first RFI Progress Report will be due 180 calendar days following receipt of written approval of the RFI Workplan.

Upon completion of all necessary site characterization activities and other requirements of the RFI Workplan, PSC Fernley facility will prepare and submit for NDEP approval an RFI Report. The RFI Report will summarize all findings of the RFI, and will be in general conformance with applicable guidance. If NDEP does not approve the RFI

Report, PSC Fernley facility will revise the RFI Report, and submit it to NDEP within 90 calendar days of receiving written comments.

L2.4 Interim Measures

If NDEP determines that a release from a SWMU or AOC poses an immediate threat to human health and the environment, PSC Fernley facility will prepare and submit an Interim Measures (IM) Workplan to NDEP within 60 calendar days of such written notification from NDEP. NDEP and PSC Fernley facility may also choose to implement an IM when the scope and nature of the release does not justify the time and expense of implementing the RFI/CMS process. Any IMs proposed in the IM Workplan should be consistent with and integrated into the any final remedy proposed for the site.

PSC Fernley facility will implement the IM Workplan consistent with the schedule provided in the IM Workplan. If completion of the IM takes longer than one year, PSC Fernley facility will prepare and submit Annual IM Progress Reports to NDEP.

L2.5 Corrective Measures Study

If, based on the findings of the RFI Report, NDEP determines that a Corrective Measures Study (CMS) is required, PSC Fernley facility will prepare and submit a CMW Workplan within 90 calendar days of such notification. The CMS Workplan will be in general conformance with applicable guidance and the Scope of Work provided in Appendix L-2.

PSC Fernley facility will implement the CMS Workplan within 60 calendar days of receiving written approval from NDEP. The CMS will be conducted consistent with the schedule contained in the CMS Workplan.

Upon completion of the CMS, PSC Fernley facility will prepare and submit a CMS report to NDEP. The CMS Report will be submitted consistent with the schedule included in the CMS Workplan. If NDEP determines they cannot approve the CMS Report, PSC Fernley facility will revise and submit the CMS Report to NDEP within 90 calendar days of receiving written comments from NDEP.

L2.6 Corrective Measures Implementation

If following approval of the CMS Report, NDEP determines that implementation of a final Corrective Measure is necessary, the permit will be modified to incorporate the selected final Corrective Measure. Within 60 calendar days of the effective date of this permit modification, PSC Fernley facility will prepare and submit a Corrective Measures Implementation (CMI) Workplan. The CMI Workplan will be in general conformance with applicable guidance and the Scope of Work provided in Appendix L-3.

Upon NDEP approval of the CMI Workplan, PSC Fernley facility will implement Corrective Measure consistent with the scheduled incorporated into the CMI Workplan.

APPENDIX L-1

RFI SCOPE OF WORK

APPENDIX L-1 RCRA FACILITY INVESTIGATION (RFI) SCOPE OF WORK

1) PURPOSE

The purpose of a RCRA Facility Investigation is to determine the nature and extent of releases of hazardous waste or constituents from regulated units, solid waste management units, and other source areas at the Facility and to gather all necessary data to support a Corrective Measures Study. The RFI must include characterization of the facility (processes, waste management, etc), environmental setting, source areas, nature and extent of contamination, migration pathways (transport mechanisms) and all potential receptors. PSC Fernley facility shall conduct those investigations necessary to: characterize the facility (Environmental Setting); define the source (Source Characterization); define the degree and extent of release of hazardous constituents (Contamination Characterization); and identify actual or potential receptors. The investigations shall result in data of adequate technical content and quality to support the development and evaluation of the corrective action plan if necessary. All sampling and analyses shall be conducted in accordance with the Sampling and Analysis Plan. All sampling locations shall be documented in a log and identified on a detailed site map.

2) SCOPE

The documents required for an RFI are, unless the Implementing Agency specifies otherwise,

1) A Current Conditions Report,
2) A RCRA Facility Investigation Workplan, (see attachment 1 for guidance)
3) A RCRA Facility Investigation Report and
4) A Health and Safety Plan.

The scope of work (SOW) for each document is specified below. The SOW's are intended to be flexible documents capable of addressing both simple and complex site situations. If PSC Fernley facility/Respondent can justify, to the satisfaction of the Implementing Agency, that a plan and/or report or portions thereof are not needed in the given site specific situation, then the Implementing Agency may waive that requirement. The Implementing Agency may require PSC Fernley facility/Respondent to conduct additional studies beyond what is discussed in the SOW's in order to meet the objectives of the RFI. PSC Fernley facility/ Respondent will furnish all personnel, materials and services necessary to conduct the additional tasks.

RCRA Facility Investigation:

A. Environmental Setting

PSC Fernley facility shall collect information to supplement and/or verify Part B information on the environmental setting at the facility. PSC Fernley facility shall characterize the following as they relate to identified sources, pathways and areas of releases of hazardous constituents from Solid Waste Management Units.

1. Hydrogeology

PSC Fernley facility shall conduct a program to evaluate hydrogeologic conditions at the facility. This program shall provide the following information:

(a) A description of the regional and facility specific geologic and hydrogeologic characteristics affecting ground-water flow beneath the facility, including:

(i) Regional and facility specific stratigraphy: description of strata including strike and dip, identification of stratigraphy contacts;

(ii) Structural geology: description of local and regional structural features (e. g., folding, faulting, tilting, jointing, etc.);

(iii) Depositional history;

(iv) Regional and facility specific ground-water flow patterns; and

(v) Identification and characterization of areas and amounts of recharge and discharge.

(b) An analysis of any topographic features that might influence the ground-water flow system.

(c) Based on field data, tests, and cores, a representative and accurate classification and description of the hydrogeologic units which may be part of the migration pathways at the facility (i. e., the aquifers and any intervening saturated and unsaturated units), including:

(i) Hydraulic conductivity and porosity (total and effective);

(ii) Lithology, grain size, sorting, degree of cementation;

(iii) An interpretation of hydraulic interconnections between saturated zones; and

(iv) The attenuation capacity and mechanisms of the natural earth materials (e. g., ion exchange capacity, organic carbon content, mineral content etc.).

(d) Based on data obtained from groundwater monitoring wells and piezometers installed upgradient and downgradient of the potential contaminant source, a representative description of water level or fluid pressure monitoring including:

(i) Water-level contour and/or potentiometric maps;

(ii) Hydrologic cross sections showing vertical gradients;

(iii) The flow system, including the vertical and horizontal components of flow; and

(iv) Any temporal changes in hydraulic gradients, for example, due to tidal or seasonal influences.

(e) A description of man-made influences that may affect the hydrology of the site, identifying:

(i) Local water-supply and production wells with an approximate schedule of pumping; and

(ii) Man-made hydraulic structures (pipelines, french drains, ditches, etc.).

2. Soils

PSC Fernley facility shall conduct a program to characterize the soil and rock units above the water table in the vicinity of contaminant release(s). Such characterization may include, but not be limited to, the following types of information as appropriate:

(a) Surface soil distribution;

(b) Soil profile, including ASTM classification of soils;

(c) Transects of soil stratigraphy;

(d) Hydraulic conductivity (saturated and unsaturated);

(e) Relative permeability;

(f) Bulk density;

(g) Porosity;

(h) Soil sorption capacity;

(i) Cation exchange capacity (CEC);

(j) Soil organic content;

(k) Soil pH;

(l) Particle size distribution;

(m) Depth of water table;

(n) Moisture content;

(o) Effect of stratification on unsaturated flow;

(p) Infiltration;

(q) Evapotranspiration;

(r) Storage capacity;

(s) Vertical flow rate; and

(t) Mineral content.

3. Surface Water and Sediment

PSC Fernley facility shall conduct a program to characterize the surface water bodies near the facility. Such characterization may include, but not be limited to, the following activities and information:

(a) Description of the temporal and permanent surface water bodies including:

(i) For lakes and estuaries: location, elevation, surface area, inflow, outflow, depth, temperature stratification, and volume;

(ii) For impoundments: location, elevation, surface area, depth, volume, freeboard, and construction and purpose;

(iii) For streams, ditches, and channels: location, elevation, flow, velocity, depth, width, seasonal fluctuations, flooding tendencies (i. e., 100 year event), discharge point(s), and general contents.

(iv) Drainage patterns; and

(v) Evapotranspiration.

(b) Description of the chemistry of the natural surface water and sediments. This includes determining the pH, total dissolved solids, total suspended solids, biological oxygen demand, alkalinity, conductivity, dissolved oxygen profiles, nutrients, chemical oxygen demand, total organic carbon, specific contaminant concentrations, etc.

(c) Description of sediment characteristics including:

(i) Deposition area;

(ii) Thickness profile; and

(iii) Physical and chemical parameters (e. g., grain size, density, organic carbon content, ion exchange capacity, pH, etc.)

