Midnite Mine Superfund Site
100 Percent Design

Appendix P – Operation, Maintenance and Monitoring Plan

June 2015

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Attachment P-11: Routine Inspection and Maintenance for Temporary Water Management Ponds (Future Construction)

LIST OF ACRONYMS

ATV	all-terrain vehicle
CD	Consent Decree
DMC	Dawn Mining Company, LLC
EPA	U.S. Environmental Protection Agency
ECN	Engineering Change Notice
Newmont	Newmont USA Limited
O&M	Operations and Maintenance
OM&M	Operations, Maintenance and Monitoring
QAPP	Quality Assurance Project Plan
RA	Remedial Action
RAWP	Remedial Action Work Plan
RD	Remedial Design
ROD	Record of Decision
SDC	Significant Design Changes
Site	Midnite Mine Superfund Site
SMP	Site-wide Monitoring Plan
SOP	Standard Operating Procedure
State	Washington State
Tribe	Spokane Tribe of Indians
WTP	water treatment plant

P1.0 INTRODUCTION

This Operation, Maintenance and Monitoring Plan (OM&M Plan) has been prepared in accordance with the *Midnite Mine Superfund Site Record of Decision* (ROD; United States Environmental Protection Agency [EPA], 2006) and a Remedial Design/Remedial Action (RD/RA) Consent Decree (CD) lodged by the United States District Court on January 17, 2012.

The existing interim water management system at the Midnite Mine Superfund Site (Site) comprises seep and surface water collection systems (including pits/surface water impoundments), conveyance systems, a water treatment plant (WTP), WTP effluent pipeline system, and WTP residual management facilities. Operation, maintenance and monitoring (OM&M) of the existing system is performed in accordance with the *Operation, Maintenance and Monitoring Plan for the Midnite Mine Water Collection System and Water Treatment Plant for the Phase I RD/RA: Interim Water Management for the Midnite Mine* (Tetra Tech, 2010). A copy of the OM&M Plan for the Phase I RD/RA is included in Attachment 1.

In order to accommodate the water management system as it evolves during the phased RA construction, the OM&M Plan will be a dynamic document and will be updated and revised as necessary, which likely will be yearly. This will be necessary because components of the pre-RA water management system will change over the course of the multi-year RA construction. For example, the mine pits (i.e., Pit 3 and Pit 4) that currently store mine-affected water will be taken off line during the backfill operation as part of the RA and new temporary impoundments and associated conveyance systems will be constructed. This process will be repeated until the entire site is remediated and the final water capture, transport, treatment, and discharge system is established.

This OM&M Plan will be updated annually during the RA by redline/strikeout revisions to add and delete information as the water management system and other components of the RD are constructed throughout the RA. This OM&M Manual will be revised to incorporate the redline/strikeout revisions when significant changes to the water management system have occurred. At the conclusion of the RA, a Remedy Operations and Maintenance (O&M) Plan will be prepared to describe post-RA O&M activities.

P1.1 MODIFICATIONS TO THE PLAN

In the event that changes are made to the WTP (existing or new), related facilities or other remedial action components, modifications to this OM&M plan in many cases will be necessary.

Modifications to this plan that are minor changes to OM&M procedures intended to improve the operation and maintenance of the facilities can be made without prior United States EPA approval. Modifications will be documented in this OM&M plan and transmitted to the EPA and Tribe within 15 business days after the modification. A submittal letter will be transmitted with the OM&M modification describing the need for the modification and the modification. Examples of minor OM&M changes include, but are not limited to, construction of temporary facilities during maintenance on permanent structures (e.g. bypass pipelines), changing pump or valve types (if the pumps or valves serve a similar function), excavation and repair of plugged pipelines (as long as the pipeline is restored to its original design configuration and intent), upgrade of computer programs and/or upgrade of programmable controller(s), upgrade/improvements to communication systems, and other corrective actions covered by the existing OM&M plan.

Significant Design Changes (SDC) to the existing or new WTP and related facilities must be approved by EPA prior to commencing work. SDCs are defined as substantial changes to the existing designs and/or work plans that require revisions to design calculations, significant modifications to existing drawings to be clearly represented, or significant modifications to existing materials and/or structures. Examples include:

- Installation of flow meters and flumes
- Addition of the sludge press to the existing WTP
- Modifications to structures that alter the design capacity or design criteria
- Modifications to re-route flows or change storage/treatment capacity
- Modifications to disposal procedures (e.g. WTP sludge disposal)
- Modifications that require construction effort, and/or are not covered by the existing OM&M plan.

When Dawn Mining Company LLC and Newmont USA Limited (DMC/ Newmont) is considering a proposed SDC, DMC/Newmont will submit to EPA information on the change including descriptions of the change, reasons for the change, drawings (if necessary to show the change), technical specifications, and an implementation schedule. Any SDCs will be documented with a draft Engineering Change Notice (ECN), which will be submitted 15 days prior to the anticipated date for construction. Draft ECNs will be prepared and submitted to EPA for review. If EPA determines that the ECN does not cover a SDC, comments (if any) will be provided to

DMC/Newmont on the ECN. DMC/Newmont will incorporate the EPA comments and issue a final ECN. If EPA determines that the ECN covers a SDN, comments (if any) will be provided on the draft ECN to DMC/Newmont/DMC/Newmont will incorporate the EPA comments (if any) and submit a final ECN to EPA for signature prior to implementing the changes noted in the ECN.

When DMC/Newmont is considering a change to existing facilities, and there is a question as to whether the change is a design change or an OM&M change, DMC/Newmont shall notify EPA of the proposed change at least 15 days prior to making the change to request a determination as to whether the change is a design change or an OM&M change except under emergency conditions. Under emergency conditions, maximum possible notice shall be provided to EPA.

Updates to this existing plan will be submitted to EPA within 30 days of final installation or SDCs as defined above.

P1.2 DOCUMENT ORGANIZATION

This overall plan includes information for all site facilities that require operations, monitoring or inspection, and maintenance. Each site facility is included as an individual attachment to this document as follows:

- The most comprehensive OM&M plan is for the existing WTP and is included as Attachment 1.
- The installation of the existing security fence was completed on August 5, 2009, and the existing Security Fence Alignment Plan is included as Figure 1 in Attachment 2 along with the monthly fence inspection form. Other permanent fences will be installed as the RA progresses and will need to be inspected and maintained during and following the RA. These fences include a permanent wildlife-friendly rail fence around the capped area and a chain-link fence around the WTP and storage ponds associated with the WTP.
- Attachment 3 includes the information for the inspection and maintenance of the existing site access road and culverts.
- Attachment 4 addresses the routine inspection and maintenance for the existing Surface Water Diversions.

- Attachment 5 includes the inspection and maintenance activities associated with the existing Alluvial Groundwater Collection System in the three drainages leading from the Site.
- Attachment 6 discusses the inspection and maintenance for existing Ponds and Tanks.
- Attachment 7 includes the information for the operations and maintenance activities associated with the Filter Press that was installed in the fall of 2013.
- Attachment 8 includes the anticipated inspection and maintenance activities associated with Water Treatment Plant Influent and Effluent Pipelines (FUTURE CONSTRUCTION)
- Attachment 9 includes the anticipated inspection and maintenance activities associated with Dewatering Systems in Pit 3 and Pit 4 (FUTURE CONSTRUCTION)
- Attachment 10 includes the anticipated inspection and maintenance activities associated with Cover Systems (FUTURE CONSTRUCTION)
- Attachment 11 includes the anticipated inspection and maintenance activities for the temporary water management ponds to be installed during RA construction (FUTURE CONSTRUCTION).

Copies of completed inspection forms will be kept initially at the DMC/Newmont Millsite office or during the RA in the contractor's main office located on-site. Additional attachments or revisions to this existing OM&M plan will be incorporated into this document as major components are installed.

P2.0 EXISTING SITE FACILITIES

A seep collection system and pump back system to collect water and direct it back to a pollution control pond and then to Pit 3 was built in 1986, and in 1988 the Midnite Mine WTP was constructed to treat the water in the open pit, which began operation in 1992.

The Midnite Mine Site Standard Operating Procedures (MM-SOPs) (Tetra Tech, 2009) shall be used to ensure that activities affecting quality meet all regulatory requirements. A copy of the Midnite Mine SOPs are kept onsite at the WTP and at the Mill Site Office. A master schedule of activities to be performed and the frequency for each is included as Appendix A to the WTP OM&M (Attachment 1).

Additional facilities including the security fence, access roads and culverts, and surface water diversions requiring periodic inspection and maintenance under the Interim Mechanisms and in

the future during the RA are included in this report. The inspection and maintenance for the access roads, culverts, and diversion channels are required quarterly or following a major storm event. Security fence inspection and maintenance is required monthly.

As RA components are installed, this section will be revised to include a description of the new facility.

P3.0 MONITORING AND STANDARDS

The Standard Operating Procedures (SOPs), which are incorporated as part of the Site-Wide Monitoring Plan (SMP), define procedures for sample collection. The SMP, which includes a Quality Assurance Project Plan (QAPP), defines the proposed locations, methods, frequency of sampling, and reporting for surface water, groundwater, and sediment monitoring at the mine site. These documents should be used in conjunction with this OM&M plan to ensure that the monitoring data is properly collected and evaluated.

Following completion of the RA, revegetated areas will be inspected each summer season until the sites achieve 60 percent live vegetation cover and 70 percent total cover that includes live cover and litter. Vegetation surveys will be conducted during each growing season until revegetation success criteria are met. Observed rills and gullies will be repaired as soon as practicable, and the area reseeded and stabilized with mulch or riprap.

In addition to the above surveys, noxious weed surveys will be conducted annually. Should noxious weeds (as defined by the Spokane Tribe of Indians) be documented at the site, control procedures will be taken to eliminate the weed following a weed control program approved by the Tribal Department of Natural Resources. Details regarding the vegetation and noxious weed surveys will be included in the Remedial Action Work Plan (RAWP).

Access to the facilities addressed by this OM&M Plan will be either by vehicle on the permanent site access roads or on foot. The use of all-terrain vehicles (ATVs) off of the permanent access roads will not be allowed.

P4.0 SUBMITTAL PROCEDURES AND REPORTING

All documents required to be submitted pursuant to the CD shall be submitted electronically and hand delivered or sent by overnight mail to the following persons or to such other persons as the parties hereafter may designate in writing:

1. Documents submitted to EPA shall include one electronic copy and two hard copies sent to:

   Karen Keeley
   Remedial Project Manager
   U.S. Environmental Protection Agency
   Region 10 (ECL-113)
   1200 Sixth Avenue, Suite 900
   Seattle, Washington 98101

2. Documents submitted to the Spokane Tribe shall include one electronic copy and one hard copy sent to:

   Spokane Tribe of Indians
   Natural Resources Department
   Attn: Randy Connolly, Superfund Coordinator
   PO Box 480
   Wellpinit, Washington 99040

   (For express mail):
   Spokane Tribe of Indians
   Natural Resources Department
   Attn: Randy Connolly, Superfund Coordinator
   6290-B Ford-Wellpinit Road
   Wellpinit, Washington 99040

In the event of a significant change in conditions or emergency circumstances relating to public health or welfare or the environment related to Work under the CD, DMC/Newmont shall provide notification according to Section XXVI of the Consent Decree.

P5.0 DOCUMENTATION, AVAILABILITY OF INFORMATION, AND RECORD RETENTION

P5.1 CENTRAL FILE

DMC/Newmont shall establish a document control system with the following objectives:

1. Creation of a central file containing all documents pertaining to Work under the CD.

2. Organization of the documents to facilitate retrieval of information.
3. Segregation of documents containing information which DMC/Newmont claims is privileged and confidential.
4. Establishment of procedures to ensure that all documents are routinely placed in the central file.

In addition, DMC/Newmont shall prepare and periodically update an inventory of all documents contained in the central file. The inventory shall contain for each document (1) the document date, (2) the author(s), (3) the recipient(s), and (4) the document title or subject. The DMC/Newmont shall submit the document inventory or an update to EPA upon written request.

P5.2 DOCUMENT MANAGEMENT

The operator shall retain records of all monitoring information, including all calibration and maintenance records, corrective action reports, copies of reports, and data generated. Adequate records will be maintained to document the process by which project objectives are met. Records kept by the operator will be legible, identifiable, and retrievable and will be protected to the extent possible against loss, damage or deterioration. Access to project files will be restricted to project and other authorized personnel only.

The inventory of all required documents contained in the central filing system will be periodically updated. In addition, copies of non-privileged documents will be made available to the EPA and the State upon request. The inventory for each document will contain the following information:

- Document date
- Authors
- Recipients
- Document title or subject

P5.3 DOCUMENT RETENTION

DMC/Newmont shall provide to EPA upon request, copies of all non-privileged documents and information within their possession and/or control or that of their contractors or agents relating to activities at the Site or to the implementation of the CD including but not limited to; sampling, analysis, chain-of-custody records, manifests, trucking logs, receipts, reports, sample traffic routing, correspondence, and other documents or information related to the Work.

DMC/Newmont shall preserve for a minimum of ten (10) years after the remedial action has been completed, all records and documents in their possession or control, including the documents in the possession or control of their contractors and agents on and after the Effective Date of the Certificate of Completion that relate in any manner to the Site. DMC/Newmont shall also preserve and shall instruct their contractors and agents to preserve all documents, records and information of whatever kind, nature or description relating to the performance of the Work. At the end of this ten-year period, DMC/Newmont shall notify the EPA at least ninety (90) days prior to the destruction of any such record, documents, or information and, upon request of the EPA, DMC/Newmont shall deliver all such documents, records, and information to the EPA.

P6.0 SITE SAFETY

At the start of the RA, the following documents will be used to define the health and safety requirements:

- Health and Safety Plan for the Midnite Mine Superfund Site (WME, 2013) – describes the health and safety requirements for operation of the WTP.
- Midnite Mine Superfund Site Remedial Action Health and Safety Plan (MWH, 2015) – describes the health and safety requirements for the RA construction activities.

P7.0 REFERENCES

MWH Americas, Inc. (MWH), 2015. Midnite Mine Superfund Site - Remedial Action Health and Safety Plan. Prepared for Dawn Mining Company, LLC and Newmont USA Limited. July.

Tetra Tech, Inc. (Tetra Tech), 2009. Standard Operating Procedures for the Phase I RD/RA: Interim Water Management for the Midnite Mine. Prepared for Dawn Mining Company and Newmont USA Limited. May 5.

Tetra Tech, Inc. (Tetra Tech), 2010. Operation, Maintenance and Monitoring (OM&M) Plan for the Midnite Mine Water Collection System and Water Treatment Plant for the Phase I RD/RA: Interim Water Management for the Midnite Mine.

U.S. Environmental Protection Agency (EPA), 2006. Record of Decision, Midnite Mine Superfund Site, Spokane Indian Reservation, Washington. September.

Worthington Miller Environmental (WME), 2013. Health and Safety Plan for the Midnite Mine Superfund Site. Prepared for Dawn Mining Company, LLC and Newmont USA Limited. June 4.

Attachment P-1

Operation, Maintenance and Monitoring (OM&M) Plan for the Midnite Mine Water Collection System and Water Treatment Plant for the Phase I RD/RA: Interim Water Management for the Midnite Mine

In order to manage the size of this 100% design report, this attachment only is included in the electronic submittal. This attachment describes current Site O&M activities, and has not been revised for this submittal.

Note: This OM&M Plan addresses inspection, monitoring, and maintenance activities for the existing water treatment plant and will be used until the existing water treatment facility is taken offline during the implementation of the remedial action. This attachment will be replaced in its entirety when the new water treatment plant is constructed and brought on-line.

Operation, Maintenance and Monitoring (OM&M) Plan for the Midnite Mine Water Collection System and Water Treatment Plant for the Phase I RD/RA: Interim Water Management for the Midnite Mine

Revision 2

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1.0 INTRODUCTION

This OM&M Plan is the treatment facility personnel's primary reference book. It describes the treatment of water and sludge handling at the WTP. The Table of Contents can be used to locate information quickly. The Table of Contents has all of the OM&M Plan sections listed along with the corresponding page on which the information can be found. Sufficient subsections are listed in each section to permit easy identification of the topics addressed in the Plan.

1.1 Operation and Managerial Responsibility

The scope of responsibility for both operations personnel and management is outlined below to ensure efficient and effective operation of the treatment facility.

1.1.1 Operational Personnel's Responsibility

- Know proper operational procedures.
- Operate the treatment system effectively.
- Keep continuously informed of the best operating and maintenance practices.
- Maintain accurate and neat operational and maintenance records.
- Use sound judgment in the expenditure of operating funds.
- Keep management advised of potential major problems in operation and maintenance of system.
- Assist supervisors in preparing an adequate budget.
- Be aware of safety hazards connected with the treatment facility.
- Be prepared to discuss plant operation with plant visitors.
- Know expected efficiencies of unit operations and processes in the treatment system and how to monitor these units.

1.1.2 Treatment Facility Management Responsibility

- Maintain efficient plant operation and maintenance.
- Maintain adequate treatment facility operational and management records.
- Establish staff requirements, prepare job descriptions, develop organization charts, and assign personnel.
- Provide good working conditions, relevant training, safety equipment, and proper tools for the operational personnel.
- Motivate personnel to achieve maximum efficiency of operation.
- Make employees aware of importance of proper plant performance.
- Make periodic inspections of the treatment system to discuss mutual problems with the operations personnel and to observe operational practices.
- Create an atmosphere that will make operations personnel feel that they can bring problems to management's attention.
- Maintain good public relations.

- Prepare budgets and reports.
- Plan for future facility needs.
- Update standard operating procedures.

1.2 Type of Treatment and Treatment Requirements

1.2.1 Type of Treatment

The plant is designed to treat a nominal flow of 500 gallons per minute (gpm) of waters collected in seep capture and pumpback systems from Pits 3 and 4. The composition of the influent is shown in Table 1-1.

Table 1-1. Water Treatment Plant Influent Raw Water Characteristics and Design Basis

Pollutant or Contaminant	Plant Feed Concentration[a]
Uranium (total), mg/L	14.1
Radium-226 (total), pCi/L	26.1
Manganese (total), mg/L	62.6
Copper (total), mg/L	0.15
Cadmium (total), mg/L	0.041
Zinc (total), mg/L	2.83
TSS, mg/L	<10

a. Concentration averages for 2007 sampling events

The type of treatment system for this facility includes physical and chemical treatment processes comprised of the following major processes:

- Chemical precipitation of metals
- Flocculation
- Clarification
- Chemical pH adjustment
- Filtration
- Sludge dewatering and disposal

1.2.2 Treatment Requirements

As specified in the SOW, the WTP effluent will comply with the interim limits for discharge to surface water as defined in Table 12-2 of the Record of Decision (ROD) and presented in Table 6-3 of this plan. The performance standards and sampling requirements are discussed in Section 6.0. The WTP sludge has historically been disposed of in tailings disposal area No. 4 (TDA-4) at the DMC Millsite. Currently and in the future, the sludge will be disposed in accordance with the selected alternative from the Residual Management Plan included in Appendix B (Miller Geotechnical Consultants, 2009) as discussed in Section 2.8.

2.0 DESCRIPTION, OPERATION AND CONTROL OF WATER COLLECTION SYSTEM AND WATER TREATMENT FACILITIES

The water collection and water treatment systems are described in this section and include overall process descriptions, process controls, major components, start-up procedures, and normal, alternate, and emergency operations. Table 2-1 presents a summary of the sections where each individual process is described. The systems which are described in the section include the following:

- Seep and Surface Water Collection System
- Raw Water System
- Neutralization and Precipitation System
- Barium Chloride System
- Lime Slurry System
- Flocculant Addition System
- Primary Solid Liquid Separation
- Clarifier Overflow pH Adjustment System
- Clarifier Overflow Anti-Scalant Addition System
- Effluent Filtration System
- Plant Effluent System
- Sludge Dewatering System

Table 2-1. Water Treatment Facility Section References

System	Control	Major Components	Laboratory or Onsite Testing Controls	Start Up	Normal Operation	Alternate Operation	Emergency Operation and Failsafe Features
Seep and Surface Water Collection System – Section 2.2							
Collection and Conveyance System for Outfall 001	2.2.1.1	2.2.1.2	2.2.1.3	2.2.1.4	2.2.1.5	2.2.1.6	2.2.1.7
Collection and Conveyance System for Outfall 002	2.2.2.1	2.2.2.2	2.2.2.3	2.2.2.4	2.2.2.5	2.2.2.6	2.2.2.7
Collection and Conveyance System for Outfall 003	2.2.3.1	2.2.3.2	2.2.3.3	2.2.3.4	2.2.3.5	2.2.3.6	2.2.3.7
Collection and Conveyance System for Outfall 004	2.2.4.1	2.2.4.2	2.2.4.3	2.2.4.4	2.2.4.5	2.2.4.6	2.2.4.7
Collection and Conveyance System Pollution Control Pond	2.2.5.1	2.2.5.2	2.2.5.3	2.2.5.4	2.2.5.5	2.2.5.6	2.2.5.7
Emergency Response and Pump Watch Procedure for the Water Collection System is found in Section 2.2.6							
Pumping Stations, Plant Conveyance Pipeline, and Water Treatment Plant Influent System – Section 2.3							
Pumping Stations and Plant Conveyance Pipeline Information is found in Section 2.3							
WTP Influent System	2.3.4.1	2.3.4.2	2.3.4.3	2.3.4.4	2.3.4.5	2.3.4.6	2.3.4.7
Primary Treatment System – Section 2.4							
Neutralization and Precipitation	2.4.1.1	2.4.1.2	2.4.1.3	2.4.1.4	2.4.1.5	2.4.1.6	2.4.1.7
Lime Slurry System	2.4.2.1	2.4.2.2	2.4.2.3	2.4.2.4	2.4.2.5	2.4.2.6	2.4.2.7
Flocculant Addition System	2.4.3.1	2.4.3.2	2.4.3.3	2.4.3.4	2.4.3.5	2.4.3.6	2.4.3.7
Primary Solid Liquid Separation	2.4.4.1	2.4.4.2	2.4.4.3	2.4.4.4	2.4.4.5	2.4.4.6	2.4.4.7
Effluent Filtration	2.4.5.1	2.4.5.2	2.4.5.3	2.4.5.4	2.4.5.5	2.4.5.6	2.4.5.7
Clarifier Overflow pH Adjustment	2.4.6.1	2.4.6.2	2.4.6.3	2.4.6.4	2.4.6.5	2.4.6.6	2.4.6.7
Plant Effluent System – Section 2.5							
Plant Effluent System	2.5.1	2.5.2	2.5.3	2.5.4	2.5.5	2.5.6	2.5.7
Sludge Handling Facilities – Section 2.6							
Sludge Dewatering	2.6.1.1	2.6.1.2	2.6.1.3	2.6.1.4	2.6.1.5	2.6.1.6	2.6.1.7
Sludge Transport and Final Disposal – Section 2.7							
Sludge Transport and Final Disposal Information is found in Section 2.7							

2.1 Overview of Seep and Surface Water Collection System and Treatment Plant Operation

The water treatment facilities include the following:

- Water Collection System
- Pumping Station and Conveyance Pipeline
- Raw Water Supply System
- Primary Treatment Process
- Plant Effluent System
- Sludge Handling System

This section provides a general description of these facilities and processes. Sections 2.2-2.6 provide detailed descriptions of the facilities and processes.

2.1.1 Seep and Surface Water Collection System

The Midnite Mine ceased operation in September of 1981 and from that time water has collected in the two open mining pits on the site. In February of 1985, Dawn Mining Company (DMC) applied to the EPA for an NPDES permit to allow discharge of treated water from those pits and other waters collected on the site. In September of 1986, the EPA issued DMC an NPDES permit which designates four outfall locations for discharge. Construction and implementation of the water collection system began upon receipt of the NPDES Permit.

As shown in Figure 1, seep and surface water is collected at six different locations which consist of the Pollution Control Pond (PCP), Western Drainage Pump Station, Restroom Pumpback Station, East Seep Pump Station, Far East Seep Pump Station, and Blood Pool Pump Station. Waters collected are pumped to the PCP and then Pit 3 or directly to Pit 3.

As shown in Figures 1 and 2, the pump-back systems convey the water to be treated from the seeps to Pit 3 where it is pumped at 450 gpm to the water treatment plant. Approximately 50 gpm from Pit 4 is also pumped to the plant for treatment.

2.1.2 Specific Treatment Plant Operations and Flow Diagrams

In the treatment plant, the solution is mixed with lime and barium chloride to precipitate insoluble metal hydroxides, oxides, and sulfates. The resultant slurry is settled and filtered to produce a solution free of solids for discharge to the Eastern Drainage and a precipitate which has historically been hauled to DMC's Ford millsite for disposal in a lined uranium tailings pond (TDA-4).

Flow diagrams for the plant are shown in Figures 3, 4 and 5 and the treatment plant layout is shown in Figure 6. The plant is designed to operate at a flow rate of up to 500 gpm. Detailed descriptions of the unit operations and processes are found in Sections 2.2-2.6 and process troubleshooting is found in Section 3.0.

2.1.2.1 Neutralization Tanks

The water to be treated (influent) is pumped into a three-stage neutralization circuit. A solution of barium chloride is added to the feed stream to ensure precipitation of the radium^{226}. Lime

slurry is added to the influent water to adjust the pH resulting in precipitation of uranium and other metals. The water flows between tanks by gravity overflow pipes.

2.1.2.2 Primary Solid Liquid Separation and Sludge Handling

The discharge from the neutralization tanks is pumped to two clarifiers for solid/liquid separation. Flocculant is added to the discharge stream from the neutralization tanks to aid in solid settling rates. The thickened solids are pumped from the bottom of the clarifiers to a steady head tank, and partially recycled to the first stage of the neutralization tanks where the raw feed is reacted or "seeded" with recycled sludge to neutralize free acid, begin the chemical reactions and increase the density of the final sludge. From the steady head tank, the slurry is pumped to a centrifuge to remove residual water and produce a final filter cake. The liquid centrate from the centrifuge is pumped back to the neutralization surge tank where it is mixed with the neutralized water and further processed through the balance of the plant.

The overflow from the clarifier is gravity fed to the clarifier overflow tank where anti-scalant is added and the pH adjusted to between 6 and 9 and pumped to down-flow sand filters. The filter discharge is sent to the filter discharge tank (clearwell) before being discharged to the Eastern Drainage. The filter backwash is directed to the filter backwash tank (mudwell) and pumped to the first neutralization tank for processing with the plant influent.

2.1.2.3 Plant Makeup Water Sources

Water from Pit 4 is used as makeup water for the process solutions (e.g., lime slurry, flocculant) and potable water is trucked to the site for mixing the barium chloride solution. Pit 4 water is not used for barium chloride make-up because it would react with the barium chloride during mixing, which can result in precipitates and reduction of the concentration of the barium chloride available for reaction with the waters to be treated by the plant.

2.1.3 Process Operating and Sizing Criteria

General operating and equipment criteria are tabulated in Appendix C.

The plant is operated four days per week for approximately 7 months of the year. However, the operational season may be more or less depending on annual precipitation. The plant is shutdown during the winter months. The plant is designed to run approximately 500 gpm through the treatment plant; however the actual flow processed each year may be less.

Scheduled operating days per year	112
Operating Time – hours per day	24
days per week	4
Feed Rate – Instantaneous gpm	250 to 500
Approximate Gallons per year processed	64,512,000 to 80,640,000

During the spring thaw, the roads from the millsite to the water treatment plant are temporarily closed to trucks, and operations cease during this time.

2.2 Seep and Surface Water Collection System

This Water Management procedure was designed and implemented to effectively capture expressions of surface waters that do not meet the performance standards, presented in this plan (Table 6-3), that would otherwise discharge from the mine site.

Figure 1 presents a flow schematic of the collection and pumping of water for Outfalls 001-004. As shown on Figure 2, seep and surface water is collected at six different locations which consist of the Pollution Control Pond (PCP), Western Drainage Pump Station, Restroom Pumpback Station, East Seep Pump Station, Far East Seep Pump Station, and Blood Pool Pump Station. Waters collected in the Western Drainage Pump Station and Restroom Pumpback Station are pumped to the PCP, water from the PCP is then pumped to Pit 3. During the very limited portion of the year when water flows into this system, water collected at the Far East Seep Pump Station is pumped to the East Seep Pump Station and then to Pit 3. Higher flow collected during this period are pumped to the Blood Pool Pump Station and then to Pit 3. Both of these pump stations operate only during high water flow times of the year, typically during snowmelt.

The following sections describe the outfall collection and pumpback systems at the site.

2.2.1 Collection and Conveyance System for Outfall 001

Outfall 001 consists of a perennial stream and two small seeps. The water from the stream and seeps is captured and transferred to the Pollution Control Pond (PCP) to await periodic pumping into Pit 3 for temporary storage and eventual treatment at the WTP and subsequent release. The perennial stream flows from the toe of the waste rock dump and is known as the Western Drainage outfall. The two small seepages flow from the alluvium about one-half way between the waste rock and the Western Drainage Pump Station. These seepages are collectively known as the Western Drainage Jr. seeps and are diverted through a single pipe into the primary tank at the Western Drainage Pump Station.

This station pumps from a low base flow of approximately 18 gallons per minute (gpm) during the winter to nearly 1,000 gpm during wet spring conditions. Three large tanks are utilized to capture flow and three permanent pumps to transfer water to the PCP. Three auxiliary pumps can be quickly mobilized and activated to accommodate extreme flow conditions. The Western Drainage Pump Station has a radio alarm system and video cameras that can be accessed remotely.

2.2.1.1 Control

As the primary tank at this pump station fills, a float switch activates the primary, or "green", pump, which will pump the tank down during base flows. If the primary pump fails or the flow is too great for the primary pump, the tank continues to fill until another float switch activates the secondary or "yellow" pump. These two pumps draw water out of the primary tank. If they cannot keep up with the flows or both pumps fail, the water overflows into the secondary tank where a similar float switch system will activate a third or "red" pump. The third tank is for storage and does not have pumps or float switches installed.

2.2.1.2 Major Components

- Concrete collection basin
- Large diameter gravity piping
- Collection tanks (3)
- Permanent pumps (2)
- Overflow (1)
- Auxiliary/backup pumps (3)
- Electrical switchgear
- Standby generator
- UHF radio alarm system
- VHF radio/phone alarm system
- Video monitoring system
- Containment building
- Discharge piping

See Appendix C for more detailed information on pumps, equipment, piping, instrumentation, and power.

2.2.1.3 Laboratory or Onsite Testing Controls

There are no laboratory or onsite testing controls associated with this system.

2.2.1.4 Start Up

This system cycles as necessary to empty the collection tanks. Therefore, a specific start up procedure is not applicable to this system.

2.2.1.5 Normal Operation

The system is designed to operate with minimum operator input and maintenance. Water flowing from the waste rock dump is directed into the concrete collection basin and allowed to flow by gravity into the primary tank inside the building. As the first tank fills, a float switch activates the primary, or "green", pump, which will pump the tank down during base flows. If the primary pump fails or the flow is too great for the primary pump, the tank continues to fill until another float switch activates the secondary or "yellow" pump. These two pumps draw water out of the primary tank. If they cannot keep up with the flows or both pumps fail, the water overflows into the secondary tank where a similar float switch system will activate a third or "red" pump. If all pumps fail or cannot keep up, the water overflows into the tertiary tank outside the building. This tank has no pump and is included to provide additional response time for the on-call responder.

2.2.1.6 Alternate Operation

There is no alternate operation for this system.

2.2.1.7 Emergency Operation and Failsafe Features

During power outages and "pump watch" periods, the Western Drainage Pump Station must be monitored at intervals corresponding to the calculated filling rate. The "pump watch" procedure is described in Section 2.2.6.

A radio alarm system operated on the DMC private frequency provides system alert capability. The alarm system detects tank overfill situations, power outages, and loss of power phase(s), and will send a daily test signal to verify operation and readiness. An alarm activation float switch is located in the primary tank above the pump float switches. When activated, the alarm system sends out an instantaneous radio alarm. The alarm float also activates a telephone alert system that dials preprogrammed phone numbers of the "on call" responders. There is a similar switching and alert system assigned to the secondary tank. Upon being made aware of an alarm situation, the responder(s) can access the video monitoring system. The two monitoring cameras can be used to help determine or verify the alarm. A more detailed discussion of the alarm system is presented in Section 2.2.6.

The emergency generator, which is always plugged in to keep the engine warm, starts three seconds after a power interruption. After a four minute run-up, the automatic switch gear in the control room routes the electrical pathway from Avista power to generated power and the pumpback system is reenergized.

2.2.2 Collection and Conveyance System for Outfall 002

Outfall 002 consists of a small seepage, identified as the Dam Toe Seep, which drains from the toe of the PCP dam. The Dam Toe Seep has a flow rate of a few gpm and is captured in an underground collection system, known as the Restroom Pumpback Station. The water captured by the Restroom Pumpback Station is pumped to the PCP to await periodic pumping into Pit 3 for temporary storage and eventual treatment at the WTP and subsequent release.

2.2.2.1 Control

The Restroom Pumpback Station consists of an underground collection tank with two submersible water pumps. The submersible pumps are activated by float switches. As the tank becomes full, a float switch activates the primary pump, which will pump the tank down by itself during normal flows. If that pump fails or the flow is too great for the primary pump, the tank continues to fill until a higher float switch activates the secondary pump.

2.2.2.2 Major Components

- Containment building
- Submersible pumps (2)
- Electrical switchgear
- Emergency Generator
- Underground collection tank (1)
- Discharge piping

See Appendix C for more detailed information on pumps, equipment, piping, instrumentation, and power.

2.2.2.3 Laboratory or Onsite Testing Controls

There are no laboratory or onsite testing controls associated with this system.

2.2.2.4 Start Up

This system cycles as necessary to empty the collection tank. Therefore, a specific start up procedure is not applicable to this system.

2.2.2.5 Normal Operation

The Restroom Pumpback Station is much simpler in design and operation than the Western Drainage Pump Station. The Restroom Pumpback station captures a small perennial seep and consists of a 1000 gallon polyethylene septic tank buried underground. In the buried tank are two submersible water pumps that are activated by float switches. Under normal conditions, only one pump operates leaving the other as a backup.

The Restroom Pumpback Station access road may or may not be plowed of snow during winter months. If the road is not plowed, this location is accessible by snowmobile.

2.2.2.6 Alternate Operation

There is no alternate operation for this system.

2.2.2.7 Emergency Operation and Failsafe Features

During power outages and “pump watch” periods, the Restroom Seep Pump Station must be monitored at intervals corresponding to the calculated filling rate. The “pump watch” procedure is described in Section 2.2.6.

The power to the Western Drainage Pump Station and the Restroom Pumpback Station are fed off the same supply and loss of power at the Western Drainage Pump Station would also indicate that there is a power interruption at this location.

An automatic start, backup generator is installed at this location. In the event that the main power fails, the emergency generator will automatically start and provide power for the pumps.

2.2.3 Collection and Conveyance System for Outfall 003

Outfall 003 is near the eastern and southern boundary of the former mine leasehold. It consists of the East Seep and the Far East Seep. The East Seep is a small perennial discharge with a flow rate varying from a few drops per minute to a few gpm. The Far East Seep is intermittent, usually flowing only during spring run-off up to about 50 gpm. The East Seep is captured in an underground tank and pumped directly to Pit 3, and the Far East Seep is captured in a surface tank and pumped into the Blood Pool pumpback system during periods of high flow and into the East Seep collection tank during periods of low flow.

2.2.3.1 Control

The East Seep Pump Station consists of an underground collection tank with two submersible water pumps. The submersible pumps are activated by float switches. As the tank becomes full, a float switch activates the primary pump, which will pump the tank down by itself during normal flows. If that pump fails or the flow is too great for the primary pump, the tank continues to fill until a float switch, located higher on the tank, activates the secondary pump.

The Far East Seep Pump Station consists of an aboveground collection tank with three submersible water pumps. The submersible pumps in this station are activated by float switches. As the tank becomes full, a float switch activates the primary pump which pumps the water to the East Seep Pump Station. If that pump fails or the flow is too great for the primary pump, one or two larger capacity pumps are activated by float switches and pump the water to the Blood Pool Pump Station.

2.2.3.2 Major Components

EAST SEEP

- Containment building
- Submersible pumps (2)
- Electrical switchgear
- Emergency Generator
- Underground collection tank (1)
- Discharge piping

See Appendix C for more detailed information on pumps, equipment, piping, instrumentation, and power.

FAR EAST SEEP

- Above ground tank
- Submersible pumps (3)
- Electrical switchgear
- Discharge piping

See Appendix C for more detailed information on pumps, equipment, piping, instrumentation, and power.

2.2.3.3 Laboratory or Onsite Testing Controls

There are no laboratory or onsite testing controls associated with this system.

2.2.3.4 Start Up

The East Seep Pump Station system cycles as necessary to empty the collection tank. Therefore, a specific start up procedure is not applicable to this system.

The Far East Seep Pump Station typically runs during the spring when snowmelt is occurring. The following steps shall be performed to start this system after extended periods of shutdown:

A. Check the pipelines to the Blood Pool and East Seep Pump Stations

B. Check that power is on to the system

C. Lower the submersible pumps into the tank

D. Open the discharge valve on the pipelines

E. Check pump operation and float switch operation by manually activating the float switches

2.2.3.5 Normal Operation

The East Seep and Far East Seep Pump Stations are fairly simple in design and operation. The East Seep Pump Station captures a small perennial seep and consists of a 1000 gallon polyethylene septic tank buried underground. In the buried tank are two submersible water pumps that are activated by float switches. Under normal conditions, only one pump operates leaving the other as a backup.

The Far East Seep Pump Station consists of an aboveground collection tank with three submersible water pumps. This pump station collects water from an intermittent seep that typically flows during snowmelt. The submersible pumps in this station are activated by float switches. As the tank becomes full, a float switch activates the primary pump which pumps the water to the East Seep Pump Station. If that pump fails or the flow is too great for the primary pump, one or two larger capacity pumps are activated by float switches and pump the water to the Blood Pool Pump Station.

During the winter, the East Seep Pumpback Station access road is not plowed of snow and is only accessible by snowmobile. During muddy periods in the spring, the East Seep Pumpback Station is only accessible by foot. The Far East Pumpback Station does not have vehicle access and is only accessible by snowmobile or by foot.

2.2.3.6 Alternate Operation

There is no alternate operation for this system.

2.2.3.7 Emergency Operation and Failsafe Features

During power outages and “pump watch” periods, the East Seep and Far East Seep Pump Stations must be monitored at intervals corresponding to the calculated filling rate. The “pump watch” procedure is described in 2.2.6.

The power to the Western Drainage Pump Station and the East Seep and Far East Seep Pump Stations are fed off the same supply and loss of power at the Western Drainage Pump Station would also indicate that there is a power interruption at these locations.

An automatic start, backup generator is installed at the East Seep Pump Station. In the event that the main power fails, the emergency generator will automatically start and provide power for the pumps.

The Far East Seep Pump Station is powered by a secondary feed from the Blood Pool Pump Station. Emergency power is by the automatic generator installed at the Blood Pool building.

2.2.4 Collection and Conveyance System for Outfall 004

Outfall 004 is the designated discharge point for treated water from the WTP. If untreated water from the Blood Pool system were to be discharged, it would be released at Outfall 004. The Blood Pool flows intermittently during the spring melt to a maximum of approximately 120 gpm

and is located on the waste rock pile immediately above the Far East Seep. Water from several seepages is directed into an underground tank which is then pumped into Pit 3.

2.2.4.1 Control

The Blood Pool Pump Station consists of an underground settling tank and a collection tank with three submersible water pumps. The submersible pumps are activated by float switches. As the collection tank becomes full, a float switch activates the primary pump, which will pump the tank down by itself during normal flows. If that pump fails or the flow is too great for the primary pump, the tank continues to fill until another float switch activates a second pump. During periods of high flow, a larger pump is manually started and stopped, as required.

2.2.4.2 Major Components

- Building
- Electrical switchgear
- Emergency Generator
- Underground settling tank (1)
- Underground collection tank (1)
- Submersible pumps (3)
- Discharge piping

See Appendix C for more detailed information on pumps, equipment, piping, instrumentation, and power.

2.2.4.3 Laboratory or Onsite Testing Controls

There are no laboratory or onsite testing controls associated with this system.

2.2.4.4 Start Up

The Far East Seep Pump Station typically runs during the spring when snowmelt is occurring. The following steps shall be performed to start this system after extended periods of shutdown:

1. Check the pipelines to the Blood Pool and East Seep Pump Stations
2. Check that power is on to the system
3. Lower the submersible pumps into the tank
4. Open the discharge valve on the pipelines
5. Check pump operation and float switch operation by manually activating the float switches

2.2.4.5 Normal Operation

This collection system typically only operates for a brief period during extreme snowmelt. The Blood Pool Pump Station consists of an underground settling tank and a collection tank with three submersible water pumps. The submersible pumps are activated by float switches. As the collection tank becomes full, a float switch activates the primary pump, which will pump the

tank down by itself during normal flows. If that pump fails or the flow is too great for the primary pump, the tank continues to fill until another float switch activates a second pump. During periods of high flow, a larger pump is manually started and stopped, as required. The settling tank is cleaned out once per year. The tank is cleaned out by using a sump pump to pump the semisolids into a 55 gallon drum.

2.2.4.6 Alternate Operation

There is no alternate operation for this system.

2.2.4.7 Emergency Operation and Failsafe Features

During power outages and "pump watch" periods, the Blood Pool Pump Station must be monitored at intervals corresponding to the calculated filling rate. The "pump watch" procedure is described in Section 2.2.6.

The power to the Western Drainage Pump Station and the Blood Pool Pump Station are fed off the same supply and loss of power at the Western Drainage Pump Station would also indicate that there is a power interruption at this location.

In the event that the main power fails at the Blood Pool Pump Station, the emergency generator will automatically start and provide power for the pumps.

2.2.5 Collection and Conveyance System Pollution Control Pond

In 1978, a seepage of water emerged from the toe of the waste rock dump in the natural depression known as the Central Drainage. An impoundment was constructed across the drainage near the leasehold boundary to retain the seepage. What became the Pollution Control Pond (PCP) was created behind the impoundment. The PCP impoundment is constructed with boulders and heavy rock and is keyed into the alluvial bedrock formation. It is clay lined and is effective in capturing the water emanating from the waste rock dump. The PCP not only directly captures the seepage from the toe of the waste rock dump in the Central Drainage, but also serves as an intermediate holding pond for the waters collected at various pumpback sites. Therefore, the PCP requires periodic pump out to Pit 3.

2.2.5.1 Control

There are no automated controls associated with this system.

2.2.5.2 Major Components

- Building
- 40 hp centrifugal pumps (2)
- Electrical switchgear
- Suction line and foot valve
- Discharge line
- Emergency generator
- Auxiliary diesel pump (winter only) (1)
- Priming pump (1)

See Appendix C for more detailed information on pumps, equipment, piping, instrumentation, and power.

2.2.5.3 Laboratory or Onsite Testing Controls

There are no laboratory or onsite testing controls associated with this system.

2.2.5.4 Start Up

A. Begin by selecting the proper intake for the pump to be used.

B. Submerge the foot valve in the PCP water.

C. Connect the primer hose to the selected pump at discharge end of pump and open valve.

D. Submerge primer pump in PCP water and start.

E. Monitor the filling process making sure air pockets are purged from intake line.

F. When intake and pump are filled past the pump, shut off primer pump and valve.

G. Start the appropriate pump at switch panel.

H. Determine that pumping has started by sound and pressure gauge.

I. Open seal water valve until water squirts from end of water tube.

J. Monitor system until pressure stabilizes, which indicates that water is ‘over the hill’.

K. Open line bleed valve until ~ 5 gpm flows from hose.

L. Verify that water is discharging from end of pump line in Pit 3.

2.2.5.5 Normal Operation

Frequent observation and weekly inspection and level measurements are made. When the PCP water level reaches a predetermined level, the pump(s) are started and the transfer of water to Pit 3 begins. During normal flow periods, only one pump is necessary and is operated 24 hours a day until the pond level is reduced to the desired level. Higher flow periods will necessitate the use of the second electric pump and in extreme conditions, an auxiliary diesel powered pump is available.

The level of the PCP pond is measured using the “steps” that go down into the pond, with step #1 being at the top of the pond. The operating level is maintained between step #10 (high level) and steps #15/#16 (low level). When the PCP level reaches step #10, the pump is turned on. When the level declines to step #15 or #16, the pump is shut off.

While these pumps are being operated, the system is monitored several times during the day, including weekends. The following information is recorded during the operational checks:

1. Verify that the appropriate pressure is registered on pump gauge.
2. Verify that flows from the seal tube and bleed hose are appropriate.
3. Verify that footvalve is clear of obstructions.
4. Measure PCP level (i.e., record the “step” that corresponds to the pond level).
5. Determine either by feel or infrared thermometer that motor is within temperature range.
6. Make general observation of entire pump system.
7. Follow pipeline to Pit 3 and check for leaks.
8. Record flowmeter reading at top of hill in pipeline.
9. Verify that water is flowing from end of pipe.

2.2.5.6 Alternate Operation

There is no alternate operation for this system.

2.2.5.7 Emergency Operation and Failsafe Features

The consequences of a power outage at the PCP do not typically require an immediate response as there is sufficient capacity in the PCP to store water for an extended period of time. Operating the system during extreme cold weather is avoided, but if a power interruption were to occur, the “bleed line” would drain the pipeline before it could freeze. A 100 kilowatt generator is on permanent standby at this location in case of an extended power interruption. However, there is no transfer capability at this location. The generator must be hard wired into the electrical control box to operate the pumps. This, and any, electrical repair, modification or maintenance must not be attempted by unqualified personnel.

2.2.6 Emergency Response and Pump Watch Procedure

2.2.6.1 Pump Watch Procedure

It is important that the system be closely monitored and that there is appropriate time for response in the event of a problem with the water collection system. Water collection flow rates are measured weekly under normal flow conditions, and daily during high flow conditions. From these flow measurements, the critical response can be determined. Table 2-2 shows the time available for a responder to arrive based on the current flow rates and tank storage capacity at the Western Drainage Pump Station. The response time assumes that the Western Drainage Pump Station primary tank is full to the alarm level and that the secondary and tertiary tanks are empty. When the response time is reduced to below the margin of time to respond, a "pump watch" procedure is activated.

Table 2-2. Western Drainage Response Time

Flow (gpm)	Hrs	Min	Flow (gpm)	Hrs	Min
5	52	29	115	2	17
10	26	15	120	2	11
15	17	30	125	2	6
20	13	7	130	2	1
25	10	30	140	1	52
30	8	45	150	1	45
35	7	30	160	1	38
40	6	34	170	1	33
45	5	50	180	1	27
50	5	15	190	1	23
55	4	46	200	1	19
60	4	22	210	1	15
65	4	2	220	1	12
70	3	45	230	1	8
75	3	30	240	1	6
80	3	17	250	1	3
85	3	5	260	1	1
90	2	55	270	0	58
95	2	46	280	0	56
100	2	37	290	0	54
105	2	30	300	0	52
110	2	23			

During periods of high flow and when the time for response is minimal, 24-hour surveillance of the pump stations is necessary. This period usually occurs during the winter or early spring when the WTP is not operating and the plant operators are available and 'on-call'. An operator schedule is prepared and operators report to duty to facilitate monitoring and operation of the emergency systems as needed.

During this period, the daily monitoring schedule for items listed in Section 7.3 are performed more frequently to ensure that an untreated discharge does not occur. A predetermined inspection route and schedule for all stations and systems is established. This procedure is modified to fit specific or unusual situation(s) as they occur.

2.2.6.2 Emergency Response

Emergency response is most critical at the Western Drainage, as the flow rates are consistently highest here. Most cases of power outage are caused by summer electrical storms or winter snow, during these periods the flow rate is typically low and ample time is available for adequate response. A power outage during "pump-watch" or during the WTP operating season is not critical, as personnel are already onsite.

A radio alarm system operated on the DMC private frequency provides system alert capability. The alarm system, located at the Western Drainage Pump Station, detects tank overfill situations, power outages, and loss of power phase(s), and also sends a daily test signal to verify operation and readiness. When activated, the alarm system sends out an instantaneous radio alarm. If an alarm is triggered, the radio alert will begin immediately,

followed by a repeat every 15 minutes for 90 minutes and is coded to describe the situation. When the alarm system activates, a telephone alert system also dials preprogrammed phone numbers of select DMC personnel. The telephone alert system will cycle through home phones, cell phones and pagers until a responder is reached and the responder enters an acknowledgement code. There is a similar switching and alert function assigned to the secondary tank; however, the second alert will only add to the primary alert that should already be transmitting.