4. Air

PSC Fernley facility shall provide information characterizing the climate in the vicinity of the facility. Such information may include, but not be limited to:

(a) A description of the following parameters:
- (i) Annual and monthly rainfall averages;
- (ii) Monthly temperature averages and extremes;
- (iii) Wind speed and direction;
- (iv) Relative humidity/dew point;
- (v) Atmospheric pressure;
- (vi) Evaporation data;
- (vii) Development of inversions; and
- (viii) Climate extremes that have been known to occur near the facility, including frequency of occurrence. (i.e. Hurricanes)

(b) A description of topographic and man-made features, which affect airflow and emission patterns, including:
- (i) Ridges, hills or mountain areas;
- (ii) Canyons or valleys;
- (iii) Surface water bodies (e. g. rivers, lakes, bays, etc.); and
- (iv) Buildings.

B. Source Characterization

For those sources from which releases of hazardous constituents have been detected, PSC Fernley facility shall collect analytical data to completely characterize the wastes and the areas where wastes have been placed. To the degree that is possible without undue safety risks, including: type, quantity; physical form; disposition (containment or nature of deposits); and facility characteristics affecting release (e. g., facility security, and engineering barriers). This shall include quantification of the following specific characteristics, at each source area:

1. Unit/Disposal Area Characteristics:

(a) Location of unit/disposal area;

(b) Type of unit/disposal area;

(c) Design features;

(d) Operating practices (past and present)

(e) Period of operation;

(f) Age of unit/disposal area;

(g) General physical conditions; and

(h) Method used to close the unit/disposal area.

2. Waste Characteristics:

(a) Type of wastes placed in the unit;

(i) Hazardous classification (e. g., flammable, reactive, corrosive, oxidizing or reducing agent);

(ii) Quantity; and

(iii) Chemical composition.

(b) Physical and chemical characteristics such as;

(i) Physical form (solid, liquid, gas);

(ii) Physical description (e. g., powder, oily sludge);

(iii) Temperature;

(iv) pH;

(v) General chemical class (e. g., acid, base, solvent);

(vi) Molecular weight;

(vii) Density;

(viii) Boiling point;

(ix) Viscosity;

(x) Solubility in water;

(xi) Cohesiveness of the waste; and

(xii) Vapor pressure.

(c) Migration and dispersal characteristics of the waste such as:

(i) Sorption capability;

(ii) Biodegradability, bioconcentration, biotransformation;

(iii) Photodegradation rates;

(iv) Hydrolysis rates; and

(v) Chemical transformations.

PSC Fernley facility shall document the procedures used in making the above determinations.

C. Characterization of Releases of Hazardous Constituents

PSC Fernley facility shall collect analytical data on groundwater, soils, surface water, sediment, and subsurface gas contamination near the facility in accordance with the sampling and analysis plan as required above. These data shall be sufficient to define the extent, origin, direction, and rate of movement of contamination. Data shall include time and location of sampling, media sampled, concentrations found, conditions during sampling, and the identity of the individuals performing the sampling and analysis. PSC Fernley facility shall address the following types of contamination at the facility:

1. Groundwater Contamination

PSC Fernley facility shall conduct a groundwater investigation to characterize any plumes of contamination detected at the facility. This investigation shall at a minimum provide the following information:

(a) A description of the horizontal and vertical extent of any plume(s) of hazardous constituents originating from within the facility;

(b) The horizontal and vertical direction of contamination movement;

(c) The velocity of contaminant movement;

(d) The horizontal and vertical concentration profiles of hazardous constituents in the plume(s);

(e) An evaluation of factors influencing the plume movement; and

(f) An extrapolation of future contaminant movement.

PSC Fernley facility shall document the procedures used in making the above determinations (e. g., well design, well construction, geophysics, modeling, etc.).

2. Soil Contamination

PSC Fernley facility shall conduct an investigation to characterize the contamination of the soil and rock units above the saturated zone near any contaminant release. The investigation may include the following information:

(a) A description of the vertical and horizontal extent of contamination;

(b) A description of appropriate contaminant and soil chemical properties within the contaminant source area and plume. This may include contaminant solubility, speciation, absorption, leachability, exchange capacity, biodegradability, hydrolysis, photolysis, oxidation and other factors that might affect contaminant migration and transformation;

(c) Specific contaminant concentrations;

(d) The velocity and direction of contaminant movement; and

(e) An extrapolation of future contaminant movement.

PSC Fernley facility shall document the procedures used in making the above determinations.

3. Surface Water and Sediment Contamination

PSC Fernley facility shall conduct a surface water investigation to characterize contamination in surface water bodies resulting from releases of hazardous constituents at the facility. The investigation may include, but not be limited to, the following information:

(a) A description of the horizontal and vertical extent of any plume(s) originating from the facility, and the extent of contamination in underlying sediments;

(b) The horizontal and vertical direction of contaminant movement;

(c) The contaminant velocity;

(d) An evaluation of the physical, biological and chemical factors influencing contaminant movement;

(e) An extrapolation of future contaminant, movement; and

(f) A description of the chemistry of the contaminated surface waters and sediments. This includes determining the pH, total dissolved solids, specific contaminant concentrations, etc.

4. Air Contamination

PSC Fernley facility shall conduct an investigation to characterize gaseous releases of hazardous constituents into the atmosphere or any structures or buildings. This investigation may provide the following information:

(a) A description of the horizontal and vertical direction and velocity of contaminant movement;

(b) The rate and amount of the release; and

(c) The chemical and physical composition of the contaminant(s) released, including horizontal and vertical concentration profiles.

PSC Fernley facility shall document the procedures used in making the above determinations.

D. Potential Receptors

PSC Fernley facility shall collect data describing the human populations and environmental systems that are susceptible to contaminant exposure from the facility. Chemical analysis of biological samples and/or data on observable effects in ecosystems may also be obtained as appropriate. The following characteristics shall be identified:

1. Current local uses and planned future uses of groundwater:
   (a) Type of use (e. g., drinking water source: municipal or residential, agricultural, domestic/non-potable, and industrial); and
   (b) Location of ground water users, to include withdrawal and discharge wells, within one mile of the impacted area.

   The above information should also indicate the aquifer or hydrogeologic unit used and/or impacted for each item.

2. Current local uses and planned future uses of surface waters directly impacted by the facility:
   (a) Domestic and municipal (e. g., potable and lawn/gardening watering);
   (b) Recreational (e. g. swimming, fishing);
   (c) Agricultural;
   (d) Industrial; and
   (e) Environmental (e. g., fish and wildlife propagation).

3. Human use of or access to the facility and adjacent lands, including but not limited to:
   (a) Recreation;
   (b) Hunting;
   (c) Residential;
   (d) Commercial; and
   (e) Relationship between population locations and prevailing wind direction.

4. A general description of the biota in surface water bodies on, adjacent to, or affected by the facility.

5. A general description of the ecology within the area adjacent to the facility.

6. A general demographic profile of the people who use have access to the facility and adjacent land, including, but not limited to: age; sex; and sensitive subgroups.

7. A description of any known or documented endangered or threatened species near the facility.

3) Current Conditions Report

The Current Conditions Report must describe existing information pertinent to the facility including operations, processes, waste management, geology, hydrogeology, contamination, migration pathways, potential receptor populations and interim corrective measures. The required format for a current conditions report is described below. If some of this information does not exist, so indicate in the applicable section.

a) Introduction

i) Purpose

Describe the purpose of the current conditions report (e.g. summary and evaluation of existing information related to the facility; required as a component of the RCRA Facility Investigation).

ii) Organization of Report

Describe how the report is organized.

iii) Facility Description

Summarize background, current operations, waste management and products produced at the facility. Include a map that shows the general geographic location of the facility.

Describe current facility structures including any buildings, tanks, sumps, wells, waste management areas, landfills, ponds, process areas and storage areas.

Include detailed facility maps that clearly show current property lines, the owners of all adjacent property, surrounding land use (residential, commercial, agricultural, recreational, etc.), all tanks, buildings, process areas, utilities, paved areas, easements, rights-of-way, waste management areas, ponds, landfills, piles, underground tanks, wells and other facility features.

b) Facility History

i) Ownership History

Describe the ownership history of the facility.

ii) Operational History

Describe in detail how facility operations, processes and products have changed over time (historical aerial photographs could be useful for this purpose).

iii) Regulatory History

Describe all permits requested or received, any enforcement actions taken by regulatory agencies and any closure activities that are planned or underway.

iv) Waste Generation

Describe all wastes (solid or hazardous) that have been generated at the facility. Include approximate waste volumes generated and summaries of any waste analysis data. Show how the waste stream (volume and chemical composition) has changed over time.

v) Waste Management

Describe in detail all past solid and hazardous waste treatment, storage and disposal activities at the facility. Show how these activities have changed over time and indicate the current status. Make a clear distinction between active waste management units and older out of service waste management units. Identify which waste management units are regulated under RCRA. Include maps showing:

(1) all solid or hazardous waste treatment, storage or disposal areas active after November 19, 1980,

(2) all known past solid waste or hazardous waste treatment, storage or disposal areas regardless of whether they were active on November 19, 1980 and

(3) all known past or present underground tanks or piping.

vi) Spill and Discharge History

Provide approximate dates or periods of past product and waste spills, identify the materials spilled and describe any response actions conducted. Include a summary of any sampling data generated because of the spill. Include a map showing approximate locations of spill areas at the facility.

vii) Chronology of Critical Events

Provide a chronological list (including a brief description) of major events, communications, agreements, and notices of violation, spills, discharges that occurred throughout the facility's history.