Upon correction of the upset condition, the radio system will send out a "clear" message. However, attention must still be given to the situation until it is verified that all systems have returned to normal. The "clear" signal will be sent after a power alarm clears but may only indicate that the emergency generator has taken over. In addition to the return of power or phase, the “clear” signal will be sent upon correction of the level alarm condition in the primary tank. In the event of level alarm activation in the secondary tank, a manual reset must occur.

Upon being made aware of an alarm situation, the responder(s) can access the video monitoring system. If the responder(s) can access the internet in timely fashion, the website can be brought up and a preliminary assessment of the cause of the alarm made using the video cameras. The two video monitoring cameras can be used to help determine or verify the alarm. The inside camera is trained on the secondary tank with a status light panel in the foreground. The panel indicates which pumps are operating and if they are actually pumping, and whether there is power, three electrical phases, and the source of the power. The responder on call may, or may not, respond depending on information gained from the video camera.

The outside camera shows weather conditions, intrusion, and generator operation. The outside camera’s most useful function is allowing the monitoring of heavy precipitation, usually snow, which could cause a power interruption. While less effective, the outside video camera can also suggest high winds. During heavy snow, electrical storms, or high winds, response personnel will be on a higher level of alert.

In the event of a power outage lasting more than three seconds, the emergency generator will start. After a four minute run-up, the automatic switch gear in the control room routes the electrical pathway from Avista power to generated power, and the permanent pump system is again energized. At this point the radio alarm system will activate and send a “clear” signal. This signal must not be confused with the same signal that indicates that Avista power has been restored.

In the event of an alarm signal being received by direct radio contact, telephone or pager, and the responder is not near the internet, he or she shall start toward the mine site. The on-call responder should be in their radio equipped vehicle, if not at their base station, and must remain within the response zone, using Table 2-2 as guidance. The responder should have appropriate attire, food and other comfort gear as appropriate, and in snowy conditions, have the snowmobile in their vehicle as well as a chainsaw.

The responder must have the necessary understanding of the system to react to the specific situation and to return the system to normal or activate recovery systems available to insure that there is no release of water. He should also monitor his vehicle radio and stay in communication with other alert personnel.

2.3 Pumping Stations, Plant Conveyance Pipeline and Water Treatment Plant Influent System

2.3.1 Pumping Station Type

2.3.1.1 Pit 3 Pump Station

Pit 3 water is pumped to the WTP by an electrically driven pump. Feed to the plant is monitored by a flow meter and controlled by a hand control valve. The flow meter is equipped with a low flow alarm. The pump is started and stopped from a local hand switch at the pump.

2.3.1.2 Potable Water Pump Station

A potable water pump station does not exist at the WTP. Potable water is brought to the plant in a 300 gallon tank by truck, for makeup of the barium chloride solution and for handwashing and eyewash stations, as needed. A 400 gallon potable water tank is located onsite for supply to the plant sink and eyewash stations. Drinking water for the plant is provided in 5 gallon bottles with a dispenser.

2.3.1.3 Pit 4 Pump Station

Pit 4 water is supplied to the plant by a diesel motor driven pump. Pit 4 water is used for makeup water to the lime system and flocculant addition system. The flow is controlled using a pressure control valve; when Pit 4 water is not being used for chemical makeup, it is processed through the clarification portion of the plant.

2.3.1.4 Fire-Flow Pumping Equipment

There is no fire flow pumping equipment at the plant.

2.3.2 Pumping Station Classification

2.3.2.1 Capacity

Pit 3 Pump – This pump is designed for 600 gpm. Normal operating flow rate to the plant is 450 gpm.

Pit 4 Pump – This pump is designed for up to 300 gpm. Normal operating flow rate to the plant is 50-70 gpm.

2.3.2.2 Energy Source

Pit 3 Pump – This mobile 3” x 4” Durion pump is powered by 75 horsepower, 480 volt, 3-phase electric motor. No standby power is available for the Pit 3 pump. All flow to the plant is discontinued in the event of a power failure of the incoming plant 480 volt feed.

Pit 4 Pump – This pump is powered by 150 horsepower four cylinder diesel driven motor. The pump must be manually shut off to the plant in the event of a power failure of the incoming plant 480 volt feed.

2.3.3 Pipeline Types and Sizes

2.3.3.1 Midnite Mine – Water Treatment Plant Pit 3 Plant Supply Pipeline

A mobile 3” x 4” Durion pump supplies flow from Pit 3 to the plant at up to 450 gpm through a six-inch high-density polyethylene (HDPE) pipeline. Check valves are provided on the inlet and outlet of the pump to prevent backflow in the system. A return line from the supply pipeline is controlled by a hand operated butterfly valve to route supply water back into Pit 3, if needed.

2.3.3.2 Midnite Mine – Water Treatment Plant Pit 4 Pipeline

The pipeline from Pit 4 is a three-inch HDPE pipeline controlled through a pressure control valve, controlling the flow to approximately 50 gpm. The flow from Pit 4 can be diverted to the plant water chemical makeup system as discussed in Section 2.3.1, or may be sent to Clarifier #1 and mixed with treatment plant water.

2.3.3.3 Treated Effluent Pipeline

The treated effluent pipeline to the Eastern Drainage is a six-inch HDPE pipeline. The treated water from the clearwell is pumped by a 3" Gallagher vacseal pump to the plant discharge location.

2.3.4 Water Treatment Plant Influent System

Water from Pit 3 is pumped to the plant using a trailer mounted centrifugal pump located at Pit 3. Up to a flowrate of 450 gallons per minute (gpm) of Pit 3 water is pumped to the treatment plant through a 6-inch HDPE supply pipeline. The flow from Pit 3 is monitored at the treatment plant for operational purposes. The pipeline contains a check valve on the supply and discharge side of the pump to prevent back-flow of water, which may result in damage to the pump.

Approximately 50 gpm of water is pumped from Pit 4 and used for chemical makeup or processed through the treatment system. Water from Pit 4 is pumped using a diesel driven pump. A pressure control valve at the plant allows for partial diversion of the flow to the flocculant tank and the lime slurry tank for chemical makeup.

2.3.4.1 Control

A hand control valve allows the operator to control flow from Pit 3 to the first neutralization tank in the plant. A second valve is located on the return line to Pit 3. When the Pit 3 pump is running, the valve on the Pit 3 return line is closed and the flow to the WTP is controlled by partially opening or closing the hand control valve. The operator controls the flow by adjusting the hand control valve, checking the flow meter to determine if the flow is at the desired rate, and repeating this process until the flow is at the desired rate. There is a process control flow meter on the influent line to the plant and an adjustable low-flow alarm that alerts the operator if flow drops below a predetermined setpoint.

A hand control valve allows the operator to control flow from Pit 4 to Clarifier #1. The flow is conveyed from the pit through a 3-inch pipeline and typically maintained between 50 and 70 gpm. There is a process control flow meter on the Pit 4 influent line. When the Pit 4 pump is running, the flow from Pit 4 is controlled by partially opening or closing the hand control valve. The operator controls the flow by adjusting the hand control valve, checking the flow meter to determine if the flow is at the desired rate, and repeating this process until the flow is at the desired rate.

2.3.4.2 Major Components

The major components of the Water Treatment Plant Influent system include:

- Pit 3
  - Pit 3 pump (1)
  - Pit 3 conveyance piping to plant
  - Pit 3 hand control valve
  - Pit 3 flow meter/totalizer (1)
- Pit 4
  - Pit 4 pump (1)
  - Pit 4 conveyance piping to plant
  - Pit 4 pressure control valve
  - Pit 4 hand control valve
  - Pit 4 hand diversion valves to chemical makeup

See Appendix C for more detailed information on pumps, equipment, piping, instrumentation, and power.

2.3.4.3 Laboratory or Onsite Testing Controls

No laboratory or onsite testing controls are relevant to the operation and maintenance of the raw water supply system.

2.3.4.4 Start Up

All pipe joints and seals shall be checked prior to startup or immediately after startup. The hand control valve (HCV-108) should be closed to divert flow back to Pit 3 and the butterfly valve on the Pit 3 return line opened for approximately 10 minutes upon startup.

2.3.4.5 Normal Operation

Under normal operation of the raw water supply system, Pit 3 flow will be pumped directly to the treatment plant. The normal operating flow from Pit 3 is 450 gpm. Pit 4 flow will be pumped directly to the treatment system at approximately 50 gpm.

2.3.4.6 Alternate Operation

There is no alternate operation associated with the Pit 3 supply to the treatment plant.

During chemical makeup for lime slurry or flocculant mixing, a portion of Pit 4 water is diverted to the chemical makeup system by opening a hand operated valve.

2.3.4.7 Emergency Operation and Failsafe Features

If there is a problem requiring the flow of the plant to be shut off, the Pit 3 and Pit 4 supply pumps are manually shut off, or the flows directed back to the pit by opening and closing the associated hand valve and opening the Pit 3 return line. In the event of a power failure, the Pit 3 pump will lose power and shut off and the manual valve from Pit 4 at the plant must be closed by the operator. Pit 4 pump must be manually shutoff as soon as possible by the operator.

2.4 Primary Treatment System

2.4.1 Neutralization and Precipitation

Neutralization Tank #1 – Treatment begins with the Pit 3 water flowing through three mixing and neutralization tanks arranged in series. Prior to entering the first mixing and neutralization tank, barium chloride ($BaCl_2$) is injected to the system feed piping to initiate the removal of radium^{226}. The feed then enters neutralization tank #1 (tank #1) where the raw feed is reacted or "seeded" with recycled sludge to neutralize free acid, begin the chemical reactions, and increase the density of the final sludge. The tank is designed so that feed water enters and exits the tank after flowing through an upcomer. The upcomer directs flow from the bottom of the tank to the discharge at the top of the tank to ensure adequate retention time and prevent flow short circuiting.

The tank #1 10 horsepower (hp) agitator is designed to maintain a homogeneous suspension and provide mixing between the raw feed and the recycled sludge. Approximately 40 gallons per minute (gpm) of recycled sludge is pumped from the underflow of clarifier #2 to neutralization tank #1 and 15 gpm from the underflow of clarifier #1 is pumped to neutralization tank #1.

Neutralization Tanks #2 and #3 – The next two tanks, called neutralization tank #2 (tank #2) and neutralization tank #3 (tank #3) provide retention time for the precipitation of metals as hydroxides. The material from tank #1 gravity flows to tank #2 where lime slurry is added to raise the pH. Tank #2 is equipped with a 10 hp agitator to mix the feed water and the lime slurry. Tank #2 is designed with an upcomer to ensure adequate retention and chemical reaction time before flowing into tank #3 by gravity. The tank #2 outlet pH is measured and indicated locally. The target pH in tank #2 is 9.9.

Tank #3, also equipped with an upcomer and a 10 hp agitator, allows for additional time for the reaction of the lime slurry with the system feed. The target pH for tank #3 is 9.85. The pH for tank #3 is measured in the outlet line and is indicated and automatically recorded on a chart. The lime slurry pumping speed is adjusted based on maintaining the outlet pH of tank #3. The level in tank #3 is controlled by gravity overflow into the neutralization surge tank.

The treatment reactions are complete in approximately 20 minutes; however, the plant is designed for a minimum 30 minute retention time of the influent water in the neutralization circuit.

Neutralization Surge Tank - The neutralization surge tank provides the feed to the clarifiers which are the primary liquid-solid separation portion of the plant. In addition to flow from tank #3, water from the centrifuges (i.e., centrate) is pumped into the surge tank for processing through the plant. The surge tank effluent is pumped to the clarifiers using a variable speed transfer pump. Flocculant is directly injected into the clarifier feed piping to assist in solids removal at the clarifiers.

Relationship to Adjacent Units – Plant influent water is pumped from Pit 3 to Tank #1. The pumping system from Pit 3 as described in Section 2.4.

Following flocculant addition, treated water is discharged through the effluent pipes as described in Section 2.6. Sludge is containerized and transported to either TDA-4 or offsite as described in Section 2.7.

2.4.1.1 Control

Neutralization Tank #1 –The tank #1 water level is maintained by gravity flow to neutralization tank #2. The agitator in this tank runs continuously and is turned on in the control room or from the remote control panel on the 2nd level.

Neutralization tanks #2 and #3 – The tank #2 water level is maintained by gravity flow to tank #3 and the tank #3 water level is maintained by gravity flow to the neutralization surge tank. Agitators in each of the tanks run continuously and are turned on in the control room or from the remote control panel on the 2nd level. The tank levels are maintained using gravity flow. The pH is measured and manually logged at the outlet of tank #3. The pH is measured and automatically logged at the outlet of tank #2.

Neutralization Surge Tank – The surge tank is fed by gravity from the outlet of tank #3. The neutralized water level is maintained by a variable speed pump which pumps the water to the clarifiers. A high level alarm will activate if the water level in this tank is too high. The pumping rate from this tank is controlled by a variable frequency drive which is located in the control room and manually adjusted on the 2nd level of the plant. If this tank overflows, water flows to the floor sump where it can be pumped back to the tank after the cause of the overflow has been corrected.

2.4.1.2 Major Components

Neutralization

- Neutralization Tank #1, Polyethylene Tank (1)
- Neutralization Tank #1 Agitator (1)
- Neutralization Tank #2, Polyethylene Tank (1)
- Neutralization Tank #2 Agitator (1)
- Neutralization Tank #3, Polyethylene Tank (1)
- Neutralization Tank #3 Agitator (1)
- pH indicator and recorder (1)
- Neutralization Surge Tank – Fiberglass Tank (1)
- Clarifier Feed Pump (1)

See Appendix C for more detailed information on pumps, equipment, piping, instrumentation, and power.

2.4.1.3 Laboratory or Onsite Testing Controls

Neutralization Tank #1 – No laboratory or onsite testing controls are relevant to the operation of tank #1.

Neutralization Tank #2 and #3 – The pH of tank #2 and tank #3 are indicated and the outlet pH recorded; however, the pH shall be checked using the field pH meter at least once per day to verify proper operation of the inline pH probes.

Purpose:	To verify proper operation of the neutralization tank pH probe. This test can also be used for process control when the reactor probe is out of service.
Sampling Site:	Neutralization tanks #2 and #3 contents near the reactor pH probes
Expected Range of Results:	pH between 9.8 to 10.5 during normal operations
Method Reference:	Standard Methods for the Examination of Water and Wastewater, AWWA.
Consequences of Test Results:	A pH measured in the laboratory which varies more than 0.3 pH units from the pH indicated by the reactor probe infers that the pH probe in the reactor should be cleaned or recalibrated. Following cleaning, proper operation will be verified by using a buffer solution of a known pH. A pH outside the range of 9.8 to 10.5 indicates a possible failure of the pH controller if the plant is in normal operation mode. Remedies and other possible causes are listed under Common Operating Problems for this unit.

Neutralization Surge Tank – No laboratory or onsite testing controls are relevant to the operation of this tank.

2.4.1.4 Plant Start-up

The common start-up procedures for the plant are described below.

Check Sequence Prior to Plant Start-up – The following general check sequence is a one-time operation intended to ensure proper operations of all equipment and subsystems. This procedure shall also be followed after extended periods of shut-down.

A. Verification of mechanical maintenance steps for all pumps, agitators, clarifier rake drives and centrifuges. This includes lubrication, drive alignment, vibration check and debris removal. Manufacturer's recommended procedures should be followed for individual equipment items.

B. Verification of electrical aspects of all pumps, agitators, drives and centrifuges. This includes verification of proper rotation of motors.

C. Verification and calibration of all instrumentation. This includes verification of input/output signals and proper span. Calibration of pH probes shall be verified with laboratory instruments and against known standards.

D. Tanks, piping and pumps shall be tested for leaks using water.

E. Verify that all necessary utilities are available including electricity, service water and potable water.

Plant Start-up Sequence

A. Start all agitators which include: lime mix tank, lime day tank, neutralization tanks #1, #2, and #3. The flocculant mix tank agitator should be started if the four hour mix time is not complete prior to shutdown.

B. Start both clarifier underflow pumps on recycle to neutralization tank #1, making sure there is flow from both thickeners. If flow is present, start rakes in both thickeners.

C. Start the barium chloride pump and then Pit 3 pump. The flow meter should be bypassed for approximately 10 minutes and the water recirculated to Pit 3. After approximately 10 minutes the recirculation valve can be shut and the water sent to the WTP.

D. Once the flow is discharging from neutralization tank #3, start the clarifier feed pump and flocculant pump. Set the flocculant flow to clarifiers at 1.5 gpm.

E. Once the clarifiers start to overflow, start clarifier overflow pump with flow bypassing the sand filters and being sent to Pit 3.

F. Start lime flow to neutralization tank #2 making adjustments until a pH of between 9.8 and 10.5 is reached and held.

G. Start sulfuric acid pump and adjust until a pH of 7 is reached and held in the flow to Pit 3.

H. Once flows and pHs are balanced, start anti-scalant pump and direct flow through the sand filters to clear well.

I. When the clear well has reached the one-half full mark, start discharge pump with flow directed to discharge area. Flow should be equal or slightly more than incoming flow to the WTP. The clear well should be kept at approximately one-half full to provide a buffer against overflow or running the effluent pump dry.

J. Start #1 and #2 conveyors making sure there is a sludge truck in place. Start and flush the centrifuge for approximately 10 minutes or until the centrate is clear.

K. Split flocculant flow between clarifiers and centrifuge. Flocculant flow on the flowmeters should read approximately 1.5 gpm to the clarifiers and approximately 1.5 gpm to the centrifuge.

L. Open sludge recycle lines enough to allow a flow to steady head tank.

M. When steady head tank is approximately 1/4 full, start centrifuge feed pump at a speed of 1.0, and adjust from there as needed. The feed rate to centrifuge #1 needs to be controlled by rotations per minute (rpm) and centrate color. When increasing feed rate, watch rpms. If they start to climb, slow rpm to the back drive. If they continue to climb, reduce feed rate until unit is stable.

N. Once centrifuge is stable, adjust sludge flow to head tank to maintain a constant level.

O. You should now be able to start monitoring and maintaining a balanced plant.

2.4.1.5 Normal Operation

The following information presents detailed information on plant operations on a unit-by-unit basis.

Neutralization Tank #1

Feed Source and Flow Rates	Pit 3 (Direct Feed): 450 gpm Clarifier #1 Recirculation: 15 gpm Clarifier #2 Recirculation: 40 gpm
pH of Reactor Contents	Normally 8.0 Total Effluent from tank #1: 500-510 gpm

Neutralization Tank #2

Feed Source and Flow Rates	Lime Slurry – Sufficient to maintain pH Neutralization tank #1 (gravity overflow): 500-510 gpm
Valve Positions	Lime Slurry Flow Control: Partially Open (pH depend)
pH of Reactor Contents	Normally 9.9

Neutralization Tank #3

Feed Source and Flow Rates	Neutralization tank #2 (gravity overflow): 500-510 gpm
pH of Reactor Contents	Normally 9.85

Neutralization Surge Tank

Feed Source and Flow Rates	Neutralization tank #3 (gravity overflow): 500-510 gpm Centrate Surge Tank: 10 gpm
Valve Positions	Clarifier Feed Pump Inlet and Discharge Valves: OPEN Flocculant Addition Valve: OPEN

2.4.1.6 Alternate Operation

There is no alternate operation of the neutralization system.

2.4.1.7 Emergency Operations and Failsafe Procedures

In the event of an accidental spill of untreated water due to pipe breaks or tank failure, the water will drain to the building sump. If necessary, the water will be directed to either tank #1 or the neutralization surge tank. The affected equipment shall be repaired. A high level alarm for the neutralization surge tank will sound in the plant to alert operator to overflow from this tank. See Section 3.1.1.7 for remedies to high tank level alarm.

2.4.2 Barium Chloride System

Barium chloride is used to initiate the removal of radium^{226}. The $BaCl_2$ is delivered to the treatment plant building in 50 pound bags, as necessary. The $BaCl_2$ solution is produced by adding 10 bags of dry chemical to the mixing tank and adding 1,200 gallons of potable water.

The solution should be mixed for 2 hours before transferring the solution from the mix tank to the day tank. The solution is transferred using the $BaCl_2$ transfer pump. Prior to entering the first mixing and neutralization tank, a solution of $BaCl_2$ is injected to the influent system piping

2.4.2.1 Control

Barium chloride solution is delivered to the treatment system using a Milton Roy metering pump set to deliver the desired flow. The feed rate of the $BaCl_2$ solution is approximately 170 to 180 ml/min.

2.4.2.2 Major Components

Barium Chloride Feed System

- Barium Chloride Mix Tank – Polyethylene Tank (1)
- Barium Chloride Storage Tank, Polyethylene Tank (1)
- Barium Chloride Transfer Pump (1)
- Barium Chloride metering pump (1)

See Appendix C for more detailed information on pumps, equipment, piping, instrumentation, and power.

2.4.2.3 Laboratory or Onsite Testing Controls

Once a day, the feed rate from the metering pump is measured using a graduated cylinder.

2.4.2.4 Start-Up

The following steps must be completed in order to start the $BaCl_2$ mix and feed system:

A. Verify that adequate water pressure is available and fill tank to above the agitator blades.

B. Start agitator.

C. Add ten, 50 pound bags of dry $BaCl_2$ to the mix tank while the tank continues to fill. Stop filling tank when it is approximately 1 foot blow the top of the tank (approximately 1200 gallons)

D. After approximately 2 hours of mixing, turn off the agitator, and transfer the solution from the mix tank to the day storage tank.

E. When the day tank contains a sufficient volume of solution to ensure that the chemical feed pump does not run dry, start the feed pump at the local control station.

2.4.2.5 Normal Operation

Feed source and flow rates: Barium Chloride. Dry $BaCl_2$ is received in 50 pound bags and loaded in the mix tank by hand. Potable water is used to mix with the $BaCl_2$. Pit 4 water should not be used for

	mixing as this water will cause an initial precipitation resulting is lower concentration solution for treatment. The mix ratio is approximately 500 pounds of dry $BaCl_2$ to 1,200 gallons of water.
Valve positions:	Normally the valve on the main service water feed is closed and the isolation valves on the chemical feed pumps are open.
General:	In general, the operation is as follows: The system is manual and the operator checks that there is a sufficient volume of $BaCl_2$ solution in the day tank. When the $BaCl_2$ day tank reaches a low level, the operator must transfer the mixed $BaCl_2$ solution from the mix tank to the day tank and mix a new solution to allow for the proper mixing time. When the mix tank reaches a low level or the day tank reaches a high level, the transfer pump is shut down.

2.4.2.6 Alternate Operation

There is no alternate operation of the flocculant mix and feed system.

2.4.2.7 Emergency Operations and Failsafe Features

There are no emergency operations associated with the flocculant mix and feed system.

2.4.3 Lime Slurry System

The hydrated lime is delivered by truck as a dry powder and slurried onsite. The lime slurry is used to supply the required alkalinity to neutralize the free acid and precipitate the metals in the plant feed. The lime slurry is added to neutralization tank #2. The system consists of one lime bin with a cone bottom, lime feeder, a lime slurry tank, a lime day tank, a transfer pump from the slurry to the day tanks and a lime delivery pump. The lime bin is pneumatically filled and contains a bag-house filter system.

One 50 ton lime bin is present to receive and store hydrated lime for use in the treatment system. The bin is equipped with a bottom activator (vibrator) to prevent bridging in the lime bin. The lime bin is pneumatically filled and contains a bag-house filter on the bin vent.

The bin is equipped with a lime feeder to meter hydrated lime into the lime slurry tank. A 4,800 gallon lime slurry tank is provided for preparation and storage of lime slurry. The tank is equipped with a mixer to mix the hydrated lime and water. The mixer is designed to incorporate dry lime into the slurry and to operate without excessive splashing.

One lime slurry pump is used to transfer lime slurry from the slurry tank to the 6,800 gallon day tank. One lime slurry pump is used to pump lime slurry from the day storage tank to Neutralization Tank #2. The discharge from the pump goes to a recycle loop to the pH control valve and then back to the lime day tank. The lime slurry is always recycled through this loop to help prevent plugging of the line. The slurry is normally recycled at the full capacity of the pump and no other flow control is required. A secondary line comes off the recycle line and is the lime feed to neutralization tank #2.

2.4.3.1 Control

The lime slurry is mixed manually by the operator in the lime slurry tank and the transfer pump operated manually. Lime is stored in the bin which is equipped with a dust collector and bin activator (shaker). The shaker is used to prevent and eliminate bridging at the bottom cone of the bin where the hydrated lime is dispensed from the silo. The shaker is turned on manually by the operator and run in approximately 2 minute intervals.

The hydrated lime tank is filled pneumatically through a hose hook-up from the lime delivery truck.

The lime auger below the lime bin is operated manually by the operator. Hydrated lime is fed from the auger for approximately 30 minute intervals to eliminate clumps. The total operation time for the auger is approximately 1.25 hours during the day shift and 1.25 hours during the night shift. The lime level in the mixing tank should be at least 1 to 2 feet below the auger discharge point when filling. The lime is then mixed with water from Pit 4, set up on a timed system, in the lime slurry tank to achieve a blend of lime slurry to be used in the neutralization process. The continuously operated agitator is operated manually by the operator and levels in the tank are periodically checked by the operator.

The slurry solution is recycled continuously in a piping loop to prevent plugging. The lime delivery pump is started and stopped manually at the pump. Lime slurry, from the recycle pipe loop, is taken off the loop for feed to neutralization tank #2. The flow in this line is manually regulated by a control valve, which is adjusted based on measured pH in neutralization tanks #2 and #3.

2.4.3.2 Major Components

The major components of the lime slurry system include:

- Lime bin (silo) – Steel Tank (1)
- Lime bin activator (1)
- Lime bin vent and filter (1)
- Lime auger (1)
- Lime Slurry Tank – Polyethylene Tank (1)
- Lime Agitator – Slurry Tank (1)
- Lime Day Tank – Polyethylene Tank (1)
- Lime Agitator – Day Tank (1)
- Lime Slurry Transfer Pump (1)
- Lime Slurry Delivery Pump (1)

See Appendix C for more detailed information on pumps, equipment, piping, instrumentation, and power.

2.4.3.3 Laboratory or Onsite Testing Controls

There are no laboratory or onsite testing controls relevant to the lime slurry system.

2.4.3.4 Start-Up

For more details of the lime system start-up and operation, please refer to the lime system operating manual. The following sequence shall be followed when starting the lime slurry system:

A. Verify that an adequate supply of hydrated lime exists in the lime silo.

B. Start the lime bin vibrator if needed and run for approximately 2 minutes. Start the auger timer and open the water hand control valve to the slurry tank. Start the slurry tank agitator once the liquid level in the tank covers the blades. After the lime slurry batch is mixed, start the transfer pump, and pump the slurry to the lime day tank.

C. Close the lime slurry control valve at tank #2.

D. Open the lime slurry recycle valve.

E. Verify that the inlet valve on the lime slurry pump is completely open.

F. Verify that the discharge valve on the lime slurry pump is mostly closed (about 90% closed).

G. Start the lime slurry pump. Slowly open the discharge pump valve until it is completely open.

H. Open the lime slurry control valve at tank #2 and adjust as necessary to maintain pH in tank #3.

2.4.3.5 Normal Operation

Feed Source and Flow Rates: Lime. Hydrated lime is received in bulk shipments and pneumatically transferred to the lime bin. The average amount of hydrated lime fed to the slurry tank is 2100 pounds per hour, during feeder operation.

Water. Service water from Pit 4 is mixed with the lime to produce a slurry containing 10 to 20 percent solids. The average flow rate of water during slurry makeup should be approximately 20 gpm.

General Operation: Lime slurry tank. The lime system is controlled by the operator. When the lime slurry tank reaches a low level which is defined as approximately 4 feet below the lime feeder (where it enters the tank), the operator starts the lime feeder timer and fully opens the makeup water valve. When the lime slurry timer shuts off (approximately 30 minutes) or when the tank level reaches approximately 2 feet below the lime feeder, the lime feeder is stopped and the valve on the makeup water is manually closed. The lime feeder and service water rates are manually adjusted to increase or decrease the slurry concentration. The

slurry concentration is increased if the manual control valve, that regulates the pH of neutralization tanks, is fully or nearly fully open. The slurry concentration is decreased if the manual control valve, that regulates the pH of neutralization tanks, is nearly closed or is plugging.

Lime transfer pump: The lime transfer pump is manually operated to transfer slurry from the lime slurry tank to the lime day tank as needed.

Lime slurry pump: The lime slurry is pumped in a continuous recycle loop from the lime day tank and back to the lime day tank. A branch off the recycle loop feeds lime to Neutralization tank #2. The recycle loop is used to allow large pipe diameters and high velocities to prevent plugging. The pump is normally operated at full capacity and no flow control is required.

2.4.3.6 Alternate Operation

There is no alternate operation option for the lime slurry system.

2.4.3.7 Emergency Operation and Failsafe Procedures

In the event of a lime system failure, a low pH will be measured at the reactor tanks, and flow must be diverted back to Pit 3.

2.4.4 Flocculant Addition System

Flocculant is delivered to the treatment plant building in 50 pound bags as necessary. The liquid flocculant is produced by adding 36 pounds of dry flocculant to the flocculant mixing tank and adding 1,200 gallons of water from the hand operated control valve on the Pit 4 water line. The solution should be mixed for 4 hours before transferring the flocculant from the mix tank to day tank. The flocculant is transferred using the flocculant transfer pump. The flocculant increases the size of particles to be settled from solution to aid in metals removal and is metered to the outlet of the neutralization overflow tank and to the feed stream of the centrifuge. An overall feed rate of 3.0 gpm is fed to the system which is split evenly to the clarifiers and centrifuge. A pressure tank fed by the flocculant pump and set at approximately 40 psi provides the backpressure necessary to supply flocculant to the system.

2.4.4.1 Control

Flocculant solution is delivered to the treatment system using a Moyno progressive cavity pump set to deliver the desired flow to the pressure tank. The flow from the pressure tank is then split equally to the clarifiers and the centrifuge(s) at approximately 1.5 gpm each.

2.4.4.2 Major Components

The major components of the flocculant mix and feed system include:

- Flocculant Mix Tank – Carbon Steel Tank (1)
- Flocculant Agitator – Mix Tank (1)
- Flocculant Day Storage Tank – Carbon Steel Tank (1)
- Flocculant Agitator – Day Tank – NOT USED
- Flocculant Transfer Pump (1)
- Flocculant metering pumps (1)
- Flocculant Pressure Tank (1)

See Appendix C for more detailed information on pumps, equipment, piping, instrumentation, and power.

2.4.4.3 Laboratory or Onsite Testing Controls

There are no laboratory or onsite testing controls associated with the flocculant mix and feed system. An operator may find that a lower or higher concentration of polymer solution increases the efficiency of the flocculation in the clarifier. This is done by trial and error and visual observation of the effects.

2.4.4.4 Start-Up

The following steps must be completed in order to start the flocculant mix and feed system:

A. Verify that adequate water pressure is available and fill tank to above the agitator blades.

B. Start agitator.

C. Add 36 pounds of dry flocculant to the floc mix tank while the tank continues to fill. Stop filling tank when it is approximately 1 foot blow the top of the tank (approximately 1200 gallons)

D. After approximately 4 hours of mixing, turn off the agitator, and transfer the flocculant from the mix tank to the day storage tank.

E. When the storage tank contains a sufficient amount of polymer solution to ensure that the chemical feed pump does not run dry, start the feed pump at the local control station.

F. The flow rate out of the pressure tank may need to be adjusted according to the plant flows.

2.4.4.5 Normal Operation

Feed source and flow rates:	Flocculant. Dry Flocculant is received in 50 pound bags and loaded in the mix tank by hand. Service water is used from Pit 4 line to mix with the flocculant. The flocculant mix ratio is approximately 36 pounds of dry flocculant to 1,200 gallons of water.
Valve positions:	Normally the valve on the main service water feed is closed and the isolation valves on the chemical feed pumps are open.
General:	In general, the operation is as follows: The system is manual and the operator checks that there is a sufficient volume of flocculant solution in the day tank. When the flocculant day tank reaches a low level, the operator must transfer the mixed flocculant to the flocculant day tank and mix a new solution to allow for the proper mixing time. When the mix tank reaches a low level or the storage tank reaches a high level, the transfer pump is shut down. The pressure in the flocculant pressure tank is adjusted to control the flow of flocculant to the system. The desired pressure of the tank is determined by visual observation of the flocculation and by the turbidity of the clarifier overflow streams.

2.4.4.6 Alternate Operation

There is no alternate operation of the flocculant mix and feed system.

2.4.4.7 Emergency Operations and Failsafe Features

There are no emergency operations associated with the flocculant mix and feed system.

2.4.5 Primary Solid Liquid Separation

The solution from the neutralization surge tank is split and diverted to two clarifiers arranged in parallel for separation of the solid and liquid phases by gravity settling. The solids are removed from the bottom of the clarifiers, and the clean water overflows through weirs at the top of the clarifiers into the clarifier overflow tank.

Each clarifier is equipped with a sludge recycle pump. The sludge recycle pump on clarifier #2 pumps approximately 40 gpm of sludge to neutralization tank #1. Approximately one-third of the flow (15 gpm) is pumped from clarifier #1 back to neutralization tank #1 with the remaining flow from clarifier #1 (25 gpm) directed to the sludge steady head tank before being pumped to the centrifuges for dewatering.

Primary solid liquid separation follows treatment in the neutralization tanks. Clean water overflowing from the top of the clarifiers is directed to the Clarifier Overflow tank and then pumped to the sand filtration units, which remove residual particles which the clarifiers did not capture. The sludge which settles to the bottom of the clarifiers is removed by centrifugal sludge

pumps and directed to neutralization tank #1 and the sludge steady head tank. The flow from the sludge steady head tank is pumped through one of two centrifuges, and the sludge cake collected in a truck for transporting to the disposal site.

2.4.5.1 Control

Clarifiers and Rake

Two clarifiers piped in parallel to the process allow time for solids and liquids to separate by a gravity settling process. The liquid above the settled sludge overflows the clarifiers to the clarifier overflow tank, where anti-scalant is added to protect the piping, equipment, and filters from sulfate precipitation. The overflow tank water is then pumped to a sand filter system for filtration. The settled sludge at the bottom is scraped by a rake mechanism, which conveys the sludge to the center cone.

Both clarifiers are provided with local control panels located near the rake motor where controls for the rake are found. The rake is a continuously operating piece of equipment, which is started locally at the panel.

Sludge Pumps

Each clarifier is equipped with a sludge pump, for pumping from the bottom of the clarifier to neutralization tank #1 or the sludge steady head tank. The sludge from the steady head tank is sent to the centrifuge for sludge/water separation.

2.4.5.2 Major Components

The major components of the primary solid liquid separation include:

- Clarifier #1 Tank – Steel Tank (1)
- Clarifier #2 Tank - Steel Tank (1)
- Clarifier #1 Sludge Pump (1)
- Clarifier #2 Sludge Pump (1)
- Clarifier #1 Rake and Drive (1)
- Clarifier #2 Rake and Drive (1)
- Local Hand Controls (2)
- Sludge Steady Head Tank – Steel Tank (1)

See Appendix C for more detailed information on pumps, equipment, piping, instrumentation, and power.

2.4.5.3 Laboratory or Onsite Testing Controls

Visual Inspection

Purpose	To verify adequate flocculation and settling of solids in the clarifier. Can also be used to determine if increased or decreased dosing of polymer is needed. Changes to polymer addition require a waiting period of approximately 30 minutes before the change will be observable.
Sampling Site	Centerwell liquid of clarifier #1, and at the deaerator on clarifier #2.
Expected Range of Results	Results are not quantified with this test. The operator or supervisor will determine whether flocculation is better or worse than before a change was made by observing the approximate and relative size of flocs and well as the presence of clear water eddies in the centerwell.
Method Reference	Not applicable
Consequences of Test Results	The operator will obtain an indication of the effects of a specific change which was made to the speed of the agitator in the flocculation tank, the point(s) of addition, or the flocculant dosage.

Paint Filter Liquids Test

Purpose	This test is used to determine the free water content in the plant sludge.
Sampling Site	Centrifuge sludge discharge #2 conveyor.
Expected Range of Results	Results are not quantified with this test. The sludge material is placed on a paint filter and if any liquid passes through and drops from the filter within the 5 minute test period, the material is deemed to contain free liquids.
Method Reference	40 CFR 264.314
Consequences of Test Results	If the test confirms the presence of free liquids, the sludge will be further processed to remove residual water.

2.4.5.4 Start-Up

Clarifiers

Following the initial start-up, the clarifiers will normally be run continuously without shut-down. The following are steps for start-up of the clarifiers.

A. Start other plant processes as described in Section 2.0.

B. Review operating manual, drawings, and maintenance manuals.

C. Familiarize operators with clarifier system.

D. Clear all debris such as loose concrete, rags, scrap metal, wood, dirt, etc., from tanks, clarifier weir, overflow tank, pipes, and pumps.

E. Check lube and oil levels in air compressor and pumps.

F. Check all valves for proper operation.

G. Partially fill clarifiers and start rakes.

H. Check filters, pipelines, airlines, pumps, and valves for leaks.

I. Finish filling clarifiers.

J. Start underflow pumps.

2.4.5.5 Normal Operation

Clarifier feed is pumped from the neutralization overflow tank, where flocculant is injected into the process stream and the flow split between clarifier #1 and clarifier #2. Approximately 100 gpm of flow is sent to clarifier #2 and 350 gpm of flow is sent to clarifier #1. The clarifier overflow is directed to the clarifier overflow tank, where anti-scalant and acid are added. Flow from the clarifier overflow tank is pumped through the sand filters. The pH of the water from the clarifier overflow tank is lowered by adding sulfuric acid into the clarifier overflow tank. The sludge from the clarifier underflows is pumped to neutralization tank #1 and the sludge steady head tank.

2.4.5.6 Alternate Operation

If one clarifier fails or requires maintenance, the other clarifier can be used as a stand alone system. Flows through the treatment plant may need to be reduced. The water from the clarifier overflow tank can be directed to bypass the sand filters to be routed back to Pit 3 when effluent water is not within specifications.

2.4.5.7 Emergency Operations and Failsafe Features

There are no emergency operations associated with the primary solid liquid separation system.

2.4.6 Effluent Filtration

Clean water overflowing from the top of the clarifiers contains small amounts of suspended solids. Therefore, the overflow is directed to two 11 foot diameter down-flow sand filtration units which remove residual particles that the clarifiers did not capture. The two filters are operated in parallel. Normally, the flow will be split evenly between both of the filters, except that when one filter is being backwashed, the total flow will be directed to the other filter. Filtrate is stored in a filter discharge tank (clearwell) to supply backwash water for the filters. Water from filter backwashing is collected in a filter backwash surge tank (mudwell) and then pumped back over time to neutralization tank #1 for processing through the treatment plant. Normal operation of the filters is manually controlled and filters are backwashed on a daily basis.

One backwash water pump is used for backwashing the sand filters. The sand filters are cleaned by reverse water flow at approximately 600 gallons per minute (gpm). An air scrubber is turned on and then the backwash water pump is started. The filter is cleaned for between 30

and 45 minutes until the backwash water is clean. An air lance is used during backwashing to breakup any clumps.

2.4.6.1 Control

The clear well contains a high level switch and alarm that sounds in the plant to indicate a high level to the operator.

The mudwell is equipped with a high level switch and alarm that sounds in the plant to indicate a high level in the tank.

The air scrubbers and backwash water pump are started and stopped manually.

2.4.6.2 Major Components

The major components of the effluent filtration system include:

- Two Filter Vessels – Steel Vessels
- Filter Discharge Tank (Clearwell) - Fiberglass Tank (1)
- Filter Backwash Surge Tank (Mudwell) - Fiberglass Tank (1)
- Backwash Water Pump (1)
- Backwash Air Compressor (1)
- Backwash Air Lance (2)
- Filter Backwash Surge Tank Transfer Pump (1)
- Level Indicator - Filter Backwash Surge Tank (1)
- Level Indicator - Filter Discharge Tank (1)

See Appendix C for more detailed information on pumps, equipment, piping, instrumentation, and power.

2.4.6.3 Laboratory or Onsite Testing Controls

There are no laboratory or onsite testing controls relevant to the operation of the sand filtration system.

2.4.6.4 Start-Up

1. Review operating manual, drawings, and maintenance manuals.
2. Familiarize operators with sand filter system.
3. Clear all debris such as loose concrete, rags, scrap metal, wood, dirt, etc., from tanks, clarifier weir and overflow tank, pipes and pumps.
4. Check lube and oil levels in air compressor and pumps.
5. Check all valves for proper operation.

6. Fill filter vessels and influent and effluent piping slowly and completely with water to minimize stress on system. Fill filter discharge tank and route water from tank to Pit 3 until the filters have been backwashed.

7. Check filters, pipelines, airlines, pumps, and valves for leaks.

8. Backwash one filter at a time using effluent water:

    a. Shut the clarifier overflow valve on the pipe to the filter being backwashed.

    b. Open influent and discharge valves to backwash pump.

    c. Start air scrubber.

    d. Start backwash pump by pressing activation button

    e. Use air lance at top of filter to mix/brake up any media clumps.

    f. Continue backwashing until backwash water has cleared up.

    g. Stop air scrubber.

    h. Approximately 5 minutes after stopping air scrubber, shut off backwash pump.

2.4.6.5 Normal Operation

Each filter should be backwashed every 24 hours when the plant is running. Backwash one filter at a time using effluent water:

A. Check that filter discharge tank is a minimum of one-half full.

B. Check that filter backwash tank is empty.

C. Shut the clarifier overflow valve on the pipe to the filter being backwashed.

D. Open influent and discharge valves to backwash pump.

E. Open valve to air scrubber.

F. Start air scrubber.

G. Start backwash pump by pressing activation button. Flow should be approximately 600 gpm.

H. Use air lance at top of filter to mix/brake up any media clumps.

I. Continue backwashing until backwash water has cleared up, typically between 30 and 45 minutes.

J. Stop air scrubber.

K. Approximately 5 minutes after stopping air scrubber, shut off backwash pump.

L. Start filter backwash surge tank transfer pump.

M. Stop filter backwash surge tank transfer pump when the tank is empty.

2.4.6.6 Alternate Operation

The sand filters may be bypassed and the overflow from the clarifiers sent back to Pit 3 upon startup or when the clarifier overflow tank water is out of specifications.

2.4.6.7 Emergency Operations and Failsafe Features

When the plant effluent pH is not within the range of 6 to 9, the effluent stream may be diverted back to Pit 3 until the pH is within discharge limits.

2.4.7 Clarifier Overflow pH Adjustment

Effluent from the clarifiers is adjusted to between pH 6 and 9 with direct injection of sulfuric acid into the clarifier overflow tank prior to entering the sand filters. In this tank, the pH of the water is adjusted to below pH 9 by reaction with sulfuric acid. The sulfuric acid is pumped from a 55 gallon plastic drum by a metering pump, which is manually controlled.

2.4.7.1 Control

Effluent from the clarifier overflow tank is adjusted for pH before being routed to the sand filters and filter discharge tank. The pH of the effluent is controlled at a target pH of 8.0 standard units via manual adjustment of the sulfuric acid metering pump.

2.4.7.2 Major Components

The major components of the final pH adjustment include:

- pH monitor and probe
- Acid metering pump
- Sulfuric acid drum – 55 gallon drum.

See Appendix C for more detailed information on pumps, equipment, piping, instrumentation, and power.

2.4.7.3 Laboratory or Onsite Testing Controls

The only laboratory testing controls required for the clarifier overflow pH adjustment is to verify the pH reading. This is done by taking a sample and comparing the inline pH measurement against the calibrated field pH meter.

2.4.7.4 Start-Up

A. Check for adequate acid level in barrel.

B. Be sure the pH meter is energized and calibrated.

C. Open acid line isolation valve.

D. Start the acid pump and adjust the speed manually until the pH is near the desired set point.

2.4.7.5 Normal Operation

Operating pH:	The normal pH set point should be between 8.0 and 8.5 and shall be less than 9.0 and greater than 6.0.
Feed Source:	66° Baume sulfuric acid in 55 gallon drum.
pH of Contents:	<0
Temperature:	33 to 60°F
Pump Settings:	Feed pump to be set at start up

2.4.7.6 Alternate Operation

There is no alternate operation for the acid system.

2.4.7.7 Emergency Operations and Failsafe Procedures

High and low pH alarms discussed in Section 2.7, Plant Effluent System, alert the operator if pH exceeds the discharge limits. Route discharge water to Pit 3 until the cause of the pH upset is determined.

2.4.8 Clarifier Overflow Anti-Scalant Addition

Effluent from the clarifiers has anti-scalant directly injected into the clarifier overflow tank prior to entering the sand filters. In this tank, the anti-scalant is added to prevent scaling of pipes, sand filters, and filter discharge tank. The anti-scalant is pumped from a 42 gallon plastic drum by a metering pump, which is manually controlled.

2.4.8.1 Control

Effluent from the clarifier overflow tank has anti-scalant added via manual adjustment of the anti-scalant metering pump.

2.4.8.2 Major Components

The major components of the final pH adjustment include:

- Anti-scalant metering pump
- Anti-scalant drum – 42 gallon drum.

See Appendix C for more detailed information on pumps, equipment, piping, instrumentation, and power.

2.4.8.3 Laboratory or Onsite Testing Controls

The only laboratory testing controls required for the clarifier overflow anti-scalant addition is to verify the proper addition rate. This is done by pumping the anti-scalant into a calibrated beaker and timing the volume.

2.4.8.4 Start-Up

A. Check for adequate anti-scalant level in barrel.

B. Open anti-scalant line isolation valve.

C. Start the anti-scalant pump and adjust the speed manually until the pumping rate is near the desired target.

2.4.8.5 Normal Operation

Operating Set point:	The normal anti-scalant set point should be at approximately 1.5 gallons per day pumping rate.
Pump Settings:	Feed pump to be set at start up

2.4.8.6 Alternate Operation

There is no alternate operation for the acid system.

2.4.8.7 Emergency Operations and Failsafe Procedures

There are no emergency operations associated with the anti-scalant operation.

2.5 Plant Effluent System

The effluent pipe from the filter discharge tank is equipped with a final effluent pH meter and flow meter.

Following final pH adjustment, the treated water is routed through the sand filters and into the clearwell before being discharged through the effluent pipe. Effluent that meets discharge limits is directed to the East Drainage.

2.5.1 Control

The pH meter has high (pH 9) and low (pH 6) alarms. The final pH is indicated locally and recorded in the control room.

2.5.2 Major Components

The major components of the plant effluent system include:

- Discharge
- Effluent pipe
- Final pH meter (1)
- Flow meter/totalizer (1)

See Appendix C for more detailed information on pumps, equipment, piping, instrumentation, and power.

2.5.3 Laboratory or Onsite Testing Controls

The WTP effluent is monitored for pH and flow. The only laboratory or onsite testing controls required for the clarifier overflow pH adjustment is to verify the pH reading. This is done by taking a sample and comparing the inline pH measurement against the calibrated field pH meter. The effluent shall be sampled and analyzed for parameters specified in Section 6.0.

LIST AND DESCRIPTION OF TESTS PERFORMED:

<u>pH of Effluent</u>

Purpose:	To verify proper operation of the inline pH probe.
Sampling Site:	Effluent sample station.
Expected Range of Results:	pH between 8.0 to 8.5 during normal operations.
Test Results:	A pH measured using the calibrated field pH meter which varies more than 0.3 pH units from the inline pH meter, indicates that the inline pH probe should be cleaned and calibrated. After calibration, verify calibration by checking the reading against two known standards.

<u>Total and Dissolved Metals</u>

Purpose:	To determine the adequacy of the treatment process in removing dissolved and suspended metals from the Pit 3 and Pit 4 feeds.
Sampling Site:	Effluent Sample Station
Method Reference:	Refer to Standard Methods for the Examination of Water and Wastewater, AWWA, for analyses methods and sampling protocol.
Test Results:	Results from AA or ICP analyses are acceptable to the EPA for performance standard compliance determination.

2.5.4 Start-Up

The following general check sequence is a one-time operation intended to ensure proper operations of all equipment. This procedure shall also be followed after extended periods of shutdown.

Check Sequence Prior to Plant Start-Up

1. Review operating manual, drawings, and maintenance manuals.
2. Clear all debris such as loose concrete, rags, scrap metal, wood, dirt, etc., from overflow tank, pipes and pumps.
3. Check oil level in pump.
4. Check all valves for proper operation.
5. Check tank, pipelines, pumps, and valves for leaks.

Start-Up Sequence

A. All equipment must be in working order.

B. Turn on the power to all the instrumentation. Clean and calibrate the pH probe.

C. Filter discharge tank should be one-half full of water.

D. Start discharge pump.

2.5.5 Normal Operation

Feed Source and Flow Rates:	Clarifier overflow tank effluent. Flow should be approximately 500 gallons per minute (gpm) and tank level should be maintained at approximately one-half full.
pH of Effluent:	8.0 to 8.5

2.5.6 Alternate Operation

The final effluent monitoring equipment may be taken out of service at any time without affecting the performance of the system. The pH may be monitored manually in the event that the pH meter fails.

The final effluent control valve is equipped with a divert valve so that the final effluent flow can be returned to Pit 3.

2.5.7 Emergency Operations and Failsafe Features

In the event the pH of the effluent water is out of specification, as determined by the final effluent pH monitor, an alarm will sound in the plant to alert the operator so that the flow may be diverted back to Pit 3. It is then the responsibility of the operator to rectify the pH problem.

2.6 Sludge Handling Facilities

The water treatment plant (WTP) produces a semi-solid sludge that is disposed offsite. The sludge is currently hauled to DMC's Ford millsite for disposal in a lined tailings pond (TDA-4) in accordance with the Residual Management Plan included in Appendix B. If the disposal location changes Appendix B will be updated to reflect the changed disposal option. This plan will also be updated to address any operational or physical WTP changes that are necessary for the final disposal option.

The WTP sludge handling facilities include the following:

- Sludge Dewatering
- Sludge Transport
- Final Disposal

2.6.1 Sludge Dewatering

Sludge from the clarifier #1 is fed to a steady head tank and pumped to the centrifuge(s) for dewatering and final removal from the system.

The liquid discharge (centrate) is pumped back to the neutralization surge tank, and the sludge discharge disposed as described in Section 2.8,Sludge Transport and Final Disposal.

Sludge dewatering follows primary solid liquid separation in the clarifiers. After the sludge is filtered and discharged from the centrifuges as a solid cake, it will be containerized and transported to the disposal area.

2.6.1.1 Control

Sludge is delivered to the centrifuges using Moyno progressive cavity pumps. The speed of the progressive cavity pumps are regulated by the speed of the centrifuge back drive. The centrifuges and progressive cavity pumps are manually started and stopped by the operator.

2.6.1.2 Major Components

The major components of the sludge dewatering system include:

- Two Centrifuges
- Centrifuge Feed Pumps (2)
- Discharge Conveyor (1)
- Centrate Surge Tank – Steel Tank (1)

See Appendix C for more detailed information on pumps, equipment, piping, instrumentation, and power.

2.6.1.3 Laboratory or Onsite Testing Controls

Paint Filter Liquids Test

Purpose	This test is used to determine the free water content in the plant sludge.
Sampling Site	Centrifuge sludge discharge conveyor #2.
Expected Range of Results	Results are not quantified with this test. The sludge material is placed on a paint filter and if any liquid passes through and drops from the filter within the 5 minute test period, the material is deemed to contain free liquids.
Method Reference	40 CFR 264.314
Consequences of Test Results	If the test confirms the presence of free liquids, the sludge will be further processed to remove residual water.

2.6.1.4 Start-Up

For more details of the centrifuge startup and operation, please refer to the Sharples operating manual. The Sharples operating manual is stored in the WTP control room. The following sequence shall be followed when starting the sludge dewatering system:

1. Inspect truck shed for obstructions around conveyor. Verify that sludge haul truck bed is down. Put truck power take off into neutral.
2. Back sludge haul truck under conveyor.
3. Check oil level in pumps.
4. Push start button for centrifuge.
5. Push start button for backdrive.
6. Push start button for conveyor.
7. After centrate surge tank has filled, start centrate pump.

2.6.1.5 Normal Operation

During normal operations, once the system is stable, the plant will run 24 hours per day and centrifuges will operate continuously for 15 hours daily. After shutdown of the centrifuges, rinse the centrifuges with water. After the sludge truck has been loaded, pull the truck out and hose down the truck bay. The daily sludge output is approximately 12 tons per day and is transported and disposed as described in the Residual Management Plan (Miller Geotechnical Consultants, 2009).

2.6.1.6 Alternate Operation

Sludge dewatering can be accomplished in one unit without adverse effects to the plant operation.

2.6.1.7 Emergency Operations and Failsafe Features

There are no emergency operations associated with the sludge dewatering system. Emergency stop cables run along the sludge conveyor. The centrifuges are equipped with vibration sensors that will shut off the centrifuges if excessive vibration is occurring.

2.7 Sludge Transport and Final Disposal

Currently the cake from the centrifuge discharges on to a conveyor which fills a truck. Once the centrifuge operation is complete for the day, the operator cleans up the area. After the floor and surrounding area is clean, the operator will sample the filtered sludge for free water. If there is no free water the truck is covered and the sludge is hauled to DMC's Ford millsite for disposal in a lined tailings pond (TDA-4) in accordance with the Residual Management Plan included in Appendix B. If the disposal location changes Appendix B will be updated to reflect the changed disposal option. This plan will also be updated to address any operational or physical WTP changes that are necessary for the final disposal option. The final Residuals Transportation Plan addresses transport of the sludge (Tetra Tech, 2009d).

3.0 TROUBLESHOOTING AND COMMON OPERATING PROBLEMS FOR WATER TREATMENT FACILITIES

The water collection system and treatment facilities most common operating problems are detailed in this section. Table 3-1 summarizes the potential operating issues and corresponding sections for the following systems:

- Water Collection and Conveyance System
- Raw Water System
- Neutralization and Precipitation System
- Lime Slurry System
- Flocculant Addition System
- Primary Solid Liquid Separation
- Clarifier Overflow pH Adjustment System
- Effluent Filtration System
- Plant Effluent System
- Sludge Dewatering System

Table 3-1. Troubleshooting Reference

System	Section	Description of Problem
Water Collection and Conveyance System – Section 3.1		
Outfall 001 – Section 3.1.1	3.1.1-1	Reduced or lack of flow
	3.1.1-2	Pumps will not start
	3.1.1-3	High power requirements, excess noise, intermittent feed, etc.
Outfall 002 – Section 3.1.2	3.1.2-1	Reduced or lack of flow
	3.1.2-2	Pumps will not start
	3.1.2-3	High power requirements, excess noise, intermittent feed, etc.
Outfall 003 – Section 3.1.3	3.1.3-1	Reduced or lack of flow
	3.1.3-2	Pumps will not start
	3.1.3-3	High power requirements, excess noise, intermittent feed, etc.
Outfall 004 – Section 3.1.4	3.1.4-1	Reduced or lack of flow
	3.1.4-2	Pumps will not start
	3.1.4-3	High power requirements, excess noise, intermittent feed, etc.
Pollution Control Pond – Section 3.1.5	3.1.5-1	Reduced or lack of flow
	3.1.5-2	Pumps will not start
	3.1.5-3	High power requirements, excess noise, intermittent feed, etc.
Raw Water System – Section 3.2		
Piping and Valves	3.2-1	Reduced or lack of flow
	3.2-2	Excessive delay (greater than 5 minutes) for flow to reach plant after starting pumps
Feed Pumps from Pit 3 and Pit 4	3.2-1	Feed pumps will not start
	3.2-2	High power requirements, excess noise, intermittent feed, etc.
Neutralization and Precipitation System – Section 3.3		
Neutralization Tank #1	3.3-1	Low or no barium chloride flow
	3.3-2	Low or no recycled sludge flow
	3.3-3	Low gravity flow to tank #2

Table 3-1. Troubleshooting Reference (continued)

System	Section	Description of Problem
Neutralization Tanks #2 and #3	3.3-4	Low pH in tank (less than 9.9 in tank #2 and 9.85 in tank #3)
	3.3-5	High pH in tank (Greater than 10.5)
	3.3-6	The pH indicated at the local station does not match the pH of the sample manually measured
	3.3-7	Excess foam in neutralization tanks
Neutralization Surge Tank	3.3-8	High level alarm sounds
Lime Slurry System – Section 3.4		
Lime Slurry System	3.4-1	Large clumps of unmixed lime are appearing in tank #2 or the lime slurry tank. These clumps may be clogging the lime slurry pump.
	3.4-2	Reduced rate of discharge at the lime slurry pumps. An inadequate amount of lime slurry is supplied to tank #2. The pH of the neutralization tank #2 and #3 may be below 9.8.
	3.4-3	The liquid in the lime slurry tank is mostly water. The pH of the neutralization tanks may be low.
	3.4-4	General troubleshooting
Flocculant Addition System – Section 3.5		
Flocculant Addition System	3.5-1	The liquid flocculant concentration which is transferred from the mix tank to the storage contains large clumps of wetted flocculant (or “fish-eyes”)
	3.5-2A	Lack of flocculant
	3.5-2B	Failure of flocculant transfer or feed pumps
	3.5-3	General troubleshooting
	3.1.10-2	General troubleshooting
Primary Solid Liquid Separation System – Section 3.6		
Clarifiers	3.6-1	The turbidity of the thickener effluent is too high. The effluent may appear red, brown, or gray
	3.6-2	The rake torque is too high
	3.6-3	The density of the clarifier underflow (recycled sludge) is too low
	3.6-4	The density of the clarifier underflow is too high
	3.6-5	The rake does not turn
	3.6-6	The liquid in the clarifier overflows the outer walls of the weir
	3.6-7	The sludge pumps will not start
	3.6-8	Reduced rate of discharge from the sludge pumps
	3.6-9	The sludge level is too high in a clarifier
	3.6-10	General troubleshooting
Clarifier Overflow pH Adjustment System – Section 3.7		
Clarifier Overflow pH Adjustment System	3.7-1	pH is too low (<6) or too high (>9)
	3.7-2	General troubleshooting
Effluent Filtration System – Section 3.8		
Effluent Filtration System	3.8-1	Abnormal or turbid effluent quality
	3.8-2	General Troubleshooting
Plant Effluent System – Section 3.9		
Plant Effluent System	3.9-1	pH is too low (<6) or too high (>9)
	3.9-2	Filter discharge tank is overflowing or no discharge to the East Drainage
Sludge Dewatering System – Section 3.10		
Sludge Dewatering System	3.10-1	Centrifuge does not start
	3.10-2	No solids or low solids produced
	3.10-3	General troubleshooting

3.1 Seep and Surface Water Collection System

3.1.1 Common Operating Problems for Outfall 001

1. **Description of Problem**: Reduced or lack of flow.

   Probable Causes and Control Techniques

   A. Check that discharge valve from pump is open.

   B. Piping has debris, scale, or ice causing plugging. Remedy: verify line pressure at pump discharge with a pressure gauge. A high discharge indicates that line blockage is possible and the blockage should be removed. Clean debris/scale/ice from inside of piping. If pieces of pump lining are found, the pump shall be repaired. A low discharge pressure indicates that a blockage is not a probable cause and the remaining causes and control techniques discussed in this section should be followed.

   C. Piping is leaking or ruptured. Remedy: repair leak or rupture.

   D. Damage to pump impeller or housing. Remedy: verify integrity of housing and impeller. Repair and replace as necessary.

   E. Submersible pump impellors not turning. Remedy: verify that motor starts. If motor starts, check splines on shaft between motor and impellors. If motor does not start, electricians should verify proper power input and motor operation.

   F. Centrifugal pump impeller out of adjustment. Remedy: Adjust impeller according to manufacturer's instructions.

2. **Description of Problem**: Pumps will not start.

   Probable Causes and Control Techniques

   A. Float switches have failed or moved from their set point. Remedy: check float switch activation point versus tank level and adjust height. If the float switch still does not operate correctly, the responder will manually operate the pumps until the float switch can be repaired or replaced by a qualified electrician.

   B. Circuit breaker for pump is tripped at pump station. Remedy: verify that no maintenance or repair work is in progress. Verify that the breaker is not locked in the OFF position. Change the breaker switch to the ON position. If breaker is in the ON position and the pump is not operating, electricians should verify proper power input and motor operation. Repair or replace motor and/or pump as necessary.

3. **Description of Problem**: High power requirements, excess noise, intermittent feed, etc.

   Probable Causes and Control Techniques

   A. Refer to manufacturer's manual for troubleshooting.

3.1.2 Common Operating Problems for Outfall 002

1. **Description of Problem:** Reduced or lack of flow.

   Probable Causes and Control Techniques

   A. Check that discharge valve from pump is open.

   B. Piping has debris, scale, or ice causing plugging. Remedy: verify line pressure at pump discharge with a pressure gauge. A high discharge indicates that line blockage is possible and the blockage should be removed. Clean debris/scale/ice from inside of piping. If pieces of pump lining are found, the pump shall be repaired. A low discharge pressure indicates that a blockage is not a probable cause and the remaining causes and control techniques discussed in this section should be followed.

   C. Piping is leaking or ruptured. Remedy: repair leak or rupture.

   D. Damage to pump impeller or housing. Remedy: verify integrity of housing and impeller. Repair and replace as necessary.

   E. Submersible pump impellors not turning. Remedy: verify that motor starts. If motor starts, check splines on shaft between motor and impellors. If motor does not start, electricians should verify proper power input and motor operation.

2. **Description of Problem:** Pumps will not start.

   Probable Causes and Control Techniques

   A. Float switches have failed or moved from their set point. Remedy: check float switch activation point versus tank level and adjust height. If the float switch still does not operate correctly, the responder will manually operate the pumps until the float switch can be repaired or replaced by a qualified electrician.

   B. Circuit breaker for pump is tripped at pump station. Remedy: verify that no maintenance or repair work is in progress. Verify that the breaker is not locked in the OFF position. Change the breaker switch to the ON position. If breaker is in the ON position and the pump is not operating, electricians should verify proper power input and motor operation. Repair or replace motor and/or pump as necessary.

3. **Description of Problem:** High power requirements, excess noise, intermittent feed, etc.

   Probable Causes and Control Techniques

   A. Refer to manufacturer's manual for troubleshooting.

3.1.3 Common Operating Problems for Outfall 003

1. **Description of Problem:** Reduced or lack of flow.

Probable Causes and Control Techniques

A. Check that discharge valve from pump is open.

B. Piping has debris, scale, or ice causing plugging. Remedy: verify line pressure at pump discharge with a pressure gauge. A high discharge indicates that line blockage is possible and the blockage should be removed. Clean debris/scale/ice from inside of piping. If pieces of pump lining are found, the pump shall be repaired. A low discharge pressure indicates that a blockage is not a probable cause and the remaining causes and control techniques discussed in this section should be followed.

C. Piping is leaking or ruptured. Remedy: repair leak or rupture.

D. Damage to pump impeller or housing. Remedy: verify integrity of housing and impeller. Repair and replace as necessary.

E. Submersible pump impellors not turning. Remedy: verify that motor starts. If motor starts, check splines on shaft between motor and impellors. If motor does not start, electricians should verify proper power input and motor operation.

2. **Description of Problem:** Pumps will not start.

Probable Causes and Control Techniques

A. Float switches have failed or moved from their set point. Remedy: check float switch activation point versus tank level and adjust height. If the float switch still does not operate correctly, the responder will manually operate the pumps until the float switch can be repaired or replaced by a qualified electrician.

B. Circuit breaker for pump is tripped at pump station. Remedy: verify that no maintenance or repair work is in progress. Verify that the breaker is not locked in the OFF position. Change the breaker switch to the ON position. If breaker is in the ON position and the pump is not operating, electricians should verify proper power input and motor operation. Repair or replace motor and/or pump as necessary.

3. **Description of Problem:** High power requirements, excess noise, intermittent feed, etc.

Probable Causes and Control Techniques

A. Refer to manufacturer's manual for troubleshooting.

3.1.4 Common Operating Problems for Outfall 004

1. **Description of Problem:** Reduced or lack of flow.

   Probable Causes and Control Techniques

   A. Check that discharge valve from pump is open.

   B. Piping has debris, scale, or ice causing plugging. Remedy: verify line pressure at pump discharge with a pressure gauge. A high discharge indicates that line blockage is possible and the blockage should be removed. Clean debris/scale/ice from inside of piping. If pieces of pump lining are found, the pump shall be repaired. A low discharge pressure indicates that a blockage is not a probable cause and the remaining causes and control techniques discussed in this section should be followed.

   C. Piping is leaking or ruptured. Remedy: repair leak or rupture.

   D. Damage to pump impeller or housing. Remedy: verify integrity of housing and impeller. Repair and replace as necessary.

   E. Submersible pump impellors not turning. Remedy: verify that motor starts. If motor starts, check splines on shaft between motor and impellors. If motor does not start, electricians should verify proper power input and motor operation.

2. **Description of Problem:** Pumps will not start.

   Probable Causes and Control Techniques

   A. Float switches have failed or moved from their set point. Remedy: check float switch activation point versus tank level and adjust height. If the float switch still does not operate correctly, the responder will manually operate the pumps until the float switch can be repaired or replaced by a qualified electrician.

   B. Circuit breaker for pump is tripped at pump station. Remedy: verify that no maintenance or repair work is in progress. Verify that the breaker is not locked in the OFF position. Change the breaker switch to the ON position. If breaker is in the ON position and the pump is not operating, electricians should verify proper power input and motor operation. Repair or replace motor and/or pump as necessary.

3. **Description of Problem:** High power requirements, excess noise, intermittent feed, etc.

   Probable Causes and Control Techniques

   A. Refer to manufacturer's manual for troubleshooting.

3.1.5 Common Operating Problems for the Pollution Control Pond

1. **Description of Problem**: Reduced or lack of flow.

   Probable Causes and Control Techniques

   A. Check that discharge valve from pump is open.

   B. Piping has debris, scale, or ice causing plugging. Remedy: verify line pressure at pump discharge with a pressure gauge. A high discharge indicates that line blockage is possible and the blockage should be removed. Clean debris/scale/ice from inside of piping. If pieces of pump lining are found, the pump shall be repaired. A low discharge pressure indicates that a blockage is not a probable cause and the remaining causes and control techniques discussed in this section should be followed.

   C. Piping is leaking or ruptured. Remedy: repair leak or rupture.

   D. Damage to pump impeller or housing. Remedy: verify integrity of housing and impeller. Repair and replace as necessary.

   E. Submersible pump impellors not turning. Remedy: verify that motor starts. If motor starts check splines on shaft between motor and impellors. If motor does not start, electricians should verify proper power input and motor operation.

   F. Centrifugal pump impeller out of adjustment. Remedy: Adjust impeller according to manufacturer's instructions.

2. **Description of Problem:** Pumps will not start.

   Probable Causes and Control Techniques

   A. Circuit breaker for pump is tripped at pump station. Remedy: verify that no maintenance or repair work is in progress. Verify that the breaker is not locked in the OFF position. Change the breaker switch to the ON position. If breaker is in the ON position and the pump is not operating, electricians should verify proper power input and motor operation. Repair or replace motor and/or pump as necessary.

3. **Description of Problem:** High power requirements, excess noise, intermittent feed, etc.

   Probable Causes and Control Techniques

   A. Refer to manufacturer's manual for troubleshooting.

3.2 Common Operating Problems for the Raw Water Supply System

Raw Water System Piping and Valves

1. **Description of Problem**: Reduced or lack of flow.

   Probable Causes and Control Techniques

   A. Piping has debris, scale, or ice causing plugging. Remedy: verify line pressure at pump discharge. A high discharge pressure indicates that line blockage is possible and the blockage should be removed. Clean debris/scale/ice from inside of piping. If pieces of pump lining are found, the pump shall be repaired. A low discharge pressure indicates that a blockage is not a probable cause and the remaining causes and control techniques discussed in this section should be followed.

   B. Piping is leaking or ruptured. Remedy: repair leak or rupture.

   C. Suction piping is out of water in pit. Remedy: move suction piping so it is submerged.

   D. Flow meter is reading incorrectly. Remedy: repair or replace flow meter.

   E. Mechanical or electrical failure of pumps. Refer to following sections.

   F. Flow control valve is partially closed. Remedy: manually open control valve to allow desired flow to pass.

   G. Set-point for flow control valve is set too low. Remedy: verify set-point value and change if necessary.

2. **Description of Problem**: Excessive delay (greater than 5 minutes) for flow to reach plant after starting pumps.

   Probable Causes and Control Techniques

   A. Piping check valves are leaking. Remedy: clean debris/scale from inside of valves or replace check valves.

Feed Pumps from Pit 3 and Pit 4

1. **Description of Problem**: Feed pumps will not start.

   Probable Causes and Control Techniques

   A. Fuel to Pit 4 pump motor is empty. Remedy: fill tank with fuel.

   B. Circuit breaker for Pit 3 pump is tripped at treatment plant. Remedy: verify that no maintenance or repair work is in progress. Verify that the breaker is not locked in the OFF position. Change the breaker switch to the ON position. Start the pump according to the startup procedure.

C. Pump or motor mechanical or electrical failure. Refer to manufacturer's manual for troubleshooting.

2. **Description of Problem**: High power requirements, excess noise, intermittent feed, etc.

Probable Causes and Control Techniques

A. Refer to manufacturer's manual for troubleshooting.

3.3 Common Operating Problems Neutralization and Precipitation

1. **Description of Problem**: Low or no barium chloride flow – Neutralization Tank #1.

Probable Causes and Control Techniques:

A. Verify the level of $BaCl_2$ solution in the $BaCl_2$ storage tank. Verify proper operation of the chemical metering pump.

2. **Description of Problem**: Low or no recycled sludge flow – Neutralization Tank #1.

Probable Causes and Control Techniques:

A. Suction lines to pumps, or discharge lines from pumps are plugged with sludge or debris. Remedy: clean out lines.

B. Clarifier Underflow Pump #2

1. Circuit breaker for pump is tripped at plant. Remedy: verify that no maintenance or repair work is in progress. Verify that the breaker is not locked in the OFF position. Change the breaker switch to the ON position. Start the pump according to start-up procedures.

2. Mechanical or electrical failure of the clarifier pump. Refer to manufacturer's manual for trouble shooting.

C. Clarifier Underflow Pump #1

1. Air line to pump is leaking. Remedy: fix airline leak.

2. Circuit breaker for air compressor for clarifier pump #1 tripped at plant. Remedy: Verify that no maintenance or repair work is in progress. Verify that the breaker is not locked in the OFF position. Change the breaker switch to the ON position. Start the air compressor according to start-up procedures.

3. Mechanical failure of the clarifier pump. Refer to manufacturer's manual for trouble shooting.

3. **Description of Problem**: Low gravity flow to tank #2 – Neutralization Tank #1.

   Probable Causes and Control Techniques:

   A. Blockage of the upcomer or overflow pipe has occurred due to solids buildup resulting in water overflow from neutralization tank #1. Remedy: remove the blockage and examine its character. Blockages due to solids buildup may indicate inadequate agitation or excessive sludge recycle. Verify the proper agitator operation and proper operation of the feed pumps from the clarifiers.

   B. Pit 3 flow problem. Remedy: verify flowrate from Pit 3 pump in not greater than 450 gpm.

4. **Description of Problem**: Low pH in tank (less than 9.9 in tank #2 and 9.85 in tank #3) - Neutralization Tanks #2 and #3

   Probable Causes and Control Techniques:

   A. pH meter is not reading correctly. Remedy: Visually inspect the probe for breakage. Clean probe and calibrate. After calibration, verify calibration by checking the reading against two known standards. Record the calibration slope and check that it is within manufacturer specifications.

   B. Lime slurry feed inadequate or has a low concentration of lime. Remedy: See Section 2.5.2 Lime Slurry System.

5. **Description of Problem**: High pH in tank (Greater than 10.5) - Neutralization Tanks #2 and #3

   Probable Causes and Control Techniques:

   A. pH meter is not reading correctly. Remedy: visually inspect the probe for breakage. Clean probe and calibrate. After calibration, verify calibration by checking the reading against two known standards.

   B. Lime slurry feed rate is too high. Remedy: reduce the feed rate of the lime pump by partially closing the valve feeding tank #2.

6. **Description of Problem**: The pH indicated at the local station does not match the pH of the sample manually measured - Neutralization Tanks #2 and #3

   Probable Causes and Control Techniques:

   A. pH meter is not reading correctly. Remedy: visually inspect the probe for breakage. Clean probe and calibrate. After calibration, verify calibration by checking the reading against two known standards.

7. **Description of Problem**: Excess foam in neutralization tanks - Neutralization Tanks #2 and #3.

   Probable Causes and Control Techniques:

   A. Some foaming is normal due to flocculant which is recirculated into the agitated tanks from the clarifiers. Excess foaming is not detrimental to the process, but it may indicate that flocculant is being wasted. Remedy: verify that flocculant dosage is correct for the feed flows which exist.

8. **Description of Problem**: High level alarm sounds – Neutralization Surge Tank.

   Probable Causes and Control Techniques:

   A. The inlet or outlet valves of the clarifier feed pump are closed or partially closed. Remedy: verify the valve position and open completely as necessary.

   B. Piping to or from the clarifier feed pump has scaling. Remedy: clean or replace piping.

   C. Failure of clarifier feed pump. Remedy: verify that the clarifier feed pump is in operation. If not, check breaker switch position and power switch position. If both are in the ON position and the pump is not operating, electricians should verify proper power input and pump operation. Repair pump as necessary.

3.4 Common Operating Problems for the Lime Slurry System

1. **Description of the Problem:** Large clumps of unmixed lime are appearing in tank #2 or the lime slurry tank. These clumps may be clogging the lime slurry pump.

   Probable Causes and Control Techniques

   A. This could be due to inadequate mixing in tank #2 or lime slurry tanks or to water leaks into the storage silo. Remedy: observe lime addition to the tanks. It is possible that large clumps may be prevented by purchasing lime from another supplier or by ensuring that there are no water leaks into the lime silo. Verify that the mixer is operating properly and consistently. If a mixer stops often due to overheating, blockages are likely to result. Check for proper power supply and electrical operation of the motor.

2. **Description of Problem:** Reduced rate of discharge at the lime slurry pumps. An inadequate amount of lime slurry is supplied to tank #2. The pH of the Neutralization tank #2 and tank #3 may be below 9.8.

   Probable Causes and Control Techniques

   A. Lack of lime slurry.

      1. The inlet valve of the slurry pump is closed or partially closed. Remedy: verify the valve position and open as necessary.

2. The discharge valve of the slurry pump is closed or partially closed. Remedy: verify valve position and open as necessary.

3. Verify the level of the lime slurry tank. Mix a new slurry batch if tank is empty or low. Verify that adequate lime and makeup water are entering the tank during mixing. Verify proper water addition if the tank is filled with dry lime or thick paste.

4. Suction line to pump, or discharge line from pump, is plugged with lime. Remedy: check to see if lime return line is flowing. Visually verify flow of lime slurry into tank #2. Lack of return flow and/or flow into tank #2 indicates a line blockage when the slurry pump is operational and slurry exists in the slurry tank. If return line is flowing and hand valves are open, then clean out line from tee on return line to tank #2. If return line is not flowing and hand valves are open, then disconnect return line at pump and verify that pump is pumping. If pump is working then clean out return line, if pump is not pumping, then clean out suction line.

5. Failure of lime slurry pump. Remedy: verify that the lime slurry pump is in operation. If not, check breaker switch position and power switch position. If both are in the ON position and the pump is not operating, electricians should verify proper power input and pump operation. Repair pump as necessary.

3. **Description of Problem:** The liquid in the lime slurry tank is mostly water. The pH of the neutralization tanks may be low.

Probable Causes and Control Techniques

A. Lack of hydrated lime in the silo. Remedy: verify silo level and refill if necessary.

B. Bridging in the lime silo. Bridging is a condition where hydrated lime clings to the sides of the silo and forms a bridge across the silo. A void will then exist over the screw feeder. This void prevents lime from being transferred into the lime slurry tank. Remedy: if possible, visually verify entry of hydrated lime into the lime slurry tank. Lack of entry indicates a possible bridging condition. Verify proper operation of the bin activator (vibrator). If the activator has cycled OFF, place in manual mode and initiate vibration until powdered lime is observed entering the slurry tank.

C. The silo screw feeder is jammed. Since the quality of hydrated lime will vary from truck to truck, it is possible that hard clumps or rocks will jam the screw, stopping lime transfer. Remedy: verify that the motor shaft and the screw drive shaft are both turning. If neither is turning, verify that the breaker switch is in the ON position and that there is no maintenance work in progress. Verify that the local switch is in the MANUAL ON position. Blockages can sometimes be removed by “bumping” the power to the screw feeder motor; that is, to turn the motor OFF then ON for a few seconds each. If the motor rotates slightly each time before binding again, it will be necessary to access the screw housing and remove the blockage. Proper electrical lock-out/tag-out procedures must be followed.

D. The silo screw shaft has uncoupled from the screw drive motor. Remedy: check to see if both the drive motor shaft and the screw shaft are turning. Verify integrity of the coupling, including tightness of set screws. Repair or tighten set screws as necessary.

E. Failure of the drive motor to the screw feeder. Remedy: verify that the breaker switch and power switch are both ON. Attempt to "bump" the power to the motor. If there is not a slight rotation of the motor shaft, an electrical failure is possible. Electricians should verify proper power input and motor operation. Replace motor if necessary.

4. **Description of the Problem:** General Troubleshooting.

Probable Causes and Control Techniques

A. See manufacturer's operation and maintenance manual for additional information.

3.5 Common Operating Problems for the Flocculant Addition System

1. **Description of Problem:** The liquid flocculant concentration which is transferred from the mix tank to the storage contains large clumps of wetted flocculant (or "fish-eyes").

Probable Causes and Control Techniques

A. The mixing time in the flocculant mixing tanks is too low. Remedy: increase the mixing time for the flocculant.

2. **Description of the Problem**

Probable Causes and Control Techniques

A. Lack of Flocculant. Remedy: verify the level in the flocculant tank. Verify that adequate process water is entering the tank during mixing.

B. Failure of the flocculant transfer or feed pumps. Remedy: verify that the pump is in operation. If not, check breaker switch position and power switch position. If both are in the ON position and the pump is not operating, electricians should verify proper power input and pump operation. Repair pump as necessary.

3. **Description of Problem:** General troubleshooting.

Probable Causes and Control Techniques

A. See manufacturer's operation and maintenance manual for additional details.

3.6 Common Operating Problems for the Primary Solid Liquid Separation System

Clarifiers

1. **Description of Problem:** The turbidity of the thickener effluent is too high. The effluent may appear red, brown, or gray.

   Probable Causes and Control Techniques:

   A. Flocculation is not adequate. There are several ways to improve flocculation:

      1. Verify that a flocculant dosage pump is running and there is adequate supply of flocculant solution in the storage tank. Verify that the flocculant feed system is working properly.

      2. Increase flocculant dosage. If higher dosages are required, it is possible that the agitation in the flocculation tank or mixing time in the flocculation make-up tank is not adequate.

      3. Change the addition point(s) of the mixed flocculant solution to the clarifiers. Detrimental effects may be seen with either too much retention time or too little. Generally, the operator should increase the retention time as a first trial by adding the flocculant flow into the treatment stream as far in front of the clarifiers as practical. The clarifiers will not respond quickly to any of these changes, so the operator should observe effects over a six to twelve hour period before proceeding with other changes.

      4. Increase the mixing time of the flocculant makeup tank to provide for a higher efficiency of the polymer chains.

      5. Decrease the makeup concentration in the flocculant mix tank. Generally, flocculant is most efficient in the 0.2% to 0.6% range, although efficient concentrations below 0.2% are also possible.

      6. Increase the flow rate of flocculant dilution water. The normal range of dilution is from 5 to 10 times the flow rate of undiluted flocculant concentrate.

      7. Use flocculant pumps that do not sheer the polymer chains such as progressive cavity pumps.

2. **Description of Problem:** The rake torque is high.

   Probable Causes and Control Techniques:

   A. The sludge in the clarifier is too dense. Remedy: pump some of the sludge to tank #1 or the sludge steady head tank until the solids content of the sludge is reduced. In unusual cases, the sludge may be so dense that the rakes will not push the sludge to the center or the sludge will plug off the suction side of the pump. In this case the clarifier may need to be drained and sludge washed out with high pressure water.

   B. There is too much sludge in the thickener, although the sludge may contain less than 30% solids. This may occur due to changes in influent water chemistry, incorrect pH readings which lead to excessive lime feed, or too long a duration between centrifuge runs. Remedy: check the pH meter and probe in neutralization tank #1 to verify that lime is not being overfed. The torque may be reduced by pumping some of the sludge to tank #1 or the steady head tank to reduce the total volume of sludge in the clarifier. If the high flow, high loading condition exists, the sludge recycle should be set at the maximum possible flow rate and the centrifuge shall be operated more frequently.

   C. The rake is dragging an object along the bottom in the clarifier. Remedy: this is somewhat difficult to verify; however, the object must be removed to prevent damage to the rake by cleaning out the clarifier.

3. **Description of Problem:** The density of the clarifier underflow (recycled sludge) is too low.

   Probable Causes and Control Techniques:

   A. There is not enough sludge recycle flow to tank #1 during normal operations. Remedy: adjust the sludge recycle rate.

   B. During the initial start-up of the plant or after the clarifier has been emptied of sludge, some time will be required before the sludge volume builds up and begins to increase in density. During these periods, the maximum amount of recycled sludge possible is likely to be less than during normal operations. All that is required is time for the sludge inventory to restore itself.

   C. The sludge in the clarifier is too dense. Remedy: pump some of the sludge to tank #1 or the sludge steady head tank until the solids content of the sludge is reduced. In unusual cases, the sludge may be so dense that the rakes will not push the sludge to the center or the sludge will plug off the suction side of the pump. In this case the clarifier may need to be drained and sludge washed out with high pressure water.

4. **Description of Problem:** The density of the clarifier underflow is too high.

   Probable Causes and Control Techniques:

   A. The procedure was not initiated to send sludge to tank #1 or the steady head tank. Remedy: begin pumping sludge to tank #1 or the steady head tank. During dewatering, the density of the recycled sludge will decrease as sludge is fed to the centrifuge. Also see the remedy for high rake torque discussed above.

5. **Description of Problem:** The rake does not turn.

   Probable Causes and Control Techniques:

   A. Hand switch for rake drive is off. Remedy: turn on hand switch.

   B. Torque limit switch is engaged or failed. Remedy: lift rakes to remove torque. Replace limit switch.

   C. Incorrect signals from the rake drive. Remedy: electricians should verify proper input and output signals from the drive motors.

   D. Failure of rake drive motor. Remedy: verify if the shear pin has been broken, if the motor has burned out, or if the motor has been shut down at the local station or the breaker switch. Check breaker switch position and power switch position. If both are in the ON position and the motor is not operating, electricians should verify proper power input and motor operation. Repair or reset the switches as necessary.

   E. Failure of gear reducer. Remedy: remove gear reducer and operate by hand to check for ease of movement. Replace if reducer is locked up.

   F. Failure of pinion shaft bearing. Remedy: remove gear reducer and check lower bearing.

   G. Refer to the manufacturer's manual for other troubleshooting.

6. **Description of Problem:** The liquid in the clarifier overflows the outer walls of the weir.

   Probable Causes and Control Techniques:

   A. Too much water is being fed to the clarifier. Remedy: reduce flow to the clarifier.

   B. There is an obstruction or scale buildup in the discharge pipe of the clarifier. Remedy: remove the blockage or scale.

7. **Description of Problem:** The sludge pumps will not start.

   Probable Causes and Control Techniques:

   A. Circuit breaker is thrown in the control room. Remedy: verify that no maintenance or repair work is in progress. Verify that the breaker is not locked in the OFF position. Change the breaker switch to the ON position. Start the pump according to the start-up procedures. If the pump still does not start, repair as necessary.

   B. Mechanical or electrical failure of the pump or motor. Remedy: electricians should verify proper operation of the drive motor. Mechanics should verify proper pump operation. Repair or replace as necessary.

8. **Description of Problem:** Reduced rate of discharge from the sludge pumps.

   Probable Causes and Control Techniques:

   A. Discharge valve partially closed. Remedy: open valve at pump.

   B. Pump inlet valve is partially closed. Remedy: open inlet valve at pump.

   C. The sludge in the clarifier is too dense. Remedy: pump some of the sludge to tank #1 or the sludge steady head tank until the solids content of the sludge is reduced. In unusual cases, the sludge may be so dense that the rakes will not push the sludge to the center or the sludge will plug off the suction side of the pump. In this case the clarifier may need to be drained and sludge washed out with high pressure water.

   D. Line blockage by trash or dense sludge. Remedy: verify line pressure at pump discharge at the local gauge. A high discharge pressure indicates that line blockage is possible and the blockage should be removed. A low discharge pressure indicates that a blockage is not a probable cause.

   E. Damage neutralization tank #1 feed pump impeller or housing. Remedy: verify integrity of housing and impeller. Repair and replace as necessary.

   F. Damage to clarifier #1 underflow pump. Remedy: verify integrity of pump housing, check balls, seats, diaphragm and o-rings. Repair and replace as necessary.

   G. Impeller out of adjustment. Remedy: Adjust impeller according to manufacturer's instructions.

9. **Description of Problem:** The sludge level is too high in a clarifier.

   Probable Causes and Control Techniques:

   See the remedy for high rake torque discussed above.

10. **Description of Problem:** General troubleshooting.

    Probable Causes and Control Techniques:

    A. See manufacturer's operation and maintenance manual for additional information.

3.7 Common Operating Problems for the Clarifier Overflow pH Adjustment System

1. **Description of Problem:** pH is too low (<6) or too high (>9).

   Probable Causes and Control Techniques

   A. pH is low:

      - The acid pump is pumping at too high a rate. Remedy: manually slow down the pump speed or stroke.

      - pH meter is not reading correctly. Remedy: visually inspect the probe for breakage. Clean probe and calibrate. After calibration, verify calibration by checking the reading against two known standards.

   B. pH is high:

      - The acid pump is pumping at a low a rate. Remedy: manually increase the pump speed or stroke. Check that pump has not lost suction.

      - Acid drum is empty or low. Remedy: replace acid drum with full drum.

      - Failure of acid metering pump. Remedy: verify that the acid pump is in operation. If not, check breaker switch position and power switch position. If both are in the ON position and the pump is not operating, electricians should verify proper power input and pump operation. Repair or replace pump as necessary.

      - Acid is pumping but not changing the pH of the water. Check acid lines for leaks or rupture. Check acid injector for plugging. Check that acid concentration is correct (i.e., 66 baume or 93%).

      - pH meter is not reading correctly. Remedy: visually inspect the probe for breakage. Clean probe and calibrate. After calibration, verify calibration by checking the reading against two known standards

2. **Description of Problem:** General troubleshooting.

   Probable Causes and Control Techniques:

   A. See manufacturer's operation and maintenance manual for additional information.

3.8 Common Operating Problems for the Clarifier Anti-Scalant System

1. **Description of Problem:** Anti-scalant is not pumping into the clarifier overflow tank or scale is occurring in the clarifier overflow tank, media filters, or filter discharge tank.

   Probable Causes and Control Techniques

   - The anti-scalant pump is pumping at a low a rate. Remedy: manually increase the pump speed or stroke. Check that pump has not lost suction.
   - Anti-scalant drum is empty or low. Remedy: replace anti-scalant drum with full drum.
   - Failure of anti-scalant metering pump. Remedy: verify that the anti-scalant pump is in operation. If not, check breaker switch position and power switch position. If both are in the ON position and the pump is not operating, electricians should verify proper power input and pump operation. Repair or replace pump as necessary.
   - Anti-scalant is pumping but not reaching the clarifier overflow tank. Check anti-scalant lines for leaks or rupture.

2. **Description of Problem:** General troubleshooting.

   Probable Causes and Control Techniques:

   A. See manufacturer's operation and maintenance manual for additional information.

3.9 Common Operating Problems for the Effluent Filtration System

1. **Description of Problem:** Abnormal or Turbid Effluent Quality

   Probable Causes and Control Techniques:
   The deep-bed sand filters are a relatively simple system with no internal moving parts, but difficulties can develop which adversely affect filtrate quality. Most filter problems result from the following operating errors:

   A. Interval between backwashing is too long. Remedy: backwash filter more frequently.

   B. Length of backwash is too short. Remedy: increase duration of air scour and backwash flow.

   C. Low or no backwash water flow. Remedy: check that filter discharge tank has sufficient volume for backwashing. Check that suction and discharge valves are

open to backwash pump. Check that backwash water valve to filter is open. Check that backwash pump is operating.

D. Air scour is not functioning or functioning at reduced rates

1. Backwash Air Boil. During a properly functioning backwash, the backwash air bubbles rising to the surface are evenly distributed over the entire surface area of the filter bed. Any significant variation from this pattern is not normal and must be investigated. Backwash air rising to the surface of the filter in large quantities in one or more isolated columns may be an indication that there is a break in the air distribution piping, that one or more of the holes in the air laterals are plugged, or that one or more of the air/water distribution blocks are broken or displaced. The remedy for this problem is to check the filter media and gravel for mudballs and/or encrustation and if the filter media is not the problem, remove the media and investigate the under drain.

2. No Backwash Air or Inadequate Backwash Air. If no air or inadequate air is being discharged into the filter during backwash, check for the following:

a. Backwash air compressor not operating properly.

b. Airline between compressor and filter leaking or broken.

c. Backwash air valve is not opening or compressor drain valve not closing.

d. Compressor block valve or filter air block valve is not open.

e. Compressor pressure relief valve is stuck open.
f. If the air supply to the filters is found to be functioning properly, the under drain system may need to be investigated.

E. Overloading the Filters. If design loadings are exceeded, long-term problems such as media encrustation, media plugging, mudball formation, and deterioration of filtrate quality can result.

Check to ensure that the maximum design loadings for flow and suspended solids and oil are not being exceeded.

F. Overdosing of Chemical Additives. If polymer, coagulants or other chemical additives are added ahead of the filters, addition rates must be controlled carefully. Overdosing can create long-term problems within the filter bed.

G. Air Binding Within the Media. The last 5 minutes of the backwash cycle consists of backwash water without any backwash air. This “rinse” phase is designed to remove residual air bubbles from the media, which otherwise creates an unnecessary head-loss. Air binding can be detected by manually bumping the backwash water pump at the conclusion of a backwash, and observing to see if there is a large release of air bubbles from the media. If air binding is a problem, consideration should be made to lengthening the rinse cycle or checking the backwash water rate during the rinse.

H. Mudball Formation. Mudballing is the accumulation of a mass of the impurities retained in the filter media into one or more large solid balls. This can occur from inadequate backwashing, overloading the filters, or overdosing of chemical additives. Once mudballs are allowed to form in a filter, it is very difficult if not impossible to backwash them out of the filter. If mudballs are allowed to grow in size and number, media replacement may become necessary.

I. Media Loss. There should be little loss from the filters during normal operation. The initial distance from the edge of the upper trough to the sand surface should be measured during start-up and recorded. If large quantities of sand are washed out during backwash, then the backwash air and water rates may be too high or the air-water backwash cycle may need to be modified.

2. **Description of Problem:** General troubleshooting.

Probable Causes and Control Techniques

A. For additional information on the backwash compressor and backwash pump, see manufacturer's operation and maintenance manual.

3.10 Common Operating Problems for the Plant Effluent System

1. **Description of Problem:** pH is too low (<6) or too high (>9).

Probable Causes and Control Techniques

A. pH meter is not reading correctly. Remedy: visually inspect the probe for breakage. Clean probe and calibrate. After calibration, verify calibration by checking the reading against two known standards.

B. The final effluent pH is controlled by the acid addition at the discharge of the clarifier overflow tank. Refer to Section 3.1.11 Clarifier Overflow pH Adjustment for trouble shooting.

2. **Description of Problem:** Filter Discharge Tank is Overflowing or No Discharge to the East Drainage

Probable Causes and Control Techniques

A. Intake or discharge valve is closed or partially closed. Remedy: open valves to allow desired flow to pass.

B. Piping has debris, scale, or ice causing discharge line plugging. Remedy: verify line pressure at pump discharge. A high discharge pressure indicates that line blockage is possible and the blockage should be removed. Clean debris/scale/ice from inside of piping. If pieces of pump lining are found, the pump shall be repaired. A low discharge pressure indicates that a blockage is not a probable cause.

C. Piping is leaking or ruptured. Remedy: repair leak or rupture.

D. Pump suction piping is plugged. Remedy: clean pump suction piping.

E. Flow meter is reading incorrectly. Remedy: repair or replace flow meter.

F. Failure of discharge pump. Remedy: verify that pump is in operation. If not, check that breaker is not tripped. If breaker is in the ON position and the pump is not operating, electricians should verify proper power input and pump operation. Repair or replace pump as necessary.

3.11 Common Operating Problems for the Sludge Dewatering System

1. **Description of Problem:** Centrifuge does not start.

   Probable Causes and Control Techniques:

   A. Failure of the drive motor to. Remedy: verify that the breaker switch and power switch are both ON. Electricians should verify proper power input and motor operation. Replace motor if necessary.

2. **Description of Problem:** No solids or low solids produced.

   Probable Causes and Control Techniques:

   A. Sludge steady head tank is empty. Remedy: open feed from clarifier #1 to sludge steady head tank.

   B. Flocculant feed to centrifuge is shut off, at the incorrect flow, or at the incorrect concentration. Remedy: check that flocculant is pumping to centrifuge, if flocculant is pumping refer to Section 3.1.9 for trouble shooting of the flocculant feed rate and concentration.

   C. Centrifuge feed pump motor has failed. Remedy: verify that the breaker switch and power switch are both ON. Electricians should verify proper power input and motor operation. Replace motor if necessary.

   D. Centrifuge feed pump stator or rotor has worn out. Remedy: check that pump is running and sludge flow is available to pump. If discharge from pump is low, replace stator and/or rotor.

3. **Description of Problem:** General troubleshooting

   Probable Causes and Control Techniques:

   A. See manufacturer's operation and maintenance manual for additional information.

4.0 ESTIMATE OF DURATION OF OPERATION AND MAINTENANCE ACTIVITIES

The current Midnite Mine Water Treatment Facility will be operated until a modified or new water treatment plant is constructed. Equipment will be maintained and replaced as needed until a new or modified treatment plant is operational.

5.0 PERSONNEL

The operation and maintenance of the Midnite Mine Water Treatment Facility must be performed with qualified personnel to prevent damage or deterioration of equipment and to provide effluent quality that meets discharge standards. The manpower and staffing requirements; personnel qualifications; certification program; and hiring problems, personnel disputes, and compliant resolution methods are described in this section.

5.1 Manpower Requirements/Staff

The treatment plant is designed for operation by one operator per 12-hour shift, four days per week with a helper on each shift four days per week. Routine maintenance will normally be performed on the day shift, four days per week, and emergency maintenance will performed as needed.

5.2 Qualifications

The scope of responsibility for both the operation personnel and management are outlined in Section 1.1.

The treatment plant is designed to be operated with minimal automation. Operators must be familiar with system operation. In general, the operators must follow standard operating procedures, keep daily operating records, and check all meters and recorders for proper operation. While there are no formal certification requirements for this facility, the operator or supervisor shall be knowledgeable on pumping, hydraulics, pumps, motors, water quality standards, good housekeeping and safety practices, wastewater treatment principles, settling characteristics of solids, sludge processing, sampling and basic chemical, physical, and biological tests.

Books useful for treatment plant operation are listed below:

1. Information Manual for Treatment Plant Operators
   Washington State Department of Ecology, 2004;
   Available online: http://www.ecy.wa.gov/pubs/0410020.pdf

2. Operation of Wastewater Treatment Plants
   Water Pollution Control Federation, 1970
   Available from: Water Pollution Control Federation
   Publications Department
   3900 Wisconsin Avenue, NW
   Washington, DC 20016

3. Sacramento Manual, Multiple Volumes
   Operation of Wastewater Treatment Plants, A Home Study Training Program
   Available from: Office of Water Programs
   Sacramento State
   Sacramento, CA

4. WPCF Wastewater Treatment Facilities, Management Skill Training Package, Volumes I and II
   Available from: Water Pollution Control Federation
   2626 Pennsylvania Avenue
   Washington, DC 20037

5. Methods for Chemical Analysis of Water and Wastes
   Available from: U.S. Environmental Protection Agency
   Office of Technology Transfer
   Cincinnati, OH 45268

6. Standard Methods for Examination of Water and Wastewater 16th Edition, 1985
   Available from: American Public Health Association
   1015 15th Street NW
   Washington, DC 20005

7. The Nalco Water Handbook
   Available from: McGraw-Hill Book Company
   P.O. Box 582
   Hightstown, NJ 08520-9959

8. Mathematics for Water and Wastewater Treatment Plant Operators, Volumes 1 and 2, by Joan Kirkpatrick
   Available from: Ann Arbor Science
   P.O. Box 1425
   Ann Arbor, MI 48106

9. American Water Works Association (AWWA) Volumes 1, 2, 3, and 4, and study guide
   Available from: American Water Works Association
   6666 West Quincy Avenue
   Denver, CO 80235

10. Hydraulics for Water and Wastewater Operators
    Available from: Ann Arbor Services
    P.O. Box 1425
    Ann Arbor, MI 48106

In general, the helper must perform routine operation and maintenance activities around the treatment facility. The helper must be knowledgeable about piping, pumps, and motors.