c) Environmental Setting

i) Location/Land Use

Discuss facility size, location and adjacent land use. Include a rough demographic profile of the human population who use or have access to the facility and adjacent lands. Provide approximate distance to nearest residential areas, schools, nursing homes, hospitals, parks, playgrounds, etc.

ii) Local Ecology

Describe any endangered or threatened species near the facility. Include a description of the ecological setting on and adjacent to the facility. Provide approximate distance to nearest environmentally sensitive areas such as marshlands, wetlands, streams, oceans, forests, etc.

iii) Topography and Surface Drainage

Describe the regional and site-specific topography and surface drainage patterns that exist at the facility. Include a map that shows the topography and surface drainage depicting all waterways, wetlands, floodplains, water features, drainage patterns and surface water containment areas.

iv) Climate

Discuss mean annual temperatures, temperature extremes, 24-hour rainfall, average annual rainfall, prevailing wind direction, etc.

v) Surface Water Hydrology

Describe the facility's proximity (distance) to surface water bodies (e.g. coastal waters, lakes, rivers, creeks, drainage basins, floodplains, vernal pools, wetlands, etc.).

vi) Geology

Describe the regional and site specific geology including stratigraphy and structure. Include cross sections to show the subsurface stratigraphy.

vii) Hydrogeology

Describe the regional and site specific hydrogeologic setting including any information concerning local aquifers, ground water levels, gradients, flow direction, hydraulic conductivity, and velocity. Include potentiometric surface contour maps. Describe the beneficial uses of the ground water (e.g. drinking water supply, agricultural water supply, etc.).

viii) Ground Water Monitoring System

Describe the facility's ground water monitoring system including a table detailing the existing well construction. The table must, at a minimum, identify the following construction details for each well:

1. Well ID
2. Completion Date
3. Drilling Method
4. Borehole Diameter (inches)
5. Well Casing Diameter and Type
6. Measuring Point Elevation (feet MSL)
7. Borehole Depth (feet BGS)
8. Depth of Well (feet)
9. Screened Interval

10. Formation Screened
11. Slot Size & Type (inches)
12. Filter Pack Material
13. Filter Pack Thickness
14. Type of Filter Pack Seal
15. Thickness of Filter Pack Seal
16. Pump System (dedicated or non-dedicated)
17. Type of Pump
18. Approximate Depth to Water (feet BGS)

If some of this information is not available, so indicate on the table with an "NA". {BGS: Below Ground Surface, MSL: Mean Sea Level. The monitoring well locations must be shown on a facility map.

d) Existing Degree and Extent of Contamination

For each medium (e.g. soil, ground water, surface water, air, etc.), describe the existing extent of contamination. This description must include all available monitoring data and qualitative information on the locations and levels of contamination at the facility (both onsite and offsite). Include a general assessment of the data quality, a map showing the location of all existing sampling points and potential source areas and contour maps showing any existing ground water plumes at the facility (if ground water release). Highlight potential ongoing release areas that would warrant use of interim corrective measures.

e) Previous Investigations

List and briefly describe all previous investigations that have occurred at the facility, who they were done for (i.e., agency) and agency contacts.

f) Potential Migration Pathways

i) Physical Properties of Contaminants

Identify the applicable physical properties for each contaminant that may influence how the contaminant moves in the environment. These properties could include melting point (degrees C), water solubility (mg/l), vapor pressure (mm Hg), Henry's law constant (atm-m3/mol), density (g/cc), dynamic viscosity (cp), kinematic viscosity (cs), octanol/water partition coefficient (log Kow), soil organic carbon/water partition coefficient (log koc) and soil/water partition coefficients. Include a table that summarizes the applicable physical properties for each contaminant.

ii) Conceptual Model of Contaminant Migration

Develop a conceptual model of contaminant migration. The conceptual model consists of a working hypothesis of how the contaminants may move from the release source to the receptor population. The conceptual model is developed by looking at the applicable physical parameters for each contaminant and assessing how the contaminant may migrate given the existing site conditions (geologic features, depth to ground water, etc.).

Describe the phase (water, soil, gas, non-aqueous) and location where contaminants are likely to be found (e.g., if a ground water contaminant has a low water solubility and a high density, then the contaminant will likely sink and be found at the bottom of the aquifer, phase: non-aqueous). Include a discussion of potential transformation reactions that could impact the type and number of contaminants (i.e., what additional contaminants could expected as a result of biotic and a biotic transformation reactions given the existing soil conditions).

A typical conceptual model should include a discussion similar to the following: Benzene, ethylbenzene, toluene and xylenes are potential contaminants at the facility. Based on their high vapor pressures and relatively low water solubilities (see Henry's law constant), the primary fate of these compounds insurface soils or surface water is expected to be volatilization to the atmosphere. These mono-cyclicaromatic hydrocarbons may leach from soils into groundwater. The log koc (soil organic carbon/water partition coefficient) values for these compounds ranges from 1.9 to 4.0, indicating that sorption to organic matter in soils or sediments may occur only to a limited extent.

g) Potential Impacts of Existing Contamination

Describe the potential impacts on human health and the environment from any existing contamination and/or ongoing activities at the facility. This description must consider the possible impacts on sensitive ecosystems and endangered species as well as on local populations. Potential impacts from any releases to ground water, surface water, soil (including direct contact with contaminated surface soil) and air (including evaporation of volatile organic compounds from contaminated soil) must be discussed.

h) Ground Water Releases

Identify all wells (municipal, domestic, agricultural, industrial, etc.) within a 1-mile radius of the facility. Include a summary of available water sampling data for any identified municipal, industrial or domestic supply wells.

Develop a well inventory table that lists the following items for each identified well:

1. Well Designation
2. State ID
3. Reported Owner
4. Driller
5. Date of Completion
6. Original Use of Well
7. Current Use of Well
8. Drilling Method
9. Borehole Diameter (inches)
10. Casing Diameter (inches)
11. Perforated Interval (feet)
12. Gravel Pack Interval (feet)
13. Total Well Depth (feet)
14. Depth to Water (feet below ground surface)
15. Date of Water Level Measurement

    If some of this information is not available, so indicate on the table with an "NA".

Include a regional map showing the facility, ground water flow direction (if known) and the location of all identified wells within a 1-mile radius of the facility.

Identify and describe any potential ground water discharge to surface water bodies.

Identify and list all relevant and applicable water standards for the protection of human health and the environment (e.g., maximum contaminant levels, water quality standards, etc).

i) Surface Water Releases

Discuss the facility's potential impact on surface water within a 2-mile radius of the facility. Describe the potential beneficial uses of the surface water (e.g., drinking water supply, recreational, agricultural, industrial, or environmentally sensitive). Identify all water supply intake points and contact areas within a 2-mile radius of the facility. Include a summary of the most recent water sampling data available for each of the identified water supply intake points. Include a description of the biota in surface water bodies on, adjacent to, or which can be potentially affected by the release. Also, summarize any available sediment sampling data.

Include a regional map showing the facility, surface water flow direction, beneficial use areas, and the location of any identified water supply intake points or contact areas that are within a 2-mile radius of the facility.

i) Sensitive Ecosystems/Habitats

Discuss the facility's potential impact on sensitive ecosystems.

j) Interim Corrective Measures and Stabilization Assessment

Identify all corrective measures that were or are being undertaken at the facility to stabilize contaminant releases. Describe the objectives of the corrective measures including how the measure is mitigating a potential threat to human health and the environment. Summarize the design features of the corrective measure. Include a schedule for completing any ongoing or future work.

Identify and describe potential interim corrective measure alternatives that could be implemented immediately to stabilize any ongoing releases and/or prevent further migration of contaminants.

k) Data Needs

Assess the amount and quality of existing data concerning the facility and determine what additional information must be collected to meet the objectives of the RFI. This assessment must identify any additional information that may be needed to (1) support development of interim measures for early action and (2) adequately evaluate and compare corrective measures alternatives (e.g., field work, treatability studies, computer modeling, literature searches, vendor contacts, etc.). For example, if soil vapor extraction (SVE) is a likely option to address contamination at the facility, then the RFI should collect applicable field data to assess SVE (e.g., soil gas analysis, depth to ground water, etc.). The RFI Workplan must detail how this additional information will be collected.

l) References

m) RCRA Facility Investigation Workplan

The RCRA Facility Investigation (RFI) Workplan shall define the procedures necessary to:

- Characterize the presence, magnitude, extent (horizontal and vertical), rate of movement and direction of any ground water contamination in and around the facility (only required for releases to ground water);

- Characterize the geology and hydrogeology in and around the facility (only required for releases to ground water and possibly for releases to soil);

- Characterize the presence, magnitude, extent (horizontal and vertical), rate of movement and direction of any soil contamination in and around the facility (only required for releases to soil);

- Characterize the presence, magnitude, extent (horizontal and vertical), rate of movement and direction of any soil gas contamination in and around the facility (may be required for releases to ground water and/or soil depending on the circumstances);

- Characterize the presence, magnitude, extent (horizontal and vertical), rate of movement and direction of any surface water contamination (includes surface water sediments) at the facility (only required for releases to surface water);

- Characterize the presence, magnitude, extent (horizontal and vertical), rate of movement and direction of any air releases at the facility (only required for air releases);

- Characterize any potential sources of contamination (required for all releases);

- Characterize the potential pathways of contaminant migration (required for all releases);

- Identify any actual or potential receptors (required for all releases);

- Gather all data to support a risk and/or ecological assessment (if required);

- Gather all necessary data to support interim corrective measures to stabilize ongoing releases and prevent further contaminant migration (required for all releases); and

- Gather all necessary data to support the Corrective Measures Study (required for all releases). This could include conducting pilot, laboratory and/or bench scale studies to assess the effectiveness of a treatment method.