All personnel employed at the Midnite Mine Water Treatment Facility must have 40 hours of Hazardous Waste Training and must be updated annually with 16-hours of Hazardous Waste Training. Documentation will be kept at the facility indicating fulfillment of adequate training and yearly refresher courses.

5.3 Hiring Problems, Personnel Disputes, and Complaints

Problems related to hiring, personnel disputes, or complaints will be addressed by the plant supervisor.

6.0 WTP MONITORING AND STANDARDS

6.1 Purpose

The treatment system laboratory testing program provides the basis for process control and produces a record of how the treatment facilities are operating. This information keeps the operating personnel informed of plant efficiencies and helps in predicting problems that are developing in the system. Because laboratory test results are a record of plant performance, they are often evaluated by governing and/or regulatory bodies. For these reasons, it is essential that a treatment system's laboratory testing program produce complete and accurate results.

The Quality Assurance Project Plan defines the policies and procedures for analytical data collection and evaluation. The Standard Operating Procedures, which are incorporated as part of the QAPP, define procedures for sample collection. The Performance Monitoring Plan defines the proposed locations, methods, frequency of sampling, and reporting for surface water, groundwater, and sediment monitoring at the mine site. These documents should be used in conjunction with this plan to ensure that the monitoring data is properly collected and evaluated.

6.2 Sampling and Monitoring

The value of the results from the wastewater laboratory testing is dependent upon the sample being representative of the source from which it was taken. There are two types of samples taken for wastewater laboratory analyses. Their definitions follow:

24-hour Composite Sample – A combination of individual samples taken at selected time intervals, over a 24 hour period, to minimize the effect of the variability of the individual sample. Samples may be of equal volume or proportional to flow at time of sampling.

"Composite samples" shall be a flow proportioned mixture of not less than 8 discrete aliquots. Each aliquot shall be a grab sample of not less than 100 milliliters and shall be collected and stored in accordance with procedures prescribed in the most recent edition of Standard Methods for the Examination of Water and Wastewater.

Grab Sample – A single sample or measurement taken at a specific time or over as short a period of time as is feasible.

The water treatment facility sampling plan is outlined in Table 6-1, the parameters for the Effluent Self Monitoring Requirements are detailed in Table 6-2, and the interim limits for discharge to surface water as defined in Table 12-2 of the Record of Decision (ROD) are presented in Table 6-3. A detailed discussion of each internal laboratory test is provided in Sections 2 and 3. This discussion includes the purpose of each test, sampling site, expected range of results, test method reference, and consequences of test results.

Table 6-1. Onsite Monitoring and Testing Program

Task[1]	pH	Tank Measurement	Mixed	Flow	Amount
Neutralization Tank #1	D				
Neutralization Tanks #2 and #3	D				
Clarifier Overflow	D				
Sand Filter Feed	D				
Plant Feed				D	
Plant Discharge	D			D	
Barium Chloride System		D		D	
Anti-Scalant System				D	
Sulfuric Acid System				D	
Flocculant System			D	D	
Lime System			D	D	D

Legend: D – Daily – every two hours
1 – To be performed at the treatment facility

Dissolved Metals – means those metals which will pass through a 0.45 micron membrane filter. The specific method of sample treatment and analysis is defined in Section 4.1.1 of "Methods for Chemical Analysis of Water and Wastes", EPA-600/4-70-020, Revised March 1983. Environmental Monitoring and Support Laboratory, U.S. Environmental Protection Agency, Cincinnati, Ohio.

Total Recoverable Metals – means the concentration of metals in an unfiltered sample following treatment with hot dilute mineral acid as described in Section 4.1.4 of "Methods for Chemical Analysis of Water and Wastes", EPA-600/4-70-020, Revised March 1983. Environmental Monitoring and Support Laboratory, U.S. Environmental Protection Agency, Cincinnati, Ohio.

Total Metals – means the concentration of metals determined in an unfiltered sample following vigorous digestion as described in Section 4.1.3 of "Methods for Chemical Analysis of Water and Wastes", EPA-600/4-70-020, Revised March 1983. Environmental Monitoring and Support Laboratory, U.S. Environmental Protection Agency, Cincinnati, Ohio.

The treatment facility shall perform static-renewal testing of the final effluent once yearly, for acute and chronic toxicity.

The replacement static toxicity tests shall be conducted in general accordance with the procedures set out for 48 and 96 hour static-renewal test, method: EPA/600/4-90/027F. The facility shall conduct an acute 48-hour static replacement toxicity test using the species of Daphnid chosen for all toxicity testing from the following: *Ceriodaphnia dubia*, *Daphnia pulex*, or *Daphnia magna* and an acute 96-hour static replacement toxicity test using fathead minnows (*Pimephales promelas*). A dilution series consisting of a minimum of five concentrations and a control shall be used to estimate the concentration of lethal to 50% of the organisms (LC_{50}). The percent survival in the 100% effluent shall also be reported.

The facility shall conduct chronic toxicity testing using Water Flea (*Ceriodaphnia dubia*) and fathead minnows (*Pimephales promelas*) according to EPA Method EPA/600/4-89/001. The chronic toxicity testing shall be conducted on serial dilutions of effluent in order to determine the IC50 or EC50. This series of dilutions shall include 86 percent effluent and compare test results

to the control using hypothesis testing at the 0.05 level of significance as described in the EPA method.

Testing shall be conducted on 24-hour composite effluent samples. Samples taken for toxicity testing shall be cooled to 4° Celsius while being collected and shall be sent to the lab immediately upon completion. The lab shall begin toxicity testing as soon as possible, but no later than 36 hours after sampling was ended.

If the effluent stream potentially contains ammonia and/or chlorine, a sample to measure total ammonia and/or chlorine shall be sampled and tested for each toxicity testing event. All samples taken for toxicity testing shall have pH, total alkalinity, total hardness, dissolved oxygen, total dissolved solids and conductivity or salinity measured prior to test initiation.

All toxicity tests shall meet quality assurance criteria in the EPA manual listed above or in its update. If test results are determined invalid by EPA, testing shall be repeated with freshly collected effluent. If control performance does not meet protocol standards for acceptability, the test shall be repeated with freshly collected effluent.

Control water and dilution water shall be laboratory water meeting the requirements of the EPA manual listed above and of sufficient quality for good control performance.

The whole effluent toxicity test series shall be run on an unmodified sample of final effluent.

DMC may choose to conduct a full dilution series test during compliance monitoring in order to determine dose response. In this case, the series must have a minimum of five effluent concentrations and a control and include testing with 86 percent effluent (estimated effluent/receiving water mixing during critical low-flow conditions).

All whole effluent toxicity tests, effluent screening tests, and rapid screening tests that involve hypothesis testing and do not comply with the acute statistical power standard of 29 percent and the chronic statistical power standard of 39 percent as defined in WAC 173-205-020 must be repeated on a fresh sample with an increased number of replicates to increase the power.

Acids and bases shall not be added to samples or test solutions unless pH is outside of the range 6.0 to 9.0. Control of unionized ammonia toxicity due to pH rise shall only be accomplished by holding test chambers in a CO_2 atmosphere.

Table 6-2. Effluent Self-Monitoring Requirements

Effluent Parameters*	Frequency	Sample Type[a]
Total Flow, mgd	Continuous	Continuous
Total Suspended Solids, mg/L*	Monthly	24-hour Composite
Chemical Oxygen Demand, mg/L*	Quarterly	24-hour Composite
$Radium^{226}$ (dissolved), pCi/L*	Monthly	24-hour Composite
$Radium^{226}$ (total), pCi/L*	Monthly	24-hour Composite
Uranium[b*]	Monthly	24-hour Composite
Zinc (total), mg/L*	Monthly	24-hour Composite
Manganese (total), mg/L*	Monthly	24-hour Composite
Copper (total recoverable), mg/L*	Quarterly	24-hour Composite
Cadmium (total recoverable), mg/L*	Quarterly	24-hour Composite
Hardness (as $CaCO_3$), mg/L*	Quarterly	24-hour Composite

[a] See definitions
[b] U (uranium) is measured by the procedure discussed in 40 CFR 141.25(b)(2), or an equivalent method.
* Laboratory testing to be contracted.

Table 6-3. Interim Limits for Discharge to Surface Water*

Pollutant or Contaminant	Interim Daily Performance Standard
Uranium (total)	4,000 µg/L max. 2,000 µg/L avg.
Radium-226 (dissolved)	10pCi/L max. 3 pCi/L avg.
Radium-226 (total)	30 pCi/L max. 10 pCi/L avg.
Manganese (total)	10,000 µg/L max. 3,000 µg/L avg.
Copper (total)	184 µg/L max. 126 µg/L avg.
Cadmium (total)	15 µg/L max. 10 µg/L avg.
Zinc (total)	1,000 µg/L max. 500 µg/L avg.
pH	6-9
TSS	30 mg/L max. 20 mg/L avg.
COD	200 mg/L max. 100 mg/L avg.

* From Table 12-2, ROD

7.0 RECORDS AND REPORTING

7.1 Purpose

This section describes the records and reports that shall be maintained. An important factor in any efficient wastewater treatment system is the maintenance of accurate operational and financial records. Without a record of past operational performance, it is difficult to identify trends in any process. Operating cost records are essential if meaningful budgets are to be prepared. Accurate records permit plant operating personnel and management to maintain control of their facility. The principal types of records discussed in this section include:

- Daily Operating Log
- Laboratory Records
- Monthly Report to the US EPA
- Operating Costs and Record Keeping
- Personnel Records
- Emergency Conditions Record

Report submittal procedures and documentation, availability of information, and record retention are also discussed.

7.2 Daily Operating Log

The operation of the system shall be recorded and documented as an aid in maintaining and illustrating an efficient treatment plant operation. The Operating Log (attached as Appendix D) includes the critical data to be gathered daily. The following is a short description of the log entries:

Parameter	Description
Flow	Record the flow rates indicated on the flow meters which are located on the plant feed line from Pit 3 and Pit 4 and on the discharge line.
pH	Record the pH of the following: Neutralization Tanks #1, #2, #3, Clarifier Tank Overflow/Sand Filter Feed, and Plant Discharge.
Tank Level	Record the tank level for the barium chloride tank.
Chemical Addition	Record the feed rate for barium chloride, anti-scalant and acid (ml/min)
Flocculant System	Record the flocculant mixed (lbs/batch) and flow to Centrifuge #2.
Lime System	Record the dry lime transfer and lime slurry transfer.
Centrifuge	Record the back drive differential between centrifuge #1 and #2 and when centrifuges flushed.
Water	Record when samples were taken
Sludge	Record information related to loading, transportation and disposal.

The log shall be maintained in notebooks or 3-ring binders to prevent the destruction or alteration of these important records.

7.3 Water Collection System Monitoring Log

Daily monitoring of the pumping systems will be performed during the work week. These inspections shall be recorded in the inspector's daily logbook. An expanded weekly system

check of the components shall also be performed and recorded in the inspector's logbook and on the attached worksheet (Figure 7). Worksheets shall be bound in notebooks to prevent the destruction or alteration of these records.

Routine monitoring and activities at the PCP, Western Drainage Pump Station, Restroom Pumpback Station, East Seep Pump Station, Far East Seep Pump Station, and Blood Pool Pump Station will include, as applicable:

Daily:

1. Visual observation of the collection system.
2. Visual observation of collection system pipe transfer into holding tank.
3. Visual observation of the pumps.
4. Recording of Hobbs meter readouts.
5. Check of camera monitoring effectiveness.
6. General observation of radio settings and indicator lights.
7. General observation of emergency generators.
8. General observation of radio antennas and satellite systems.

Weekly:

1. All of the daily items.
2. Flow measurements shall be taken and recorded.
3. The alarm system will be cycled.
4. The modem will be reset.

7.4 Monthly Reports to the US EPA

7.4.1.1 Discharge Monitoring Reports

DMC shall submit monthly Discharge Monitoring Reports (DMRs) to the EPA containing the plant effluent total monthly flow in millions of gallons, range of pH measured throughout the month, and effluent concentrations for analytes listed in Table 6-2. These reports shall be prepared, postmarked, and submitted to the EPA by the tenth day of the following month.

7.4.1.2 Monthly Progress Reports

DMC shall submit monthly progress reports to the EPA and Spokane Tribe with respect to actions and activities undertaken pursuant to the AO and at a minimum shall include:

1. Describe the actions which have been taken to comply with the AO during the prior month.

2. Include all results of sampling and tests and all other data received by DMC and not previously submitted to EPA.

3. Describe work planned for the next sixty (60) days with schedules relating such work to the overall project schedule for RD/RA completion.

4. Describe problems encountered and anticipated problems, any actual or anticipated delays, and solutions developed and implemented to address any actual or anticipated problems or delays.

The progress reports shall be submitted within 15 business days following the conclusion of each month's work as detailed in the SOW.

7.5 Operating Costs

The major categories of operating costs are labor, utilities, chemicals, contract services and maintenance and supplies. A current operating cost breakdown for the treatment system is included in Section 8.0.

7.6 Personnel

Personnel records shall be maintained. A sample personal data sheet is shown on 8. It is important to update these files. All information will be treated confidentially and the file will be available for review by the employee. Questionnaires should be distributed periodically for updating this information.

7.7 Emergency Conditions Record and Reporting

7.7.1 Emergency Conditions Reporting

A record of emergency conditions affecting the treatment system shall be maintained. These emergency condition records might include bypass reports, spill reports and records of deteriorated effluent conditions.

7.7.2 Emergency Conditions Reporting

The procedures for non-compliance reporting are as follows:

7.7.2.1 Twenty-Four Hour Notice of Noncompliance Reporting

1. The following occurrences of noncompliance shall be reported by telephone within 24 hours from the time DMC becomes aware of the circumstances. Section 10.7, Emergency Response Contact Information, contains the contact information for EPA reporting.

    a. Any noncompliance which may endanger health or the environment.

    b. Any unanticipated bypass which exceeds performance standards. "Bypass" means the intentional diversion of waste streams from any portion of the treatment facility.

    c. Any upset which exceeds performance standards. "Upset" means an exceptional incident in which there is unintentional and temporary noncompliance with the performance standards because of factors beyond the reasonable control of DMC.

    d. Violation of a maximum daily performance standard for pollutants listed in Table 6-3 to be reported within 24 hours.

2. A written submission shall also be provided within five (5) days of the time that DMC becomes aware of the circumstances. The written submission shall contain:

    a. A description of the noncompliance and its cause.

    b. The period of noncompliance, including exact dates and times.

    c. The estimated time noncompliance is expected to continue if it has not been corrected.

    d. Steps taken or planned to reduce, eliminate, and prevent recurrence of the noncompliance.

7.7.2.2 Other Noncompliance Reporting

Instances of noncompliance not required to be reported within 24 hours shall be reported at the time that monthly reports are submitted. The reports shall contain the information listed in Section 7.7.2.1, part 2.

7.8 Submittal Procedures and Reporting

All documents required to be submitted pursuant to the AO shall be hand delivered or sent by overnight mail to the following persons or to such other persons as the parties hereafter may designate in writing:

1. Documents submitted to EPA Shall include one electronic copy and one hard copy sent to:

   Ellen Hale
   Remedial Project Manager
   U.S. Environmental Protection Agency
   Region 10 (ECL-113)
   1200 Sixth Avenue, Suite 900
   Seattle, Washington 98101

2. Documents submitted to the Spokane Tribe Shall include one electronic copy and one hard copy sent to:

   Spokane Tribe of Indians
   Natural Resources Department
   Attn: Randy Conolly, Superfund Coordinator
   PO Box 480
   Wellpinit, Washington 99040

   (For express mail):

   Spokane Tribe of Indians
   Natural Resources Department
   Attn: Randy Conolly, Superfund Coordinator
   6290-B Ford-Wellpinit Road
   Wellpinit, Washington 99040

In the event of a significant change in conditions or emergency circumstances relating to public health or welfare or the environment related to Work under this AO, DMC shall provide notification according to Section 7.7.

7.9 Documentation, Availability of Information, and Record Retention

7.9.1 Central File

The Dawn Mining Company shall establish a document control system with the following objectives:

1. Creation of a central file containing all documents pertaining to Work under the AO.
2. Organization of the documents to facilitate retrieval of information.
3. Segregation of documents containing information which DMC claims is privileged and confidential.
4. Establishment of procedures to ensure that all documents are routinely placed in the central file.

In addition, the Dawn Mining Company shall prepare and periodically update an inventory of all documents contained in the central file. The inventory shall contain for each document (1) the document date, (2) the author(s), (3) the recipient(s), and (4) the document title or subject. The DMC shall submit the document inventory or an update to EPA upon written request.

7.9.2 Document Management

The operator shall retain records of all monitoring information, including all calibration and maintenance records, corrective action reports, copies of reports, and data generated. Adequate records will be maintained to document the process by which project objectives are met. Records kept by the operator will be legible, identifiable, and retrievable and will be protected to the extent possible against loss, damage or deterioration. Access to project files will be restricted to project and other authorized personnel only.

The inventory of all required documents contained in the central filing system will be periodically updated. In addition, copies of non-privileged documents will be made available to the EPA and the State upon request. The inventory for each document will contain the following information:

- Document date
- Authors
- Recipients
- Document title or subject

7.9.3 Document Retention

The Dawn Mining Company shall provide to EPA upon request, copies of all non-privileged documents and information within their possession and/or control or that of their contractors or agents relating to activities at the Site or to the implementation of the AO including but not limited to; sampling, analysis, chain-of-custody records, manifests, trucking logs, receipts, reports, sample traffic routing, correspondence, and other documents or information related to the Work.

DMC shall preserve during the duration of the AO and for a minimum of ten (10) years after the remedial action has been completed, all records and documents in their possession or control,

including the documents in the possession or control of their contractors and agents on and after the Effective Date of the AO that relate in any manner to the Site. DMC shall also preserve and shall instruct their contractors and agents to preserve all documents, records and information of whatever kind, nature or description relating to the performance of the Work. At the end of this ten-year period, DMC shall notify the U.S. EPA at least ninety (90) days prior to the destruction of any such record, documents, or information and, upon request of the U.S. EPA, DMC shall deliver all such documents, records, and information to the EPA.

8.0 ANNUAL OPERATION AND MAINTENANCE COSTS

The annual operation and maintenance costs for the Midnite Mine Water Treatment Plant Facility are summarized in this section. The annual operation and maintenance costs include labor, utility, chemicals, supplies, training, service contracts, and insurance costs.

8.1 Annual Operation and Maintenance Costs

The estimated annual operation and maintenance costs are summarized in Table 8-1. Each of the costs are summarized below. The estimated annual operation and maintenance costs are $389,400.

Table 8-1. Estimated Annual Operation and Maintenance Costs

Operating Labor	Temporary Labor: 1 operator/shift, 2 daytime helpers	$206,000
	Salaried Personnel	$48,300
		$254,300
Utilities	Electricity & Propane	$21,000
	Fuel	$7,500
		$28,500
Chemicals	Treatment Plant Chemicals and Road Salt	$64,000
Supplies & Maintenance	Repair & Maintenance	$20,000
	Permit & Truck Licensing and Postage	$5,000
		$25,000
Contract Services	Compliance Analysis	$9,200
	Lease Equipment	$4,900
	Outside Contract Services	$3,500
		$17,600
	Total Estimated Yearly Operations Cost:	**$389,400**

8.1.1 Labor

The annual labor cost to operate and maintain the water treatment facility is estimated to be $254,300. This cost assumes: (1) one operator per shift, four days per week, and (2) one maintenance/truck driver on each shift, four days per week. The labor costs also include Dawn Mining salaried personnel related to plant operations and benefit costs for salaried employees.

8.1.2 Utilities

The annual utility cost to operate and maintain the water treatment facility is estimated to be $28,500. This includes the cost for electricity, propane, and fuel. No cost was included for the onsite cellular telephone.

8.1.3 Chemicals

The annual chemical cost for the operation of the water treatment facility is estimated to be $64,000. This includes the costs for hydrated lime, anti-scalant, flocculant, sulfuric acid, and road salt.

8.1.4 Supplies and Maintenance

The annual supply and maintenance cost for the operation and maintenance of the water treatment facility is estimated to be $25,000. The cost includes repair and maintenance at the plant, permit and license renewals for continued plant operation, and postage.

8.1.5 Contract Services

The annual contract services cost for the operation and maintenance of the water treatment facility is estimated to be $17,600. Service contracts will be handled on an as-needed basis. Contracted services include analytical costs for compliance monitoring at the plant and lease equipment for road maintenance, heavy equipment, etc.

8.2 Operating Entity

The existing water treatment plant shall continue to be managed and operated by the Dawn Mining Company.

9.0 MAINTENANCE

9.1 General

A quality maintenance program at a treatment facility is a necessity for producing a safe work environment and producing an effluent that meets performance standards. The supervisor at the plant is in charge of making sure that regular maintenance at the plant is performed. To ensure regular maintenance, specific equipment shall be inspected, repaired, etc., on fixed time intervals, as described below.

During operations, the centrifuges at the treatment plant shall be greased daily and the Pit 4 pump greased as needed and indicated on the pump sight-glass. All plant instrumentation shall be calibrated weekly. All other pumps at the plant are greased on a monthly basis and rebuilt, if necessary, during the operating season. During the winter months when the plant is shutdown, oil for all pumps will be changed, and pumps and other equipment will be inspected for wear and rebuilt, as necessary. All piping flanges are disconnected at the end of the operating season to allow for system draining.

The lime system auger will be cleaned out at the end of each operating season. At the end of the WTP operating system the slurry levels are lowered in the lime tanks and the tanks are inspected for buildup and damage. The lime system is left in recirculation mode during the winter to prevent scaling and precipitation of the tanks and piping.

Historically, the neutralization tank risers have been replaced every 4 years. The risers shall be visually checked yearly and replaced as needed. The risers are to be repaired or replaced if they have holes or leaks.

Historically, the sand filter media has been replaced every 5 years. The media shall be checked yearly and replaced as necessary. The protocol for media replacement consists of digging an inspection hole into the media and determining if the media is agglomerating.

For the remaining WTP, a formal replacement schedule does not exist and is not necessary. Tanks and piping shall be checked at the end of each operating season for corrosion and leaks and replaced/repaired while the WTP is shut down. Valves, pumps, and instrumentation shall be replaced or repaired as needed. Valves that do not operate properly, pumps that have unusual noise or show signs of excessive wear, and instrumentation that does not function, shall be repaired or replaced.

Manufacturer's maintenance manuals are generally the best guide for preventative maintenance instructions. These manuals are included in Appendix E, and the maintenance procedures shall be followed, as applicable.

In addition to this preventative maintenance, the supervisor shall work with plant maintenance personnel to continuously monitor the plant operations to determine other maintenance work to be performed.

9.2 Spare Parts

Enough spare parts are kept onsite for one complete pump rebuild for each type of pump, one rebuild for gearboxes and one new pH probe. When any of the spare parts are used, replacement parts shall be ordered as soon as time permits.

9.3 Maintenance Personnel

Only properly trained personnel may be expected to perform satisfactory inspections, repairs and preventative maintenance tasks. The plant supervisor will select proper personnel for the work to be performed. The personnel should be selected and trained before and during yearly plant start up. Even with a properly trained preventative maintenance staff, however, some tasks will be beyond their capabilities. In specialty areas, consultants or factory representatives may be called in to perform certain maintenance functions.

Trained personnel shall possess knowledge of the functions and operations of the mechanical equipment as well as the maintenance procedure for the service to be performed. The specific skills of a maintenance mechanic are required in the maintenance of mechanical and electromechanical machinery and equipment.

Only a qualified maintenance electrician shall maintain electrical or electronic operating control systems, equipment and fixtures, instrumentation, and heating and cooling systems. There is danger in electrical maintenance, particularly when high voltage is involved.

Personnel qualifications are discussed further in Section 5.0.

9.4 Housekeeping

Good housekeeping is necessary to promote a clean, safe workplace, and to establish a favorable public opinion. In summary:

1. A routine program and schedule for housekeeping shall be established. Personnel shall be oriented to the program and to a schedule of regular management inspections.

2. All places of employment, passageways, storerooms, and service rooms should be kept clean and orderly and in a sanitary condition.

3. The floor of every workroom will be maintained in a clean and, as when possible, a dry condition. Where wet processes are used, drainage should be maintained and false floors, platforms, mats, or other dry standing places should be provided.

4. Trash and loose debris and rubbish shall be picked up from floors, stairways, passageways, and platforms.

5. To facilitate cleaning, every floor, working place, and passageway shall be kept free of protruding nails, splinters, holes, and loose boards.

6. Walkways should be kept free of grease, sludge and oil.

7. Splash guards and drip pans shall be used whenever possible to keep oil and grease from machinery and pumps, off the floor. In cases where drip pans cannot be used, floor dry or other absorbent material shall be used.

8. Walkways should be shoveled and kept free of snow and ice. If this is not possible, they shall be salted and/or sanded.

9. Solvent-soaked and combustible wastes shall be disposed of in covered metal receptacles and removed daily from the plant.

10. Kick plates should be used on catwalks and raised platforms.

11. General housekeeping shall be scheduled on a periodic basis. This should include the floor drains and traps. Floor drains and traps are to be emptied when they are full. If the drains and traps are filled with plant process fluids (e.g., water, sludge, etc.) then these fluids can be metered back to the front of the plant. In the event that drain or trap fills with a waste (e.g., oil, solvent, etc.) then this material is to be pumped to a container that can be sealed and properly disposed, according to Federal and State regulations.

12. Process equipment shall be cleaned and painted as required.

13. Used oil shall be put in a container, sealed, and hauled to the Dawn Mining Company Mill Site and placed into the oil storage unit. Used absorbent materials shall be handled and disposed according to Federal and State regulations. Solidified lime can be added in small quantities to the WTP sludge, for disposal at TDA-4.

9.5 Special Tools and Equipment

A survey of in-house maintenance procedures to be performed indicates the tools that need to be kept onsite. Tools and equipment shall be maintained in good working order and stored in a tool area or located with appropriate equipment, when required.

The following is a list of tools that are typically used at the WTP and shall be kept onsite:

- Allen wrenches (SAE)
- Screw drivers (Slotted and Phillips)
- Hammer (Claw and Sledge)
- Combination wrenches (1/4” through 1 ¼”)
- Monkey wrench
- Pipe wrench
- Chisel set
- Hacksaw and blades
- Wire stripper/crimper
- Volt detector
- Pliers (Diagonal, Slip joint, Long nose)
- Socket sets (1/4”, 3/8”, 1/2”)(Ratchets, Extensions, Sockets ¼ through 1 ¼”)

9.6 Major Equipment Information

9.6.1 General

The equipment listed in Table 9-1 are classified as major pieces of equipment for the Midnite Mine Water Treatment Facility. The O&M manuals provided by the manufacturer should be

consulted for complete maintenance details. Where applicable, the manufacturer O&M manuals are provided in Appendix E except for manuals contained at the WTP and indicated by an * in Table 9-1.

Table 9-1. Major Equipment for the Midnite Mine Water Treatment Facility

Equipment		
Lime Silo	Filter Backwash Surge Tank	Lime Pump
Lime Slurry Tank	Sludge Steady Head Tank	Lime Delivery Pump
Lime Day Tank	Centrifuge #1*	Anti-Scalant Metering Pump*
Flocculant Mix Tank	Centrifuge #2*	Sulfuric Acid Metering Pump*
Flocculant Day Storage Tank	Centrate Surge Tank	Clarifier Feed Pump
Flocculant Delivery Pressure Tank	Discharge Conveyor	Flocculant Transfer Pump*
Barium Chloride Mix Tank	Lime Slurry Tank Agitator	Two Flocculant Chemical Feed Pumps
Barium Chloride Day Storage Tank	Lime Day Tank Agitator	Neutralization Tank #1 Feed Pump
Anti-Scalant Barrel	Flocculant Mix Tank Agitator	Clarifier Underflow Pump
Sulfuric Acid Barrel	Flocculant Day Storage Tank Agitator	Clarifier Overflow Pump
Neutralization Tank #1	Barium Chloride Tank Agitator	Filter Backwash Pump
Neutralization Tank #2	Barium Chloride Storage Tank Agitator	Filter Discharge Surge Pump
Neutralization Tank #3	Neutralization Tank #1 Agitator	Solution Discharge Pump
Neutralization Surge Tank	Neutralization Tank #2 Agitator	Centrifuge #1 Feed Pump
Clarifier #1	Neutralization Tank #3 Agitator	Centrifuge #2 Feed Pump
Clarifier #2	Pit 3 Feed Pump	Centrate Pump
Clarifier Overflow Tank	Pit 4 Feed Pump	High Pressure Air Compressor
Two Sand Filter Tanks	Barium Chloride Transfer Pump	
Filter Discharge Tank	Barium Chloride Chemical Metering Pump	
Instrumentation		
Pit 3 Feed Flowmeter	Neutralization Tank #3 Discharge pH Meter/Relay*	Filter Discharge Tank Level Switch*
Pit 4 Feed Flowmeter	Neutralization Surge Tank Level Switch*	Plant Discharge Flowmeter
Neutralization Tank #2 pH Indicator*	Filter Backwash Surge Tank Level Switch*	Plant Discharge pH Meter*

9.6.2 Spare Parts

The format for ordering spare parts will vary depending on the manufacturer. Below is a suggested format that will generally supply the information necessary for a successful supply part purchase.

1. Identify equipment using the contract number (or purchase order) as shown listed with invoice, warranty, etc.

2. Identify the part name and give the number of the drawing on which this part or assembly appears. If it is a part of a motor, pump, electrical control, or any part not manufactured by the company associated with major piece of equipment, the

information will be found in the manufacturer's reference data included in the manufacturer's equipment manual or on the manufacturer's nameplate.

3. Show the part number.

4. Show size, and include all pertinent dimensions (such as diameter, length, thickness, bore, pitch, etc.) whenever possible.

5. If parts being ordered are electrical in nature, give all pertinent data; voltage, amperage, wattage, cycle, speed, power factor, or other information given on a nameplate or brochure.

6. Submit your written purchase order or request for quotation, both signing and printing your full name so that the manufacturer will know whom to contact should further clarification of the order be necessary. ALL VERBAL ORDERS MUST BE VERIFIED IN WRITING.

7. Give return address and shipping address.

8. Give preferred method of shipping: parcel post, truck freight, rail freight, air express, etc.

9. Show quantity desired.

10. Give directions on where to send invoice.

11. Minimum order charges may be required.

9.7 Lubrication

Lubrication is a necessary maintenance task to ensure proper and long-lasting performance of equipment. The various parts in a plant require lubrication by different lubricants at different time frames. The various manufacturers of equipment used at the plant will specify different suppliers' lubricants even though the quality may be the same. The lubricants required at the plant shall be identified so that lubricants are purchased based on quality and need and that purchases of lubricant from the suppliers are not redundant. Specific lubrication requirements and frequencies for the major equipment used are listed in Table 9-2.

Table 9-2. Equipment Lubrication Requirements

Equipment	Grease			Oil		
	Type	Quantity	Frequency	Type	Quantity	Frequency
Lime Silo (Auger)	MP*	3 Pumps	Monthly	90 wt	1 qt	Annual
Clarifier #1	MP	6 Pumps	Annual	90 wt	1 ½ gal	Annual
Clarifier #2	MP	6 Pumps	Annual	90 wt	1 ½ gal	Annual
Centrifuge #1						
External Bearings	MP	6 Pumps	Daily			
Internal Bearings	MP	6 Pumps	Weekly			
Centrifuge #2	When Used					
External Bearings	MP	6 Pumps	Daily			
Internal Bearings	MP	6 Pumps	Weekly			
Discharge Conveyor	MP	3 Pumps – Multiple Locations	Monthly			
Lime Slurry Tank Agitator	When Used	6 Pumps	Monthly			
Lime Day Tank Agitator	When Used	6 Pumps	Monthly			
Flocculant Mix Tank Agitator	MP	6 Pumps	Monthly			
Flocculant Day Storage Tank Agitator	Not Used					
Barium Chloride Tank Agitator	MP	6 Pumps	Monthly			
Barium Chloride Storage Tank Agitator	MP	6 Pumps	Monthly			
Neutralization Tank #1 Agitator	MP	6 Pumps	Monthly			
Neutralization Tank #2 Agitator	MP	6 Pumps	Monthly			
Neutralization Tank #3 Agitator	MP	6 Pumps	Monthly			
Pit 3 Feed Pump	MP	6 Pumps (Motor)	Monthly	30 wt non-detergent	As Needed	Monthly
					1 ½ gal	Annual
Pit 4 Feed Pump	MP	3 Pumps	Monthly	15/40 wt	1 ½ gal	Weekly
Barium Chloride Transfer Pump	MP	3 Pumps	Monthly			
Barium Chloride Chemical Metering Pump	N/A					
Lime Pump	MP	3 Pumps	Monthly			
Lime Delivery Pump	MP	3 Pumps	Monthly			
Anti-scalant Metering Pump	N/A					
Sulfuric Acid Metering Pump	N/A					
Clarifier Feed Pump				30 wt non-detergent	1 ½ gal	Annual
Flocculant Transfer Pump	MP	3 Pumps	Monthly			
Two Flocculant Chemical Feed Pumps	MP	3 Pumps	Monthly			
Clarifier Underflow Pump	N/A					
Clarifier Overflow Pump				30 wt non-detergent	1 ½ gal	Annual
Filter Backwash Pump				30 wt non-detergent	1 ½ gal	Annual

Table 9-2. Equipment Lubrication Requirements (continued)

Equipment	Grease			Oil		
	Type	Quantity	Frequency	Type	Quantity	Frequency
Filter Discharge Surge Pump				30 wt non-detergent	1 ½ gal	Annual
Solution Discharge Pump				30 wt non-detergent	1 ½ gal	Annual
Centrifuge #1 Feed Pump	MP	6 Pumps	Monthly			
Centrifuge #2 Feed Pump	MP	6 Pumps	Monthly			
Centrate Pump	MP	3 Pumps	Monthly	30 wt non-detergent	1 ½ gal	Annual
High Pressure Air Compressor				Cascade Machine Services		Every 2 years
*MP=Multi-purpose Grease						

9.8 Contract Maintenance

Ideally, the Midnite Mine Water Treatment Facility maintenance staff should develop skills and qualifications to have the capability to perform all maintenance activities at the plant. However, if this is not possible, maintenance activities beyond the abilities of the plant maintenance staff shall be contracted to qualified manufacturer or trained personnel. Such help shall be minimized due to the higher cost of outside help.
The following is a list of jobs that may need to be contracted:

- Pumping and disposal of any harmful solutions collected in the building sump as a result of pipe breaks or tank failure.
- Laboratory analysis of the effluent to determine performance standard compliance.
- Janitorial service.
- General electrical repair.
- Major mechanical repairs to equipment.
- Road maintenance.

10.0 EMERGENCY OPERATING AND RESPONSE PROGRAM

The purpose of this section is to provide a response program for the operators in the case of an emergency situation during the operation of the Midnite Mine Water Treatment Plant (WTP). The response to any emergency requires the use of common sense to avoid causing any injury to personnel and avoid jeopardizing personal safety. The emergency response program is designed to minimize the adverse effects of an emergency situation, provide emergency response procedures, delegate responsibilities during an emergency situation, and provide a record of proper emergency equipment. A list of emergency response centers is found in Section 10.7. Figure 9 is a map showing directions to the WTP.

10.1 Vulnerability Analysis

The Midnite Mine Water Treatment Plant is vulnerable to a variety of emergency situations. The following emergency situations are covered in this section.

1. Power Failure
2. Flood
3. Fire
4. Wind Storms
5. Explosions
6. Equipment Breakdown and Process Failure
7. Spills
8. Personal Injury
9. Surge Events in Excess of Design Surge
10. Blizzards
11. Earthquakes

10.1.1.1 Power Failure

The Midnite Mine WTP relies on pumps to feed the plant and for processes within the plant. Power is provided to a transformer just inside the treatment plant property line by Avista Utilities. The remainder of the power system is maintained by Dawn Mining Company. There are three transformers located in the plant; 480V - 3 phase, 230V and 110V.

In the event of a power failure, the Pit 3 influent and effluent pumps will shut-down. The treatment plant effluent flow must be manually diverted back to Pit 3 prior to restarting the plant. The operator will contact his supervisor in the event the power is out in excess of 5 to 10 minutes. The supervisor will contact Avista to determine the cause and length of time the power will be out and request the facility be given a priority. If the power failure is due to a malfunction within the treatment building, the operator will contact his supervisor immediately. The electrical system will be inspected and the malfunction repaired immediately by a qualified electrician.

10.1.1.2 Flood

The Midnite Mine Pits may accommodate some flow during a large storm event. If a storm of significant magnitude has occurred, the influent and effluent conveyance system and equipment located outside the treatment plant building will be inspected for damage and repaired, as necessary, following the storm.

10.1.1.3 Fire

The immediate areas surrounding the Midnite Mine WTP are generally clear of combustible material. It is unlikely that a fire of significance will occur within the treatment plant as few combustibles are stored onsite. If a fire does occur, the operator will notify the local emergency responders IMMEDIATELY. When used on the reservation, 911 does not connect directly with emergency responders in Wellpinit, but goes to Stevens County. The local police department has stated it is best to call (509) 258-4400 in case of an emergency, including fire.

A small fire can be extinguished with the fire extinguisher located in the treatment plant building. If the fire is large, the operators will leave the building and remain clear until the fire is extinguished by the local fire department. The SOP for Fire Response Plan (MM-SOP16) includes information on responsibility, equipment, and protocol for fire fighting, evacuation and rescue. After the fire is extinguished, the extent of the damage will be assessed and repairs will be made, and all of the plant facilities will be inspected. The list of emergency numbers found in Section 10.7 will be displayed near the cell phone located in the WTP control room.

10.1.1.4 Wind Storms

The WTP is generally not vulnerable to damage during high wind conditions. If the building is damaged during a wind storm, repairs will be made following the storm.

10.1.1.5 Explosions

The water treatment facility is generally not vulnerable to explosions due to the nature of the processes used. If the building is damaged during an explosion, repairs will be made following the explosion.

10.1.1.6 Equipment Breakdowns and Process Failure

In the event of equipment breakdowns and process failure, the malfunctioning equipment will be repaired or replaced. Repair and replacement procedures are located in Section 9.0 and in the manufacturers O&M manuals.

10.1.1.7 Spills

Chemicals used in the treatment process include:

- Barium Chloride
- Sulfuric Acid
- Lime
- Flocculant
- Anti-Scalant

Spills from these materials shall be cleaned up promptly following the procedures presented in the Spill Prevention Control and Countermeasure Plan (SPCC), which is included as Appendix F. In the event that a dry powder spill results in air borne dust, the operators shall leave the spill area until the dust settles or the operators put on respirators. In the event of a sulfuric acid spill which results in fuming, the operators shall leave the spill area until the operators put on respirators or the fuming has stopped. The Material Safety Data Sheets (MSDS) for these materials are included in the SPCC.

10.1.1.8 Personal Injury

The operators shall be trained in first aid procedures. Hazards of the facilities and preventative measures are outlined in the Health and Safety Plan for the Phase I RD/RA: Interim Water Management for the Midnite Mine. This document shall be kept onsite at the WTP. In the event of an injury, the severity of the injury and/or situation will be evaluated by qualified personnel and appropriate action taken.

10.1.1.9 Overtopping of Pit 3

In the unlikely event that Pit 3 is overtopped due to excessive inflow or lack of plant capacity, the WTP may not have sufficient capacity to process all the water from the event. Should this happen, surge water may overtop Pit 3 and the operator shall notify the plant supervisor immediately. In turn, the supervisor will notify EPA and the Spokane Tribe. The phone numbers for these agencies are shown in Section 10.7. Following the event, the facilities and equipment outside the treatment building will be inspected for damage and repaired as necessary.

10.1.1.10 Blizzards

The site is located in an area that receives a large amount of snow during the winter months. Following snowfall, the site access roads will be plowed and snow will be removed from walkways as necessary for operation. In the event blizzard conditions occur during operations, the operating personnel will remain at the building. They will notify the plant supervisor of the conditions and wait for instructions from the supervisor.

10.1.1.11 Earthquake

The site is located in a region that may be subject to seismic activity (earthquakes). In the unlikely event of an earthquake, the operations personnel will shut down the equipment and leave the building. Following the event, the site will be thoroughly inspected for damage.

10.2 Methods to Reduce Vulnerability

The system has been designed to minimize vulnerability. Explosives and flammables shall not be stored in the building. Equipment shall be maintained on a routine basis to minimize equipment breakdown failure. Operators shall perform work in accordance with other sections of this manual and the Health and Safety Plan for the Phase I RD/RA: Interim Water Management for the Midnite Mine.

10.3 Emergency Equipment Inventory

- The list of emergency numbers found in Section 10.7 will be displayed near the cell phone in the control room of the WTP.
- Fire extinguishers are located at every exit and at the #2 conveyor.

- One foot actuated emergency eyewash is located on the landing to the clarifiers, one near the acid barrels in the truck shed, one hanging eyewash at the lime system, and one hanging eyewash in the belt room across from the shower.
- The cellular telephone is located in the control room near the exit door.
- A first-aid kit is located in the plant near the doorway by the control room.

10.4 Preserving Treatment System Records

A detailed discussion of records documentation and record preservation is detailed in Section 7.0.

10.5 Industrial Waste Inventory/Monitoring System

The sludge disposal from the WTP will be handled as discussed in the Residual Management Plan included as Appendix B of this document. Sludge shipments will be tallied on a daily basis. Shipping manifests for used oil and other industrial wastes, that require special disposal, will be maintained at the Dawn Mining Company Mill Site office.

10.6 Coordinating Instructions for Local Police and Fire Department

The treatment system's Emergency Operating and Response Program should be coordinated with the local police and fire departments.

Arrangements should be made to have the local police contact the treatment facility about any emergencies outside the treatment facility which may affect operations.

Arrangements shall be made with the local fire department, or other qualified entity, to routinely check firefighting equipment within the facility and inspect the facility for potential fire hazards.

10.7 Emergency Response Contact Information

The emergency personnel, procedures, and contacts for a spill incident were discussed in Section 4.0 of the Contingency Plan (Tetra Tech, 2009c). Emergency contacts are listed below for ease of reference. When used on the reservation, 911 does not connect directly with emergency responders in Wellpinit, but goes to Stevens County. The local police department has stated it is best to call directly to 258-4400 in case of an emergency, including fire.

General Emergency Numbers:

Local Law Enforcement (Stevens County Sheriff)	509-684-5296
Spokane Tribal Police Department and Ambulance	509-258-4400

Hospital:

Sacred Heart Medical Center:	509-455-3131
Washington Poison Control Center:	800-222-1222

Corporate Resources:

WTP Project Manager

	(office)	509-258-4511
Bob Nelson	(cell)	(b) (6)
	(home)	(b) (6)
	(pager)	509-889-6687

WTP Site Supervisor

	(office)	509-258-4511
Don Plummer	(pager)	509-889-6688
	(home)	(b) (6)

Site Operations Manager

	(office)	509-258-4511
Bobby Nelson	(Home)	(b) (6)
	(pager)	509-889-6686

EPA
Remedial Project Manager
Ellie Hale
EPA, Region 10 (ECL-113)
1200 Sixth Avenue, Suite 900
Seattle, Washington 98101
206-553-1215

EPA Emergency Response Unit, Region 10
206-553-1263

Other Resources:

National Response Center	800-424-8802
RCRA, Superfund & EPCRA Hotline	800-424-9346
U.S. EPA Environmental Response Team	732-321-6660

11.0 SITE SAFETY

A complete discussion of health and safety for the WTP is included in the ***Health and Safety Plan for the Phase I RD/RA: Interim Water Management for the Midnite Mine***. This document shall be kept onsite at the WTP with this OM&M Manual.

12.0 UTILITIES

The purpose of the utilities systems at the Midnite Mine WTP is to provide service to the various motors, instruments and components and to provide communication service. The WTP utilities include:

1. Electrical Service
2. Cellular Telephone Service
3. Propane
4. Portable Toilet Service

12.1 Electricity

High voltage is transmitted to the property boundary by Avista Utilities. The power is stepped down to 480V in order to use it at the site. Inspection and maintenance of the high voltage lines and transformer are carried out by the utility company. Any problems shall be reported to Avista at (800) 227-9187. The power available at the plant includes 480V-3 phase, 230V and 110V.

There is no standby power available at the WTP.

12.2 Telephone

Cellular telephone service is supplied to the site by Verizon Wireless. The cell phone is the only means of communication from the WTP. If a problem occurs with the cell phone service, contact Verizon at (800) 922-0204.

12.3 Propane

The propane tanks onsite at the WTP are serviced by Banner Furnace & Fuel located in Spokane. Any problems with the propane service shall be reported to Banner at (800) 570-2897.

12.4 Portable Toilet Service

Portable toilet service at the WTP is provided by American Onsite located in Spokane. Any problems with the toilet service shall be reported to American Onsite at (509) 244-8404.

13.0 REFERENCES

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Tetra Tech, Inc., 2009c. *Contingency Plan for the Midnite Mine Water Treatment Plant for the Phase I RD/RA Interim Water Management for the Midnite Mine.* Appendix A: Spill Prevention, Control and Countermeasures (SPCC) Plan. Revision 1.0. Prepared for Dawn Mining Company and Newmont USA Limited. May 5.

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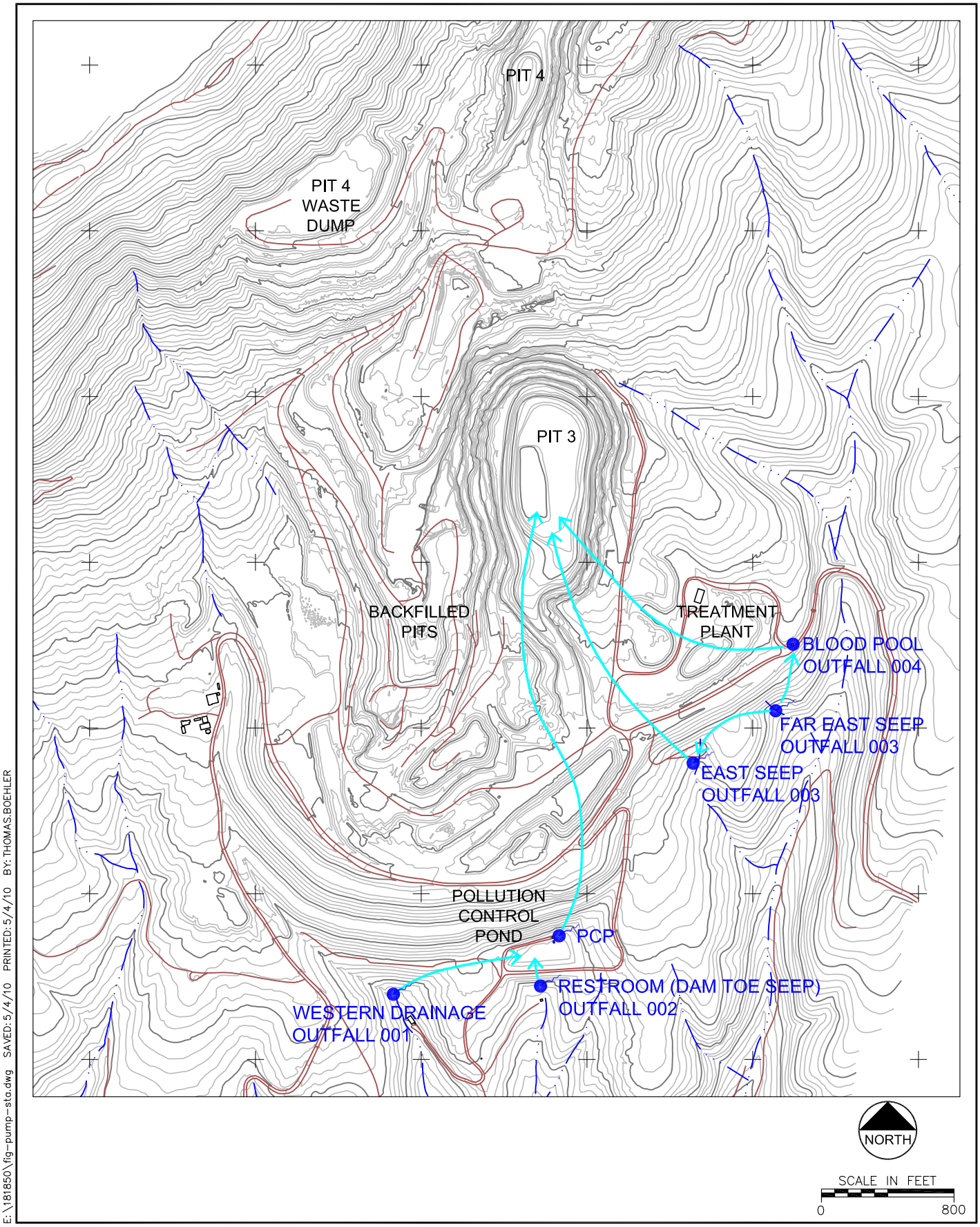
U.S. Environmental Protection Agency (EPA), 2008b. Statement of Work for Phase I RD/RA: Interim Water Management for the Midnite Mine Superfund Site, Spokane Indian Reservation, Washington. November 7.

FIGURES



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May 2010

Figure 1
Water Collection Pump Stations

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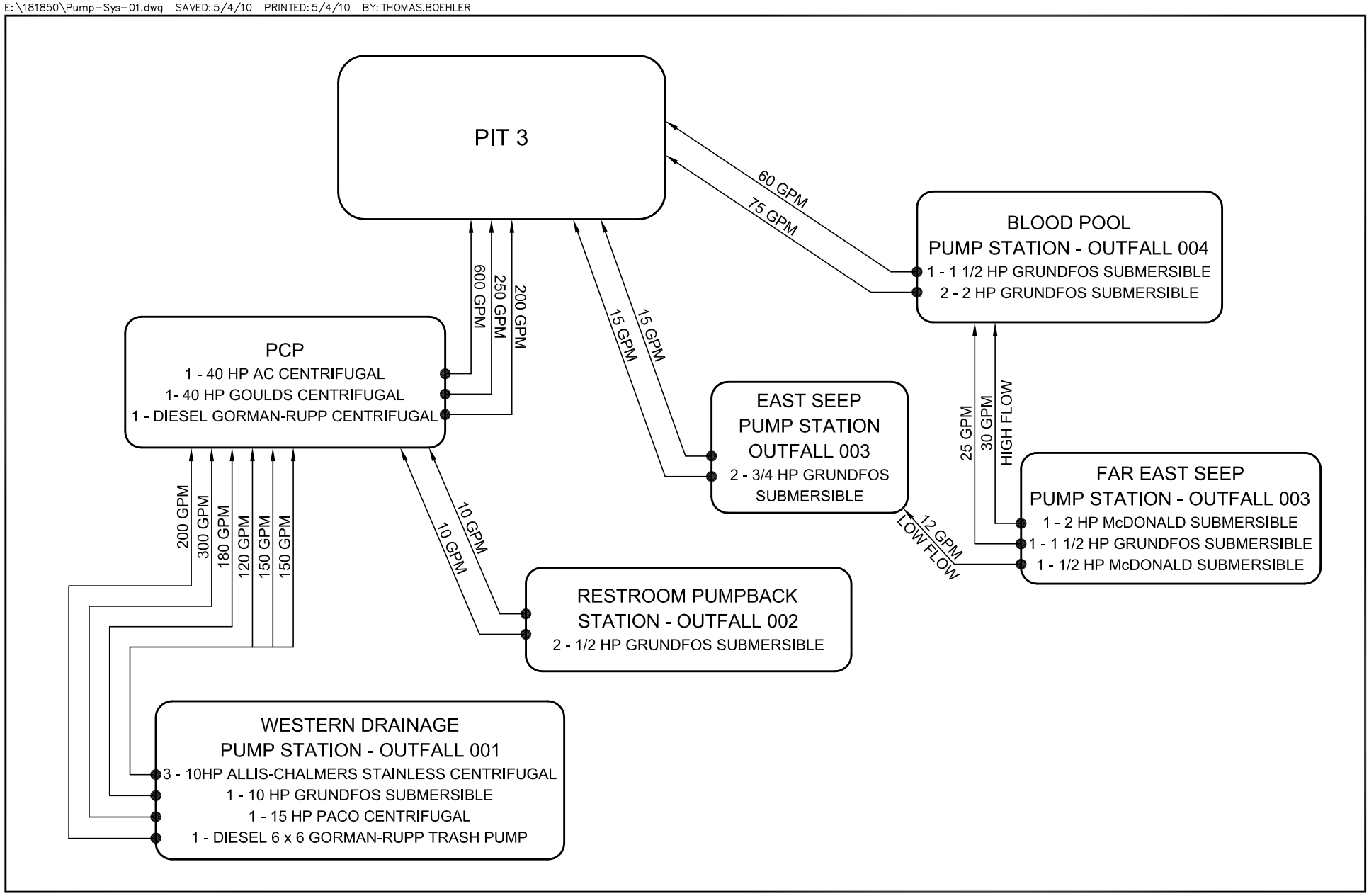


Project No. 181850

May 2010

Figure 2
Dawn Mining Company
Water Management Pumping System Schematic

AAH	Analysis Alarm High
AAL	Analysis Alarm Low
AR	Analysis Recorder
AI	Analysis indicator
FAL	Flow Alarm Low
FC	Flow Controller
FI	Flow Indicator
H_aSO_4	Sulfuric Acid
HCV	Hand Control Valve
HDPE	High-Density Polyethylene
LAH	Level Alarm High
LS	Level Switch
O/F	Over Flow
PI	Pressure Indicator
PVC	Polyvinyl Chloride
SS	Stainless Steel
VAR/SPD	Variable Speed

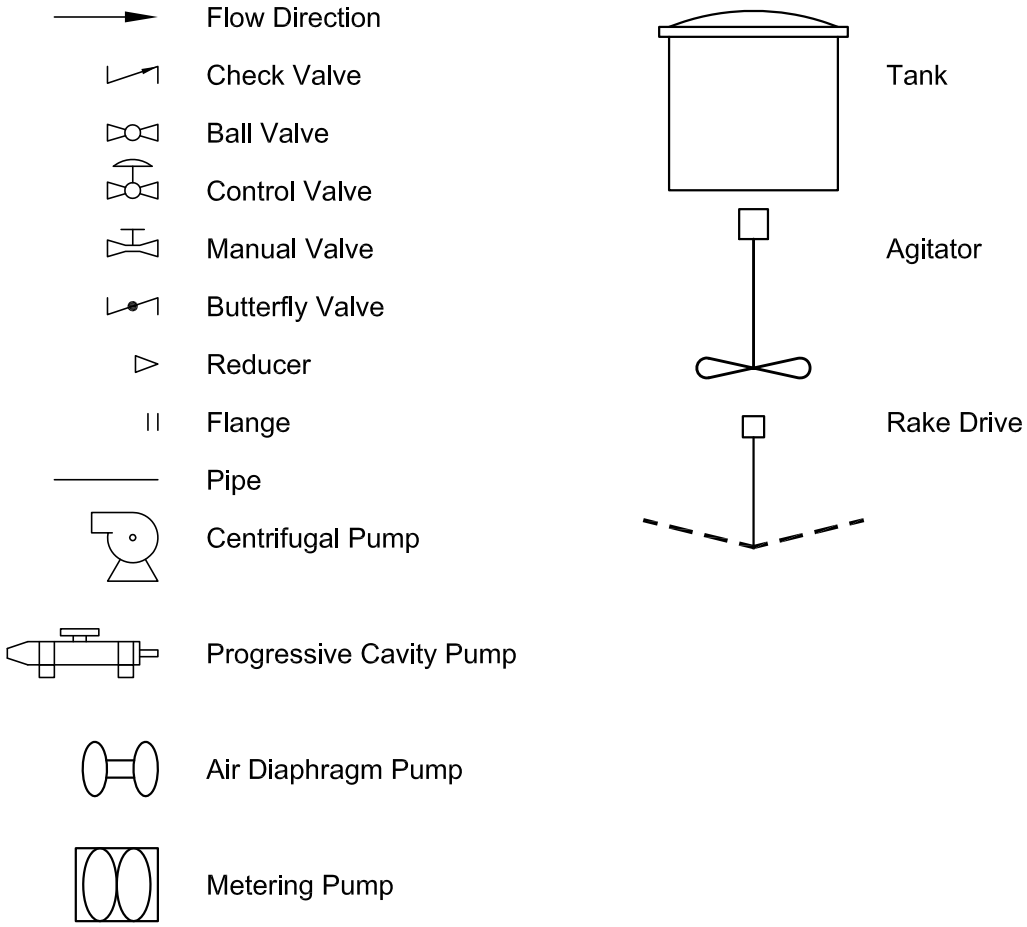
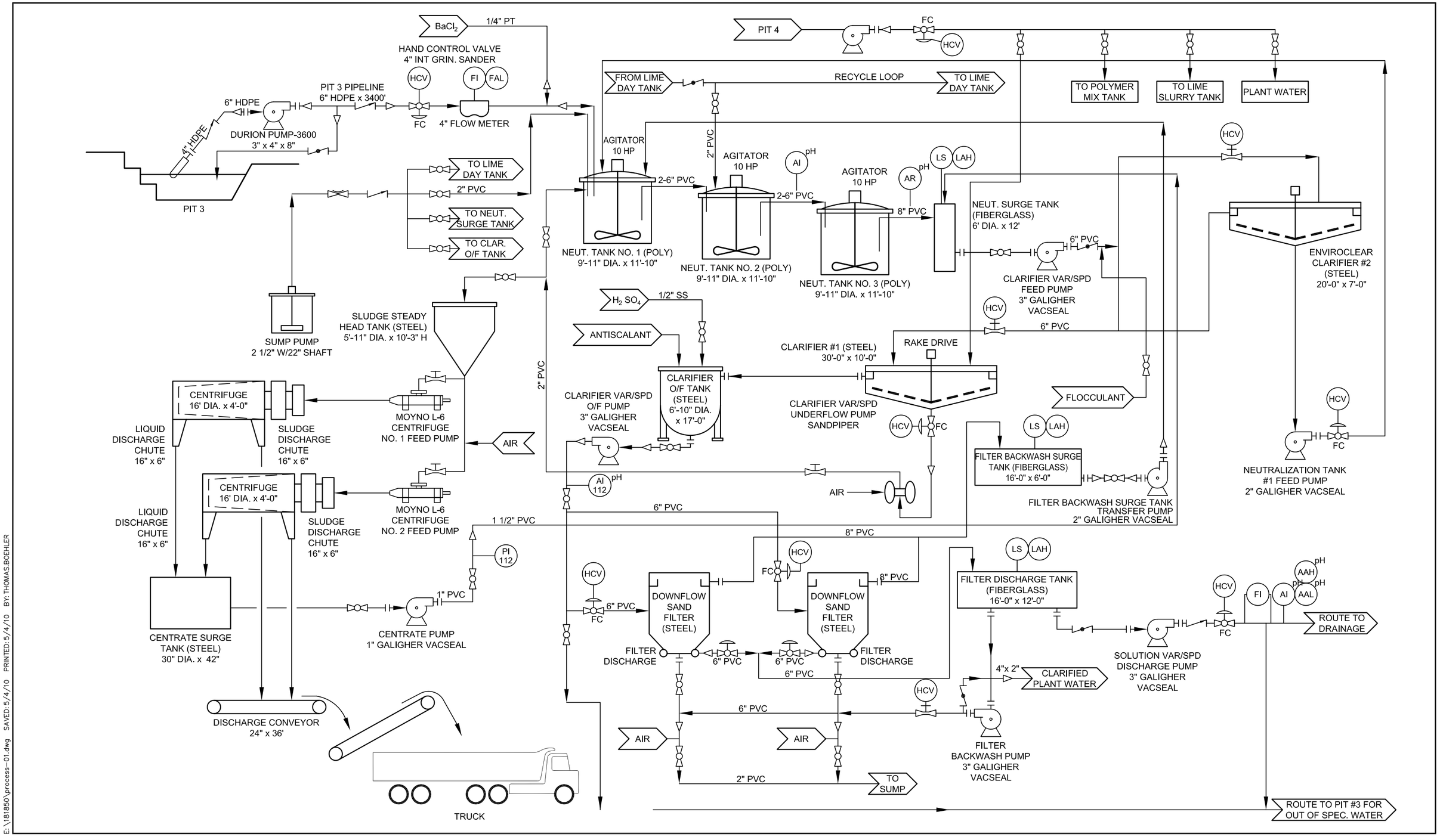


Figure 3
Conceptual Process Flow Diagram Legend



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Project No. 181850

May 2010

Figure 4
Conceptual Process Flow Diagram

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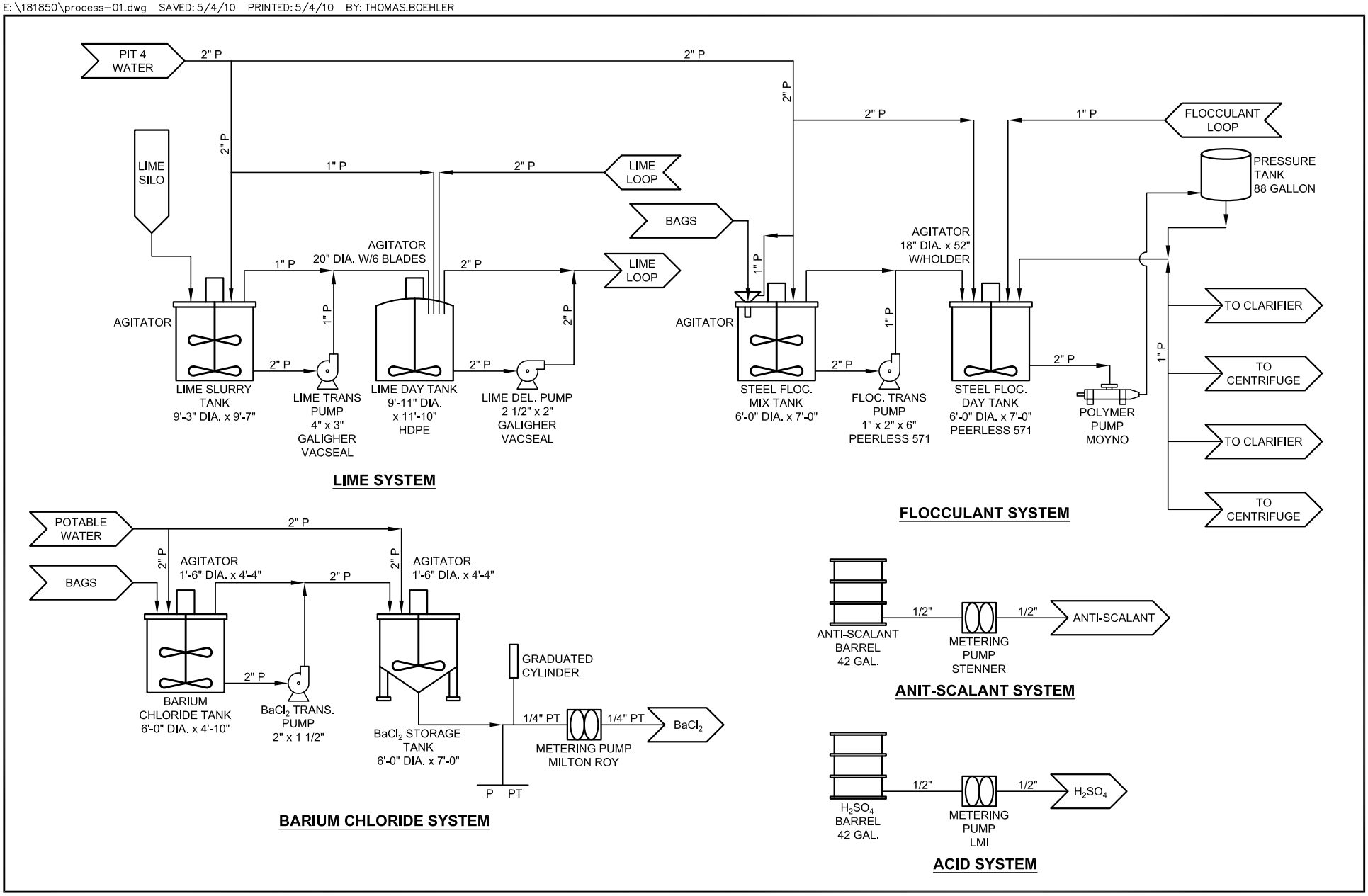
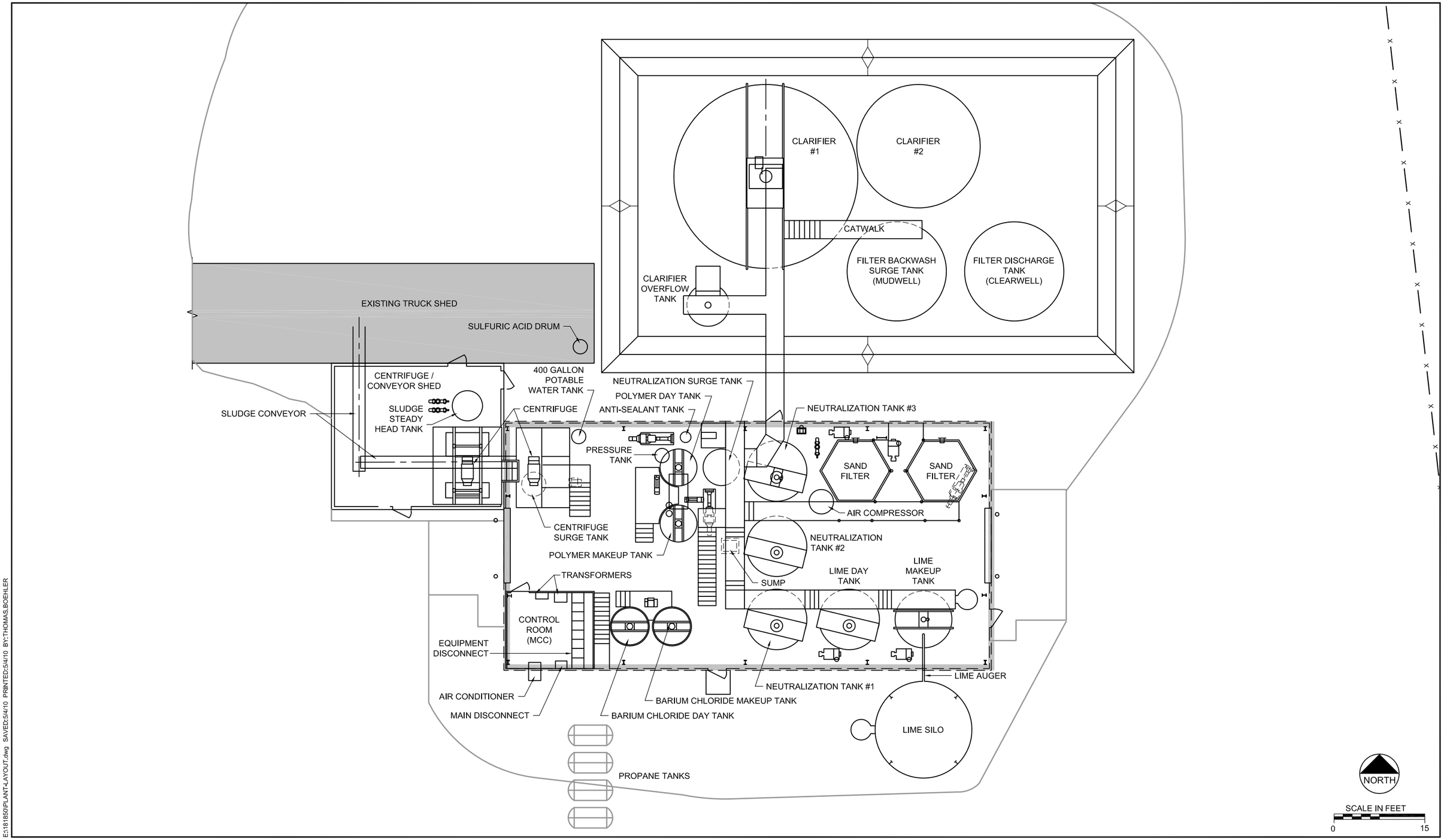


Project No. 181850

May 2010

Figure 5
Conceptual Process Flow Diagram



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May 2010

Figure 6
Dawn Mining Company
Plant Layout

Figure 7
Western Drainage Check Sheet

Date	Time	Temp F	WD Flow	WDJ Flow	Total Flow	Pump Hours			Initials
		indoor/outdoor				Green	Yellow	Red	

Figure 8. Personal Data Sheet

Name:_____

Present Address:_____

_____

Home Phone No.:_____

Social Security No._____ Sex: Male Female

Birthdate:_____ (month/day/year)

Marital Status: Single Engaged Married Separated Divorced

Dependents: (List first name, middle initial, and last name if different than yours)

Spouse:_____ Birthday:_____

Children:_____ Birthday:_____

_____ _____

_____ _____

In the event of an emergency, the company should notify:

Name:_____

Address:_____

_____

Telephone No. (Day):_____ (Evening)_____

Relationship:_____

Years of Relevant Work Experience:_____

Relevant Training:_____

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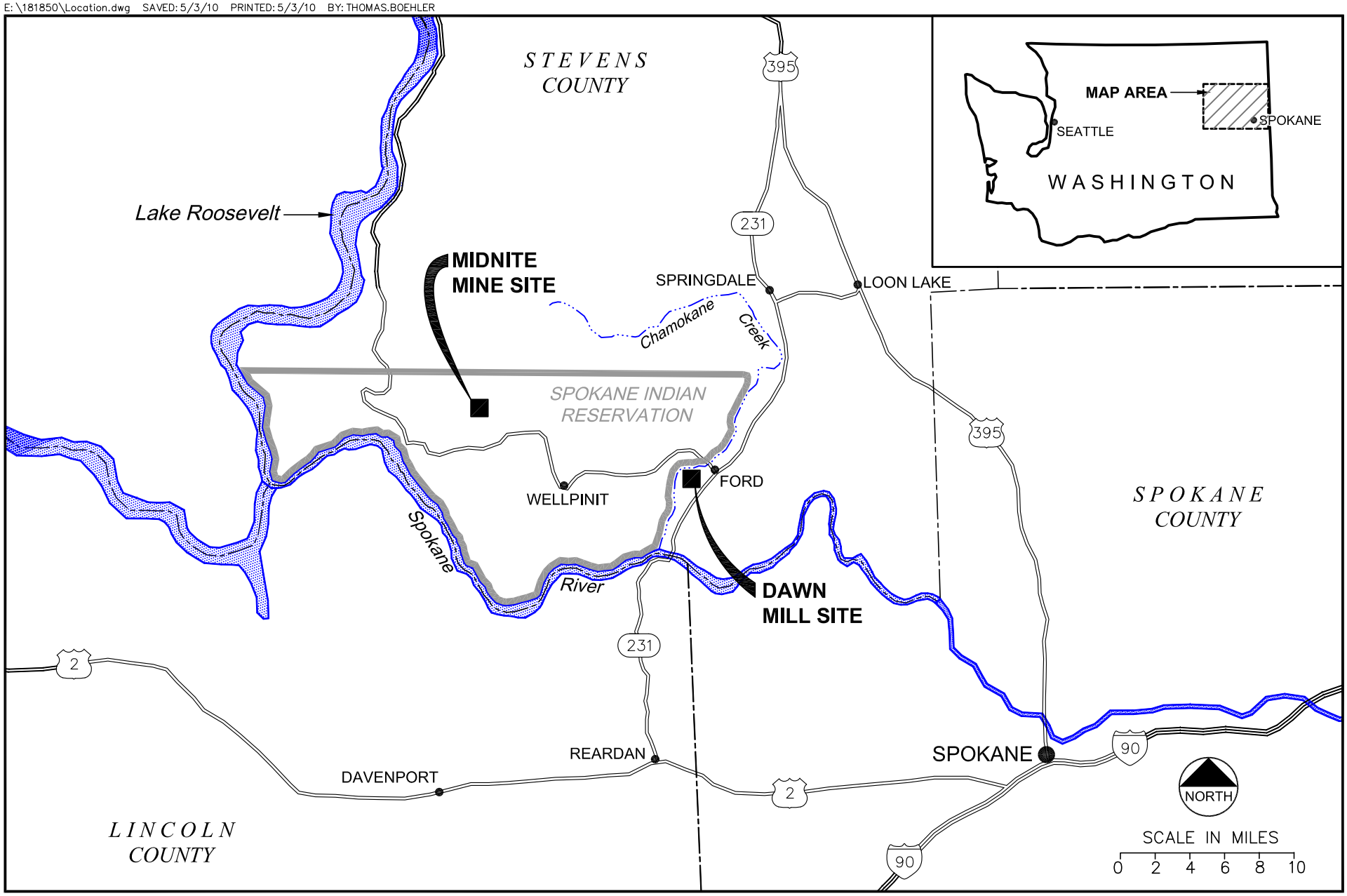

Project No. 181850

May 2010

Figure 9
Midnite Mine Site Location Map

APPENDIX A
MIDNITE MINE MASTER SCHEDULE

Midnite Mine Master Schedule

Frequency			Reference Section
Daily Activities			
	pH Measurements – Every 2 hours		
		Neutralization Tank #1	7.0 of this Appendix
		Neutralization Tanks #2 & #3	7.0 of this Appendix
		Clarifier Overflow	7.0 of this Appendix
		Sand Filter Feed	7.0 of this Appendix
		Plant Discharge	7.0 of this Appendix
	Flow Measurements – Every 2 hours		
		Plant Feed	7.0 of this Appendix
		Plant Discharge	7.0 of this Appendix
		Barium Chloride	7.0 of this Appendix
		Anti-Scalant	7.0 of this Appendix
		Sulfuric Acid	7.0 of this Appendix
		Flocculant	7.0 of this Appendix
		Lime Slurry	7.0 of this Appendix
	Tank Measurements – Every 2 hours		
		Barium Chloride Tank	7.0 of this Appendix
	Amount of Chemical Mixed or Used – Every 2 hours		
		Flocculant Mixed	7.0 of this Appendix
		Lime Mixed	7.0 of this Appendix
		Dry Lime Used	7.0 of this Appendix
	Sludge Loading, Transportation and Disposal		7.0 of this Appendix
	Grease Centrifuges		9.0 of this Appendix
Weekly Activities			
	Calibrate Plant Instrumentation		9.0 of this Appendix
Monthly Activities			
	Performance Sampling		7.0 of this Appendix
	Discharge Monitoring Reports		7.0 of this Appendix
	Progress Reports		7.0 of this Appendix
	Grease Pumps		9.0 of this Appendix
Annual Activities			
	Static Toxicity Testing		6.0 of this Appendix
	Change Oil for all Pumps		9.0 of this Appendix
	Rebuild Pumps and Other Equipment		9.0 of this Appendix
	Clean Out Lime System		9.0 of this Appendix
	Disconnect Piping Flanges		9.0 of this Appendix
	Check Neutralization Tank Risers – Replace as needed		9.0 of this Appendix
	Check Sand Filter Media – Replace as needed		9.0 of this Appendix
As Needed			
	Engineering Design Notice submitted to EPA		1.0 of Operations, Monitoring, Inspection, and Maintenance Report
	Changes to OM&M Plan		1.0 of Operations, Monitoring, Inspection, and Maintenance Report
	Grease Pit 4 Pump		9.0 of this Appendix

APPENDIX B
RESIDUAL MANAGEMENT PLAN

RESIDUALS MANAGEMENT PLAN

Prepared on Behalf of:

Newmont USA Ltd.
Dawn Mining Company

Prepared for:

U.S. Environmental Protection Agency
Region 10
1200 Sixth Avenue
Seattle, Washington 98101

Prepared by:

Miller Geotechnical Consultants
3801 Automation Way, Suite 100
Fort Collins, Colorado 80525

April 10, 2009

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LIST OF ATTACHMENTS

Attachment 1 Request for Extension of Sludge Disposal in TDA-4
Attachment 2 Letters of Concurrence from U.S. Nuclear Regulatory Commission, U.S. Department of Energy, and the Northwest Interstate Compact for Extension of Sludge Disposal in TDA-4
Attachment 3 American Ecology Radioactive Material License
Attachment 4 E-mail from Perma-Fix Regarding their Capacity and Capability to Process the Midnite Mine Sludge at their Facility
Attachment 5 Forms submitted to American Ecology, Perma-Fix and Washington Department of Ecology
Attachment 6 E-mail from American Ecology Regarding License Condition 10A Requirements and Ability to Dispose of Midnite Mine Sludge at their Facility
Attachment 7 E-mail from Perma-Fix Regarding Cost Estimate for Processing Sludge at Perma-Fix
Attachment 8 E-mail from American Ecology Regarding Cost Estimate for Disposal at American Ecology
Attachment 9 E-mail from Denison Mining Regarding Processing Sludge at their Uranium Mill

1.0 INTRODUCTION

On November 7, 2008, Region 10 of the United States Environmental Protection Agency (EPA) issued to Newmont USA Limited and Dawn Mining Company a Unilateral Administrative Order for Phase I Remedial Design and Remedial Action, U.S. EPA Docket No. CERCLA-10-2009-0026 (UAO) with an attached Statement of Work (SOW). As part of the prescribed Phase I Remedial Design and Remedial Action, the SOW requires the submission of a draft Residuals Management Plan (RMP) to provide a plan for disposal of residual materials (sludge) from the water treatment plant (WTP) at Midnite Mine. Specifically, SOW requirements for the RMP are as follows:

> Manage Residuals (ROD Section 12.2.3)
>
> "In compliance with the ROD (including Section 12.2.3) and applicable regulations, Respondents shall manage all residuals generated by water treatment. Continued disposal of WTP residuals at the Dawn Mill would require amendment of the Mill License, which may not be possible in time for the start of water treatment in spring 2009. Respondents shall implement necessary modifications to the WTP necessary to dispose of WTP residuals (sludge) at a commercial low-level radioactive waste facility (LLRW facility), and dispose of WTP residuals in this manner unless and until arrangements for alternative disposal in accordance with the ROD, the UAO, and this SOW are approved by EPA.
>
> In accordance with the Schedule of Deliverables, Respondents shall submit a draft Residuals Management Plan (RMP) for WTP residuals (sludge) disposal at a commercial low-level radioactive waste facility (LLRW facility). The RMP shall identify applicable regulations for transport and disposal, disposal facility requirements and WTP changes which will be needed to comply with facility disposal requirements.
>
> For WTP changes necessary to meet disposal facility requirements (e.g. the addition of a filter press, containerizing or solidification of residuals) the RMP shall include for EPA review and approval a plan and schedule for pilot testing, submittal of design changes to EPA (see Section 3.4), and for implementation of changes in water treatment and waste management practices necessary for residuals disposal at a LLRW facility to commence when WTP operations resume no later than May 1, 2009. The RMP shall describe how the resulting WTP residuals will comply with facility requirements and include cost estimates for system modifications and unit costs for transport and disposal. Required treatment system changes shall comply with the ROD and shall not adversely affect the flow and pit drawdown rates, discharge water quality, or worker health and safety.
>
> The RMP shall also clearly indicate whether Respondents intend to evaluate other changes to the water treatment process, such as the addition of an ion exchange step, as provided in the ROD for purposes of reducing overall costs. If so, the plan shall include for EPA review and approval a description of and proposed schedule for the evaluation in accordance with Section 2.1.5 of this SOW, including a schedule for submitting a draft treatability testing plan, reports, and design recommendations. Optional treatment system changes shall comply with the ROD and shall not adversely affect the flow and pit drawdown rates, discharge water quality, or worker health and safety."

To address the requirements for the RMP as specified in the SOW, the following report presents a plan and schedule for sludge disposal from the WTP. A draft RMP was submitted to EPA on December 30, 2008. Comments were received from EPA and the Spokane Tribe of Indians on January 28, 2009 and on March 30, 2009. This revised RMP incorporates and addresses the comments that were received and updates the report to reflect the recently received permission to disposal of the sludge in the Dawn mill site TDA-4.

Permission has been received from the Washington Department of Health (WDOH) to dispose of the WTP sludge in the Dawn mill site TDA-4 in 2009 and 2010. The radioactive materials license will be amended by April 17, 2009 to document that approval. A discussion of the sludge disposal at the Dawn mill site is presented in Section 2. Other sludge disposal alternatives that might be used after 2010 include:

- Disposal at the American Ecology LLRW facility
- Shipping the sludge to a uranium mill for processing
- Disposal of sludge at a non-LLRW disposal site if pre-treatment of the water can remove uranium from the sludge to levels that would be acceptable at non-LLRW facilities
- Disposal of sludge in a new waste disposal facility dedicated to the WTP

These alternatives are discussed in Section 3.

2.0 SLUDGE DISPOSAL AT THE DAWN MILL SITE

Since 2000, sludge from the WTP has been disposed of in Dawn Mining Company's existing tailings disposal area, which is designated as TDA-4, pursuant to terms of its Radioactive Materials License. The previous License conditions provided that sludge disposal in TDA-4 would cease at the end of 2008 unless an extension is approved by the WDOH. Since 2000, substantially less sludge has been disposed of in TDA-4 than was approved by WDOH. Additionally, it is currently estimated that further disposal of sludge into TDA-4 will not adversely affect the schedule for final closure of TDA-4. Accordingly, in November 2008, Dawn Mining Company submitted to WDOH a request to extend the time for disposal of sludge in TDA-4 through 2010. The letter requesting that extension is attached (Attachment 1).

WDOH has approved the application to allow disposal of sludge from the WTP in the Dawn mill site TDA-4 during 2009 and 2010. WDOH approval was contingent on concurrence from the US Nuclear Regulatory Commission, the US Department of Energy and the Northwest Interstate Compact. Concurrence from those three agencies was received in March. A copy of each of the letters is provided in Attachment 2.

The WDOH has indicated that the Dawn Mill Site Radioactive Materials License will be amended to authorize disposal of sludge from the WTP in the Dawn mill site TDA-4 by April 17, 2009.

It is understood that disposal in TDA-4 is a temporary solution, as disposal in TDA-4 will only be allowed in 2009 and 2010, and that a long-term solution for sludge management will still need to be determined.

Dawn Mining Company would continue to transport the material from the mine to the mill in the manner that has been used historically. Costs associated with this option are primarily related to transportation, and total approximately $15,000/year. During the time that sludge is disposed in TDA-4, Dawn Mining Company would continue to coordinate with EPA in developing and obtaining approval of a long-term sludge disposal option.

3.0 OTHER SLUDGE DISPOSAL ALTERNATIVES

There are other sludge disposal alternatives that could be used for sludge disposal after 2010. These options will be advanced with the objective of having one or more available for long-term sludge disposal.

The other options that will be explored include disposal at the American Ecology LLRW facility, shipping for processing at a uranium mill, disposal at a municipal or commercial non-LLRW waste disposal facility with pre-treatment of the water for uranium removal, and disposal at a dedicated waste disposal facility. These options are discussed below.

3.1 American Ecology Facility

American Ecology has a LLRW disposal facility located near Richland, Washington. Discussions (including a site meeting on January 6, 2009) with site personnel and the Washington Department of Health (WDOH), which regulates the facility, indicate that sludge from the WTP can be accepted at the site. The facility has the ability to receive the total volume of sludge that would be produced by the WTP over many years and there are no minimum volume requirements. The requirements for waste material that may be accepted at this facility are set forth in American Ecology's radioactive materials license, a copy of which is included as Attachment 3.

It has been determined that the WTP sludge will need to be dried or solidified prior to disposal at the American Ecology facility. The Perma-Fix facility, which is located near the American Ecology facility, can be used to dry the material prior to disposal. The Perma-Fix facility processes waste, including radioactive waste, to meet conditions necessary for disposal at other facilities, including the American Ecology facility. The Perma-Fix site is regulated by the WDOH and their license will allow them to accept, store and process the WTP sludge. The Perma-Fix facility can be able to accept WTP sludge for processing within a minimum of 30 days after a contract is in place. Perma-Fix can accept the sludge without prior processing, and has the capacity to dewater the volume of sludge that will be produced by the WTP. This information was confirmed during a meeting at the Perma-Fix facility on January 6, 2009 with Perma-Fix and WDOH staff, and via an e-mail from Perma-Fix (Attachment 4).

Shipping requirements and containers to transport the sludge from the WTP to the Perma-fix facility are discussed in the Residuals Transportation Plan (Tetra Tech, 2009a).

On February 10, 2009, Dawn Mining Company submitted to American Ecology a "Radioactive Waste Generator Registration" form and a "Waste Profile" was submitted to Perma-Fix. An application for a "Site Use Permit" was also submitted to the Washington Department of Ecology on February 10. These forms constitute the information that needs to be submitted to allow for Perma-Fix to accept and modify the sludge and for American Ecology to accept the waste. Copies of the forms are included in Attachment 5.

3.1.1 Containers

The radioactive materials license for the American Ecology site has options for containers for disposal. The selection of the containers that would be used by Perma-Fix to transport the material from their facility and ultimately for disposal at the American Ecology facility would be determined in consultation between Perma-Fix, American Ecology and the WDOH. Containers to transport the sludge from the WTP to the Perma-Fix facility are discussed in Section 2.1 of the Residuals Transportation Plan (Tetra Tech, 2009a).

3.1.2 Transportation

Transportation of the sludge to the American Ecology site would be governed by US Department of Transportation and the WDOH license. The license requirements for shipping are included in license conditions 45 through 49 (see American Ecology's radioactive material license, Attachment 3). Details of the transportation plan to ship the sludge from the WTP to Perma-Fix and from the Perma-Fix facility to the American Ecology disposal site, including the containers, are documented in the Residuals Transportation Plan (Tetra Tech, 2009a).

3.1.3 Total Uranium Limit

Discussions with American Ecology indicate that an additional 88 curies of uranium may be disposed of at their facility. Based on volumes and content of the sludge produced by the WTP over the last several years, approximately 1 curie of uranium is contained in the sludge each year. Discussions with site personnel confirmed that American Ecology's acceptance of the WTP sludge would not be impacted by this limit for the next decade. Additionally, discussions between American Ecology and the WDOH indicate that American Ecology's license can likely be modified in the future should the uranium activity limit become restrictive. American Ecology has indicated

that the WDOH would be agreeable to discussing a license modification. E-mail confirmation from American Ecology regarding the information in this section is provided as Attachment 6.

3.1.4 Cost Estimate

An approximate cost estimate for this alternative is as follows:

Annual transportation cost[1]	$200,000
Annual processing costs[2]	$5,900,000
Annual disposal costs[3]	$2,000,000

3.2 Processing at Uranium Mill

Denison Mining Company has indicated that it would be willing and able to take the WTP sludge on a multi-year basis for processing at its White Mesa Mill in Utah. Denison has indicated that its radioactive materials license would need to be amended by the State of Utah to allow it to accept the sludge for processing. Denison estimates that a license amendment could be obtained within 6 to 12 months (see e-mail from Denison, Attachment 9). Discussions in mid-January with Denison indicates that they remain interested in taking the material and they have begun the process of applying for an amendment to their license to allow for them to accept the sludge for processing.

If an agreement is reached with Denison to process the sludge, permission from EPA to ship the sludge to the Denison mill will be sought. EPA's approval would be conditioned upon the State of Utah approving the necessary amendment to Denison's license. The sludge could be transported and processed without further dewatering. While the complete financial details are yet to be determined, some of the approximate economic factors include:

- Annual sludge tonnage - 850 tons
- Uranium content - 0.6%
- U3O8 spot price - $40/pound
- Gross value per ton - $636
- Sludge shipping costs - $200/ton

Given these numbers, this could be an economically attractive alternative. It is understood that discussions regarding royalty issues with the Spokane Tribe of Indians will be necessary for this alternative.

3.3 Optional Modifications to WTP

As suggested in the SOW and the ROD, it is possible that the WTP could be modified to provide pre-treatment of the water to remove uranium using ion exchange or other technology. Since the uranium would be removed prior to lime treatment and sludge precipitation, the residual sludge material would have substantially lower uranium concentrations. This could potentially allow for sludge disposal at commercial or municipal landfills at much lower costs than LLRW disposal facilities.

It is not possible to design, evaluate and implement such a system before May 2009. It might be possible, however, that a system could be in place by May 2010. In accordance with the SOW, section 2.1.5, Optional WTP

[1] Approximately 850 tons/yr at $200/ton + $30,000 for administrative requirements
[2] Approximately 850 tons/yr at $3.50/ton - see attached e-mail from Perma-Fix –Attachment 7
[3] Approximately 20,000 cubic feet/year at approximately $100/cubic foot for disposal – see attached e-mail from American Ecology –Attachment 8

Modifications, a Treatability Testing Plan (TTP) (Tetra Tech, 2009b) was submitted on March 31, 2009. As specified in Section 2.1.5.1 of the SOW:

> "The TTP shall describe the waste characteristics that must be achieved for disposal of the sludge as non-hazardous waste and non-low-level radioactive waste, including regulatory and facility requirements. The TTP shall include a plan for testing the process and the waste stream to assess whether the waste meets regulatory and facility requirements for disposal at other than a LLRW facility. The TTP shall present the capital and long-term costs of disposal based on available information and shall include a review of facilities where the ion exchange resin or other material could be regenerated or replaced. The TTP shall include a QAPP that addresses process monitoring, discharge monitoring, and waste characterization necessary to complete the evaluation."

The current plan is that pilot scale testing of ion exchange technology will be conducted in the summer of 2009. It is anticipated that the pilot scale testing will be conducted at the WTP. If the pilot scale testing is successful, the feasibility of a full scale facility would be evaluated. An evaluation of the sludge disposal alternatives including the allowable radiological and chemical constituent concentrations for alternative disposal facilities is a part of the TTP (Tetra Tech, 2009b).

It was requested that this RMP include a schedule for the development of the optional modifications to the water treatment plant. The TTP (Tetra Tech, 2009b) includes the schedule for the activities necessary to perform and evaluate the pilot scale testing for the WTP. The treatability testing evaluation report and treatability testing data report will be prepared and submitted detailing and evaluating the results of the pilot testing.

3.4 Other Alternative

Respondents will continue to evaluate long-term options for sludge disposal on site or at the Dawn mill site in a specifically designed disposal facility. These options would be technically and economically beneficial for long-term sludge management. A dedicated facility that is close to the WTP would significantly reduce transportation costs and risks, as well as overall disposal costs.

It is understood that it would take time to obtain appropriate regulatory approvals for a new disposal facility dedicated specifically to the WTP. The respondents are aware that these alternatives must comply with applicable tribal, state and federal regulations, and that off-site disposal must comply with EPA's Off-Site Rule. Respondents propose discussions with the EPA regarding the viability of and applicable regulatory process for these long-term alternatives to be initiated in 2009. Further advancement of these alternatives will be not affect compliance with the UAO and SOW requirement to have a short-term sludge disposal option in place by May 1, 2009.

3.5 Energy Solutions

Disposal at the Energy Solutions facility near Clive, Utah was initially considered. This alternative has been eliminated as it was determined that permission would have to be obtained from the Northwest Interstate Compact to allow for the waste to be shipped to the Energy Solutions facility and that they would not support this option as long as the American Ecology site could accept the waste.

4.0 SUMMARY

This RMP sets forth a plan for disposal of residual material (sludge) from the Midnite Mine WTP at the Dawn mill site TDA-4. Disposal in TDA-4 will continue through 2010.

Other alternatives for sludge disposal are also discussed. These alternatives include disposal at the American Ecology LLRW facility, shipping to a uranium mill for processing, disposal in a non-LLRW facility (with pre-treatment of the water for uranium removal) and disposal in a dedicated waste disposal facility. These options might not be in-place in time to accept sludge starting May 1, 2009. However, a concerted effort will be made to determine the optimal long-term solution for sludge disposal in a timely manner. When the optimal alternative is determined and developed, permission from EPA would be sought to implement the optimal solution.

5.0 REFERENCES

Tetra Tech, Inc. (Tetra Tech), 2009a. *Residuals Transportation Plan for the Midnite Mine*. March 31.

Tetra Tech, Inc. (Tetra Tech), 2009b. *Treatability Testing Plan: Pilot Scale Testing of Uranium Removal Using Anionic Exchange with Conventional Strong-Base Resins.* March 31.

Attachment 1
Request for Extension of Sludge Disposal in TDA-4

DAWN MINING COMPANY, LLC
5326 Uranium City Road
Ford, Washington 99013

November 20, 2008

Mr. Mikel Elsen
Supervisor, Waste Management Section
Washington Department of Health
Division of Radiation Protection
111 Israel Road S.E.
P.O. Box 47827
Olympia, WA 98504-7827

Re: Request for Extension of Sludge Disposal

Dear Mr. Elsen:

Dawn Mining Company (Dawn) hereby requests the Washington Department of Health (WDOH) for approval to dispose of sludge from the Midnite Mine water treatment plant (MMWTP) directly into TDA-4 for as long as TDA-4 is scheduled to remain open and available for such disposal. This request is supported by the following discussion, Attachment 1 to this letter, Radioactive Materials License No. WN-I043-2 (Amendments 23 and 24), the 2007 Addendum to Existing Environmental Documents (2007 Addendum), the 2000 Addendum to Existing Documents, the 2000 Technical and Environmental Evaluation (2000 TEE), the 1994 Supplemental Final Environmental Impact Statement and the 1991 Final Environmental Impact Statement.

I. Background

In 1999 and 2000, when Dawn originally sought approval from WDOH for direct disposal of MMWTP sludge into TDA-4, it was anticipated that Dawn would need to dispose of the sludge through 2004. While at that time Dawn did not expect that sludge disposal would be needed beyond 2004, WDOH evaluated and ultimately approved of Dawn's proposal to directly dispose of MMWTP sludge into TDA-4 until 2008. According to the millsite closure timeline submitted to the WDOH in 1999, TDA-4 was thought to be available for such disposal through the end of 2008 and sludge could be disposed of into TDA-4 through 2008 without interfering with TDA-4 closure and other millsite closure activities. See 2000 TEE. Amendment 23 of Dawn's Radioactive Materials License, issued in 2001, placed no time limit on the direct sludge disposal. WDOH's 2007 amendment to Dawn's license imposed a time limit on direct sludge disposal. Amendment 24 requires that direct disposal of MMWTP sludge into TDA-4 cease at

the end of 2008, but expressly contemplates that an extension of time for sludge disposal may be approved. See Condition 33, Radioactive Materials License WN-I043-2, Amendment 24 ("Unless specifically approved by the department, receipt and disposal of MMWTP filtercake sludge at the licensee's millsite shall cease December 31, 2008.").

Since the issuance of Amendment 24 of Dawn's license, two new developments have occurred. First, a more detailed closure timeline[1] for Dawn's millsite shows that TDA-4 will remain available for sludge disposal beyond 2008.[2] Second, the Environmental Protection Agency (EPA) recently ordered Dawn to continue to operate the MMWTP and make arrangements for disposal of the MMWTP sludge. See Unilateral Administrative Order and Statement of Work for Water Treatment and Sludge Disposal at Midnite Mine Superfund Site (EPA, November 7, 2008). Dawn's current request is in response to these two developments and is made pursuant to Condition 33 of its license. While Dawn explores other sludge disposal options, Dawn seeks the approval of the WDOH to continue direct disposal of sludge into TDA-4 for as long as TDA-4 is scheduled to remain open and available for such disposal.

II. WDOH's 2000 Approval of Direct Sludge Disposal

In 2000, the WDOH prepared a technical and environmental evaluation of Dawn's proposal to dispose of MMWTP sludge directly into TDA-4. The 2000 TEE was based on the following information regarding the direct disposal of MMWTP sludge:

- The direct sludge disposal proposal was part of an amended millsite closure plan that included abandoning the approved and then-licensed plan to fill TDA-4 with imported 11.e(2) byproduct material. Direct disposal of the MMTWP sludge into TDA-4 was proposed to replace the then-current operation of milling the sludge and discharging the resulting tailings into TDA-4.

- Dawn possessed a radioactive materials license under which Dawn operated the MMWTP and transported the resulting sludge to the Dawn mill. No changes to the MMWTP process or the mode of transportation of the sludge were anticipated.

- Sludge production resulted in one or two truckloads per day shipped from the mine to the mill, except during the off-season winter shutdown.

- TDA-4 would be open and available for sludge disposal, without interfering with closure activities, through the end of 2008.

- If Dawn were to dispose of sludge through 2008, it was anticipated that a total of 753,500 cubic feet of sludge would be disposed of into TDA-4. This total was based on 137,000 cubic feet of sludge being disposed of into TDA-4 each year during the years 2000 and

[1] The more detailed closure timeline will be submitted to WDOH with the 2008 update of the Integrated Project Schedule (IPS).

[2] As will be discussed in more detail, the western half of TDA-4 will remain open and available for sludge disposal in 2009 and 2010. A small area in the western half of TDA-4 will remain open for part of 2011 for final soil cleanup activities.

2001, and 68,500 cubic feet of sludge being disposed of into TDA-4 each year during the years 2002 through 2008.

- The MMWTP sludge did not designate as Hazardous or Dangerous Waste.

See 2000 TEE at 6-7. WDOH's evaluation in the 2000 TEE was based primarily on a comparison of the direct sludge disposal proposal with the approved and then-licensed 11.e(2) byproduct material closure plan which included milling the sludge and discharging the resulting tailings into TDA-4. WDOH's 2000 approval of direct sludge disposal was based on the following environmental findings:

Volume of Sludge to TDA-4: The increase in the volume of material to be disposed into TDA-4 from direct sludge disposal was insignificant when compared to the overall volume of material already in TDA-4. The proposed sludge volume was also insignificant when compared with the then-licensed plan to fill TDA-4 with imported 11.e(2) byproduct material.