- The RFI Workplan shall describe all aspects of the investigation, including project management, sampling and analysis, well drilling and installation and quality assurance and quality control. If the scope of the investigation is such that more than one phase is necessary, the "Phase 1" RFI Workplan must include a summary description of each phase.

APPENDIX L-1 RCRA FACILITY INVESTIGATION (RFI) SCOPE OF WORK

Required format for the RFI Workplan

1. INTRODUCTION

Briefly, introduce the Workplan. Discuss the Order or Permit requiring the RFI and how the Workplan is organized.

1.1. Investigation Objectives

1.1.1. Project Objectives

Describe the overall objectives and critical elements of the RFI. State the general information needed from the site (e.g. soil chemistry, hydraulic conductivity of aquifer, stratigraphy, ground water flow direction, identification of potential receptors, etc.). The general information should be consistent with the objectives of the RFI and the data needs identified in the Current Conditions Report.

2. DATA QUALITY OBJECTIVES

Provide data quality objectives that identify what data are needed and the intended use of the data.

3. PROJECT MANAGEMENT

Describe how the investigation will be managed, including the following information:

* Organization chart showing key personnel, levels of authority and lines of communication;

* Project Schedule; and

* Estimated Project Budget.

Identify the individuals or positions who are responsible for: project management, field activities, laboratory analysis, database management, overall quality assurance, data validation, etc. Include a description of qualifications for personnel performing or directing the RFI, including contractor personnel.

4. FACILITY BACKGROUND

Summarize existing contamination (e.g., contaminants, concentrations, etc.), local hydrogeologic setting and any other areas of concern at the facility. Include a map showing the general geographic location of the facility and a more detailed facility map showing the areas of contamination. Provide a reference to the Current Conditions Report and/or other applicable documents as a source of additional information.

5. FIELD INVESTIGATION

5.1. Task Description

Provide a qualitative description of each investigation task. Example tasks may include, but are not limited to the following:

Task 1: Surface Soil Sampling
Task 2: Subsurface Soil Boring
Task 3: Data Gathering to Support Interim Corrective Measures
Task 4: Monitoring Well Installation
Task 5: Aquifer Testing
Task 6: Ground Water Sampling
Task 7: Potential Receptor Identification
Task 8: Treatability Studies

5.2. Rationale for Sampling

Describe where all samples will be collected (location and depth), types of matrices that will be sampled and the analytical parameters. Explain the rationale for each sampling point, the total number of sampling points, and any statistical approach used to select these points. The conceptual model of contaminant migration developed in the Current Conditions Report should be considered when selecting sampling locations and depths. If some possible sampling points are excluded, explain why. Describe any field screening techniques that will be used to identify samples for laboratory analysis. Include the rationale for use of field screening techniques and criteria for sample selection.

5.2.1. Background Samples

Background samples should be analyzed for the complete set of parameters for each matrix; treat sediments, surface soils and subsurface soils as separate matrices. Background samples are collected, numbered, packaged, and sealed in the same manner as other samples. For long term and/or especially large projects, it is recommended that 10% of samples collected be from background locations.

5.3. Sample Analysis

List and discuss all analysis proposed for the project. Include a table that summarizes the following information for each analysis to be performed:

1) Analytical Parameters
2) Analytical Method Reference Number (from EPA SW 846)
3) Sample Preparation and/or Extraction Method Reference Number (from SW 846)
4) Practical Quantitation Limits

5.4. Sampling and Analysis Plan

PSC Fernley facility shall prepare a plan to document all monitoring procedures: field sampling, sampling procedures and sample analysis performed during the investigation to characterize the environmental setting, source, and releases of hazardous constituents, so as to ensure that all information and data are valid and properly documented. The Sampling Strategy and Procedures shall be in accordance with EPA Region 4 Environmental Compliance Branch's Standard Operating Procedure and Quality Assurance Manual (SOP) (most recent version). Any deviations from this reference must be requested by the applicant and approved by the Department. The Sampling and Analysis Plan must specifically discuss the following unless the SOP procedures are specifically referenced. See Attachment 1 for example.

Discuss the rationale for selection of the analytical parameters. The rationale must relate to site history and the RFI objectives. The achievable detection limits or Quantitation limits stated in the selected methods must be adequate for valid comparisons of analytical results against any action levels or standards. For example, the objective may be to collect ground water data for comparison with Maximum Contaminant Levels (MCL's). If this were the case, it would be important to ensure that any ground water test methods had detection limits below the MCL's. Give an explanation if not all samples from the same matrix will be analyzed for the same parameters.

Provide the name(s) of the laboratory(s) that will be doing the analytical work. Indicate any special certifications or ratings of the laboratory. Describe the steps that will be taken to select and pre-qualify analytical laboratories to be used including any previous audits and/or other criteria. If a definite laboratory has not yet been selected, list at least 3 laboratories that are being considered for the analytical work.

5.5. Sample Collection Procedures

Describe how sampling points will be selected in the field, and how these locations will be documented and marked for future reference. If a sampling grid will be used, describe the dimensions and lay out planned for the grid.

Outline sequentially or step-by-step the procedure for collecting a sample for each matrix and each different sampling technique. Include a description of sampling equipment (including materials of construction), field measurements, sample preservation, housekeeping/ cleanliness techniques and well purging procedures. The procedure described must ensure that a representative sample is collected, and that sample handling does not result in cross contamination or unnecessary loss of contaminants. Special care in sample handling for volatile organic samples must be addressed.

Describe how and when duplicates, blanks, laboratory quality control samples and background samples will be collected.

PSC Fernley facility/Respondent must include sufficient maps and tables to fully describe the sampling effort. This shall include, at a minimum, a map showing all proposed sampling locations and tables that contain the following information:

Sample Collection Table

- Sampling Location/Interval
- Analytical Parameters (e.g., volatile organic compounds)
- Analytical Method Number
- Matrix
- Preservation Method
- Holding Times
- Containers (quantity, size, type plus footnotes that discuss source and grade of containers)

Sample Summary Table

- Sample Description/Area (include QC samples)

- Analytical Parameters
- Analytical Method Number
- Preparation or Extraction Method Number
- Matrix
- Number of Sample Sites
- Number of Analyses

5.5.1. Equipment Decontamination

Describe the decontamination procedure for all drilling and sampling equipment (including metal sleeves).

5.5.2. Equipment Calibration and Maintenance

Logbooks or pre-formatted calibration worksheets should be maintained for major field instruments, to document servicing, maintenance and instrument modification. The calibration, maintenance and operating procedures for all instruments, equipment and sampling tools must be based upon manufacturer's instructions. List all field equipment to be used, specify the maintenance/calibration frequency for each instrument and the calibration procedures (referenced in text and included in appendices).

5.5.3. Sample Packaging and Shipment

Describe how samples will be packaged and shipped. All applicable Department of Transportation regulations must be followed.

5.5.4. Sample Documentation

Discuss the use of all paperwork including field notebooks, record logs, photographs, sample paperwork, and Chain of Custody forms (include a blank copy in RFI Workplan Appendices) and seals.

Describe how sample containers will be labeled and provide an example label if available. At a minimum, each sample container label should include: project ID, sample location, analytical parameters, date sampled and any preservative added to the sample.

A bound field logbook must be maintained by the sampling team to provide a daily record of events.

Field logbooks shall provide the means of recording all data regarding sample collection. All documentation in field books must be made in permanent ink. If an error is made, corrections must be made by crossing a line through the error and entering the correct information. Changes must be initialed, no entries shall be obliterated or rendered unreadable. Entries in the logbook must include, at a minimum, the following for each days sampling:

- Date
- Starting Time
- Meteorological Conditions
- Field Personnel Present
- Level of Personal Protection
- Site Identification
- Field Observations/Parameters
- Sample Identification Numbers
- Location and Description of Sampling Points
- Number of Samples Collected
- Time of Sample Collection
- Signature of Person Making the Entry

5.5.5. Disposal of Contaminated Materials

Describe the storage and disposal methods for all contaminated cuttings, well development and purge water, disposable equipment, decontamination water and any other contaminated materials. The waste material must be disposed of in a manner consistent with local, state and federal regulations.

5.5.6. Standard Operating Procedures

If Standard Operating Procedures (SOPs) are referenced, the relevant procedure must be summarized in the RFI Workplan. The SOP must be specific to the type of tasks proposed and be clearly referenced in the RFI Workplan. The SOP must also be directly applicable, as written, to the RFI Workplan; otherwise, modifications to the SOP must be discussed. Include the full SOP description in the RFI Workplan appendix.