Geotechnical Stability: Direct sludge disposal eliminated the addition of 6,000 gallons per day of liquid solution to the sludge from the milling process, required sludge depths no greater than two feet, and required the addition of site soil between layers of sludge. As a result, the potential impacts from geotechnical instability were reduced.

Transportation: Direct sludge disposal did not involve a change to the transportation of the sludge from the mine to the millsite; it did, however, eliminate chemical tanker truck shipments to the millsite.

Water Quality: The mobility of uranium and other constituents from unprocessed sludge was no greater and very likely less than from processed sludge tailings.

Air Emissions: Direct sludge disposal involved no changes related to air emissions.

Biota: Direct sludge disposal involved no changes related to biota impacts.

Timing: Ceasing sludge processing meant earlier decommissioning and disposal of the mill buildings, earlier cleanup of contaminated soils, and earlier closure of TDA-4, resulting in a possible acceleration of the evaporation schedule and millsite closure timeline.

Radiation: Direct sludge disposal (and abandonment of the imported 11.e(2) material closure plan) involved no substantial changes to total radioactivity values and actually reduced the total amount allowed by approximately 3,000 curies.

Regulations: Direct sludge disposal complied with Criterion 6A(c) requirements.

See 2000 TEE at 8-12.

The 2000 TEE further concluded that the direct disposal of MMWTP sludge into TDA-4 complied with the ten criteria set forth in the Nuclear Regulatory Commission's (NRC) Final

Revised Guidance on Disposal of Non-Atomic Energy Act of 1954, Section 11e.(2) Byproduct Material in Tailings Impoundments (NCR Guidance).[3] See 2000 TEE at 12-15 and the discussion below.

III. Proposal to Extend Direct Sludge Disposal

Dawn's current proposal is to extend the direct disposal of MMWTP sludge into TDA-4 for as long as TDA-4 is open and available for such disposal. Dawn will continue to employ the same MMWTP process and the same mode of transporting the sludge from the mine to the mill. Dawn expects the truck volume to be one truck per day during MMWTP operation. As with current sludge disposal operations, Dawn will follow DMOP 18 which, among other things, sets forth procedures for TDA-4 preparation and water management, placement and covering of the sludge, and sludge testing and monitoring.

Based on MMWTP operations and actual sludge volumes produced and placed in TDA-4 during the period 2001-2008, the volume of sludge that could be disposed of in TDA-4 during the remaining time that TDA-4 is scheduled to be open and available is expected to be no more than 90,000 cubic feet.[4]

Millsite closure activities will continue uninterrupted during the extended sludge disposal period and the final closure of TDA-4 will not be delayed as a result of the extension. Sludge would only be accepted in TDA-4 for as long as TDA-4 is open and available for sludge disposal and such that sludge disposal does not interfere with the scheduled closure of TDA-4 and other millsite closure activities. See Extension of Direct Sludge Disposal and Millsite Closure, attached hereto as Attachment 1.

IV. Dawn's Proposal to Extend Sludge Disposal Satisfies All Approval Criteria

Dawn's proposal to extend direct sludge disposal for as long as TDA-4 is open and available for such disposal should be approved for the following reasons:

- Direct sludge disposal was approved by WDOH in 2000. The basis of that approval was that direct sludge disposal met all regulatory and NRC Guidance criteria, and posed no significant environmental impacts.

- The current proposal to extend direct sludge disposal is essentially the same as the proposal evaluated by WDOH in 2000. The only change is that TDA-4 will be open and available for sludge disposal for longer than was anticipated in 2000.

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[3] Criteria 8 and 9 of the NRC Guidance require approval from the Northwest Interstate Compact (Compact) and the United States Department of Energy (USDOE), respectively. These two criteria were not yet satisfied at the time of the 2000 TEE in June of 2000, but were later satisfied upon receipt of approvals from both the Compact and the USDOE.

[4] The estimate of 90,000 cubic feet of additional sludge is conservative. It is based on 45,000 cubic feet of sludge disposed of each year for two years. 45,000 cubic feet was the maximum annual volume disposed of between 2001 and 2008. The actual volume of sludge that would be placed into TDA-4 during the extension period is expected to be less.

- Condition 33 of Amendment 24 of Dawn's Radioactive Materials License expressly contemplates the possibility of an extension of sludge disposal.

- Even with the extension, the total volume of sludge placed in TDA-4 would be significantly less than the volume evaluated by WDOH in 2000.

- An extension of direct sludge disposal would result in no new environmental impacts from those evaluated in 2000.

- The proposal meets all NRC Guidance criteria.

- The proposal will not result in any delay in TDA-4 closure or millsite closure.

As the following discussion demonstrates, because the proposal to extend direct sludge disposal for as long as TDA-4 is open and available is essentially the same direct sludge disposal proposal evaluated and approved by WDOH is 2000, the evaluation and analysis of the proposal remains essentially unchanged.

A. WDOH's 2000 Environmental Analysis is Not Affected by the Extension

A review of each element of the environmental evaluation conducted by WDOH in 2000 TEE reveals that extending direct sludge disposal has no effect on the analysis.

Volume of Sludge to TDA-4: In 2000, the WDOH's evaluation was based on a total anticipated volume of 753,500 cubic feet of MMWTP sludge that would be placed into TDA-4 through 2008. A comparison of the estimated volume of sludge evaluated with the actual volume of sludge placed in TDA-4 shows that less than one third of the expected volume of sludge has actually been disposed.

Year	Volume of MMWTP evaluated in 2000 TEE	Actual Volume of MMWTP sludge placed in TDA-4
2000	137,000 cubic feet	None[5]
2001	137,000 cubic feet	27,926 cubic feet[6]
2002	68,500 cubic feet	22,060 cubic feet[7]
2003	68,500 cubic feet	29,704 cubic feet[8]
2004	68,500 cubic feet	24,750 cubic feet[9]

[5] Dawn's license allowing for direct sludge disposal was not issued until 2001.
[6] See Dawn Mining Company records.
[7] See Dawn Mining Company 2002 Environmental Monitoring Report, submitted to WDOH May 31, 2003.
[8] See Dawn Mining Company 2003 Environmental Monitoring Report, submitted to WDOH May 31, 2004.
[9] See Dawn Mining Company 2004 Environmental Monitoring Report, submitted to WDOH May 31, 2005.

2005	68,500 cubic feet	15,420 cubic feet[10]
2006	68,500 cubic feet	45,220 cubic feet[11]
2007	68,500 cubic feet	36,005 cubic feet[12]
2008	68,500 cubic feet	30,898 cubic feet[13]
Total	753,500 cubic feet	231,983 cubic feet

Even with the extension, the total volume of sludge directly disposed into TDA-4 will be less than half of the volume evaluated by WDOH in the 2000 TEE. As a result, the current proposal to extend direct sludge disposal does not change the 2000 TEE conclusion that the volume of sludge placed in TDA-4 will result in no significant impacts.

Geotechnical Stability: The analysis of geotechnical stability in the 2000 TEE was based on the total volume of sludge to be directly disposed and the cessation of mill tailings disposal. Because (1) even with the extension, the total volume of sludge that would be directly disposed of is less than half anticipated in 2000, and (2) mill tailings disposal has already ceased, the current proposal to extend direct sludge disposal does not change the 2000 TEE conclusion that there are no significant impacts to geotechnical stability.

Transportation: The transportation analysis in the 2000 TEE was based on two trucks per day transporting sludge from the mill to the mine. The actual truck volume between 2001 and 2008 was one truck per day. The extension proposal anticipates one truck per day transporting sludge from the mill to the mine during MMWTP operation. Because (1) no changes have been made to the procedures for sludge transport and (2) the anticipated frequency of sludge transport will be even less than evaluated in 2000, the current proposal to extend sludge disposal does not change the 2000 TEE conclusion that there are no significant transportation impacts.[14]

Water Quality: The water quality analysis in the 2000 TEE was based on the potential for mobility of uranium and other constituents from the unprocessed sludge. Because (1) the total volume of directly disposed sludge is significantly less than evaluated in 2000 and (2) the composition of the sludge has not changed, the current proposal to extend sludge disposal does not change the 2000 TEE conclusion that there are no significant impacts to water quality.

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[10] See Dawn Mining Company 2005 Environmental Monitoring Report, submitted to WDOH May 31, 2006.
[11] See Dawn Mining Company 2006 Environmental Monitoring Report, submitted to WDOH May 31, 2007.
[12] See Dawn Mining Company 2007 Environmental Monitoring Report, submitted to WDOH May 31, 2008.
[13] See Dawn Mining Company records.
[14] The 2000 TEE transportation analysis was not specifically based on a limited number of years of sludge transport. Moreover, it is important to note that the sludge will need to be trucked from the Midnite Mine to a disposal location much more distant than TDA-4 if the sludge disposal extension is not granted.

Air Emissions: The 2000 TEE concluded that the moist condition of the sludge presented no air emissions issues. Because the composition of the sludge has not changed, the current proposal to extend sludge disposal does not change the 2000 TEE air emissions analysis.

Biota: The 2000 TEE biota analysis was based on the procedures for sludge disposal and the moisture content of the sludge. Because neither of these has changed, the current proposal to extend sludge disposal does not change the 2000 TEE conclusion that there are no significant impacts to biota.

Timing: The 2000 TEE timing analysis was based on earlier decommissioning and disposal of mill buildings, and an earlier cleanup of contaminated soils and closure of TDA-4, which could possibly accelerate the evaporation schedule and, in turn, shorten the closure timeline by approximately one year. To date, the mill has already been decommissioned and the mill buildings disposed. The earlier cleanup of contaminated site soils has begun. The IPS closure timeline reflects the earlier closure of TDA-4. As the discussion Attachment 1 demonstrates, the extension of sludge disposal will not interfere with the closure schedule of TDA-4. As a result, the current proposal to extend sludge disposal does not change the 2000 TEE timing analysis.

Radiation: The 2000 TEE radiation analysis was based on the fact that direct sludge disposal would contribute an insignificant amount of radiation in comparison to the amount allowed under the 11.e(2) byproduct material closure plan. Because, even with the extension, Dawn will dispose of less than half of the volume of sludge that was evaluated in the 2000 TEE, the current proposal to extend sludge disposal does not change the 2000 TEE analysis of radiation impacts. See also Attachment 1 at 3-4.

Regulations: The 2000 TEE based its regulatory analysis on the composition of the MMWTP sludge, as well as the finding that the final radon barrier over TDA-4 would not be delayed by direct sludge disposal. Since the composition of the sludge has not changed and the final radon barrier will not be delayed by an extension of direct sludge disposal, the current proposal to extend sludge disposal does not change the 2000 TEE regulatory analysis. For a detailed discussion, see Attachment 1.

B. The Proposal to Extend Sludge Disposal Satisfies the NRC Guidance Criteria

Dawn's proposal to extend direct disposal of MMWTP sludge into TDA-4 also satisfies the criteria set forth in the NRC Guidance.

NRC Criterion 1: In reviewing licensee requests for the disposal of wastes that have radiological characteristics comparable to those of the Atomic Energy Act (AEA) of 1954, Section 11e.(2) byproducts material [hereinafter designated as "11e.(2) byproduct material"] in tailings impoundments, staff will follow the guidance set forth [in the criteria] below. Since mill tailings impoundments are already regulated under 10 CFR Part 40, licensing of the receipt and disposal of such material [hereinafter designated "non-11e.(2) byproduct material"] should also be done under 10 CFR Part 40.

2000 TEE Response to Criterion 1: "[T]he MMWTP sludge comes from the same source as the byproduct material that was produced during the milling operations and discharged into TDA-4. It is a filtercake similar in physical form to the mill-produced byproduct material, and contains the same chemical and radiological elements. Staff have followed the NRC guidance criteria and applied the state equivalent of Appendix A to 10 CFR Part 40, WAC 246-353, to the request." 2000 TEE at 12.

Direct Sludge Disposal Extension Proposal: The character and composition of the sludge remain the same as that evaluated in the 2000 TEE. It is similar to the 11.e(2) byproduct material already present in TDA-4. As a result, the current proposal to extend sludge disposal continues to satisfy Criterion 1 of the NRC Guidance.

NRC Criterion 2: Radioactive material not regulated under the AEA shall not be authorized for disposal in an 11e.(2) byproduct material impoundment.

2000 TEE Response to Criterion 2: "Prior to regulatory oversight of the MMWTP by WDOH, an evaluation was done of the filtercake material, and it was determined that it met the federal and state definition of source material. Therefore, it is regulated under the AEA." 2000 TEE at 13.

Direct Sludge Disposal Extension Proposal: The character and composition of the sludge remain the same as that evaluated in the 2000 TEE. It is source material. As a result, the current proposal to extend sludge disposal continues to satisfy Criterion 2 of the NRC Guidance.

Criterion 3: The material proposed for disposal may not be special nuclear material or 11.e(1) material.

2000 TEE Response to Criterion 3: "As stated in the response to Criterion 2, the MMWTP sludge is source material, and therefore is neither special nuclear material nor 11.e(1) material." 2000 TEE at 13.

Direct Sludge Disposal Extension Proposal: The character and composition of the sludge remain the same as that evaluated in the 2000 TEE. It is neither special nuclear material nor 11.e(1) material. Therefore, the current proposal to extend sludge disposal continues to satisfy Criterion 3 of the NRC Guidance.

Criterion 4: The material proposed for disposal must not be subject to applicable RCRA regulation or other EPA standards for hazardous or toxic waste disposal. The material may not contain material classified as hazardous waste under 40 CFR 261, nor may it contain material regulated under TSCA.

2000 TEE Response to Criterion 4: "In June 1992, the Department of Ecology concurred with DMC's assessment that the MMWTP sludge was not dangerous waste. The Department of Ecology evaluated the MMWTP sludge again in April 2000, and again concurred with DMC's assessment that it is not dangerous waste (WDOE). The analyses of the constituents of the MMWTP sludge demonstrate that it contains no other material implicated by this criterion." 2000 TEE at 13.

Direct Sludge Disposal Extension Proposal: The character and composition of the sludge remain the same as that evaluated in the 2000 TEE. Moreover, the TDA-4 Sludge Disposal Operations Procedures include monitoring procedures that continue to confirm that the sludge is neither dangerous nor hazardous waste. See DMOP 18. The current proposal to extend sludge disposal continues to satisfy Criterion 4 of the NRC Guidance.

Criterion 5: The 11.e(2) licensee must demonstrate that there are no CERCLA issues related to the disposal of the non-11.e(2) byproduct material in the tailings impoundment.

2000 TEE Response to Criterion 5: "The purpose of the NRC guidance provision is to reduce the potential for regulatory oversight of the tailings impoundment by more than one agency, in relation to the eventual transfer of the site to the Department of Energy. WDOH does not consider the guidance provision to require that the licensee demonstrate that there are no CERCLA issues related to the site whatsoever. Rather, the analysis of the CERCLA issues should be whether or not the disposal of source material into TDA-4 raises any new or different CERCLA issues than those that already exist. The 1994 Final Supplemental EIS (WDOH 1994) recognizes that both CERCLA and MTCA authorities are available to address remediation of the site. Thus, CERCLA issues related to the millsite already exist. There is no indication that the disposal of source material into TDA-4 raises any new CERCLA issues. EPA has stated that is has no present intention of regulating TDA-4 under CERCLA (EPA)." 2000 TEE at 14.

Direct Sludge Disposal Extension Proposal: The character and composition of the sludge remain the same as that evaluated in the 2000 TEE. Moreover, the total amount of sludge that would be placed into TDA-4 even with the extension is less than half of that evaluated in the 2000 TEE. Consequently, no new CERCLA or MTCA issues are raised by Dawn's proposal to extend sludge disposal. Criterion 5 of the NRC Guidance continues to be satisfied.

Criterion 6: The 11.e(2) licensee must demonstrate that there will be no significant environmental impacts from disposing of the non-11e.(2) byproduct material.

2000 TEE Response to Criterion 6: "WDOH's review, provided in this document [the 2000 TEE], has determined that the direct disposal of MMWTP

sludge into TDA-4 would not involve substantial changes and/or new information indicating probable significant adverse environmental impacts that were not adequately evaluated in existing environmental reviews (WDOH 1981, 1991, 1992a, and 1994)." 2000 TEE at 14

Direct Sludge Disposal Extension Proposal: The character and composition of the sludge remain the same as that evaluated in the 2000 TEE. The same transportation and disposal procedures will be used. Moreover, the total amount of sludge that would be placed into TDA-4 even after an extension is less than half of that evaluated in the 2000 TEE. As discussed above in section IV.A., there is no significant change from the environmental analysis conducted in the 2000 TEE. As a result, the current proposal to extend sludge disposal continues to satisfy Criterion 6 of the NRC Guidance.

Criterion 7: The proposed disposal will not compromise the reclamation of the tailings impoundment by demonstrating compliance with the criteria of Appendix A of 10 CFR Part 40 (WAC 246-252-030).

2000 TEE Response to Criterion 7: "WDOH's review, provided in this document [the 2000 TEE], has determined that the direct disposal of MMWTP sludge into TDA-4 would not compromise the reclamation of the tailings impoundment, and is consistent and complies with Washington's equivalent to Appendix A 10 CFR Part 40, WAC 246-252 (WDOH 1997)." 2000 TEE at 14.

Direct Sludge Disposal Extension Proposal: As the discussion in the attached "Extension of Direct Sludge Disposal and Millsite Closure" demonstrates, an extension of direct sludge disposal will not compromise the reclamation of the tailings impoundment, and is consistent and complies with the millsite closure criteria set forth in WAC 246-252-030. See Attachment 1.

Criterion 8: The 11.e(2) licensee must provide documentation showing approval by the Regional Low-Level Waste Compact, as well as approval by the Compact in whose jurisdiction the disposal site is located.

2000 TEE Response to Criterion 8: "The Northwest Compact's decision is pending completion of WDOH's review of DMC's request and presentation of WDOH's findings to the Compact committee. Before WDOH would amend the DMC's radioactive materials license to allow direct discharge, final approval must be given." 2000 TEE at 15.

Direct Sludge Disposal Extension Proposal: On August 4, 2000, the Compact sent a letter to Dawn documenting that the Compact had unanimously adopted a motion stating it had no objections to Dawn's proposal. See Letter from Lawrence Goldstein, Chair of the Northwest Interstate Compact, to David Delcour, Dawn Mining Company (August 4, 2000). Dawn's proposal to extend direct disposal is essentially the same as that approved by the Compact in 2000. The character and composition of the sludge remain the same as that evaluated in

2000. The same transportation and disposal procedures would be used. Moreover, the total amount of sludge that would be placed into TDA-4 even after an extension is less than half of that evaluated in 2000. As a result, the Compact's 2000 letter stating it has no objections to the direct sludge disposal plan could be considered applicable to Dawn's proposal to extend sludge disposal. However, WDOH has stated that it will seek approval from the Compact before granting Dawn's extension request. Dawn will assist WDOH in this effort.

Criterion 9: The Department of Energy (USDOE) is to be informed of the NRC's (or agreement state's) findings and proposed actions, with a request to concur within 120 days. A concurrence and commitment from either the USDOE or the State to take title to the tailings impoundment after closure must be received before granting the license amendment to the licensee.

2000 TEE Response to Criterion 9: "U.S. DOE's decision is pending receipt of the completed Technical and Environmental Evaluation, and a request from WDOH for a determination that the implementation of DMC's proposal would not interfere with the transfer of ownership to U.S. DOE. WDOH would not amend DMC's radioactive materials license to allow direct discharge, without written concurrence from U.S. DOE." 2000 TEE at 15.

Direct Sludge Disposal Extension Proposal: On March 29, 2001, the USDOE sent a letter to WDOH in which it stated that it had no objection to the direct disposal of the sludge into TDA-4. See Letter from Donna Bergman-Tabbert, USDOE (Grand Junction Office) to Gary Robertson, WDOH (March 29, 2001). The 2007 Addendum states that "Any extension of sludge disposal would require not only the department's approval but also that of the U.S. Department of Energy and the U. S. Nuclear Regulator Commission." 2007 Addendum at 2. Dawn will assist WDOH in the effort to secure the concurrences of the NRC and the USDOE.

Criterion 10: The mechanism to authorize the disposal of non-11.e(2) byproduct material in a tailings impoundment is an amendment to the mill license. Along with the license amendment, the agreement state must also take appropriate action to exempt the non-11.e(2) byproduct material from regulation as a low-level waste.

2000 TEE Response to Criterion 10: "WDOH's review, provided in this document [the 2000 TEE], has determined that direct disposal of MMWTP sludge into TDA-4 would be consistent and in compliance with WAC 246-252. TDA-4 was constructed in compliance with 10 CFR Part 40 criteria, and since the sludge material has been demonstrated to be very similar to the tailings, it is acceptable for disposal into TDA-4. In addition, direct disposal would not involve substantial changes and/or new information indicating probable significant adverse environmental impacts that were not adequately evaluated in the existing EIS/SEIS. Protection of public health and the environment does not require application of the requirements of WAC 246-250, the state equivalent of 10 CFR

Part 61. Therefore, direct disposal of the sludge should be exempted from WAC 246-250. If the license is amended to allow direct disposal of the sludge, an exemption will be granted." 2000 TEE at 15.

Direct Sludge Disposal Extension Proposal: After receiving concurrence from the NRC, see Letter from Paul Lohaus, NRC Office of State and Tribal Programs, to Gary Robertson, WDOH (December 14, 2000), the WDOH approved Dawn's proposal and amended Dawn's radioactive materials license in 2001 to allow for direct sludge disposal into TDA-4. WDOH amended Dawn's radioactive materials license again in 2007, authorizing direct sludge disposal through 2008 and providing that direct sludge disposal could be extended with WDOH approval. See Condition 33, Radioactive Materials License #WN-I043-2, Amendment 24. Because Dawn's license anticipates that the time frame for such disposal may be extended, no further amendment to Dawn's license is necessary.

V. Conclusion

Dawn's proposal to extend the direct disposal of MMWTP sludge into TDA-4 for as long as TDA-4 is open and available for such disposal is essentially the same as that evaluated and approved by the WDOH in 2000. The current proposal continues to satisfy all the necessary regulatory and NRC Guidance criteria and poses no significant environmental impacts. Continued sludge disposal in TDA-4 will not interfere with any millsite closure activities and will not interrupt or delay the closure of TDA-4.

Thank you for considering Dawn's request for an extension of direct sludge disposal. Dawn would like to offer its help in any way that would assist WDOH in its review and evaluation of this sludge disposal extension request. If you have any questions, please do not hesitate to contact me at (509) 258-4511.

Sincerely,

DAWN MINING COMPANY, LLC

Robert E. Nelson
Vice President & General Manager

Attachment

xc: Dorothy Stoffel, WDOH
file

ATTACHMENT 1:
EXTENSION OF DIRECT SLUDGE DISPOSAL AND MILLSITE CLOSURE

Background. The initial proposal for direct disposal of Midnite Mine Water Treatment Plant (MMWTP) sludge was developed by the Dawn Mining Company (DMC) and presented in the Integrated Project Schedule (IPS) submitted to Washington Department of Health (WDOH) in November 1999. The direct disposal proposal was based on a projected five-year period, 1999 through 2004, of MMWTP operation during which MMWTP sludge would be disposed directly in TDA-4. At that time, DMC did not anticipate the need to dispose of sludge beyond 2004 and believed that the plan for mine water treatment through 2004 was sufficient for removal of mine pit water and residual seepage at the Midnite Mine. The estimates of the sludge production volumes were based on: (1) two years of MMWTP operation at approximately 100% treatment capacity, treating mine water in Pit 3, Pit 4, and water collected in the backfilled pits; and (2) three years of MMWTP operation at 50% capacity, treating residual seepage and meteoric water collected in the open pits, backfilled pits, and the pollution control pond (PCP) collection system.

For the purpose of evaluating DMC's proposal, WDOH assumed direct disposal of MMWTP sludge through 2008 which, according to the millsite closure timeline submitted with the 1999 IPS, was how long TDA-4 would be available for such disposal. WDOH approved DMC's proposal for direct disposal of MMWTP sludge into TDA-4 in the 2000 Addendum to Existing Environmental Documents. After issuance of Amendment 23 of DMC's Radioactive Materials License, direct disposal of MMWTP sludge to begin in 2001. Amendment 24 of DMC's license, issued in 2007, allows DMC to continue to directly dispose of MMWTP sludge into TDA-4 through the end of 2008.

Pursuant to the EPA's Unilateral Administrative Order and Statement of Work for Water Treatment and Sludge Disposal at Midnite Mine Superfund Site (EPA, November 7, 2008), DMC is required to continue operation of the MMWTP and disposal of the sludge. While DMC explores other sludge disposal options, Dawn seeks the approval of WDOH to continue direct disposal of sludge into TDA-4 for as long as TDA-4 is scheduled to remain open and available for such disposal. Such an extension of sludge disposal will not affect

the timing for overall DMC millsite closure and closure of TDA-4 specifically. The basis for this conclusion is discussed in this attachment.

MMWTP operation and sludge volumes. Appendix I.3.4 of the 1999 IPS estimated that the sludge volume produced during the initially proposed five-year period of MMWTP operation (1999-2004) would total of approximately 0.50 million cubic feet. This total was based on two years of sludge production at full MMWTP capacity, followed by three years at 50 percent capacity. This volume of sludge, 0.50 million cubic feet, would be approximately 3 percent of the total volume of material that would be placed in TDA-4 under clean fill operations (excluding the cover). WDOH evaluated and approved of the direct sludge disposal proposal based on the total volume of sludge that would be placed into TDA-4 if sludge production and disposal continued through 2008. Adding another four years of sludge production at 50 percent capacity resulted in an estimated total sludge volume of about 0.75 million cubic feet that would be placed in TDA-4 under clean fill operations.

The volume of MMWTP sludge actually placed directly in TDA-4 since 2001 is approximately 235,000 cubic feet. This volume is less than one half of the initially estimated amount, less than one third of the volume estimated to be placed into TDA-4 through 2008, and comprises approximately 1.5 percent of the total volume of material currently stored in TDA-4. Based on MMWTP operations and actual sludge volumes produced and placed in TDA-4 since 2001, the volume of sludge that could be disposed of in TDA-4 during the remaining time that TDA-4 is scheduled to be open and available is expected to be no more than 90,000 cubic feet. Sludge would only be accepted in TDA-4 as long as TDA-4 is open and available and such that disposal would not affect the scheduled TDA-4 closure plan. This extended period of sludge disposal would result in a total sludge volume in TDA-4 of no more than 325,000 cubic feet, which is 2 percent of the total volume of material in TDA-4 (as of the end of 2008), and less than half of the volume evaluated and approved by WDOH in 2000.

Sludge disposal and TDA-4 reclamation. Extending the period of direct disposal of MMWTP sludge for as long as TDA-4 remains open and available would not affect the

reclamation and closure of TDA-4 or modify overall millsite closure under clean fill operations as described in the 2008 IPS. In 2009, contaminated site soil and general fill material are scheduled to be placed in TDA-4 to bring the eastern portion of TDA-4 to a level and grade required for overliner placement that year, and to stabilize the surface of the western portion of TDA-4 in preparation for overliner placement in 2010. In 2009, following placement of fill material, the overliner is scheduled to be placed over the eastern portion of TDA-4. In 2010, additional contaminated site soil, contaminated debris from demolition of the remaining millsite structures, and general fill material are scheduled to be placed in the western portion of TDA-4 to bring the surface of TDA-4 up to the level required for placement of the overliner. A small area in the overliner on the western portion of TDA-4 is scheduled to remain open to accommodate disposal of contaminated material that may be discovered during final soil cleanup activities. It is expected that this area of TDA-4 will be closed in 2011. Construction of reclamation cover over TDA-4 is expected to be done in 2012.

As discussed above, a portion of TDA-4 is scheduled to remain open until late 2010 to receive relatively large volumes of contaminated site soil and demolition debris, therefore disposal of additional MMWTP sludge in TDA-4 during this time will not impact the timing of TDA-4 closure and final reclamation.

Millsite water balance. An extension of sludge disposal in TDA-4 through the period of time that TDA-4 remains open and available and such that it does not alter the scheduled TDA-4 closure plans will not affect the overall water balance at the millsite. The volume of water collected in TDA-4 and pumped to the evaporations ponds is expected to be minimal in 2009 and 2010 (but will depend on actual climatic conditions). As described above, and as presented in the 2008 IPS, the western portion of TDA-4 is scheduled to remain open until late 2010 to receive contaminated site soil and demolition debris, as well as additional fill, prior to placement of the overliner over this area. Therefore, there will be a location for placement of MMWTP sludge in the western portion of TDA-4 and the additional volume of sludge will not alter material placement plans or grading for the overliner.

TDA-4 cover design. The cover design will not be affected by placement of additional MMWTP sludge in TDA-4. As discussed in Appendix C.2.2 of the IPS, the calculated cover thickness over TDA-4 for radon attenuation is based on a zone of contaminated millsite soils and stabilizing fill over tailings. The MMWTP sludge would be within this zone. The radium-226 activity concentration of the contaminated millsite soils used in the cover design calculations is estimated to be 51 pCi/g (the average value for the materials in the millsite area). The radium-226 activity concentration of the tailings used in the cover design calculations is 596 pCi/g based on the average value from ore grade calculations. The radium-226 activity concentration of the MMWTP sludge is 17 pCi/g (from Appendix I.3.4 of the IPS). Due to the low radium-226 activity concentration of the sludge, only the tailings and contaminated soils were used in the radon attenuation calculations.

The increase in radium-226 activity concentration in the sludge with time due to decay of uranium-238 was evaluated. This evaluation incorporated the decay of radium-226 as well as the in-growth of radium-226 from uranium-238 and thorium-230. The results show that after 100 years, the radium-226 activity concentration of the sludge would increase from approximately 17 pCi/g to 18 pCi/g. After 1000 years, the radium-226 activity concentration of the sludge would increase to approximately 43 pCi/g. The estimated radium-226 activity concentration in the sludge for the maximum regulatory design period of 1000 years is less than the contaminated millsite soil value (51 pCi/g). Therefore the cover design calculations in Appendix C of the IPS using the radium activity concentration of the contaminated millsite soils conservatively represent the materials beneath the cover in TDA-4. Placement of additional sludge in TDA-4 would not require modification of the cover design calculations.

WAC 246-252-030. Each of the criterion in WAC 246-252-030 is discussed below with regard to the direct disposal amendment request.

Criterion 1: Site Selection. The DMC millsite is located in a rural area of eastern Washington and the reclamation design demonstrates that TDA-4 will be permanently isolated from humans and the environment as required by this criteria. An extension of direct disposal of MMWTP will not alter this condition and thus achieves this criterion.

Criterion 2: Proliferation of Small Waste Sites. DMC seeks to dispose of MMWTP sludge in its existing tailings disposal site. Such action does not establish a new waste disposal site.

Criterion 3: Below Grade Disposal. The prime option for disposal of tailings is a below grade disposal impoundment. TDA-4 meets this criterion. An extension of direct disposal of MMWTP sludge will not alter this condition and thus achieves this criterion.

Criterion 4: Closure. Direct disposal of MMWTP sludge in TDA-4 is proposed for the period of time that TDA-4 is scheduled to remain open and such that it does not affect the timing of scheduled closure plans. The closure plan design presented in the IPS for TDA-4, as well as the other three TDAs, has been analyzed and shown to meet all the performance criteria for tailings disposal facilities. An extension of direct disposal of MMWTP in TDA-4 is only proposed for the period of time that TDA-4 remains available and provided that sludge disposal does not affect currently scheduled closure plans for TDA-4 as well as the remainder of the DMC millsite.

Criterion 5 and Criterion 13: Groundwater Protection. TDA-4 meets these criteria and the closure plan for the millsite has also been demonstrated to meet these criteria. An extension of direct disposal of MMWTP sludge will not alter achievement of these criteria.

Criterion 6: Radon Control. An extension of direct disposal of MMWTP sludge during the period of time that TDA-4 is scheduled to remain open and available does not affect achievement of this criterion. The reclamation design presented in the IPS demonstrates adequate cover performance with regard to radon attenuation.

Criterion 7: Monitoring. DMC's ongoing environmental monitoring program meets this criterion and is not affected by direct disposal of MMWTP sludge.

Criterion 8: Milling Operations. This criterion requires milling operations to be conducted so that all airborne effluent releases are reduced to As Low As Reasonably Achievable (ALARA). The mill was closed in 2001 and thus achieves this criterion.

Criterion 9: Financial Surety. This criterion does not apply to direct disposal of MMWTP sludge. However, updated surety cost estimates have been presented in the IPS, based on the proposed closure plan.

Criterion 10: Long-term Surveillance Bond. This criterion does not apply to direct disposal of MMWTP sludge. However, this item is included in the updated surety cost estimates presented in the IPS.

Criterion 11: Ownership. DMC's sludge disposal extension request presents a detailed discussion of how the proposed extension of direct disposal of MMWTP sludge meets each of the criteria presented in the NRC Final Revised Guidance on Disposal of Non-Atomic Energy Act of 1954, Section 11e.(2) Byproduct Material in Tailings Impoundments. By meeting these NRC criteria, direct disposal would not affect site ownership or transfer issues.

Criterion 12: On-going Maintenance. An extension of direct disposal of MMWTP sludge does not affect the reclamation cover design for the DMC millsite. The reclamation design presented in the IPS has been shown to meet all the reclamation requirements for tailings disposal facilities.

Attachment 2
Letters of Concurrence from U.S. Nuclear Regulatory Commission, U.S. Department of Energy, and the Northwest Interstate Compact for Extension of Sludge Disposal in TDA-4

09-04-01 ME/GR

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

RECEIVED
APR 03 2009
OFFICE OF RADIATION PROTECTION

March 27, 2009

Gary L. Robertson, Director
Office of Radiation Protection
111 Israel Road, SE
P.O. Box 47827
Olympia, WA 98504-7827

Dear Mr. Robertson:

I am responding to the February 12, 2009, letter from Mikel Elsen, Supervisor, Waste Management Section, to Dennis Sollenberger, Senior Health Physicist, in which the State of Washington requested the U.S. Nuclear Regulatory Commission (NRC) review the State of Washington's evaluation of Dawn Mining Company's (DMC's) request to extend the date of disposal of mine water treatment sludge (source material) into a tailings (11e.(2) byproduct material) disposal cell at the DMC mill site. The December 14, 2000, letter from Paul Lohaus concluded that the State had appropriately followed the NRC guidance, entitled, "Final Revised Guidance on Disposal of Non-Atomic Energy Act of 1954, Section 11e. (2) Byproduct Material In Tailings Impoundments," as published in the September 22, 1995 Federal Register. The NRC revised the guidance and issued it as part of a Regulatory Issues Summary (RIS) entitled, "Recent Changes to Uranium Recovery Policy," dated November 30, 2000.

We have completed our review of your submittal. Based on our review, we have concluded the State of Washington has considered the appropriate technical issues to authorize a continuation of the disposal of limited source material in the tailings impoundment at the DMC mill site through December 31, 2010. We agree that the time extension is consistent with the NRC guidance for conducting this activity.

If you have any questions concerning our response, please contact me at 301-415-3340 or Dennis Sollenberger at 301-415-2819.

Sincerely,

Robert J. Lewis, Director **/RA/**
Division of Materials Safety and State Agreements
Office of Federal and State Materials and
Environmental Management Programs

cc: Mikel Elsen

RECEIVED
MAR 10 2009
OFFICE OF RADIATION PROTECTION

Department of Energy
Office of Legacy Management

MAR - 4 2009

Mikel J. Elsen, Supervisor
Waste Management Section
Office of Radiation Protection
State of Washington Department of Health
111 Israel Road, SE
P.O. Box 47827
Olympia, WA 98504-6388

Dear Mr. Elsen:

This letter is in response to your request for the Department of Energy (DOE) concurrence for the further disposal of Midnite Mine sludge wastes at the Ford, Washington, Uranium Mill Tailings Radiation Control Act site operated by Dawn Mining Company, dated February 12, 2009. The DOE previously (2001) had concurred with the initial request for the disposal of wastes originating from the Midnite Mine treatment plant as sludge similar in nature to the UMTRCA tailings already being disposed by Dawn Mining at the site.

In reviewing your request dated February 12, 2009 and the Technical Evaluation Report (TER) of the State of Washington Department of Health, DOE is in concurrence with the request. It is the understanding of DOE that the disposal of additional material will take place during the extended license period to end December 31, 2010, and that the amount of material will be somewhat less than that originally projected for such disposal in the initial request. It is also the understanding of DOE that this amendment will be granted by the State Department of Health upon concurrence of DOE, the Nuclear Regulatory Commission (NRC), and the Northwest Regional Low-Level Radioactive Waste Compact. The DOE agrees with State assessment that this request continues to fulfill the 10 requirements of the NRC guidance for the disposal of non 11.e(2) wastes as cited in the TER as reviewed. The DOE also agrees that this action is already covered under the existing Environmental Policy Act evaluation previously performed and will not require a supplemental review.

Sincerely,

Richard P. Bush
Site Manager

2597 B 3/4 Road, Grand Junction, CO 81503	☐	3600 Collins Ferry Road, Morgantown, WV 26505
1000 Independence Avenue, S.W., Washington, DC 20585	☐	11025 Dover Street, Suite 1000, Westminster, CO 80021
10995 Hamilton-Cleves Highway, Harrison, OH 45030	☐	955 Mound Road, Miamisburg, OH 45342
232 Energy Way, N. Las Vegas, NV 89030	☐	
REPLY TO: Grand Junction Office		

cc:
A. Blado, State Assistant Attorney General
M. Garner, Northwest Low-Level Waste Compact
S. Miller, DOE GC
R. Peone, Spokane Tribe
G. Robertson, Washington Department of Health
D. Sollenberger, NRC
M. Widdop, Stoller (e)
File: FOR 000 (A) (Roberts)

bush/ford wa/mml request ltr to coe 2-09.doc

Northwest Interstate Compact
On Low-Level Radioactive Waste Management
P.O. Box 47600. Olympia, Washington 98504-7600. (360) 407-7102. Mike Garner, Executive Director

March 17, 2009

Mr. Mikel J. Elsen, Supervisor
Waste Management Section
Washington State Department of Health
Dawn Mining Company LLC
W. 505 Riverside, Suite 500
Spokane, Washington 99201

Dear Mr. Elsen:

Thank you for your February 12, 2009, letter stating it is the intention of the Washington State Department of Health to support a license amendment requested by Dawn Mining Company. The amendment request would extend authorization for the company to dispose of non-11.e(2) material, Midnite Mine water treatment plant sludge (source material), in Tailing Disposal Area 4 located at the company's mill site for a two year period.

Your letter states that with the two-year extension the total volume of treatment plant sludge will amount to only forty percent of the volume originally evaluated in 2000. The total radioactivity of the treatment plant sludge will amount to only thirty-three percent of the amount originally evaluated.

The Northwest Interstate Compact has no objections to the proposal to extend authorization allowing Dawn Mining Company to dispose of Midnite Mine water treatment sludge in Tailing Disposal Area 4 for two additional years.

Should you have any questions please contact Mike Garner at (360) 407-7102.

Sincerely,

Mike Garner

Mike Garner, Executive Director
Northwest Interstate Compact

cc: Northwest Compact Committee

Attachment 3
American Ecology Radioactive Material License

State of Washington

Radioactive Materials License

License Number: WN- I019-2

Pursuant to the Nuclear Energy and Radiation Control Act, RCW 70.98, and the Radiation Control Regulations, chapters 246-220 through 246-255 WAC, and in reliance on statements and representations heretofore made by the licensee designated below, a license is hereby issued authorizing such licensee to transfer, receive, possess and use the radioactive material(s) designated below; and to use such radioactive materials for the purpose(s) and at the place(s) designated below. **This license is subject to all applicable rules and regulations** promulgated by the State of Washington Department of Health.

1. Licensee Name: US ECOLOGY WASHINGTON, INC.	**3. License Number:** WN-I019-2 **Amendment in Entirety** Amendment 36
2. Address: 1777 TERMINAL DRIVE RICHLAND, WASHINGTON 99354 Attn: Mike Ault, Facility Manager	**4. Expiration Date:** 31 January 2011 **5. Reference Number(s):**

6. Radioactive Material (element and mass number).	7. Chemical and/or Physical Form.	8. Maximum quantity licensee may possess at any one time.
6.A. Any radioactive material, excluding source material and special nuclear material.	7.A. Dry packaged radioactive waste except as authorized by this license.	8.A. 60,000 curies (2.22×10^{15} Bequerels).
6.B. Source material.	7.B. Dry packaged radioactive waste except as authorized by this license.	8.B. 36,000 kilograms.
6.C. Special Nuclear Material.	7.C. Dry packaged radioactive waste except as authorized by this license.	8.C. 350 grams of U^{235} or 200 grams of U^{233} or 200 grams of plutonium or any combination of these, provided the sum of the ratios of the quantities does not exceed unity.
6.D. Any radioactive material.	7.D. Check and calibration sources in any form.	8.D. 0.1 Curie (3.7×10^{9} Bequerels).

License Number: WN-I019-2

Amendment 36

CONDITIONS

9. Authorized use.

A-C Radioactive waste may be received, transferred, stored, repackaged, and disposed at a low-level radioactive waste disposal facility. The maximum radioactivity and/or quantity of radioactive material indicated in items 8.A, 8.B, and 8.C apply only to above-ground activity.

D. For use as check and calibration sources.

10. A. The licensee shall not receive for disposal any waste containing Ra-226, H-3, I-129, Tc-99, U-238, C-14, U-234, and Pu-239 once the following source term limits have been reached:

Radionuclide	Total Site Limit (Curies)
Ra-226	464.60
I-129	5.98
Tc-99	55.10
U-238	1,547.7
C-14	5,090.00
U-234	335.4
Pu-239	4,510.00

B. Commencing January 1, 2006, the licensee shall not receive for disposal, any waste containing H-3 in an unstable waste form once the following yearly source term limit has been reached:

Radionuclide	Yearly Limit (Curies)
H-3 (unstable waste form)	100.0 Curies

11. The authorized place of use is a low-level waste burial facility located in the southeast corner of Section 9, Township 12 North, Range 26E W.M., Benton County, Washington, Route 4 - U.S. DOE Hanford Reservation, Richland, Washington 99352, within the boundary of the land area described in Sublease Agreement with the state of Washington, dated July 29, 1965, as amended. For the purposes of this license, the authorized place of use shall be referred to as the "facility."

License Number: WN-I019-2

Amendment 36

12. Reference to the "department" in this license shall mean the Department of Health or successor agency.

13. A. The licensee shall notify the department in writing within 30 days of the appointment of a new Facility Manager, Assistant Facility Manager, Radiation Protection Manager, or Assistant Radiation Protection Manager, describing how the appointee meets or exceeds the minimum qualifications specified in the Facility Standards Manual.

    B. The licensee shall notify the department in writing 30 days prior to any change in the licensee's corporate structure.

14. Upon receipt of a shipment, the licensee shall furnish to the department copies of all shipment manifests received. The licensee shall furnish to the department, within 30 days of a specific written request, special reports consisting of selected information contained on shipment manifests. By the tenth day of each month, the licensee shall submit a report totaling the volume and activity of the waste received during the previous month. In addition, a monthly facility receipt and burial activities report shall be submitted by the licensee, no later than the fifteenth day of the following month to the Department of Health, Supervisor, Waste Management Section. The report shall include the following information for each shipment:

    A. Name and address of the generator(s), broker (if any), and shipper.

    B. Radionuclides and activity of each radionuclide in millicuries (total and by generator).

    C. Grams of special nuclear material (total and by generator).

    D. Mass (in kilograms) of source material received (total and by generator).

    E. Class totals of volume and activity of Class A, B, and C waste entrenched (total and by generator).

    F. Volume of packages disposed with radiation readings at the surface of the disposal container of:

≤50 mr/hr	>1 R/hr ≤10 R/hr
>50 mR/hr ≤200 mR/hr	>10 R/hr ≤100 R/hr
>200 mR/hr ≤1 R/hr	>100 R/hr

and to the extent practicable:

G. Type and physical form of the waste.

H. Chemical form of the waste and solidification/stabilization/sorption agent used.

I. If an Engineered Concrete Barrier (ECB), or High Integrity Container (HIC) was used (total and by generator).

J. Quantity and type of chelates in concentrations greater than 0.1 percent by weight (total and by generator).

K. Type of secondary containment used (if any).

L. Volume of diffuse Naturally Occurring or accelerator produced radioactive material received (total and by generator).

15. In addition to the record keeping requirements contained in WAC 246-250-600, the licensee shall maintain a record for each shipment of waste disposed at the facility. As a minimum, the record shall include:

A. The date of disposal of the waste.

B. The location of the waste in the disposal site.

C. The condition of the waste packages as received.

D. Any discrepancies between materials listed on the manifest and those received.

E. Any evidence of leaking or damaged packages or radiation or contamination levels in excess of limits specified in United States Department of Transportation and state of Washington regulations.

F. A description of any repackaging operations of any of the waste packages in the shipment.

G. Type of secondary containment used (if any).

License Number: WN-I019-2

Amendment 36

GENERAL PACKAGING CONDITIONS

16. All radioactive waste shall be packaged, loaded, received, and transported in accordance with all applicable U.S. Department of Transportation regulations, U.S. Nuclear Regulatory Commission regulations, state regulations, and the requirements of this license. Nothing in this license shall in any way relieve the licensee from full compliance with all applicable state and federal laws and regulations, including but not limited to the Resource Conservation and Recovery Act of 1976, as amended, and the State Hazardous Waste Management Statutes of 1976, as amended, and subsequently enacted regulations.

17. Unless otherwise authorized, the licensee shall not receive for disposal any mixed low-level radioactive waste. Mixed waste is defined as any radioactive material which is no longer of use or value, and contains waste that either (A) is listed as dangerous waste in the state's Dangerous Waste Regulations, (B) causes the waste to exhibit any of the dangerous waste characteristics identified in the state's Dangerous Waste Regulations, (C) fulfills any of the "dangerous waste criteria" identified in the state's Dangerous Waste Regulations, (D) listed as hazardous waste in Subpart D, 40 CFR Part 261, or (E) causes the waste to exhibit any of the hazardous waste characteristics identified in Subpart C, 40 CFR Part 261.

18. Unless specifically authorized by the department, all radioactive waste shall be received and buried in closed containers. Cardboard, corrugated paper, wood, and fiberboard are prohibited burial containers.

19. All metal containers shall be secured by an intact heavy-duty closure device when presented for disposal. Closure devices of open-head metal drums having 55-gallons or greater capacity shall be secured by bolts having 5/8 inch or larger diameters. The shipper of any DOT 7A Type A container must maintain on file complete documentation of tests and an engineering evaluation or comparative data showing that the construction methods, packaging design, and materials of construction comply with that specification.

20. Radioactive waste shall be packaged in such a manner that waste containers received at the facility do not show:

    A. Significant deformation.

    B. Loss or dispersal of contents.

    C. An increase in the external radiation levels as recorded on the manifest, within instrument tolerances.

D. Degradation due to rust or other chemical action which results in a loss of container integrity.

21. Void spaces within the radioactive waste and between the waste and its package shall be reduced to the maximum extent practicable. Unless specifically approved by the department, void spaces within all waste packages shall be less than 15 percent of the total volume of the disposal package, provided the disposal package is not a high integrity container nor contains activated metals that are too large to put into high integrity containers. For Class B and Class C waste packages containing activated metals, voids shall be reduced to the extent practicable and shall be demonstrated to be structurally stable by any of the methods discussed in WAC 246-249-050(2)(a). This documentation shall be submitted to the department prior to disposal, and shall be kept on file by the licensee.

22. Waste shall not contain, or be capable of generating, toxic gases, vapors, or fumes during transportation, handling, or disposal.

23. No pyrophoric, hazardous, dangerous, or chemically explosive materials or materials which could react violently with water or moisture or when subject to agitation shall be accepted for disposal.

24. Waste or packaging shall not contain any liquid except as authorized by this license.

25. In order to keep doses as low as reasonably achievable (ALARA), the licensee shall not receive shipments of radioactive material unless appropriate lifting devices of sufficient length have been provided and securely attached to containers and palletized shipments within a cask.

26. The licensee shall not accept radioactive waste unless each waste package has been:

A. Classified in accordance with Appendix A of this license and the most recent version of the "Low-Level Waste Licensing Branch Technical Position on Radioactive Waste Classification," issued May 1983 by the U.S. Nuclear Regulatory Commission.