5.6. Well Construction and Aquifer Testing

When new monitoring wells (or piezometers) are proposed, describe the drilling method, well design and construction details (e.g. depth of well, screen length, slot size, filter pack material, etc.) and well development procedures. Describe the rationale for proposed well locations and selection of all well design and construction criteria (i.e., provide rationale for selection of slot size and screen length - FYI, EPA recommends 10 foot screen lengths).

When aquifer testing is proposed, describe the testing procedures, flow rates, which wells are involved, test periods, how water levels will be measured, and any other pertinent information.

6. QUALITY ASSURANCE AND QUALITY CONTROL

Quality control checks of field and laboratory sampling and analysis serve two purposes: to document the data quality, and to identify areas of weakness within the measurement process which need correction.

Include a summary table of data quality assurance objectives that, at a minimum, list:

Analysis Group (e.g., volatile organic compounds)
Matrix
Practical Quantitation Limits (PQL)
Spike Recovery Control Limits (%R)
Duplicate Control Limits +/-(RPD)
QA Sample Frequency

A reference may note the specific pages from EPA's SW 846 Guidance Document that list the test method objectives for precision and accuracy. If the field and laboratory numerical data quality objectives for precision are the same and presented on a single table, then a statement should be made to this effect and added as a footnote to the table (e.g., "These limits apply to both field and laboratory duplicates"). Include a copy of the analytical laboratory quality assurance/quality control plan in the appendices of the RFI Workplan and provide the equations for calculating precision and accuracy.

6.1. Field Quality Control Samples

6.1.1. Field Duplicates

Duplicates are additional samples that must be collected to check for sampling and analytical precision. Duplicate samples for all parameters and matrices must be collected at a frequency of at least1 sample per week or 10 percent of all field samples, whichever is greater.

Duplicates should be collected from points, which are known or suspected to be contaminated. For large projects, duplicates should be spread out over the entire site and collected at regular intervals.

Duplicates must be collected, numbered, packaged, and sealed in the same manner as other samples; duplicate samples are assigned separate sample numbers and submitted blind to the laboratory.

6.1.2. Blank Samples

Blanks are samples that must be collected to check for possible cross-contamination during sample collection and shipment and in the laboratory. Blank samples should be analyzed for all parameters being evaluated. At least one blank sample per day must be done for all water and air sampling. Additionally, field blanks are required for soil sampling if non-dedicated field equipment is being used for sample collection.

Blank samples must be prepared using analytically certified organic-free (HPLC-grade) water for organic parameters and metal-free (deionized-distilled) water for inorganic parameters. Blanks must be collected, numbered, packaged, and sealed in the same manner as other samples; blank samples are assigned separate sample numbers and submitted blind to the laboratory. The following types of blank samples may be required:

Equipment Blank: An equipment blank must be collected when sampling equipment (e.g., bladder pump) or a sample collection vessel (e.g., a bailer or beaker) is decontaminated and reused in the field. Use the appropriate "blank" water to rinse the sampling equipment after the equipment has been decontaminated and then collect this water in the proper sample containers.

Field Bottle Blank: This type of blank must be collected when sampling equipment decontamination is not necessary. The field bottle blank is obtained by pouring the appropriate "blank" water into a container at a sampling point.

6.2. Laboratory Quality Control Samples

Laboratories routinely perform matrix spike and laboratory duplicate analysis on field samples as a quality control check. A minimum of one field sample per week or 1 per 20 samples (including field blanks and duplicates), whichever is greater, must be designated as the "Lab QC Sample" for the matrix and laboratory duplicate analysis.

Laboratory quality control samples should be selected from sampling points, which are suspected to be moderately contaminated. Label the bottles and all copies of the paperwork as "Lab QC Sample"; the laboratory must know that this sample is for their QC analyses. The first laboratory QC sample of the sampling effort should be part of the first or second day's shipment. Subsequent laboratory QC samples should be spread out over the entire sampling effort.

For water matrices, 2-3 times the normal sample volume must be collected for the laboratory QC sample. Additional volume is usually not necessary for soil samples.

6.3. Performance System Audits by Permittee/Respondent

This section should describe any internal performance and/or system audit which PSC Fernley facility/Respondent will conduct to monitor the capability and performance of the project. The extent of the audit program should reflect the data quality needs and intended data uses. Audits are used to quickly identify and correct problems thus preventing and/or reducing costly errors. For example, a performance audit could include monitoring field activities to ensure consistency with the workplan. If the audit strategy has already been addressed in a QA program plan or standard operating procedure, cite the appropriate section, which contains the information.

7. DATA MANAGEMENT

Describe how investigation data and results will be evaluated, documented and managed, including development of an analytical database. State the criteria that will be used by the project team to review and determine the quality of data. To document any quality assurance anomalies, the RFI QC Summary Forms (see Appendix A of Attachment 3) must be completed by the analytical laboratory and submitted as part of the RFI Report. In addition, provide examples of any other forms or checklists to be used.

Identify and discuss personnel and data management responsibilities, all field, laboratory and other data to be recorded and maintained, and any statistical methods that may be used to manipulate the data.

8. REFERENCES

8.1. RCRA Facility Investigation Report

An RFI Report must be prepared that describes the entire site investigation and presents the basic results. The RFI Report must clearly present an evaluation of investigation results (e.g., all potential contaminant source areas must be identified, potential migration pathways must be described, and affected media shown, etc.).

The RFI Report must also include an evaluation of the completeness of the investigation and indicate if additional work is needed. This work could include additional investigation activities and/or interim corrective measures to stabilize contaminant release areas and limit contaminant migration. If additional work is needed, a Phase 2 RFI Workplan and/or Interim Corrective Measures Workplan must be submitted to PSC Fernley facility/ Respondent along with the RFI Report.

<u>At a minimum, the RFI Report must include:</u>

* A summary of investigation results (include tables that summarize analytical results).

* A complete description of the investigation, including all data necessary to understand the project in its entirety including all investigative methods and procedures.

* A discussion of key decision points encountered and resolved during the course of the investigation.

* Graphical displays such a isopleths, potentiometric surface maps, cross-sections, plume contour maps (showing concentration levels, isoconcentration contours), facility maps (showing

sample locations, etc.) and regional maps (showing receptor areas, water supply wells, etc.) that describe report results. Highlight important facts such as geologic features that may affect contaminant transport.

* Tables that list all chemistry data for each matrix investigated.

* An analysis of current and existing ground water data to illustrate temporal changes for both water chemistry and piezometric data (use graphics whenever possible).

* A description of potential or known impacts on human and environmental receptors from releases at the facility. Depending on the site-specific circumstances, this analysis could be based on the results from contaminant dispersion models.

* A discussion of any upset conditions that occurred during any sampling events or laboratory analysis that may influence the results. The discussion must include any problems with the chain of custody procedures, sample holding times, sample preservation, handling and transport procedures, field equipment calibration and handling, field blank results that show potential sample contamination and any field duplicate results that indicate a potential problem. Summary tables must be provided that show the upset condition and the samples that could be impacted. The RFI QC Summary Forms (see Appendix A of Attachment 3) must be completed by the analytical laboratory and submitted as part of the RFI Report.

* Assessment of the entire QA/QC program effectiveness.

8.2. Health and Safety Plan

8.2.1. Objectives

Describe the goals and objectives of the RFI health and safety plan (must apply to on-site personnel and visitors). The health and safety plan must be consistent with the facility Contingency Plan, OSHA Regulations, NIOSH Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities (1985), all state and local regulations and other Implementing Agency guidance as provided.

8.2.2. Hazard Assessment

List and describe the potentially hazardous substances that could be encountered by field personnel during investigation activities.

Discuss the following:

• Inhalation Hazards
• Dermal Exposure
• Ingestion Hazards
• Physical Hazards
• Overall Hazard Rating

Include a table that, at a minimum, lists: Known Contaminants, Highest Observed Concentration, Media, Symptoms/Effects of Acute Exposure.

8.2.3. Personal Protection/Monitoring Equipment

i. For each investigation task, describe personal protection levels and identify all monitoring equipment.

ii. Describe any action levels and corresponding response actions (i.e. when will levels of safety be upgraded).

iii. Describe decontamination procedures and areas.

8.2.4. Site Organization and Emergency Contacts

List and identify all contacts (include phone numbers). Identify the nearest hospital and provide a regional map showing the shortest route from the facility to the hospital. Describe site emergency procedures and any site safety organizations. Include evacuation procedures for neighbors (where applicable).

Include a facility Map showing emergency station locations (first aid, eye wash areas, etc.).

APPENDIX L-2

CMS SCOPE OF WORK

APPENDIX L-2 CORRECTIVE MEASURES STUDY (CMS) SCOPE OF WORK

1. PURPOSE

The purpose of the Corrective Measures Study (CMS) is to:

1. Develop and evaluate corrective measure alternatives (or a single corrective measure) that may be taken at the Facility to address releases of hazardous wastes (including hazardous constituents); and

2. Recommend the corrective measures to be taken at the Facility that are protective of human health and the environment.

3. Form the basis of a Corrective Measures Implementation Plan

2. SCOPE

A Corrective Measures Study Workplan and Corrective Measures Study Report are, unless otherwise specified by the Division, required elements of the CMS. The Scope of Work (SOW) for the Corrective Measures Study Workplan and Report describe what should be included in each document. If PSC Fernley facility can justify, to the satisfaction of the Division, that sections of a plan and/or report are not needed in the given site specific situation, then the Division may waive that requirement.

The Division may require PSC Fernley facility to conduct additional studies beyond what is discussed in the SOW's in order to support the CMS. PSC Fernley facility will furnish all personnel, materials and services necessary to conduct the additional tasks. The SOW for the Corrective Measures Study Workplan and Report are specified below:

A. Corrective Measures Study Workplan

The Corrective Measures Study (CMS) Workplan shall, at a minimum, include the following elements:

1. A description of the overall purpose of the Corrective Measure Study;

2. Corrective measure objectives including proposed media cleanup standards (promulgated federal and state standards, risk derived standards) and points of compliance;

3. A description of the specific corrective measure technologies and/or corrective measure alternatives which will be studied;

4. A description of the general approach to investigating and evaluating potential corrective measures;

5. A summary description of any proposed pilot, laboratory and/or bench scale studies. Proposed studies must be further detailed in either the CMS Workplan or in separate workplans. Submittal times for separate workplans must be included in the CMS Workplan project schedule;

6. A proposed outline for the CMS Report including a description of how information will be presented;

7. A description of overall project management including overall approach, levels of authority (include organization chart), lines of communication, budget and personnel. Include a description of qualifications for personnel directing or performing the work; and

8. A project schedule that specifies all significant steps in the process and when key documents (e.g., CMS Report) are to be submitted to the Division.

B. Corrective Measures Study Report

The Corrective Measures Study (CMS) Report shall, at a minimum, include the following elements:

1. Introduction/Purpose

Describe the purpose and intent of the document.

2. Description of Current Conditions

PSC Fernley facility shall include a brief discussion of any new information that has been developed since the RCRA Facility Investigation Report was finalized. This discussion should concentrate on those issues, which could significantly affect the evaluation and selection of the corrective measure alternative(s).

3. Corrective Action Objectives

PSC Fernley facility shall propose corrective action objectives including applicable media cleanup standards. The corrective action objectives must be based on available promulgated federal and state cleanup standards, risk derived standards, data and information gathered during the corrective action process (e.g., from interim measures, RCRA Facility Investigation, etc.), and/or other applicable guidance documents. If no specific standards exist for a given contaminant and media, PSC Fernley facility shall propose and justify a media cleanup standard. The Division may require that PSC Fernley facility conduct a risk assessment to develop appropriate cleanup standards.

4. Identification and Screening of Corrective Measure Technologies

<u>Identification</u>

List and briefly describe potentially applicable technologies for each affected media that may be used to achieve the corrective action objectives. PSC Fernley facility should consider including a table that summarizes the available technologies.

PSC Fernley facility should consider innovative treatment technologies, especially in situations where there are a limited number of applicable corrective measure technologies. Innovative technologies are defined as those technologies for source control other than incineration, solidification/stabilization and pumping with conventional treatment for contaminated groundwater. Innovative treatment technologies may require extra initial effort to gather information, analyze options and to adapt the technology to the site-specific situation. However, in the end, innovative treatment technologies could be more cost effective. Pilot, laboratory and/or bench scale studies are useful for evaluating innovative treatment technologies. Depending on the site-specific situation, the Division may require PSC Fernley facility to consider additional technologies.

Screening

Technologies must be screened to eliminate those that may prove unfeasible to implement given the existing set of waste and site-specific conditions. The screening is accomplished by evaluating technology limitations (e.g., for volume, area, contaminant concentrations, interferences, etc.) and using contaminant and site characterization information from the RCRA Facility Investigation to screen out technologies that cannot be fully implemented at the facility. The screening process must focus on eliminating those technologies which have severe limitations for a given set of waste and site-specific conditions (e.g., depth to groundwater and aquitards). As with all decisions during the CMS, the screening of technologies must be fully documented. This is especially true if the screening step indicates that only one corrective action technology should proceed to the next step and be evaluated in detail. List the corrective action technologies selected for further evaluation. Also, document the reasons for excluding any corrective action technologies. PSC Fernley facility/ Respondent should consider including a table that summarizes the findings.

5. Corrective Measure Alternative Development

Assemble the technologies that pass the screening step into specific alternatives that have potential to meet the corrective action objectives. Options for addressing less complex sites could be relatively straightforward and may only require evaluation of a single or limited number of alternatives.

Each alternative may consist of an individual technology or a combination of technologies used in sequence (e.g., treatment train). Depending on the site-specific situation, different alternatives may be considered for separate areas of the facility. List and briefly describe each corrective measure alternative.

6. Evaluation of Corrective Measure Alternatives

Each corrective measure alternative must be evaluated (including its components) based on Short- and Long-Term Effectiveness, Reduction of Toxicity, Mobility and/or Volume, Long Term Reliability, Implementability, and Preliminary Cost.

<u>Short-and Long-Term Effectiveness</u>

Each corrective measure alternative must be evaluated as to its effectiveness in protecting human health and the environment and meeting the corrective action objectives. Both short- and long-term components of effectiveness must be evaluated; short-term referring to the construction and implementation period, and long-term referring to the period after the remedial action is complete. Estimate approximately how much time it will take to implement each corrective measure alternative, how much time to see initial beneficial results, and how much time to achieve the corrective action objectives.

The evaluation of short-term effectiveness must include possible threats to the safety of nearby communities, workers, and environmentally sensitive areas (e.g., oceans, wetlands) during construction of the corrective measure alternative. Factors to consider are fire, explosion, exposure to hazardous substances and potential threats associated with treatment, excavation, transportation and re-disposal or containment of waste material. Laboratory and/or field studies are extremely useful in estimating the effectiveness of corrective measures and should be used whenever possible.

The evaluation of long-term effectiveness must include possible threats to the safety of nearby communities workers, and environmentally sensitive areas (e.g., oceans, wetlands) during operation of the corrective measure alternative.

<u>Reduction of Toxicity, Mobility and/or Volume</u>

Each corrective measure alternative must be evaluated for its ability to reduce the toxicity, mobility, and/or volume of the contaminated media. Reduction in toxicity, mobility, and/or volume refers to changes in one or more characteristics of the contaminated media by the use of corrective measures that decrease the inherent threats associated with the media.

Estimate how much the corrective measure alternative will reduce the waste toxicity, volume and/or mobility (compare initial site conditions to post-corrective measure conditions). In general, Division's strongly prefer corrective measures that have a high degree of permanence and reduce the contaminant toxicity, mobility and volume through treatment.

Long-Term Reliability

Each corrective measure alternative must be evaluated as to its long-term reliability. This evaluation includes consideration of operation and maintenance requirements. Demonstrated and expected reliability is a way of assessing the risk and effect of failure. Discuss whether the technology or combination of technologies have been used effectively together under analogous site conditions, whether failure of any one technology in the alternative has an impact on receptors or contaminant migration, and whether the alternative would have the flexibility to deal with uncontrollable changes at the site (e.g., heavy rain storms, earth- quakes, etc).

Operation and maintenance requirements include the frequency and complexity of necessary operation and maintenance. Technologies requiring frequent or complex operation and maintenance activities should be regarded as less reliable than technologies requiring little or straightforward operation and maintenance. The availability of labor and materials to meet these requirements must also be considered.

Most corrective measure technologies, with the exception of destruction, deteriorate with time. Often, deterioration can be slowed through proper system operation and maintenance, but the technology eventually may require replacement. Each corrective measure alternative shall be evaluated in terms of the projected useful life of the overall alternative and of its component technologies. Useful life is defined as the length of time the necessary or required level of effectiveness can be maintained.

Implementability of Corrective Measure Alternatives

The implementability criterion addresses the technical and administrative feasibility of implementing a corrective measure alternative and the availability of various services and materials needed during implementation. Each corrective measure alternative must be evaluated using the following criteria:

Construction and Operation: Corrective measure alternatives must be feasible to implement given the existing set of waste and site-specific conditions. This evaluation was initially done for specific technologies during the screening process and is addressed again in this detailed analysis of the alternative as a whole. It is not intended that the screening process be repeated here, but instead to highlight key differences and/or changes from the screening analysis that may result from combining technologies.

Administrative Feasibility: Discuss the administrative activities needed to implement the corrective measure alternative (e.g., permits, public acceptance, rights of way, off-site approvals, etc.).

Availability of Services and Materials: Discuss the availability of adequate off-site treatment, storage capacity, disposal services, needed technical services and materials, and the availability of prospective technologies for each corrective measure alternative.

Preliminary Cost Estimates

Develop a preliminary cost estimate for each corrective measure alternative (and for each phase or segment of the alternative). The cost estimate shall include both capital and operation and maintenance costs. Include a description of how the costs were estimated and what assumptions were used.

The preliminary capital cost estimate must consider all key costs including, at a minimum, costs for engineering, mobilization, demobilization, site preparation, construction, materials, labor, equipment purchase and rental, sampling, analysis, waste disposal, permitting and health and safety measures.