B. Marked as either Class A stable, Class A unstable, Class B, or Class C, as defined in Appendix A of this license and the most recent version of the "Low-Level Waste Licensing Branch Technical Position on Radioactive Waste Classification," issued May 1983 by the U.S. Nuclear Regulatory Commission.

C. Marked with a unique package identification number, clearly visible on the package, that can be correlated with the manifest for that particular shipment.

D. Stabilized, when required by this license, in accordance with criteria contained in the most recent version of the "Technical Position on Waste Forms," issued May 1983 by the U.S. Nuclear Regulatory Commission, and procedures that are described in approved vendor topical reports. Only those stabilization media approved by the department and listed in Appendix C to this license, or High Integrity Containers approved by the department and listed in Appendix D to this license may be used. Stability may also be achieved using engineered barriers in the disposal unit. Specific approval by the department is required prior to construction of any newly designed or redesigned engineered barrier. Only those engineered barriers listed in Appendix E of this license are approved for use at the facility.

27. The classification and package identification marking required by Condition 26 is in addition to any marking or labeling required by U.S. NRC or U.S. DOT, and shall consist of lettering 1/2 inch high or greater in a durable contrasting color to the background surrounding the lettering. The classification marking shall be visible on the same side as the radioactive marking or label and in close proximity (within six inches). Waste packages marked "Radioactive," "Limited Quantity," or "Radioactive LSA" need only one classification marking, whereas waste packages labeled White I, Yellow II, or Yellow III shall have classification markings in close proximity (within six inches) to each label. Waste materials shipped in casks shall have the classification markings visible on the outside of the cask.

28. The licensee may possess SNM that has not been disposed of at the facility, subject to the following restrictions and all other conditions of this license:

A. No single package shall contain more than 100 grams of U-235, or 60 grams of U-233, or 60 grams of Pu, or any combination thereof, such that the sum of the ratios of the quantity of each SNM radionuclide to the quantities specified herein exceeds unity. Compliance with this requirement shall be determined by the following formula:

$$\frac{\text{grams containing U-235}}{100} + \frac{\text{grams containing U-233}}{60} + \frac{\text{grams containing Pu}}{60} = <1$$

B. No single package shall contain more than 15 grams of any combination of U-235, U-233, and Pu, per cubic foot of the total volume. To the extent practicable, the SNM will essentially be uniformly distributed throughout the waste package.

License Number: WN-I019-2

Amendment 36

SPECIFIC WASTE FORM REQUIREMENTS

29. Except as allowed under this license, untreated liquids and wet sludges are not allowed for disposal. Liquids shall be rendered non-corrosive (4≤ pH ≤11) prior to treatment. Acceptable treatments are stabilization or solidification, depending on waste class. Wet sludges and slurries, such as evaporator bottoms, shall be non-corrosive and shall be treated by stabilization or solidification. Ion exchange media shall not be treated by sorption.

30. Liquids, ion exchange resins, or filter media treated by stabilization shall be processed in accordance with a process control program using an approved stabilization medium (see Appendix C). The resulting waste form shall contain no detectable free-standing liquid and shall meet the stability requirements of Condition 26. "No detectable free-standing liquid" is defined to be as little free-standing and noncorrosive liquid as is reasonably achievable, but in no case shall the liquid exceed 1.0% of the volume of the waste when the waste is in a disposal container designed to ensure stability, or 0.5% of the volume of waste processed to a stable form.

31. Liquids treated by solidification shall be processed in accordance with a process control program using an approved solidification medium (see Appendix B). The resulting waste form shall contain no detectable free-standing liquid. "No detectable free-standing liquid" is defined to be as little liquid as is reasonably achievable, but in no case shall it exceed more than 0.5 percent (by volume) of liquid per container.

32. Except as specifically provided in this license, the licensee shall not accept for disposal, any liquid radioactive waste packaged in sorbent material.

33. Incidental and unintentional liquids entrained in solid material may be received, provided that:

    A. (1) The dry material contains less than 0.1 volume percent of liquid within the package, or

    (2) If a process control program (PCP) is used to verify the amount of liquids, the dry material must contain less than 0.5 volume percent of liquids within the package and;

    B. Sufficient approved sorbent material (see Appendix F) is used and layered to absorb the incidental and unintentional liquids.

34. Waste containing biological (excluding animal carcasses, which are considered in Condition 35), pathogenic, or infectious material or equipment (e.g., syringes, test tubes, capillary tubes) used to handle such material, shall be treated to reduce, to the maximum extent practicable, the potential hazard from the non-radiological materials. The inner waste container shall be a metal container meeting DOT 7A performance specifications (see Condition 19) and shall be lined with a minimum 4 mil plastic liner which shall be sealed. The inner waste container shall be placed in an outer metal container meeting DOT 7A performance specifications with a heavy duty closure device (see Condition 19) and shall have a capacity at least 40 percent greater than the inner container. The void between inner container and outer container shall be completely filled by approved sorbent material and the outer container must be sealed. Only sorbents approved by the department shall be allowed (see Appendix F).

35. Animal carcasses containing, or contained in, radioactive materials shall be packaged in accordance with the following requirements: the biological material shall be layered with absorbent and lime and placed in a metal container meeting DOT 7A performance specification, having a heavy duty closure device (see Condition 19). The inner container shall be closed and placed in a metal container meeting DOT 7A performance specification with a heavy duty closure device, having a capacity at least 40 percent greater than the inner container. The void between the inner container and the outer container shall be completely filled by approved sorbent material and the outer container must be sealed. Only sorbents approved by the department (except Perlites) shall be used (see Appendix F).

36. Waste in gaseous form must be packaged at a pressure that does not exceed 1.5 atmospheres at 20^0C. Total activity shall not exceed 100 curies (3.7×10^{12} Bqs) per container. Class A gaseous waste shall be contained within U.S. DOT specification cylinders. Class A gaseous waste contained in hermetically sealed glass ampules, tubes, or sealed sources are exempt from the requirement for the specification cylinder provided that they are packaged in containers meeting DOT 7A specifications, having a heavy duty closure device (see Condition 19) and with sufficient sorbent material to prevent breakage and rupture of its contents. Specific approval of the department is required if the gaseous waste is Class B or C. Only sorbents approved by the department shall be used (see Appendix F).

37. Class A ion exchange and filter media containing radionuclides with half-lives greater than five years, the total package concentration of which is one microcurie (3.7×10^4 Bqs) per cubic centimeter or greater, except Cobalt 60 having a concentration of 50 microcuries per cubic centimeter or greater, shall:

A. Meet the stability requirements of Condition 26 and shall contain no detectable free-standing liquid. "No detectable free-standing liquid" is defined to mean as little liquid as reasonably achievable, but in no case shall the liquid exceed 1.0% of the volume of the waste when the waste is in a disposal container designed to ensure stability, or 0.5% of the volume of waste processed to a stable form. Other Class A ion exchange and filter media which are classified as unstable shall contain no more liquid than 0.5% by volume of the waste.

B. The calculations of concentrations of isotope activity will adhere to the "sum of fractions being equal to or less than unity rule" for ion exchange resins and filter media containing isotopes with half-lives greater than five years, with the exception of Cobalt 60.

38. Radioactive waste containing radium and/or transuranic radionuclides, as described in Appendix A, is acceptable, provided that the radium and transuranic radionuclides are essentially evenly distributed within an homogenous waste form. The receipt and disposal of waste in which the radium or transuranic radionuclides are not evenly distributed (components, or equipment primarily contaminated with radium or transuranic radionuclides), or radium or transuranic radionuclides in excess of Class A limits, requires the specific approval of the department. Radioactive waste packaged in accordance with License Condition 39 is exempt from this condition.

39. Radioactive consumer products, the use and disposal of which is exempt from licensing control (see WAC 246-232), may be received for disposal without regard to concentration limits of Appendix A, provided the entire unit is received and is packaged with sufficient sorbent material so as to preclude breakage and rupture of its contents. Only sorbents approved by the department shall be used (see Appendix F).

This condition allows the disposal of such consumer products as intact household or industrial smoke detector units containing Americium-241 foils, and radium or other radioactive materials incorporated into self-luminous devices and electron tubes. Documentation that the consumer product was manufactured under a U.S. Nuclear Regulatory Commission exempt license shall accompany each shipment made under this condition. Waste packaged in accordance with this license condition shall be Class A unstable, and the words "Condition 39" shall be noted on the manifest or other documentation accompanying the waste package.

40. Incinerator ash which is classified as Class A waste according to Condition 26 shall be solidified, granular, or treated in such a manner as to be rendered nondispersible in air, exclusive of packaging.

41. Wastes containing a concentration of oil in excess of ten percent by weight are not authorized for burial. Dilution by solidification or stabilization media shall not be allowed in determining the waste composition. "Oil" means an organic liquid which is immiscible in water, the disposal of which is not regulated under RCRA or the state hazardous waste regulations.

42. Until alternative waste management techniques such as incineration or recycling become generally available, waste liquids which have a pretreatment concentration of chelating agents in excess of 0.1 percent by weight shall be treated by either solidification or stabilization, and placed into an Engineering Concrete Barrier (ECB). Prior to receipt of any chelate waste in excess of 1.0 percent by weight, the generator must notify the licensee of the intent to ship such material for disposal. The notification shall consist of telephone and written notification to the Facility Manager prior to shipment. Dilution by solidification or stabilization media shall not be allowed in determining waste composition. "Chelating agent" means amine polycarboxylic acids (e.g., EDTA, DTPA), hydroxy-carboxylic acids and polycarboxylic acids (e.g., citric acid, carbolic acid, and gluconic acid), the disposal of which is not regulated under RCRA or the state hazardous waste laws. Additionally, the licensee shall record the three-dimensional location of the ECBs containing these wastes

43. The licensee shall not accept for disposal any neutron source (e.g., polonium 210, americium 241, radium 226 in combination with beryllium or other target) unless the generator has notified the licensee of the intent to ship such source to the licensees disposal facility. The notification shall consist of telephone and written notification to the Facility Manager prior to shipment. The notification shall indicate the isotope, activity, form of the source, a description of the packaging utilized, radiological data, and anticipated date of arrival. Additionally, a copy of the written notification must accompany the shipment made under this license condition.

RECEIPT, ACCEPTANCE, AND INSPECTION CONDITIONS

44. The licensee is exempt from the timely inspection requirements of WAC 246-221-160(2)(a) and (3)(a), provided the requirements of the Facility Standards Manual and Conditions 45 through 48 of this license are met.

45. Waste shipments shall not be accepted at the facility unless accompanied by the following (a single shipment shall consist of not more than one vehicle or one tractor with legal trailer(s) attached):

    A. Shipment manifest approved by the department.

B. Washington State Patrol or Washington State Utilities and Transportation Commission vehicle inspection certificate, or a current visible Washington State 90-day vehicle inspection seal.

C. Current certification Form RHF-31, properly executed by a representative of the shipper/generator of the waste, in accordance with requirements of Washington State Rules and Regulations for Radiation Protection, WAC 246-249-030.

D. Copies of any specific approval or variance granted by the department for disposal.

E. Upon departmental request, other permits or documentation required under this license, or state or federal law or regulation.

46. Waste shipments shall not be accepted by the facility unless the accompanying Form RHF-31 is stamped as received, and initialed by an authorized representative of the department. (This individual may be the licensee, when designated by telephone notification and confirming letter from the department.)

47. Upon acceptance for disposal of each waste shipment, the licensee shall:

A. Acknowledge receipt of the waste as soon as practicable, but no later than seven days following its acceptance for disposal, by returning a signed copy or equivalent documentation of the shipment manifest to the shipper. The shipper to be notified by the licensee is the one last possessing the waste and transferring it to the licensee.

B. Indicate on the returned copy of the shipment manifest, shipping papers, or equivalent documentation any discrepancy between noted waste descriptions listed on the manifest or papers and the waste materials received in the shipment.

C. Notify the shipper and the department when any shipment or part of a shipment has not arrived 60 days after the separate copy of the shipment manifest or shipping papers was received by the licensee.

D. Maintain copies of completed shipment manifests, including annotations of discrepancies found in accordance with Condition 47.B.

E. Maintain records in accordance with in WAC 246-250-600.

48. Any shipment in which there is evidence that any radioactive material is missing, or that the waste packages have been tampered with or damaged in transit, shall be received by the licensee and safely stored pending notification to the department. The licensee shall not dispose of such packages unless authorized by the department.

49. The manifest for each package of waste received for disposal shall list all radionuclides greater than 3,700 kBq (100 microcuries).

BURIAL OPERATIONS CONDITIONS

50. Packages containing radioactive material shall not be stored above ground for a period greater than ninety days from the date of the department's release of the packages. Packages shall be stored in such a manner as to maintain radiation exposures as low as reasonably achievable. Retention of packaged waste above ground for not more than three working days does not constitute storage.

51. Unless otherwise specifically authorized by the department, the licensee is not authorized to open any package containing radioactive material at the facility, except for the following:

    A. For purposes of repairing, repackaging, or overpacking leaking containers or containers damaged in transport in the event the material is to be disposed, or returned to the generator if required for the protection of the health and safety of the employees or the environment.

    B. For purposes of inspection and waste confirmation in the presence of a department inspector for compliance with Title 246 WAC, other applicable federal and state regulations, and conditions of this license.

    C. For purposes of returning outer shipping containers.

    The licensee shall use and maintain a facility, in accordance with the Facility Standards Manual, where the above operations can be safely conducted.

52. By June 1, 2006 the licensee shall dispose of all Class B, and C waste in a secondary containment system which has been reviewed and approved by the department. In addition, waste packages containing any of the following radionuclides, H-3, I-129, C-14, Tc-99, U-238, U-234, and Pu-239, shall be disposed in accordance with procedures approved by the department. Secondary containment shall be used for all packages that exceed the predetermined levels contained in these procedures, and the Facility

Standards Manual. Levels shall be established such that at least 90% of the allowable future source term activity for each listed isotope is placed in secondary containment. The effectiveness of these procedures shall be evaluated annually and reported in the Facility Utilization Report required by License Condition 71:

53. Class B and C waste packages stabilized with bitumen shall be backfilled immediately after waste placement. Sufficient backfill material shall be placed around each container to cover all sides around the packages.

54. Accumulations of waste packages, with an SNM Mass ratio (SNM Mass/ Package Mass) that exceeds 0.0002 (1/5000), in quantities specified in this license, shall be disposed so that there is a minimum of eight inches of soil or a minimum of four feet of non-SNM-bearing waste in all directions from any other accumulation of packages containing SNM in quantities specified in this license, with an SNM Mass ratio that exceeds 0.0002.

55. Class B, and C waste packages must be disposed at a minimum depth of five meters (16.5 feet) below the natural grade of the trench, as defined in the Comprehensive Facility Utilization Plan.

56. All discrete radium 226 must be disposed in an engineered concrete barrier (ECB) at a minimum depth of 23 feet below the natural grade of the trench, as defined in the Comprehensive Facility Utilization Plan.

SITE DESIGN AND CONSTRUCTION CONDITIONS

57. All burial trenches or disposal units shall be in a controlled area surrounded by a chain link fence, eight feet high, and topped with barbed wire.

58. Thirty days prior to commencement of construction of any new disposal unit, the licensee shall submit to the department a detailed engineering plan for the trench in accordance with the provisions of the Facility Standards Manual, or a statement that the proposed trench will be designed and constructed in accordance with Condition 60 of this license.

59. By June 30, 2006, the licensee shall submit, for approval by the department an updated Comprehensive Facility Utilization and Engineering Plan which encompasses the proposed site conditions for the expected lifetime of the facility. The Plan shall discuss, at a minimum, the reasoning for the choice of design, and shall include detailed drawings and calculations sufficient to support the conclusions reached. Changes to the Plan must be submitted to the department for review and approval. The plan shall be updated and submitted for approval by the department every five years.

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60. Until an the updated Comprehensive Facility Utilization and Engineering Plan required by Condition 59 is approved by the department, the licensee shall construct new disposal units in accordance with the March 6, 1991 department-approved Comprehensive Facility Utilization Plan, Document 200-DOC-001, Rev. 3.

61. A. Upon completion of the construction of any new trench, submit to the department two copies of the trench construction report. The report shall include, at a minimum, as-built drawings, daily and final inspection reports, laboratory and field soil test results, and a description of any problems encountered during construction, in order to demonstrate that the construction of the disposal unit is in compliance with applicable plans and specifications contained in the approved Facility Utilization Plan.

    B. 30 days prior to use of any new trench, notify the department in writing of the intent to physically place waste in the trench.

62. The dimensions of burial trenches shall not exceed a width of 150 feet (46 meters), a depth of 50 feet (15.24 meters), or a length of 1000 feet (305 meters) without specific documented approval from the department. Measurements shall be referenced to natural grade as established in the March 6, 1991 department-approved Comprehensive Facility Utilization Plan.

63. Until an agreement is secured with agencies controlling adjacent lands, which meets the requirements of Condition 74 (K) of this license, disposal units constructed after the effective date of this license shall be placed at least 100 feet away from the North, South, and West subleasehold boundaries. The set-back distance for the East boundary shall be no less than 50 feet.

ENVIRONMENTAL MONITORING AND SURVEY CONDITIONS

64. The licensee shall perform an exposure pathway analysis of the site closure plan within 180 days of a department-approved closure plan. The licensee shall verify that the proposed closure actions remain within the acceptable parameters developed and established by the Environmental Impact Statement's (EIS) "Comprehensive Exposure Pathway Analysis". The verification shall include air, soil, ground water, vegetation, fauna, burrowing animals, and human impacts. Additionally, the analyses shall be reviewed and updated as necessary every four years subsequent to the approval of the pathway analyses. Upon completion of the review, the licensee shall submit a copy of the review to the department. This requirement is in addition to the requirements found in WAC 246-250-060(1). Within 120 days of completion of the pathway analysis report, the licensee

shall submit to the department the licensee's evaluation and analysis of the report with respect to the environmental monitoring programs. The analyses shall clearly identify and differentiate between the roles performed by the natural disposal site characteristics and design features in isolating and segregating the wastes. The analyses shall clearly demonstrate that there is reasonable assurance that the exposure to humans from the release of radioactivity will not exceed the limits set forth in WAC 246-250-170.

65. The licensee shall conduct an environmental monitoring program capable of detecting the potential contribution of radioactive material from the site to the environment. The program shall include collection of samples and analyses at frequencies specified in the Facility Standards Manual (FSM). The licensee shall coordinate sampling schedules with the department to provide, when possible, duplicate samples on a prearranged frequency. A comprehensive annual report of all sample analyses, with statistical trend analyses and discussions of all anomalous results and actions taken, specification of the quantity of each of the principal contaminants released to unrestricted areas in liquid and in airborne effluents during the preceding year, wind rose for the facility, depth to water, and depth to bottom, Ph, as well as non-radiological contaminants specified in the FSM, for all groundwater wells, ventilation exhaust samples taken from the inspection facility, and comparisons of onsite groundwater wells and U.S. DOE groundwater wells in the vicinity of the facility shall be forwarded to the department by June 1 of each year. The report shall be submitted in general accordance with the department's document entitled "Recommended Content and Format for Annual Environmental Reports." Deviations in the reporting format must be approved by the department. In addition, the licensee shall report immediately any environmental monitoring results in excess of reporting levels specified in the Facility Standards Manual.

66. The licensee shall conduct an experimental monitoring program designed to determine the extent and modes of migration of disposed waste into the unsaturated zone, in accordance with procedures specifically approved by the department. Annual reports shall be made to the department by June 1 of each year. The results of the program shall be discussed in the annual Environmental Monitoring Report required by license Condition 65.

TRENCH AND SITE CLOSURE CONDITIONS

67. The licensee shall, within 90 days of filling each disposal unit, closed after the effective date of this license, erect interim disposal unit monuments upon which the following information shall be displayed in a legible manner:

A. Total activity of radioactive material, in curies, excluding source and special nuclear materials, total amount of source materials in kilograms, and total amount of special nuclear material in grams.

B. Trench number or disposal unit designation.

C. Date of opening and closing of the disposal unit.

D. Volume of waste contained in the disposal unit.

E. Coordinates of the disposal unit.

The erection of interim monuments may be omitted if permanent monuments, required by Condition 73, are scheduled to be erected within six months of completion of the disposal unit.

68. The licensee shall initiate closure and stabilization measures as each trench is filled and covered in accordance with the schedule and performance criteria defined in the Final Environmental Impact Statement for the Commercial Low-Level Radioactive Waste Disposal Site, Richland Washington, dated May 28, 2004.

69. The licensee shall conduct closure and stabilization operations in accordance with the most recent department-approved Comprehensive Facility Utilization Plan and the Facility Closure and Stabilization Plan required by Condition 74 as each trench is filled and covered.

70. In addition to the requirements of Condition 69, the licensee shall design and construct interim disposal unit caps in accordance with the specifications contained in the Facility Standards Manual. Interim disposal unit caps shall be established within 3 months of completion of a disposal unit, or as described in the Comprehensive Facility Utilization Plan approved by the department.

71. The licensee shall submit a facility utilization report to the department by June 30 of each year. The report shall provide:

A. Identification of each disposal unit and description of all waste emplaced during the previous calendar year. A three-dimensional identification to describe the disposal location of each Class B, and C package of waste including the location of engineered barriers used to provide structural stability, and the disposal location of those wastes containing oils or chelates shall also be provided. The location of Class A waste shall be tracked three-dimensionally within 50 feet horizontally and within 10 feet in the vertical plane.

B. Percent of utilization for each operating stable and unstable trench or disposal unit filled during the previous calendar year.

C. Annual aerial photograph of the leasehold.

D. Summary, by waste class, of activities and quantities of radionuclides disposed.

E. A summary of disposal unit maintenance activities.

F. Any instances in which observed site characteristics were significantly different from those described in the application for the license.

G. The remaining capacity of the disposal facility and each open disposal unit.

H. A summary of each disposed radionuclide and its activity.

I. An updated source term for the facility that covers all waste disposed during the previous year.

J. A summary of waste packages that have been placed in secondary containment.

K. The volume of diffuse Naturally Occurring and Accelerator produced Radioactive Material (NARM) disposed.

L. An evaluation of waste disposed in secondary containment during the previous year.

M. Any other information the department may require.

72. As radioactive material buried may not be transferred by abandonment or otherwise, unless specifically authorized by the department, the expiration date of this license applies only to the above-ground activities and to the authority to bury radioactive material wastes at the location specified in Condition 11. The license continues in effect, and the responsibility and authority for possession of buried radioactive material wastes continues until the department finds that the plan established for preparation of the facility for transfer to another person or custodial agency has been satisfactorily implemented in a manner to reasonably assure protection of the public health and safety and the environment, and the department takes action to terminate the licensee's responsibility and authority under this license. All requirements for environmental monitoring, site inspection, maintenance, and site security continue whether wastes are being buried or not.

73. All trenches or disposal units shall be conspicuously marked with permanent, stable monuments at each end, consistent with the approved site closure plan required by Condition 74. Permanent monuments shall be designed to stand erect, well above the grade of the final trench cover, and in a manner which will not allow them to be covered or obscured by drifting sand during the institutional control period. Inscriptions shall be made so as to endure and remain legible well beyond the institutional control period. The permanent monuments shall be inscribed with the following information:

    A. Total activity of radioactive material, in curies, excluding source and special nuclear materials, total amount of source material in kilograms, and total amount of special nuclear material, in grams, in the trench.

    B. Trench number or other means of identifying the disposal unit.

    C. Date of opening and closing the disposal unit.

    D. Volume of waste in the disposal unit.

    E. Coordinates of the stable and unstable disposal units, including disposal unit depth and depth of cover at closure.

    This same information shall be reported to the Department of Health and the Department of Ecology within 30 days of closure of each trench or disposal unit.

74. Upon approval of the Trench Cap Design required by License Condition 68, the licensee shall review and update the July 1996 Facility Closure and Stabilization Plan within one year, and shall review and update the plan as necessary every four years thereafter. A copy of this review shall be submitted to the department upon completion of the review. The facility closure and stabilization plan shall address how the licensee meets or plans to meet the following requirements:

    A. Bury all waste in accordance with the requirements of the license.

    B. Dismantle, decontaminate (as required), and dispose of all structures, equipment, and materials that are not to be transferred to the site custodian.

    C. Document the arrangements and the status of the arrangements for orderly transfer of site control and for long-term care by the government custodian. Also document the agreement, if any, of state or federal governments to participate in, or accomplish, performance objectives. Specific arrangements to assure availability of funds to complete the site closure and stabilization plan shall be documented.

D. Direct gamma radiation levels from buried wastes shall be essentially background at any accessible above-ground location, as determined by evaluation of environmental data from the licensee, the U.S. Department of Energy, and its contractors.

E. Demonstrate by measurement and model during operations and after site closure that concentrations of radioactive material which may be released to the general environment in ground water, surface water, air, soil, plants, or animals will not result in any member of the public receiving an annual dose exceeding an equivalent to 25 millirems (0.25 mSv) to the whole body, 75 millirems (0.75 mSv) to the thyroid, and 25 millirems (0.25 mSv) to any other organ.

F. Render the site suitable for surface activities without resort to custodial care exceeding vegetation control, minor maintenance, and environmental monitoring. No active ongoing maintenance shall be necessary. Final conditions at the site must be acceptable to the government custodian and compatible with its plan for the site.

G. Demonstrate that all trench elevations are above water table levels, taking into account the complete history of seasonable fluctuations.

H. Eliminate the potential for erosion or loss of site or trench integrity due to factors such as ground water, surface water, wind, subsidence, and frost action. All slopes shall be sufficiently gentle to prevent slumping or gullying. The surface shall be stabilized to minimize erosion, settling, or slumping of caps.

I. Demonstrate that permanent trench markers are in place, stable, and keyed to benchmarks. Identifying information shall be clearly and permanently marked as required by Condition 67 of this license.

J. Compile and transfer to the department complete records of site maintenance and stabilization activities, trench elevation and locations, trench inventories, and monitoring data for use during custodial care for unexpected corrective measures and data interpretation.

K. Maintain a buffer zone to provide space to stabilize slopes, incorporate offsite surface water management features, assure that any future excavation on adjoining areas shall be evaluated for the potential to compromise trench or site integrity, and provide working space for unexpected mitigating measures, if needed, in the future. The buffer zone may be within the subleasehold or on adjacent land, provided written agreements are secured with persons owning or controlling adjacent lands, which shall allow the licensee or custodial agency the required access and actions.

L. Provide a secure passive site security system (e.g., a fence) that requires minimum maintenance.

M. Stabilize the site in a manner to minimize environmental monitoring requirements for the long-term custodial phase, and develop a monitoring program based on the stabilization plan.

N. Investigate the causes of any statistically significant levels of radioactive or hazardous materials in environmental samples taken during operation and stabilization. In particular, any evidence of unusual or unexpected rates or levels of radionuclide migration in or with the ground water shall be analyzed, and corrective measures implemented.

O. Eliminate the need for active water management measures, such as a sump or trench pumping and treatment of water to assure that wastes are not leached by standing water in the trenches.

P. Evaluate present and proposed activities on adjoining areas to determine their impact on the long-term performances of the site, and take reasonable action to identify and minimize the effects.

75. Upon completion of Phase II of Trench Cap construction, the licensee shall develop specific procedures, and implement a program, approved by the department, which is designed to study (A) erosion of soils onto and off of the facility, (B) methods of revegetation of closed trenches, and (C) subsidence of trenches, in accordance with criteria established by the department. Once approved, the licensee shall submit annual reports to the department by October 31 which discusses the results of the program.

76. Upon closure of each disposal unit, the licensee shall submit to the department a summary of:

A. All radionuclides and associated activities disposed in that trench.

B. Waste class totals by volume and activities.

C. Disposal locations and volume of chelates disposed.

D. A summary, to the extent practical, of the physical and chemical forms disposed.

77. Notwithstanding other requirements of this license or the sublease, one year prior to the anticipated transfer of the licensee's facility and buried radioactive waste to another person (including an agency of the state or federal government), the licensee shall submit a final version of the facility closure plan, including a schedule for implementation of all remaining plan elements prior to transfer, and a description of the mechanics of orderly transfer in coordination with the transferee.

FINANCIAL ASSURANCES

78. By June 30 of each year, the licensee shall submit the following financial documentation to the department:

    A. A copy of its financial report or a certified financial statement and Security and Exchange Commission (SEC) Form 10K.

    B. A copy of its financial or surety arrangements for closure and stabilization of the disposal facility.

    C. A copy of personnel and nuclear liability insurance held for the facility.

79. The licensee shall submit to the department a copy of site surveillance fees paid, within 45 days after the end of each calendar quarter.

80. The licensee shall conduct a quality assurance/quality control program in accordance with US Ecology Quality Assurance Manual, and Quality Assurance Procedures Manual QA-MA-2. Changes to these documents shall be submitted to the department within 30 days of the change.

81. The licensee shall comply with the requirements set forth in Order dated November 29, 2005, signed by Gary Robertson, Director, Office of Radiation Protection, and made a part hereof by this reference. The licensee shall comply with any new requirements issued subsequent to date of original Order.

82. <u>Effective 4 April 2008:</u>
The licensee shall comply with the requirements described in the Administrative Amendment to this license and the document (NRC ORDER EA-07-305, with attachments, dated 5 December 2007) entitled "Fingerprinting and Criminal History Records Check Requirements for Unescorted Access to Certain Radioactive Material". Those requirements listed in the U.S. Nuclear Regulatory Commission Order (implemented in accordance with the due dates given in the "Timeline Attachment" to the 5 March 2008 Administrative Amendment cover letter), shall be instituted as required as part of the licensee's Trustworthiness and Reliability component of the Increased Controls requirements.

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By 3 July 2008, the licensee shall provide under oath or affirmation, to the state of Washington Department of Health and to the Nuclear Regulatory Commission, a certification that the Trustworthiness and Reliability Official is deemed trustworthy and reliable by the licensee as required in paragraph B.2 of the U.S. Nuclear Regulatory Commission (NRC) Order EA-07-305, published in the Federal Register on December 13, 2007 [72 FR 70901].

All fingerprints obtained by the licensee pursuant to this requirement must be submitted to the NRC for transmission to the U.S. Federal Bureau of Investigation (FBI). Additionally, the licensee's submission of fingerprints shall also be accompanied by a certification, under oath and affirmation, of the trustworthiness and reliability of the licensee's Trustworthiness and Reliability Official as required by paragraph B.2 of NRC Order EA-07-305.

The licensee shall complete implementation of the fingerprinting requirements by 1 October 2008. The licensee shall notify the state of Washington Department of Health and the U.S. Nuclear Regulatory Commission when they have achieved full compliance with the requirements described in the NRC Order. The notification shall be made within twenty-five (25) days after full compliance has been achieved.

The licensee shall notify the state of Washington Department of Health and the U.S. Nuclear Regulatory Commission within 24 hours if the results from a criminal history records check indicate that an individual is identified on the FBI's Terrorist Screening Data Base.

83. Except as specifically provided by this license, the licensee shall possess and use radioactive material described in Conditions 6, 7, and 8 of this license in accordance with statements, representations, and procedures contained in the documents listed below. The department's "Rules and Regulations for Radiation Protection," Title 246 WAC, shall govern the licensee's statements in applications or letters, unless statements are more restrictive than the regulations. Any change to the documents listed below shall require departmental approval in the form of an amendment to this license.

A. Application and cover letter dated January 7, 1997.

B. Facility Standards Manual, dated February 2003; Superseded by License Condition 83.D.

C. Administrative amendment incorporating increased controls, dated November 30, 2005.

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D. US Ecology Washington, Inc. Facility Standards Manual dated September 2006; Superseded by License Condition 83.F.

E. Letter and attachments dated March 29, 2007 RE: request to revise disposal limits for SNM and addition of requirement to dispose of Radium 226 sources in ECBs.

F. Letter and attachments dated December 20, 2007 RE: request to: eliminate experimental monitoring of vadose tritium and radon , solar still tritium, and radon in air; suspend vadose vapor sampling and groundwater sampling of hazardous constituent until after completion of the MTCA investigation; change gamma composite of air filters from monthly to quarterly; change tritium in air sampling from continuous to continuous for 30 days each quarter; change soil sampling from quarterly to once every 3 quarters; change vegetation sampling from quarterly to annually; change groundwater sampling from quarterly to once every 3 quarters; change all environmental TLDs to quarterly; change personal dosimetry exchange form quarterly to semi-annually; reduce vendor audits from every three years to every five years.

G. US Ecology Washington, Inc. Facility Standards Manual dated December 2007.

H. Administrative amendment; RE: adding new IC requirements for fingerprinting and criminal history checks.

FOR THE STATE OF WASHINGTON DEPARTMENT OF HEALTH

Date: March 5, 2008

By _____
Mikel J. Elsen, Supervisor
Waste Management Section

APPENDIX A

WASTE CLASSIFICATION TABLE

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RADIONUCLIDES	CONCENTRATION LIMITS IN CURIES/CUBIC METER**	
Table 1 (long-lived)	Class A	Class C
C-14	≤0.8	≤8
C-14 in activated metal	≤8	≤80
Ni-59 in activated metal	≤22	≤220
Nb-94 in activated metal	≤0.02	≤0.2
Tc-99	≤0.3	≤3
I-129	≤0.008	≤0.08

CONCENTRATION LIMITS IN NANOCURIES/GRAM		
Alpha emitting Transuranic radionuclides with half-lives greater than five years	≤10	≤100 with specific departmental approval
Radium 226	≤10	≤100 with specific departmental approval
Curium 242	≤2,000	≤20,000 with specific departmental approval
Plutonium 241	≤350	≤3,500

APPENDIX A

WASTE CLASSIFICATION TABLE

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RADIONUCLIDES	CONCENTRATION LIMITS IN CURIES/CUBIC METER**		
Table 2 (short-lived)	Class A	Class B	Class C
Total of all with half-life less than 5 years	≤700	♦	
H-3	≤40	♦ with specific departmental approval	
Co-60	≤700	♦	
Ni-63	≤3.5	≤70	≤700
Ni-63 in activated metal	≤35	≤700	≤7000
Sr-90	≤0.04	≤150	≤7000
Cs-137	≤1	≤44	≤4600

** Curies/cubic meter is equivalent to microcuries/cubic centimeter

♦ There are no limits established for these radionuclides in Class B or C wastes. Practical considerations such as the effects of external radiation and internal heat generation on transportation, handling, and disposal will limit the concentrations for these wastes. These wastes shall be Class B unless the concentrations of other nuclides in Table 2 determine the Waste to be Class C independent of these nuclides.

Note 1. Unless specifically restricted elsewhere in the license, the concentration of a radionuclide or radionuclide mixture may be averaged over the volume (or mass) of the waste and, if used, the solidification agent or matrix. The concentration of radionuclides in filters encapsulated with a solidification agent or matrix shall be averaged over the volume of the filter, not the solidification agent. The volume (mass) of packaging containers, liners or overpacks shall not be included in this calculation, nor shall the volume (mass) of the waste mixture be artificially increased by the addition of heavy, nondispersible solids or objects even if considered as waste. Further guidance is provided in "Low-Level Waste Licensing Branch Technical Position on Radioactive Waste Classification," May 1983, or successor documents issued by the U.S. Nuclear Regulatory Commission.

Note 2. The waste is Class A if none of the listed radionuclides is present. Waste packaged in accordance with Condition 39 of this license shall be Class A unstable and the words "Condition 39" shall be noted on the manifest or other documentation accompanying the waste package.

Note 3. There are no Class B values for Table 1 radionuclides; their presence classifies the waste as either Class A or Class C according to their concentrations.

Note 4. The waste class for mixtures of the listed radionuclides is determined by deriving for each radionuclide the ratio between its concentration in the mixture and its concentration limit in the table of this license and adding the resulting ratio values for each radionuclide group. All limits used in the calculations must be for the same waste class. The sum of the ratios for each radionuclide group must be equal to or less than 1.0, or the waste is the next higher classification than that used for the calculation.

If Class C limits are used in the calculation and the sum of ratios for either group exceeds 1.0, the waste is not acceptable for near-surface disposal without prior written approval from the department.

Note 5. If radioactive waste contains a mixture of radionuclides, some of which are listed on Table 1, and some of which are listed on Table 2, classification shall be determined as follows:

A. If the concentration of a nuclide listed in Table 1 does not exceed the Class A limit, the class shall be that determined by the concentration of nuclides listed in Table 2.

B. If the concentration of a nuclide listed in Table 1 exceeds the Class A limit, but does not exceed the Class C limit, the waste shall be Class C, provided the concentration of nuclides listed in Table 2 does not exceed the Class C value.

Note 6. If concentrations for any single radionuclide exceed the Class C values in the table, the waste is not acceptable for near-surface disposal under this license.

APPENDIX B

APPROVED SOLIDIFICATION MEDIA

License Number: WN-I019-2

Amendment 36

Only approved solidification media can be used. Approved solidification media are:

1. Atcor Cement
2. Aquaset I and II
3. Aztech (General Electric)
4. Bitumen* (Waste Chem and ATI)
5. Chem-Nuclear Cement
6. Concrete (Structural)
7. Delaware Custom Media
8. Dow Media
9. Envirostone
10. LN Technologies Portland Cement Formula for Oils
11. Pacific Nuclear Portland Cement
12. Petroset I and II
13. Safe T Set
14. SEG (Westinghouse - Hittman) Cement
15. Petroset -H
16. Aquaset -H
17. EMC Cement
18. Other solidification media and processes which have been approved by U.S. NRC and/or the department.

*Note: For waste types that require solidification, both oxidized bitumen and straight distilled are acceptable.

"Solidification" means a resultant waste form which is a free-standing solid and primarily relies upon a chemical reaction or encapsulation to contain the liquid. Approved stabilization media may also be used as solidification agents without conducting tests necessary to verify stability, provided the resulting waste form is a free-standing solid.

It is the responsibility of the person processing the waste into a solid form to adhere to a quality control program to verify the waste form is appropriate. If a material can also be used as a sorbent, the restrictions noted for its use in Appendix F shall apply to its use as a solidification agent.

APPENDIX C

APPROVED STABILIZATION MEDIA

License Number: WN-I019-2

Amendment 36

Only approved stabilization media may be used. Approved stabilization media are:

1. Aztech (General Electric)
2. Bitumen* (Waste Chem)
3. Concrete**
4. Dow Media (Vinyl Ester Styrene)
5. Veri Solidification Process
6. Other stabilization media and processes which have been reviewed and approved by U.S. NRC and the department as meeting waste form stability criteria.

*Note: Oxidized Bitumen only.

**Concrete, when used as an encapsulation medium around a small volume of radioactive material; e.g., a sealed source centered in a 55-gallon drum containing concrete, shall have a formulated compressive strength greater than or equal to 2500 psi.

APPENDIX D

CERTIFICATES OF COMPLIANCE FOR HIGH INTEGRITY CONTAINERS

License Number: WN-I019-2

Amendment 36

Only those High Integrity Containers which have been approved by the department and used in accordance with the Certificate of Compliance (C of C) may be used. Approved High Integrity Containers are:

C of C Number	Manufacturer	Package Identification Number
WN-HIC-01	Pacific Nuclear	DSHS-HIC-TMI-01
WN-HIC-02	Nuclear Packaging	DSHS-HIC-EA-50
WN-HIC-03	Chichibu Cement	DSHS-HIC-SFPIC 200L
WN-HIC-04	Chichibu Cement	DSHS-HIC-SFPIC 400L
WN-HIC-05	Nuclear Packaging	DSHS-HIC-EA 142-A
WN-HIC-06	Nuclear Packaging	DSHS-HIC-EA 50-A
WN-HIC-07	Nuclear Packaging	DSHS-HIC-EA 140-A
WN-HIC-08	Nuclear Packaging	DSHS-HIC-EA 190-A
WN-HIC-09	Nuclear Packaging	DSHS-HIC-EA 210-A
WN-HIC-10	Nuclear Packaging	DSHS-HIC-EA 50-C
WN-HIC-11	Nuclear Packaging	DSHS-HIC-EA 140-C
WN-HIC-12	Nuclear Packaging	DSHS-HIC-EA 142-C
WN-HIC-13	Nuclear Packaging	DSS-HIC-EA 190-C

APPENDIX D

CERTIFICATES OF COMPLIANCE FOR HIGH INTEGRITY CONTAINERS

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C of C Number	Manufacturer	Package Identification Number
WN-HIC-14	Nuclear Packaging	DSHS-HIC-EA 210-C
WN-HIC-15	(SEG) LN Technologies	DSHS-HIC-LN 179-H
WN-HIC-16	(SEG) LN Technologies	DSHS-HIC-LN 131-H
WN-HIC-17	(SEG) LN Technologies	DSHS-HIC-LN 118-H
WN-HIC-18	(SEG) LN Technologies	DSHS-HIC-LN 96-H

Other High-Integrity Containers which have been specifically approved by the department.

APPENDIX E

CERTIFICATES OF COMPLIANCE FOR ENGINEERED BARRIERS

License Number: WN-I019-2

Amendment 36

Only those Engineered Barriers approved by the department and/or NRC and used in accordance with the Certificate of Compliance (C of C) may be used. Approved Engineered Barriers are:

C of C Number	Issued To
WN-EB-01	US Ecology Washington, Inc.
WN-EB-02	US Ecology Washington, Inc.

Other Engineered Barriers which have been specifically approved by the department.

APPENDIX F

APPROVED SORBENTS

License Number: WN-I019-2

Amendment 36

Only those absorbents listed below have been approved by the state of Washington, Department of Health, Division of Radiation Protection, (department) for use in packaging and/or processing of incidental or unintentional radioactive liquids in accordance with License Condition 33.

Absorbency efficiencies and quantity of absorbent required vary. In all cases, it is the responsibility of the waste generator and/or packager to determine the efficiency and proper proportions of absorbent for incidental or unintentional liquids being absorbed. Note: Enough absorbent materials must be provided to absorb at least twice the volume of radioactive liquid contents.

Media

A. Clay Materials

1. Speedi Dri
2. Hi Dri
3. Florco
4. Florco X
5. Instant Dri
6. Safe T Sorb
7. Opalex
8. Moltan Plus

B. Diatomaceous Earths

1. Superfine
2. Floor Dry
3. Celetom
4. Safe N Dri
5. Solid-A-Sorb
6. Xtrasorb- 248

C. Perlite *

1. Chemsil 30
2. Chemsil 50
3. Chemsil 3030
4. Dicaperl HP2OO
5. Dicaperl HP5OO

D. Others

1. Dicalite Dicasorb
2. Petroset
3. Petroset II
4. Aquaset
5. Aquaset II
6. Safe T Set
7. SP-100
8. SP-400
9. Large Grain Superabsorbent crystals

* Note: Perlite products shall not be used for packaging animal carcasses.

Attachment 4
E-mail from Perma-Fix Regarding their Capacity and Capability to Process the Midnite Mine Sludge at their Facility

Davis, Melanie

From: John H. Hagan [jhagan@perma-fix.com]
Sent: Thursday, April 09, 2009 4:19 PM
To: Davis, Melanie
Cc: 'Richard Grondin'; 'Cannon, Curt'; 'Turner, Zane'
Subject: FW: Rev. 1 Perma-Fix Response - Midnite Mine sludge processing

Melanie,

We have revised the below response to reflect a minimum of 30 days required before we can proceed with waste receipts at our PFNW facility. As discussed, this minimum 30 day time frame begins upon contract execution and is subject to change (increasing) based upon the review and approval process as dictated by the regulating authority (WDOH).

If you have any questions, please feel free to contact me at (949) 939-7404.

Thank you,
John H. Hagan

From: Davis, Melanie [mailto:Melanie.Davis@tetratech.com]
Sent: Tuesday, April 07, 2009 4:49 PM
To: jhagan@perma-fix.com
Subject: Midnite Mine sludge processing

John,
I left you a voice mail as well. I am working with Lou Miller on the Midnite Mine sludge report for the EPA. I'll need to get some additional information from Perma-Fix to include in our report. We will need the information in the format of an email or letter which we would attach to the report. Some of the information needed is listed below.

1. The capacity and capability of the Perma-Fix facility to prepare the Midnite Mine sludge for disposal at U.S. Ecology

   Perma-Fix Response: We currently possess the capacity to receive and treat approximately 1.7 million net pounds of LLW sludge that is generated at your facility on an annual basis (please reference waste profile 2009-WPAFB-0001, Rev. 0). Our PFNW facility will require a minimum of thirty (30) business days after contract execution, before we can begin to receive waste shipments from Midnite Mines (due to license variance process as noted below). All waste shipments shall be pre-approved/authorized prior to shipment to our facility (per Waste Acceptance Criteria and profile approval letter dated February 26, 2009). We look forward to working with Midnight Mine on assembling a mutually beneficial shipment and receipt schedule that addresses both your waste shipment expectations as well as our facility waste receipt requirements at your convenience. Additionally, upon contract execution, we will assemble an anticipated treatment and disposal schedule for processed materials that may enable Midnite Mine and PFNW in preparation for disposal activities at the US Ecology disposal facility in Richland Washington. We understand that Midnite Mine will be responsible for all disposal costs related to this

sludge processing effort.

Note: Perma-Fix will need to increase condition 8.C. (Source Material) and possibly condition 8.D. (Any other radioactive material, Atomic Numbers 84-103, except Special Nuclear Material and Source Material) of our Radioactive Materials License prior to receiving this material at PFNW. We have already discussed this license variance request with WDOH and are confident that we can get a variance once a contract is in place and later amend the license for a more permanent adjustment to the license.

2. Confirmation that Perma-Fix can begin accepting sludge starting May 1, 2009.

   Please see above response.

There may be additional information needed, but that is all I have for now. Again, an email would be sufficient to provide the information.

Please call if you want to discuss.

Kind Regards,
Melanie

Melanie M. Davis, P.E. | **Project Manager/Senior Geotechnical Engineer**
Main 970.223.9600 | Fax 970.223.7171
melanie.davis@tetratech.com

Tetra Tech | Complex World, **Clear Solutions™**
3801 Automation Way | Suite 100 | Fort Collins, Colorado | 80524
www.tetratech.com

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Attachment 5
Forms submitted to American Ecology, Perma-Fix and Washington Department of Ecology

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
P.O. Box 47600 • Olympia, Washington 98504-7600
(360) 407-6000 • TDD Only (Hearing Impaired) (360) 407-6006

TO: Applicant

FROM: Diane Hallisy
Nuclear Waste Program

SUBJECT: Application for a Site Use Permit to Dispose of
Low-Level Radioactive Waste in Washington State

Enclosed is an application form for a Generator Site Use Permit and a permit fee schedule to enable you to calculate the permit fee due in accordance with Chapter 173-326 WAC, Commercial Low-Level Radioactive Waste Disposal -- Site Use Permits, accessible online at http://www.ecy.wa.gov/biblio/wac173326.html .
NOTE: This application is for generators of low-level radioactive wastes within the Northwest Interstate and Rocky Mountain compacts only. If your waste stream contains N.A.R.M. (naturally occurring or accelerator produced radioactive material) or Exempt wastes, you must apply for a separate disposal permit for those portions of the waste.

All items on the application must be answered. Completed applications with full payment should be returned to the address listed on the application. Failure to provide complete information (including the 9-digit Zipcode) on the application form, or lack of accompanying payment, will delay processing your application. Please note that the permit period runs from March 1 through February 28 of the following year. Permit fees for permits issued for less than the twelve month period will not be pro-rated. **USE THIS LETTER AS AN ORIGINAL INVOICE.**

In accordance with Washington State's Dangerous Waste Regulations, accessible online at http://www.ecy.wa.gov/biblio/wac173303.html , neither chemically hazardous nor mixed wastes (both chemically hazardous and radioactive) are acceptable for disposal at the low-level radioactive waste disposal site. These include, but are not limited to, scintillation fluids containing organic solvents (benzene, toluene, etc.).

If you have any questions or require additional information, please contact me at (360) 407-7109, or via e-mail at diha461@ecy.wa.gov.

DKH:dh
Enclosures

STATE OF WASHINGTON
SITE USE PERMIT FEE SCHEDULE
FOR THE
COMMERCIAL LOW-LEVEL RADIOACTIVE WASTE
DISPOSAL SITE,
RICHLAND, WASHINGTON

1. Generators, except nuclear utilities, who have previously held a site use permit for disposal of NARM, Exempt, or low-level radioactive wastes at the Richland site, must determine the amount of waste disposed by their organization in the most recent complete calendar year in which they held a permit. Using this volume figure, the Site Use Permit fee may be determined by referencing the table in paragraph 2.

2. Generators applying for a permit for the first time must estimate the volume of waste which they plan to dispose of during the period of March 1 through February 28 (low-level waste generators) or April 1 through March 31 (NARM and Exempt waste generators). Using this volume figure, the Site Use Permit fee may be determined by referencing the table below.