The preliminary operation and maintenance cost estimate must consider all key costs including, at a minimum, costs for labor, training, sampling, analysis, maintenance materials, utilities, waste disposal, waste treatment, permitting and health and safety measures.

Calculate the net present value of preliminary capital and operation and maintenance costs for each corrective measure alternative.

7. Recommendation and Justification of the Corrective Measure Alternative

PSC Fernley facility shall recommend and justify a corrective measure alternative using the five criteria specified in Section 6. This recommendation shall include summary tables, which allow the alternative or alternatives to be easily understood. Tradeoffs among implementability, effectiveness, reliability, and other pertinent factors shall be highlighted.

In addition, the recommended corrective measure alternative(s) must meet the following corrective action standards:

a. Be protective of human health and the environment;

b. Attain corrective action objectives including media cleanup standards;

c. Control the source(s) of releases so as to reduce or eliminate, to the extent practicable, further releases of hazardous wastes (including hazardous constituents) that may pose a threat to human health and the environment; and

d. Comply with any applicable federal, state, and local standards for management of wastes.

PSC Fernley facility must document how the recommended alternative meets the corrective action standards (a-d above).

8. Summary of Recommended Corrective Measure Alternative

Provide a description of the recommended corrective measure alternative and qualitatively describe what the alternative is supposed to do and how it will function at the facility.

APPENDIX L-3

CMI SCOPE OF WORK

APPENDIX L-3 CORRECTIVE MEASURES IMPLEMENTATION (CMI) SCOPE OF WORK

1) PURPOSE

This Scope of Work ("SOW") sets forth the requirements for the implementation of the design, construction, operation, maintenance, and monitoring of the corrective measures or measures pursuant to the Final decision by the Division to which this SOW is attached. The work performed under the CMI will implement the corrective measures that have been selected by the Division in the Final Decision and Response to Comments ("FDRTC") and any amendments thereto. PSC Fernley facility will furnish all personnel, materials, and services necessary for the implementation of the corrective measure or measures.

2) SCOPE

The Corrective Measures Implementation will consist of four tasks:

Task I: Corrective Measures Implementation Work Plan

A. Management Plan
B. Community Relations Plan
C. Sampling and Analysis Plan
D. Corrective Measures Permitting Plan
E. Supplemental Field Investigation Work Plan

Task II: Corrective Measure Design

A. Design Plans and Specifications
B. Operation and Maintenance Plan
C. Cost Estimate
D. Construction Quality Assurance Objectives
E. Health and Safety Plan
F. Sampling and Analysis Plan
G. Final CMI Design

Task III: Corrective Measures Construction

A. Inspections
B. CMI Report

Task IV: Reports

A. Progress Reports and Assessment Reports
B. CMI Work Plan

C. CMI Design Report

D. CMI Report

Further specifications of the work outlined in this SOW will be provided in the Corrective Measures Implementation Work Plan and subsequent plans to be approved by the Division. Variations from the SOW will be made, if necessary, to fulfill the objectives of the Corrective measures set forth in the FDRTC and any amendments thereto. Additional studies may be needed as part of the Corrective measures Implementation to supplement the available data. At the direction of the Division for any such studies required, the Respondent shall furnish all services, including field work, materials, supplies, plant, labor, equipment, investigations, and superintendence. Sufficient sampling, testing and analysis shall be performed to optimize the required treatment and/or disposal operations system.

3) <u>TASK I: CORRECTIVE MEASURES IMPLEMENTATION WORK PLAN</u>

PSC Fernley facility shall prepare a Corrective Measures Implementation ("CMI") Work Plan. The CMI Work Plan shall outline the design, construction, operation, maintenance and monitoring of all actions taken to implement the Corrective measures as defined in the Order and the FDRTC and any amendments thereto. This CMI Work Plan will include the development and implementation of several plans, which require concurrent preparation. It may be necessary to revise plans as necessary during the performance of this Order. The CMI Work Plan includes the following:

A. Management Plan

PSC Fernley facility shall prepare a Management Plan, which will include:

1. Documentation of the overall management strategy for performing the design, construction, operation, maintenance, and monitoring of corrective measure(s);
2. Description of the responsibility and authority of all organizations and key personnel involved with the implementation;
3. Description of the qualifications of key personnel directing the CMI, including contractor personnel;
4. Conceptual design of the treatment and/or disposal system or any corrective measures to be installed as set forth in the requirements of the FDRTC;
5. An outline of proposed field activities necessary to complete the CMI Design;

6. Proposed locations of groundwater monitoring wells and a detailed well development plan;
7. Proposed discharge options for treated ground water, with a proposed option upon which the CMI Design will be based;
8. Proposed detailed performance criteria for groundwater treatment;
9. A description of how the conceptual design is expected to meet the technical requirements of the FDRTC and any amendments thereto; and
10. Flow chart and schedule of work to be performed during the CMI.

B. Community Relations Plan

PSC Fernley facility shall submit and/or revise the Community Relations Plan to include any material changes in the level of concern or information needs of the community during design and construction activities.

1. Specific activities which must be conducted during the design stage are the following:
    a. The facility Community Relations Plan is to reflect knowledge of citizen concerns and involvement at this stage of the process; and
    b. Prepare and distribute a public notice and an updated fact sheet at the completion of engineering design.
2. Specific activities to be conducted during the construction stage could be the following: depending on citizen interest at a facility at this point in the corrective action process, community relations activities could range from group meetings to fact sheets on the technical status.

C. Sampling and Analysis Plan

Respondent shall submit and/or revise the Sampling and Analysis Plan describing work to be performed during Corrective Measures Design, the 12-month evaluation Period, and after completion of construction. The Sampling and Analysis Plan shall be comprised of:

1. Data quality objectives for design phase activities,
2. A Quality Assurance Project Plan (QAPP),
3. A Field Sampling Plan, and
4. A Data Management Plan describing the steps to be followed in compiling, organizing, and reviewing data collected in accordance with the Sampling and Analysis Plan and identifying the frequency of periodic data reviews and

evaluations. The Sampling and Analysis Plan will include the existing soil and well sampling and analysis program, with appropriate revisions as necessary.

D. Corrective Measures Permitting Plan

Respondent shall submit a Corrective Measures Permitting Plan identifying federal, state, interstate and local permits and approvals required for the implementation of the Corrective Measures and for the implementation of any institutional controls required. The plan shall also identify all agreements or other arrangements with adjoining landowners, if any, known by Respondent to be necessary for the implementation of the Corrective measures, including, but not limited to, site access and easement agreements. The plan shall include a schedule indicating the time needed to obtain all such approvals and permits and to enter into such agreements and arrangements (this may be integrated with the design/implementation schedule items).

E. Supplemental Field Investigation Work Plan

Respondent shall submit a work plan setting forth the protocols and methodologies for any additional hydrogeologic investigations or other field work, if any such additional investigation or field work is necessary, for the proper design of the groundwater extraction and treatment systems. The work plan shall include an expeditious schedule for the completion of any such supplemental fieldwork.

4) TASK II: CORRECTIVE MEASURES DESIGN

PSC Fernley facility shall prepare final construction plans and specifications to implement the Corrective measures at the facility as defined in the Corrective measures set forth in the FDRTC and any amendments thereto.

A. Design Plans and Specifications

PSC Fernley facility shall develop clear and comprehensive design plans and specifications which include, but are not limited to, the following:

1. Discussion of the design strategy and the design basis, including:
    a. Compliance with all applicable or relevant environmental and public health standards;
    b. Minimization of environmental and public health impacts; and
    c. Update schedules, if necessary, from commencement through completion of construction of the CMI.

2. Discussion of the technical factors of importance including:
   a. Use of currently accepted environmental control measures and technology;
   b. The constructability of the design; and
   c. Use of currently acceptable construction practices and techniques.

3. Description of assumptions made and detailed justification of these assumptions;

4. Discussion of the possible sources of error and references to possible operation and maintenance problems;

5. Detailed drawings of the proposed design including;
   a. Qualitative flow sheets; and
   b. Quantitative flow sheets.

6. Tables listing equipment and specifications;

7. Tables giving material and energy balances;

8. Appendices including:

   a. Sample calculations (one example presented and explained clearly for significant or unique design calculations);
   b. Derivation of equations essential to understanding the report; and
   c. Results of laboratory or field tests.

B. Operation and Maintenance Plan

PSC Fernley facility shall prepare or revise the Operation and Maintenance ("O&M") Plan to cover both implementation and long-term maintenance of the Corrective measures. The O&M Plan is to identify the processes to occur, submissions during O&M, and schedule for O&M activities consistent with remedial objectives set forth in the FDRTC and any amendments thereto. The plan shall be composed of the following elements:

1. Description of normal O&M:
   a. Description of tasks for operation;

b. Description of tasks for maintenance;

c. Description of prescribed treatment or operation conditions; and

d. Schedule showing frequency of each O&M task, also to be included in the Management Plan.

2. Description of potential operating problems:

a. Description and analysis of potential operation problems;

b. Sources of information regarding problems; and

c. Common and/or anticipated remedies.

3. Description of routine monitoring and laboratory testing:

a. Description of monitoring tasks;

b. Description of required laboratory tests and their interpretation;

c. Required QA/QC; and

d. Schedule of monitoring frequency and date, if appropriate, when monitoring may cease.

4. Description of alternate O&M:

a. Should systems fail, alternate procedures to prevent undue hazard; and

b. Analysis of vulnerability and additional resource requirements should a failure occur.

5. Safety plan:

a. Description of precautions, of necessary equipment, etc., for site personnel; and

b. Safety tasks required in event of systems failure.

6. Description of equipment:

a. Equipment identification;

b. Installation of monitoring components;

c. Maintenance of site equipment; and

d. Replacement schedule for equipment and installed components.

7. Records and reporting mechanisms required:

a. Daily operating logs;
b. Laboratory records;
c. Records for operating and maintenance costs;
d. Mechanism for reporting emergencies;
e. Personnel and maintenance records;
f. Contents of periodic progress reports described in Task IV.A and providing details on how Task IV. A requirements will be met; and
g. Monthly/annual reports to State agencies.

C. Cost Estimate

PSC Fernley facility shall develop cost estimates of the Corrective Measures for the purpose of assuring that the Respondent has the financial resources necessary to construct and implement the Corrective measures. The cost estimate developed in the Corrective Measure Study shall be refined to reflect the more detailed/accurate design plans and specifications being developed. The cost estimate shall include both capital and operation and maintenance costs.

D. Construction Quality Assurance Objectives

PSC Fernley facility shall identify and document the objectives and framework for the development of a construction quality assurance program including, but not limited to the following: responsibility and authority; personnel qualifications; inspection activities; sampling requirements; and documentation.

E. Health and Safety Plan

PSC Fernley facility shall prepare a Health and Safety Plan or modify the Health and Safety Plan developed for the RCRA Facility Investigation to address the activities to be performed at the facility to implement the corrective measures.

F. Sampling and Analysis Plan Revision

Respondent shall update the Sampling and Analysis Plan, including the QAPP, during each phase of the project, as appropriate, to reflect changes in the following: responsibility and authority; personnel qualifications; inspection activities; sampling requirements; documentation, and other changes to the sampling and analysis program.

G. Final CMI Design

The Final CMI Design submittal shall consist of the Final Design Plans and Specifications (100% complete), the Respondent's Final Cost Estimate, the Final Draft Operation and Maintenance Plan, Final Quality Assurance Plan, Final Project Schedule, and Final Health and Safety Plan specifications. The quality of the design documents should be such that the Respondent would be able to include them in a bid package and invite contractors to submit bids for the construction project.

5) TASK III: CORRECTIVE MEASURES CONSTRUCTION

Following the Division approval of the Final CMI Design Report, the Respondent shall develop and implement construction in accordance with procedures, specifications, and schedules in the Division approved Final CMI Design Report and the Division approved CMI Work Plan. During the Construction Phase, Respondent will continue to submit periodic progress reports. PSC Fernley facility shall also implement the elements of the approved O&M plan. PSC Fernley facility shall update the Sampling and Analysis Plan, including the QAPP, during the Construction Phase, as appropriate, to reflect changes in the following: responsibility and authority, personnel qualification, construction quality assurance, inspection activities, documentation, and other changes affecting quality assurance.

PSC Fernley facility shall conduct the following activities during construction:

A. Inspections

1. Respondent will conduct inspections to monitor the construction and/or installation of components of the Corrective measures. Inspections shall verify compliance with all environmental requirements and include, but not limited to, review of air quality and emissions monitoring records, waste disposal records (e.g. RCRA transportation manifests), etc, as applicable. Inspections will also ensure compliance with all health and safety procedures. Treatment and/or disposal equipment will be operationally tested by the Respondent. PSC Fernley facility will certify that the equipment has performed to meet the purposes and intent of the specifications. Retesting will be completed where deficiencies are revealed.
2. When all construction is complete, the Respondent shall notify the Division for the purposes of conducting a final inspection. The final inspection will consist of a walk through inspection of the project site. The inspection is to

determine whether the project is complete and consistent with contract documents and the Division approved corrective measures. Any outstanding construction items will be identified and noted. If necessary, Respondent shall notify the Division upon completion of any outstanding construction items and another final inspection consisting of a walk-through inspection of the project site to confirm all outstanding items have been resolved.

B. CMI Report

Upon completion of construction and an initial period, not to exceed fourteen (14) days, of performance monitoring after starting, and in accordance with the schedule included in the Management Plan, Respondent will prepare and submit a CMI Report.

6) <u>TASK IV: REPORTS</u>

PSC Fernley facility shall prepare plans, specifications, and reports as set forth in Tasks I through III to document the design, construction, operation, maintenance, and monitoring of the corrective measure. The documentation shall include, but not be limited to the following:

A. Progress Reports and Assessment Reports Quarterly

PSC Fernley facility shall provide the Division with signed, semi-annual progress reports containing:

1. A description of the work performed during the preceding monitoring interval and estimate of the percentage of the CMI completed;

2. Summaries of all findings;

3. Summaries of all changes made in the CMI during the reporting period;

4. Summaries of all contacts with representative of the local community, public interest groups, or State government during the reporting period;

5. Summaries of system performance during the reporting period including a summary of all problems or potential problems encountered or anticipated during the reporting period;

6. Actions being taken to rectify problems;

7. Changes in personnel during the reporting period;

8. Projected work for the next reporting period; and

9. Copies of daily reports, inspection reports, laboratory/monitoring data, etc.

Annual Progress Reports and Assessment Reports

Annual Progress Reports, the CMI Assessment Report of the initial recovery network and the Five-Year Assessment Reports shall contain:

1. A narrative summary of principal activities conducted during the reporting period,
2. Graphical or tabular presentations of monitoring data, including but not limited to average monthly system pumping rates and throughput, efficiency, groundwater levels and flow direction, and groundwater quality,

3. A schedule of sampling and field activities to be performed in the reporting period, and

4. An O&M Evaluation. The O&M Evaluation shall assess performance of the corrective measure over time and provide one basis for the Division's Five-Year evaluation of the corrective measure. Annual O&M Evaluation shall include:

   a. Summarized data representing corrective measure performance during the reporting period;

   b. Any proposed changes to the corrective measure and summary of changes to have been previously made;

c. Iso-concentration maps for each contaminant of concern listed in the Order and any other hazardous constituent identified above its MCL;

d. Statistical assessment of the progress of the corrective measure towards achievement of media clean-up standards;

e. When appropriate, notification that the media cleanup standards have been achieved.

An Annual Progress Report shall not be required for any year in which the Respondent is required to submit a Corrective Measures Five-Year Assessment Report.

B. CMI Work Plan

PSC Fernley facility shall submit a CMI Work Plan as outlined in Task I. The QAPP, included with the CMI Work Plan, will be revised, as appropriate, throughout the CMI.

C. The CMI Design Report

The CMI Design Report shall include:

1. A summary of activities performed and data generated during Corrective Measure Design, including results and interpretation of treatability studies;

2. Draft detailed Corrective Measure Design Plans and Specifications reflecting the design work to be completed;

3. Final performance criteria for the corrective measures, consistent with comments to have been provided by the Division on the Conceptual Design proposed in the Management Plan;

4. Proposal of means to evaluate system performance against media cleanup standards listed in the FDRTC and any amendments thereto;

5. A Final O&M Plan;

6. A revised Cost Estimate;

7. Revision to the Sampling and Analysis Plan, including the QAPP, to address sampling activities to be performed during the Corrective Measures Construction Phase and Evaluation Period including the sampling activities, sample size, sample locations, frequency of testing, acceptance and rejection criteria, and plans for correcting problems as addressed in the project specification;

8. Sampling and construction activities to be performed during the Corrective Measure Construction Phase;

9. Proposed changes to the Project Schedule, if appropriate, with emphasis on short-term Construction schedule. These proposed changes in schedule also will be included in the revised Management Plan.

7) F. CMI REPORT

PSC Fernley facility shall submit the CMI Report as outlined in Task III to this SOW. The CMI Report shall describe activities performed during construction, provide actual specifications of the implemented remedy, and provide a preliminary assessment of CMI performance. The CMI Report shall include, but not be limited to, the following elements:

1. Synopsis of the corrective measure and certification of the design and construction;

2. Explanation of any modifications to the Division-approved construction and/or design plans and why these were necessary for the project;

3. Listing of the criteria, established in the Division-approved CMI Work Plan, for judging whether the corrective measure is functioning properly, and also explaining any modification to these criteria;

4. Certification by registered professional engineer that the construction is complete, consistent with contract documents, and the Division-approved

corrective measure, and that the equipment performs to meet the intent of the specifications;

5. Results of Facility monitoring, assessing the likelihood that the Corrective Measure will meet or exceed the media clean-up standards set forth in the FDRTC and any amendment thereto. This report should include all of the daily inspection summary reports, inspection summary reports, inspection data sheets, problem identification and corrective measure reports, block evaluation reports, photographic reporting data sheets, design engineers' acceptance reports, deviations from design and material specifications (with justifying documentation), and as-built drawings, unless otherwise agreed to by the Division.