CATEGORY	**FEE**
Brokers	$ 1,000
< 50 cubic feet	$ 424
≥ 50 < 500 cubic feet	$ 848
≥ 500 < 1000 cubic feet	$ 2,120
≥ 1000 < 2500 cubic feet	$ 4,240
≥ 2500 cubic feet	$14,840
Nuclear Utilities	$42,400

STATE OF WASHINGTON
200 9
APPLICATION FOR A SITE USE PERMIT
TO DISPOSE OF LOW-LEVEL RADIOACTIVE WASTE
AT THE
COMMERCIAL LOW-LEVEL RADIOACTIVE WASTE
DISPOSAL SITE, RICHLAND, WASHINGTON

A. *Name of the company, organization, institution, etc., that is the original generator of the waste to be disposed of under this permit. (If the name changes, you must notify us by mail on the new letterhead.) Original generator means the last person who puts radioactive material to practical use. A broker may not list itself as the original generator of its client's radioactive material or waste, nor sign on behalf of the generator.*

Dawn Mining Company

GENERATOR'S NAME:

B. *Address where waste is generated.* ***(YOU MUST INCLUDE THE 9-DIGIT ZIP-CODE OR PERMIT WILL NOT BE PROCESSED****. Contact your local Post Office for further information.) Generators who own multiple facilities within the same state may apply for one permit if the same contact person within the generator's organization will be responsible for handling the waste shipments from the multiple facilities (attach a list of in-state facilities to the application). Otherwise, separate permits will be required. Facilities which are owned by the same generator but located in different states will require separate permits.*

Midnite Mine Water Treatment Plant	Dawn Mining Company
ADDRESS WHERE WASTE IS GENERATED	***MAILING ADDRESS (OF CONTACT PERSON)***
6834 Ford-Wellpinit Road	PO Box 250
Wellpinit WA 99040-6834	Ford WA 99013-0250
CITY STATE ZIP CODE (9 DIGITS)	***CITY STATE ZIP CODE (9 DIGITS)***

C. *Name of contact person who will be able to provide answers to any questions we may have on your application, waste generating activities or shipments.* ***(NOTE: PERMITS WILL BE MAILED ADDRESSED TO CONTACT PERSON; ENSURE MAILING ADDRESS AND CONTACT NAME AGREE.)***

Robert A. Nelson	Site Manager	(509) 258 - 4511 Ext
(First) (M.I.) (Last)	***TITLE***	***PHONE***

D. *A Nuclear Regulatory Commission or agreement state license is required for activities involving the possession, use, ownership, or transfer of most radioactive materials. List all license numbers pertaining to materials to be disposed. If you do not have a license relating to the materials to be disposed, please explain fully in the space provided.*

NRC LICENSE #(S): ***OR AGREEMENT STATE LICENSE #***

EXPIRATION DATE(S): ***EXPIRATION DATE:***

There is no current radioactive material license for the facility. The mine is under authority

IF YOU DO NOT HAVE EITHER LICENSE PLEASE EXPLAIN.

of the U.S. EPA

E. *Type of permit you are applying for. If you possess a current permit, or previously had a permit that expired, please state your permit number and volume of waste disposed of at the Richland site in the most recent calendar year in which you held a permit. First-time applicants should enter projected volume of waste to be disposed during the period March through February of the coming year.*

___ ***RENEWAL - SITE USE PERMIT #*** _____ ***- VOLUME DISPOSED DURING PREVIOUS PERMIT*** _____ ***(CU FT)*** _____ ***(YEAR)***

X ***FIRST-TIME APPLICANT - VOLUME PROJECTION (March - February)*** <50 ***(CU FT)***

F. *Calculate the permit fee due using the enclosed fee schedule and indicate amount of fee enclosed.*

AMOUNT ENCLOSED $_____

G. *Do you use a broker's services? If yes, indicate your broker's name and its Washington State Broker Site Use Permit number. If you use more than one broker, list them all.*

YES ____ ***NO*** X -- _____ -- _____

BROKER NAME(S) ***BROKER'S SITE USE PERMIT #(S)***

H. *Please indicate the one specific type which best describes your facility:*

1. ***FUEL CYCLE***
   - *a. NUCLEAR POWER REACTOR* ( )
   - *b. REACTOR FUEL PRODUCTION* ( )
   - *c. OTHER (NON-REACTOR)* (X)
2. ***MEDICAL***
   - *a. HOSPITAL/CLINIC* ( )
   - *b. RESEARCH* ( )
   - *c. LABORATORY* ( )
   - *d. OTHER* ( )
3. ***GOVERNMENT (NON-MEDICAL)***
   - *a. MILITARY* ( )
   - *b. RESEARCH* ( )
   - *c. REGULATORY* ( )
   - *d. OTHER* ( )
4. ***INDUSTRIAL***
   - *a. RESEARCH & DEVELOPMENT* ( )
   - *b. MANUFACTURING* ( )
   - *c. NUCLEAR PHARMACY* ( )
   - *d. WASTE BROKER* ( )
   - *e. OTHER* ( )
5. ***ACADEMIC (NON-MEDICAL)***
   - *a. RESEARCH* ( )
   - *b. LABORATORY* ( )
   - *c. REACTOR* ( )
   - *d. OTHER* ( )

I. *Types of wastes (e.g. solidified liquids, ion exchange resins, activated components, pipe scale, building rubble, etc.), and all radionuclides (e.g. C-14, H-3) that you will be shipping for disposal in Washington State.*

1. Source material, sludge from water treatment plant at uranium mine. Will be dried or solidified at Perma-Fix facility in Richland, WA prior to disposal.
   TYPES OF WASTES

2. Naturally occurring radionuclides, including uranium and progeny.
   RADIONUCLIDES

J. *Estimated volume of waste in cubic feet, and amount of activity in millicuries (mCi) that you will dispose of in Washington State in the next calendar year.* ***DO NOT USE SCIENTIFIC NOTATION FOR ACTIVITY.***

_____ ft^3 1000 *mCi*

K. *Estimated percentage of each class of waste. Total of percentage from all classes should equal 100%. (See WAC 246-249-040 online at* http://search.leg.wa.gov/wslwac/WAC%20246%20%20TITLE/WAC%20246%20-249%20%20CHAPTER/WAC%20246%20-249%20%20CHAPTER.htm

CLASS A (100 %) ***CLASS B*** (%) ***CLASS C*** (%)

L. *The permit fee is required at the time of submitting an application (WAC 173-326-040(1)). Make check or money order payable to the State of Washington, with your Washington State site use permit number (if renewing) written on the check or money order. Please provide the following information:*

CHECK OR MONEY ORDER # ***NAME OF COMPANY ISSUING CHECK OR MONEY ORDER***

M. *I certify that I am fully authorized to enter into the terms and conditions of this permit and am legally authorized to bind the applicant thereto. I hereby agree to comply with all applicable state and federal regulations related to the safe management of low-level radioactive waste (including the assurance that the waste contains no hazardous components as defined in Washington Administrative Code, Chapter 173-303, Dangerous Waste Regulations, and complies with the site operator's Radioactive Materials License and with all Department of Transportation packaging and shipping requirements as defined in 49 CFR 170 through 179). I understand that the State of Washington reserves the right to suspend or revoke this permit. The information provided on this form is complete and true to the best of my knowledge.*

SIGNATURE OF PERSON AUTHORIZED TO SIGN THIS APPLICATION (IN BLUE INK)

PRINTED NAME OF PERSON SIGNING ROBERT E. NELSON

TITLE VICE PRESIDENT + GEN. MGR.

DATE OF SIGNATURE FEB. 10, 2009

N. *Mail check or money order and application form (with original ink signature) to:*

Department of Ecology
Cashiering Section
PO Box 47611
Olympia, WA 98504-7611

Correspondence (other than application forms) may be addressed to diha461@ecy.wa.gov *(e-mail), or:*

Department of Ecology
Nuclear Waste Program
PO Box 47600
Olympia, WA 98504-7600

The Department of Ecology is an Equal Opportunity employer. If you need this document in an alternate format, please contact the Nuclear Waste Program at (360) 407-7109 (voice) or 1-800-833-6388 (TTY).

PLEASE ALLOW A MINIMUM OF 5 WEEKS TO PROCESS AND ISSUE SITE USE PERMIT. INCOMPLETE APPLICATION OR LATE PAYMENT WILL CAUSE DELAY.

Attachment 6
E-mail from American Ecology Regarding License Condition 10A Requirements and Ability to Dispose of Midnite Mine Sludge at their Facility

Davis, Melanie

From: Robert Haight [RHAIGHT@usecology.com]
Sent: Thursday, April 09, 2009 1:35 PM
To: Chad Hyslop; Lou.miller@live.com; Davis, Melanie
Cc: Chad Hyslop; Mike Ault
Subject: US Ecology Uranium

Chad asked me to send you our evaluation License Condition 10A requirements and our ability to dispose of Midnite Mine uranium bearing materials. See below.

Pursuant to your inquiry, Condition 10A of our State of Washington License #WN-I019-2 allows US Ecology Washington to dispose 1883 Curies of uranium (primarily U-234 and U-238) at our Richland LLRW disposal facility. To date we have disposed approximately 1795 Curies, leaving 88 curies remaining. We expect this remaining amount to last through site closure in 2056, unless large volumes of uranium are received in the interim. Shipments from Midnite Mine of approximately 1 Curie per year will not have a material impact on our limit for more than a decade. Based on business conditions and other factors US Ecology may pursue an increase in this limit at some future date. We believe the State of Washington will be open to these discussions. We are confident that our license will not prevent us from disposing Midnite Mine waste at the shipment schedule indicated.

Please let me know if you have any questions or need a formal written response.

Robert Haight, CHP
Radiation Protection Manager

Attachment 7
E-mail from Perma-Fix Regarding Cost Estimate for Processing Sludge at Perma-Fix

Davis, Melanie

From: John H. Hagan [jhagan@perma-fix.com]
Sent: Thursday, April 09, 2009 4:08 PM
To: Davis, Melanie
Cc: 'Lou Miller'; 'Grondin, Richard'
Subject: RE: Perma-Fix Budgetary Estimate No. 2009-03-013, Rev. 1 - Midnite Mine sludge processing

From: John H. Hagan [mailto:jhagan@perma-fix.com]
Sent: Tuesday, March 24, 2009 3:08 PM
To: 'Lou Miller'
Cc: 'Grondin, Richard'; 'Turner, Zane'
Subject: RE: Perma-Fix Budgetary Estimate No. 2009-03-013 - Midnite Mine sludge processing

Mr. Miller,

Reference: Perma-Fix Northwest Waste Profile No. 2009-WPAFB-0001 [approved]

We are pleased to provide the below budgetary estimate for the treatment of sludges currently residing at the Dawn Mining Company located in Ford Washington. This treatment estimate includes waste treatment activities employed at PFNW that will render the subject sludges acceptable for disposal at the US Ecology disposal unit in Hanford.

- Waste Treatment Activities at PFNW: $3.50/lb
    - Assumptions:
    - Treatment activities may include both thermal and non-thermal treatment technologies as determined by PFNW
    - Waste is designated as a Low-Level Radioactive Waste (LLRW)
    - Pricing above does not include Mixed Low-level waste treatment services
    - Waste Profiling Services into PFNW: provided by PFNW
    - Waste Profiling Services into Disposal Unit: provided by PFNW
    - Pricing is based upon entire waste volume 1.5 – 2.0 million pounds/year
    - Client will deliver material to PFNW in a container system suitable for management at PFNW facility
    - Estimated shipment timeframe to PFNW: April through September
    - Disposal: provided by client at US Ecology disposal unit at Hanford
    - Transportation to PFNW: provided by client
    - Transportation to disposal: provided by Perma-Fix

Please note that we have provided this budgetary estimate in a timely effort to assist you with the off-site waste disposition activities related to your recent requests. We will gladly follow-up with a formal proposal at your request. Please let me know if you have any questions or would like to discuss the above in further detail.

We appreciate the opportunity to provide this budgetary estimate to the Dawn Mining Company.

Thank you,
John H. Hagan
Regional Sales Manager
Perma-Fix Environmental Services, Inc.
(949) 939-7404

Attachment 8
E-mail from American Ecology Regarding Cost Estimate for Processing Sludge at Perma-Fix

FW: Dawn Mining
From: **Chad Hyslop** (CHYSLOP@americanecology.com)
Sent: Mon 1/05/09 12:18 PM
To: Lou Miller (b) (6)
Cc: Tray Caldwell (TCALDWELL@usecology.com)
Attachments: Dawn Mining Estimated Affect on Rates.xls (62.6 KB)

Lou;

Attached is the cost estimate for LLRW uranium disposal at USEW.

Please note Tray used 20,000 cuft in 2009 for this estimate. As you can see, our site Revenue Requirement (green cell) is $5,275,000.

If you participated in our rate survey for 2009 (ending in March), you could expect a cost of about $2,333,000 (yellow cells), with a $371,000 rebate at the end of the year, for a total net cost of $1,961,000.

If you did not participate in our rate survey but still shipped the same amount of waste, your up-front cost would be $3,576,000 (pink cells), with a $1,592,000 rebate, for a total net cost of $1,984,000.

Either way, your net cost is about the same, and your average disposal price is ~$98/cuft.

Please note that all of these calculations are based on estimates that we will need to refine together. However, this should give you a pretty good idea of costs and how our rate structure works.

Please call Tray or me with any questions (numbers below).

Thanks,

Chad

From: Tray Caldwell
Sent: Tuesday, December 30, 2008 7:22 PM
To: Chad Hyslop
Subject: RE: Dawn Mining

Chad,

Here is the disposal cost estimate. Give me a call tomorrow if you have questions when you look at it. Of course, this is based on a lot of assumptions but it gives a pretty good idea and shows how either way will be similar net amounts.

Tray Caldwell
US Ecology Washington, Inc.
tcaldwell@usecology.com
(509) 946-4945
(509) 946-5495 fax

From: Chad Hyslop
Sent: Thursday, December 18, 2008 2:06 PM
To: Lou Miller
Cc: Tray Caldwell
Subject: FW: documents

Lou;

Attached are the documents that we will need completed to begin receiving LLRW shipments from Dawn Mining. The key document with fees associated is the Site Use Permit.

We have also attached the "projection form" for your reference. We understand you aren't ready to submit this yet. Our final projection is due to our regulators by the end of March, so we still have time.

Tray Caldwell is our LLRW rate expert. He will work up an estimate for you of what your disposal costs would be in 2009 for 15,000 to 20,000 cubic feet of LLRW Class A uranium waste at ~1 to 2 nCi/g uranium. The estimate will include 1) expected costs if you were to participate in the rate setting process, and 2) expected costs if you did not. (b) (6) [redacted] you will receive this estimate the week of the 29th.

Please let us know if you have any questions or there is any additional information we can provide.

Thanks,

Chad

Chad Hyslop
Director of Sales & Marketing
American Ecology & US Ecology subsidiaries
300 East Mallard, Suite 300
Boise, ID 83706
Direct (208) 319-1604
Cell (208) 794-3415
Fax (208) 331-7900
chyslop@americanecology.com

From: Tray Caldwell
Sent: Thursday, December 18, 2008 2:09 PM
To: Chad Hyslop
Subject: documents

Here are all the documents I can think of for sending LLRW. I checked with Mike and he didn't add any.
The first four richland waste criteria, credit app, lowlevel generator (registration), and lowlevel radioactive (a waste shipment certification for the state) are all found on our website.
The 2009 projection form would be useful if they know before the end of March so I can include it in the rate filing.
The llrwpkg (site use permit application) is from the State of Washington Department of Ecology website.
This disposal contract is just a basic contract.

Tray Caldwell
US Ecology Washington, Inc.
tcaldwell@usecology.com
(509) 946-4945
(509) 946-5495 fax

US Ecology Washington, Inc.
Affect of Additional Volume on 2009 Rates and
Possible Refund if not Included in Final Rate Calculation

Assumptions: Additional 20,000 cu. ft., 34 shipments, and 204 containers all < = 200 mR/hr.

	Rate Components					
	Site Availability Charge (SAC)	Volume	Shipments	Containers	Dose Rate	TOTAL
Estimated Final Rates Effective May 1, 2009						
Revenue requirement for 2009	700,004	1,853,695	627,675	1,261,217	832,990	5,275,581
Projections for 2009		31,916	67	294		
"Safety Margin"		80%	80%	80%	Block 1 rate	
Billing determinants for 2009 rates		25,533	54	235	calculated for	
Rates for 2009, before rounding		$ 72.60	$ 11,710.35	$ 5,362.32	<=200 mR/hr	
Rates for 2009, rounded		$ 72.60	$ 11,710.00	$ 5,360.00	$ 131.00	
Affect of additional 20,000 cu.ft., 34 shipments, and 204 containers all <= 200 mR/hr.:						
Revenue requirement for 2009	827,986	1,801,846	610,119	1,225,940	809,690	5,275,581
Projections for 2009 plus additional		51,916	101	498		
"Safety Margin"		80%	80%	80%	Block 1 rate	
Billing determinants for 2009 rates		41,533	81	398	calculated for	
Rates for 2009, before rounding		$ 43.38	$ 7,550.98	$ 3,077.16	<=200 mR/hr	
Rates for 2009, rounded		$ 43.40	$ 7,550.00	$ 3,080.00	$ 124.00	
Using these adjusted rates, the total disposal charges		20,000	34	204	204	
plus the site availability charge would be:	$ 127,982	$ 868,000	$ 256,700	$ 628,320	$ 25,296	$ 1,906,298
Adding Tax and Fees ($1.75 cu. ft. PC&M, $6.50 cu. ft. Surcharge, $9.00 cu. ft. Site Surv., 3.3% B&O tax, and 1% WUTC Fee)						426,971
Total Charges:						$ 2,333,269
Average Cost Per Cubic Foot		$ 117				
Possible refund due to built in safety margin calculated	827,986	2,253,154	762,550	1,533,840	1,011,756	6,389,286
assuming all amounts of waste are sent in as projected:	827,986	1,801,846	610,119	1,225,940	809,690	5,275,581
	(0)	451,308	152,431	307,900	202,066	1,113,705
Estimated refund share:		0.39	0.34	0.41	0.03	
		173,861	51,313	126,128	5,052	$ 356,354
Adding Tax and Fees (3.3% B&O tax, and 1% WUTC Fee)						15,323
Total Possible Refund:						$ 371,677
Total Charges Net of Possible Refund:						$ 1,961,591
Average Cost Per Cubic Foot		$ 98				
Affect if additional volume is not included in final rate calculation and possible refund						
Revenue requirement for 2009	700,004	1,853,695	627,675	1,261,217	832,990	5,275,581
Projections for 2009		31,916	67	294		
"Safety Margin"		80%	80%	80%	Block 1 rate	
Billing determinants for 2009 rates		25,533	54	235	calculated for	
Rates for 2009, before rounding		$ 72.60	$ 11,710.35	$ 5,362.32	<=200 mR/hr	
Rates for 2009, rounded		$ 72.60	$ 11,710.00	$ 5,360.00	$ 131.00	
Using the non-adjusted rates, the total disposal charges		20,000	34	204	204	
plus the site availability charge would be:	$ 127,982	$ 1,452,000	$ 398,140	$ 1,093,440	$ 26,724	$ 3,098,286
Adding Tax and Fees ($1.75 cu. ft. PC&M, $6.50 cu. ft. Surcharge, $9.00 cu. ft. Site Surv., 3.3% B&O tax, and 1% WUTC Fee)						478,226
Total Charges:						$ 3,576,512
Average Cost Per Cubic Foot		$ 179				
Possible refund calculated assuming all amounts of waste are	827,986	3,769,102	1,182,710	2,669,280	1,038,480	9,487,558
sent in as projected plus the additional waste:	700,004	1,853,695	627,675	1,261,217	832,990	5,275,581
	127,982	1,915,407	555,035	1,408,063	205,490	4,211,977
Calculated share:	0.15	0.39	0.34	0.41	0.03	
	19,782	737,887	186,843	576,797	5,288	$ 1,526,597
Adding Tax and Fees (3.3% B&O tax, and 1% WUTC Fee)						65,644
Total Possible Refund:						$ 1,592,241
Total Charges Net of Possible Refund:						$ 1,984,271
Average Cost Per Cubic Foot		$ 99				

Attachment 9
E-mail from Denison Mining Regarding Processing Sludge at their Uranium Mill

FW: Water Treatment Sludge

From: **Lou Miller** (b) (6) [redacted]
Sent: Mon 12/29/08 3:58 PM
To: (b) (6) [redacted]

----- Original Message -----
From: Harold Roberts
To: Bob Nelson
Sent: Tuesday, December 23, 2008 3:06 PM
Subject: Re: Water Treatment Sludge

Bob:

We have been working on the sample of water treatment sludge received last month and so far the results look favorable for processing the material at the White Mesa Mill. We will need to finish the test work and work up a reagent, equipment and labor estimate to process the material. The basis of our proposal to accept the material for processing will depend on the amount of uranium recoverable and the processing cost. The uranium content is clearly high enough to qualify as an Alternate Feed material.

If we can agree on acceptable commercial terms then I believe we would be open to entering into a multi-year agreement, with allowance for periodic evaluation of the processing costs, and assuming the characteristics and uranium content of the material remains generally the same.

In order for us to accept the material as an Alternate Feed we will have to apply to the State of Utah for a license amendment to accept the material. That process can take anywhere from 6 months to a year. The process can get delayed by challenges from environmental groups, but this material should be easily defended. As long as the material is not a RCRA listed waste and it does not contain anything not contemplated by the Mill's original EIS, there should not be any big problems.

The material should be able to be shipped under the same regulations as uranium ore. I realize the material has an initial high moisture content, but as long as the material does not contain free liquid we should not have any receiving or storage issues. Our company web site has a copy of our Ore Transportation Procedures, under the Ore Purchase page. This should answer any questions about transportation of the material.

If you have any questions from your company management or the regulators I will be happy to talk with them.

Harold Roberts
Executive Vice President, US Operations

t: (303) 389-4160 | f: (303) 389-4125

DENISON MINES (USA) CORP

APPENDIX C
GENERAL OPERATING AND EQUIPMENT CRITERIA

1.0 WATER COLLECTION SYSTEM

1.1 Western Drainage Pump Station

- Pumps and Pipelines
  - Primary (Green) Pump:

    10 hp Electrically Driven Allis Chalmers 3X1.5,
    316 stainless centrifugal
    3 inch HDPE underground pipeline to the PCP

  - Secondary (Yellow) Pump:

    10 Hp Electrically Driven Allis Chalmers 3X1.5
    316 stainless centrifugal
    3 inch HDPE underground pipeline to the PCP

  - Tertiary (Red) Pump:

    10 hp Electrically Driven Allis Chalmers 3X1.5
    316 stainless centrifugal
    4 inch surface HDPE pipeline to the PCP

  - Back-up pump #1:

    10 hp Electrically Driven Grundfos 316 stainless submersible
    4 inch surface HDPE pipeline to the PCP

  - Back-up pump #2:

    15 hp Electrically Driven 4X3 Paco
    316 stainless centrifugal
    4 inch surface HDPE pipeline to the PCP

  - Back-up pump #3:

    Ford diesel powered 6X6 Gorman Rupp trash pump
    4 inch surface HDPE pipeline to the PCP

- Power
  - 3 phase, 15 KVA pole mount transformers
  - 200 amp. 480v. 3 phase service
  - Asco series 300, 70 amp. automatic transfer switch
  - Lima Silver Eagle 35 kw diesel generator set

1.2 Restroom Pump Station

- Pumps and Pipelines
  - Two ½ hp Electrically Driven Grundfos stainless submersible pumps
  - 1¼ in. polypipe to PCP

- Power
  - 15 kva pole mount transformer
  - 50 amp. 230v. single phase service
  - 230v. transfer switch
  - Kohler Power System 8.5Res, 8.5 kw Automatic start generator

1.3 East Seep Pump Station

- Pumps and Pipelines
  - McDonald ¾ hp Electrically Driven submersible pump
  - 1 inch polypipe to Pit 3

  - Grundfos ¾ hp Electrically Driven submersible pump
  - 1 inch polypipe to Pit 3.

- Power
  - 15 kva pole mount transformer
  - 200 amp. 230v. single phase service
  - 230v. transfer switch
  - Kohler Power System 8.5Res, 8.5 kw Automatic start generator

1.4 Far East Seep Pump Station

- Pumps and Pipelines
  - McDonald ½ hp Electrically Driven submersible pump
  - 1 ¼ inch polypipe to East Seep
  - Grundfos 1½ hp Electrically Driven submersible pump
  - 2 inch polypipe to Blood Pool

  - McDonald 2 hp Electrically Driven submersible pump

    - 1 ¼ inch polypipe to Blood Pool

- Power.
    - Feeds off of Blood Pool electrical system
    - 230v. transfer switch
    - Generator Power Fed from Far East Seep

1.5 Blood Pool Pump Station

- Pumps and Pipelines
    - 1½ hp Grundfos Electrically Driven submersible pump
    - 3 inch HDPE pipe to Pit 3

    - 2 hp Grundfos Electrically Driven submersible pump
    - 3 inch HDPE pipe to Pit 3

    - 2 hp Grundfos Electrically Driven submersible pump
    - 2 inch polypipe to Pit 3

- Power
    - 15 kva pole mount transformer
    - 100 amp. 230v. single phase service
    - 230v. transfer switch
    - Kohler Power Systems 18Res, 18 kw Automatic start generator

1.6 PCP Pump Station

- Pumps and Pipelines
    - 40 hp Electrically Driven Allis Chalmers 316SS 3X2 centrifugal pump
    - 4 inch HDPE pipe.

    - 40 hp Electrically Driven Gould 316SS 3X2 centrifugal pump
    - 4 inch HDPE pipe.

    - 671 Diesel powered 6X6 Gorman Rupp centrifugal
    - 6 inch HDPE pipe.

- Power
  - Three 37.5 kva pole mount transformers
  - 200 amp. 480v. three phase service
  - 100 kw Cummins generator set

2.0 PUMPING STATION, PLANT CONVEYANCE PIPELINE, AND WATER TREATMENT PLANT INFLUENT SYSTEM

2.1 Pit 3

- Pit 3 pump
  Pump Capacity = 600 gpm

  Normal Operating Flow = 450 gpm

  3”x4”x8” Stainless Steel Centrifugal Durco 3600 Pump

  Model # DT-222341, 480 Volt, 3-Pahse

  Electrically Driven 75 hP, 3560 RPM Motor, Frame 365TS
- Pit 3 conveyance piping to plant – 6-Inch HDPE x 3,400 feet
- Pit 3 hand control valve – 4-Inch Int Grn. Sander
  FNW-461 Stainless Steel
- Pit 3 4-Inch Blancett flow meter/totalizer
  134-400 Stainless Steel

2.2 Pit 4

- Pit 4 pump
  Pump Capacity = 300 gpm

  Normal Operating Flow = 50-70 gpm

  Gorman Rupp Trash Pump

  Model 16C2-B, Cast Iron

  Diesel Driven 150 hP, Ford 15-D Motor
- Pit 4 conveyance piping to plant – 3-Inch HDPE
- Pit 4 2-Inch manual valve
  Grinnell steel, flange mount butterfly valve
- Pit 4 2-Inch pressure control valve
  Watts 208, Steel
- Pit 4 2-Inch hand control valve
  Tufline steel ball valve, J8788
- Pit 4 2-Inch hand diversion valves to chemical makeup
  Grinnell steel, flange mount butterfly valve

3.0 PRIMARY TREATMENT SYSTEM

3.1 Barium Chloride Feed System

- Tank:
  Capacity – 1,000 gallons
  Diameter – 6 feet 0 inches
  Height – 4 feet 10 inches
  Mixing – Yes
  Material – steel

- Agitator – Belt driven steel
-
- Barium Chloride Transfer Pump – Barium Chloride Tank to BaCl2 Storage Tank
  2”x1 ½ ” Galigher Vacseal Stainless Centrifugal Pump
  Electrically Driven 2 hP Dayton Motor, Model 27935K
- Barium Chloride stainless metering pump, ¼ hP Milton Roy Diaphragm Pump
  Model #R-220A-117
  5 gpm @ 925 psi
- Barium chloride mixed feed is 50 g/L fed at a rate of 170-180 mL/min

3.2 Neutralization Tank #1

- Tank:
  Capacity – 5,600 gallons
  Diameter – 9 feet 11 inches
  Height – 11 feet 10 inches
  Mixing – Yes
  Material – Polyethylene

- Agitator – Belt driven steel
  HP – 10

- Feed Source & Flow Rates Pit 3 (Direct Feed): 450 gpm
  Clarifier #1 Recirculation: 15 gpm
  Clarifier #2 Recirculation: 40 gpm

- pH of Reactor Contents Normally 8.0
  Total Effluent from Tank #1: 500-510 gpm

3.3 Neutralization Tank #2

- Tank:
  Capacity – 5,600 gallons
  Diameter – 9 feet 11 inches
  Height – 11 feet 10 inches
  Mixing – Yes

Material – Polyethylene

- Agitator – Belt driven steel
  HP – 10

- Feed Source & Flow Rates Lime Slurry – Sufficient to maintain pH
  Neutralization Tank #1 (gravity overflow): 500-510 gpm
  Clarifier #2 Recirculation: 40 gpm

- Valve Positions Lime Slurry Flow Control: Partially Open (pH dependant)
-
- pH of Reactor Contents Normally 9.9

3.4 Neutralization Tank #3

- Tank:
  Capacity – 5,600 gallons
  Diameter – 9 feet 11 inches
  Height – 11 feet 10 inches
  Mixing – Yes
  Material – Polyethylene

- Agitator – Belt driven steel
  HP – 10

- Feed Source & Flow Rates Neutralization Tank #2 (gravity overflow): 500-510 gpm
-
- pH indicator and recorder
  Omega pH TX-92
  Normal operating pH of Tank #3 = 9.85

3.5 Neutralization Surge Tank

- Tank:
  Capacity – 2,500 gallons
  Diameter – 6 feet
  Height – 12 feet
  Mixing – No
  Material – Fiberglass

- Feed Source & Flow Rates Neutralization Tank #3 (gravity overflow): 500-510 gpm
  Centrate Surge Tank: 10 gpm

- Valve Positions Clarifier Feed Pump Inlet and Discharge Valves: OPEN

Hydraulic Retention Time of neutralization circuit is at least 30 minutes

3.6 Lime Slurry System

- Lime bin (silo) – Manufactured by Tri-State Metal Fabrication – Spokane, WA

  Tank:
  - Capacity – 50 tons
  - Diameter – 12 feet
  - Height – 30.5 feet
  - Material – Steel
  - Mixing – No

- Lime bin activator
- Lime bin vent and filter
- Lime auger – US Gear Box 2 ½ hP
- Lime Slaker Tank:

  Tank:
  - Capacity – 4,800 gallons
  - Diameter – 9 feet 3 inches
  - Height – 9 feet 7 inches
  - Mixing – Yes
  - Material – Steel
  - Mixer motor – 20 hP gear Driven
    - Doris Gear Box model 207SM-15, 15:1 gear ratio

- Lime Day Tank:

  Tank:
  - Capacity – 6,800 gallons
  - Diameter – 9 feet 11 inches
  - Height – 11 feet 10 inches
  - Mixing – Yes
  - Material –Polyethylene

- Lime Slurry Agitator - Slaker Tank
- Lime Slurry Agitator – Lime Slurry Day Tank, 20-foot diameter with 6 shafts
- Lime Slurry Transfer Pump – Slaker Tank to Day Tank

  4”x3” Rubber Lined Galigher Vacseal Centrifugal Pump

  Electrically Driven 3 hP Allis Chalmers Motor, 215 Frame
- Lime Slurry Delivery Pump – From Day Tank to Neutralization tank #2

  2 ½”x2” Wilfly Cast Iron Centrifugal Pump

  Electrically Driven 5 hP Reliance Motor, 184T Frame

3.7 Flocculant Mix and Feed System

- Flocculant Mix Tank:

  Capacity – 1,450 gallons
  Diameter – 6 feet
  Height – 7 feet
  Mixing – Yes
  Material – Carbon Steel

- Flocculant Day Storage Tank:

  Capacity – 1,450 gallons
  Diameter – 6 feet
  Height – 7 feet
  Mixing – Yes
  Material – Carbon Steel

- Flocculant Agitators – Mix Tank, 14-Inch Agitator, 1 shaft, 4 blades
- Flocculant Agitators – Day Tank – NOT USED
- Flocculant Transfer Pump – Mix Tank to Day Tank, 1”x2”x6” 2 hP Stainless Peerless 571, 184 Frame
- Flocculant metering pumps, Two 1 hP Rubber Lined L-4 Moyno Rotary Pumps

  Normal operating flow = 1.5 gpm to clarifiers & 1.5 gpm to centrifuge
- Flocculant Pressure Tank – Set pressure @ 40 psi

3.8 Primary Solid Liquid Separation

- Two Clarifiers:

  Clarifier #1 Tank:
  Liquid Volume – Approximately 53,000 gal
  Diameter - 30 feet
  Height - 10 foot side wall
  Material - Steel
  Mixing - No, sludge rake

  Clarifier #2 Tank:
  Liquid Volume – Approximately 16,500 gal
  Diameter - 20 feet
  Height - 7 foot side wall
  Material - Steel
  Mixing - No, sludge rake

- Sludge Pumps:

  Clarifier #1 Sludge Pump
  2-Inch Air operated Versamatic V235 E2, Rubber lined ball and check with steel housing

  Clarifier #2 Sludge Pump –
  2-Inch Galigher Vacseal centrifugal rubber lines steel pump, Model DIS-VRA-105

- Rakes and Drives:

  One Rake and One Drive per Clarifier

- Local Hand Controls
- Sludge Steady Head Tank

  Tank:
  Capacity – 2,100 gal
  Diameter – 5 feet 11 inches
  Height – 10 feet 3 inches
  Material - Steel
  Mixing - No

3.9 Effluent Filtration System

- Two Filter Vessels:

  Tank:
  Operating Flux Rate - 2.6 gpm/ft^2 each
  Diameter - 11 feet
  Height - 10 feet
  Material - Steel

- Filter Discharge Tank (Clearwell):

  Tank:
  Capacity – 18,000 gal
  Diameter - 16 feet
  Height - 12 feet
  Material - Fiberglass
  Mixing - No

- Filter Backwash Surge Tank (Mudwell):

  Tank:
  Capacity - 9000 gal
  Diameter - 16 feet
  Height - 6 feet
  Material - Fiberglass
  Mixing - No

- Backwash Water Pump

  3-Inch Galigher Vacseal rubber lined steel centrifugal pump

  Normal Operating Flow = 600 gpm

  Electrically Driven 15 hP Motor, 284U Frame
- Backwash Air Compressor – Alup Kompressor SCK 26-115
- Backwash Air Lance
- Filter Backwash Surge Tank Transfer Pump – Surge Tank to Neutralization Tank #1

  2 ½ x 2-Inch rubber lined cast iron Galigher Vacseal centrifugal pump, Model D-15-VR-A-101

  Electrically Driven 5 hP Allis Chalmer Motor, 215 Frame
- Level Indicator - Filter Backwash Surge Tank
- Level Indicator - Filter Discharge Tank

3.10 Final pH Adjustment

- pH monitor

  Omega pH TX-92

  Normal operating pH = 8.0-8.5

- Acid metering pump – LMI, Model A761 36TS1 Stainless
- Sulfuric acid drum – 55 gallons

4.0 PLANT EFFLUENT SYSTEM

- Discharge pump

  3-Inch Galigher Vacseal centrifugal pump with ABB ASC-500 Variable Speed Drive

  Electrically Driven 20 hP Motor, Frame 286U

- Effluent pipe – 6-Inch HDPE
- Final pH meter and probe

  Omega pH TX-92 meter, PHE-4580 Probe
  Normal operating pH = 6.0-9.0

- Flow meter/totalizer - Blancett

5.0 SLUDGE HANDLING

- Two Centrifuges – Sharples 3400, 16-Inch Diameter x 4-Feet
- Centrifuge Feed Pumps – Moyno L-4, 1.5 hP rubber lined
- Discharge Conveyor – 24” x 36”
- Centrate Surge Tank

  Tank:

  Capacity – 52.6 gal
  Diameter – 30 inches
  Height - 42 inches
  Material - Steel
  Mixing - No

APPENDIX D
DAILY OPERATING LOG

Dawn Mining Company – Water Treatment Plant
24 Hour Daily Report

Date:_____
First Shift, Name:_____ Section Shift, Name:_____

	0700	0900	1100	1300	1500	1700	1900	2100	2300	0100	0300	0500
pH-Neut. Tank #1 Grab												
pH-Neut, Tank #2 Auto/Grab												
pH-Neut, Tank #3 Auto/Grab												
pH-Chevron O.F.												
pH-Clarifier O.F.												
pH-Entering Sand Filters												
Plant Feed Rate gpm												
Flow Rate of Discharge gpm												
Discharge Location												
Discharge pH Auto/Grab												
BacL/2 Tank Meas. (ins.)												
BacL/2 Flow (ml/min)												
Antiscalant (ml/min)												
Acid (ml/min)												
Floc Flow Cent #2 0.4 gpm 15 hrs												
Centrifuge Back Drive Diff #1/#2												
Dry Lime Transfer (min)												
Lime Transfer (ins)												
Floc Mixed (lbs./batch)												
Flushed Centrifuge												
Samples water												
Time Truck Moved												

Comments:	Safety Check

Date:_____

WATER TREATMENT PLANT
Supervisors Daily Report
Report Period – previous 24 hours

Pit Level:

Pit 3:_____ Pit 4:_____ Precipitation:_____

Flow Rate Data:

Pit #3 (GPM):_____ Time:_____ Totalizer Reading:_____

Plant Discharge (GPM): _____ Time:_____ Totalizer Reading:_____

Pit #4 (GPM):_____ Time:_____ Totalizer Reading:_____

Operational Data:

Hours Discharged:_____

Hours Returned to Pit #3:_____

Hours Shut Down:_____

Tons of Lime Delivered:_____

Lime Auger Operated for _____ hours

Total Floc Mixed for Period _____ lbs (dry)

Other:

1. Are film badges being worn? ☐ Yes ☐ No
2. Are personnel/vehicle surveys being completed? ☐ Yes ☐ No
3. Are sludge splatter being cleaned up in a timely manner? ☐ Yes ☐ No
5. Paint Filter Liquid Test: ☐ OK ☐ Failed Percent of Solids: _____ %

Sludge Production Gross Weight (wet):

International _____
Previous trip return inspection ☐ OK

Ford _____
Previous trip return inspection ☐ OK

Truck Load # _____
Fuel pumped: _____ gallons
Vehicle Inspection:

International	OK?	Comments
Brakes	☐	_____
Steering	☐	_____
Tires	☐	_____
Lights	☐	_____
Emergency blinkers, turn signals, brake lights		
Mirrors	☐	_____
Tailgate	☐	_____
Emergency Equip	☐	_____
Sludge Kit	☐	_____
Operating Fluids	☐	_____
Fire Extinguisher	☐	_____

Truck Load # _____
Fuel pumped: _____ gallons
Vehicle Inspection:

Ford	OK?	Comments
Brakes	☐	_____
Steering	☐	_____
Tires	☐	_____
Lights	☐	_____
Emergency blinkers, turn signals, brake lights		
Mirrors	☐	_____
Tailgate	☐	_____
Emergency Equip	☐	_____
Sludge Kit	☐	_____
Operating Fluids	☐	_____
Fire Extinguisher	☐	_____

APPENDIX E
MANUFACTURER OPERATIONS AND MAINTENANCE MANUALS

Appendix E
Manufacturer Operations and Maintenance Manuals
Index

1. Versa-Matic E2 2-inch Pumps with Rubber Elastomers
2. Asea Brown Bovari Installation and Start Up Manual for ACS 501 Adjustable Frequency AC Drives 1-75 HP, Series D
3. Wilfley Operating Handbook for Centrifugal Sand Pump Model K
4. Milton Roy Company mROY Controlled Volume Pump
5. Durion Company Installation Operation and Maintenance of Mark II Durcopumps
6. Gorman Rupp 66-B2-6031C
7. Robbins & Myers Operations – Assembly Instructions and Parts List for “L4” Drive End
8. Blancett Fluid Flow Meters BL-5100 Loop Powered 4-20 MA Transmitter
9. Galigher Company Horizontal Vacseal Pumps
10. U.S. Motors Varidrive Installation and Maintenance Manual
11. Galigher Vertical Sump Pumps
12. Kohler Power Systems 8.5/12Res Generator
13. Kohler Power Systems 18Res Generator
14. Kohler Residential/Commercial Generator Sets Operation Manual

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APPENDIX F
MIDNITE MINE SITE SPILL PREVENTION CONTROL AND COUNTERMEASURES PLAN

Spill Prevention, Control and Countermeasure Plan for the Midnite Mine Water Treatment Plant for the Phase I RD/RA: Interim Water Management for Midnite Mine

Revision 1

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May 5, 2009

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1.0 INTRODUCTION

This Spill Prevention, Control, and Countermeasures (SPCC) Plan has been prepared for the Midnite Mine Water Treatment Plant (WTP) as part of the Contingency Plan as required by U.S. Environmental Protection Agency (EPA) Title 40 CFR Part 109. This plan has been prepared in accordance with good engineering practices, and has the full approval of management at a level of authority to commit the necessary resources for implementation. This plan discusses the design and operating measures practiced to prevent the discharge of harmful quantities of oil, hazardous substances (HS), extremely hazardous substances (EHS), or hazardous waste (HW) into the environment in accordance with the following regulations promulgated by the EPA and identified in Title 40 CFR:

Part 112 – Oil Pollution Prevention
Part 116 – Designation of Hazardous Substances
Part 264 – Hazardous Waste
Part 302 – Designation, Reportable Quantities, and Notification (CERCLA)
Part 355 – Emergency Planning and Notification (SARA)

Oil, HS, EHS, and/or HW releases, regardless of location, size, and reason for the release create situations which must be handled swiftly and efficiently. The purpose of this SPCC Plan is:

1. To prevent spills of oil, HS, EHS, and HW
2. To prepare plant personnel for releases of these materials
3. To aid in the orderly and efficient containment and recovery of all types of releases
4. To indicate the proper procedure for reporting such releases

The plan discusses potential spills, materials and waste inventory, spill containment and prevention, and general emergency procedures. The provisions of this plan will be carried out immediately whenever there is a spill at the Midnite Mine Water Treatment plant (WTP) which could threaten human health or the environment.

Dawn Mining Company (DMC) implements a Best Management Practices (BMP) Plan (SMI, 1996) at the site that includes measures to prevent or minimize the potential for the release of pollutants from the WTP to waters of the United States. This SPCC plan replaces the BMP Plan (SMI, 1996).

Copies of the SPCC Plan as part of the Contingency Plan will be distributed to the persons listed on the distribution list. Robert Nelson, Site Manager, will be responsible for distributing copies of the plan to local police departments, fire departments, hospitals, and state and local emergency response teams. Copies of the plan will also be maintained at the Midnite Mine WTP. EPA and emergency response teams will be instructed on the facility layout and operation, potential hazards, places where facility personnel would normally be working, entrances and exits, and possible evacuation routes.

Copies of this plan will be updated if improvements are made or information changes.

2.0 GENERAL INFORMATION

The Midnite Mine Water Treatment Plant is located approximately 25 miles northwest of the town of Ford, Washington. The location is shown in Figure 2-1. A general plant layout is provided in Figure 2-2.

The Midnite Mine is an inactive mining facility. The only operations carried out at the mine site by Dawn Mining Company (DMC) consist of activities associated with the seasonal treatment of water contained in open mine Pit Number 3 (see Figure 2-3). Most of the storm water that comes in contact with the treatment plant area flows into the Blood Pool, or to the Blood Pool pumpback station (see Figure 2-3). From these areas, the stormwater is pumped into Pit No. 3. The rest of the storm water that comes in contact with the treatment plant area either flows directly into Pit No. 3, evaporates, or drains to the ground. Water from Pit No. 3 is pumped to the WTP for treatment and eventually discharged to Blue Creek.

The activities at the WTP require only a few employees to be present at the mine site, and then only during approximately seven months of the year when the treatment plant is operational.

The Midnite Mine WTP precipitates metals from the influent aqueous solutions using hydrated lime, barium chloride, and recycled sludge. The final pH of the treated water is adjusted down utilizing sulfuric acid before discharging. This treated, neutralized water is then returned to the natural drainages within the area.

Potential spills from the Midnite Mine WTP include spills of the following materials and/or chemicals:

- Hydrated lime
- Flocculant
- Sulfuric acid
- Diesel fuel
- Lube oil and grease
- Gasoline
- Propane
- Barium chloride
- Anti-Scalant
- Sludge (filter cake)

Should an incident involving a spill of or contact with one of the above materials occur, Table 2-1 includes the immediate attention necessary for contact with skin or eyes, or if the material is inhaled or ingested onsite. Table 2-2 includes information necessary for emergency responders to the scene.

Table 2-1. Operator Spill Responses

Operator Emergency Response		
Chemical	**Method**	**First Aid Response**
Hydrated Lime	Skin	Brush off skin surface, Rinse with lukewarm water for 15 to 20 minutes. Call physician if exposed area is large or if irritation persists.
	Eyes	Immediately rinse with saline solution for 15 to 20 minutes including lifting the upper and lower lids, or water if saline is not available. If embedded particle in the eye, contact a physician.
	Inhalation	Move source of dust or to fresh air. Obtain medical attention immediately.
	Ingestion	Drink 300 ml (10 oz.) of water, followed by diluted vinegar (1 part vinegar, 2 parts water) or fruit juice. Do not induce vomiting. Contact a physician immediately
Flocculant (NS 6852)	Skin	Wash with water and soap. Call physician if irritation persists.
	Eyes	Rinse with water including lifting the upper and lower lids. In case of persistent eye irritation, contact a physician.
	Inhalation	Move source or to fresh air. Contact a physician if irritation persists.
	Ingestion	Product is not considered toxic based on studies on laboratory animals
Sulfuric Acid	Skin	Flush with soap and water for at least 15 minutes. Do not scrub or rub. Seek medical attention immediately.
	Eyes	Flush immediately with water for at least 15 minutes, lifting the upper and lower lids. Seek medical attention immediately.
	Inhalation	Move to fresh air immediately. Seek medical attention immediately.
	Ingestion	Consume large amounts of water or milk. Do not induce vomiting. Seek medical attention immediately.
Diesel fuel	Skin	Wash affected area with soap and water. If irritation develops, consult a physician.
	Eyes	Wash with water for at least 15 minutes, including lifting the upper and lower lids.
	Inhalation	Move to fresh air. Contact a physician if irritation persists.
	Ingestion	Drink two glasses of water. Hold head lower than hips. Do not induce vomiting. Seek medical attention immediately.
Gasoline	Skin	Wash with soap and water. If irritation develops and persists, consult a physician
	Eyes	Immediately flush with water for at least 15 minutes including lifting the upper and lower lids. Contact a physician.
	Inhalation	Move to fresh air. Contact a physician.
	Ingestion	Drink 2 glasses of water. Do not induce vomiting. Contact a physician. Physician may recommend mixing 50 g activated charcoal in 400 ml water and mix well. Consume 5 ml/kg or about 7.7 oz/100 lb.
Propane	Skin	Rinse with water. If freeze burn occurs immerse burned area in warm (not hot) water. Contact a physician if irritation persists.
	Eyes	Flush with water including lifting the upper and lower lids. Obtain medical assistance.
	Inhalation	Move to fresh air. Contact a physician.
	Ingestion	Contact a physician.
Barium Chloride	Skin	Wash with soap and water for at least 15-20 minutes. Contact a physician immediately.
	Eyes	Immediately rinse with saline solution for 15 to 20 minutes including lifting the upper and lower lids, or water if saline is not available. Contact a physician.
	Inhalation	Move to fresh air. Get medical attention immediately.
	Ingestion	Induce vomiting immediately. Get medical attention immediately.

Table 2-1. Operator Spill Responses (continued)

Operator Emergency Response		
Chemical	**Method**	**First Aid Response**
Anti-Scalant (NS 1100)	Skin	Wash with soap and water. If irritation persists, consult a physician.
	Eyes	Rinse with water including lifting the upper and lower lids. If irritation persists, consult a physician.
	Inhalation	Move to fresh air. If irritation persists, consult a physician.
	Ingestion	Do not induce vomiting. If irritation persists, consult a physician.
Sludge or Process Solution	Skin	Rinse with water. Consult a physician.
	Eyes	Rinse with water including lifting the upper and lower lids. Consult a physician.
	Inhalation	Move to fresh air. Consult a physician.
	Ingestion	Consult a physician.

Table 2-2. Emergency Response Team Spill Response

Emergency Response Team	
Chemical	**Special Response Notes**
Hydrated Lime	Do not expose to acids
Flocculant (NS 6852)	Slippery when wet
Sulfuric Acid	Extremely strong acid, neoprene or PVC PPE equipment required. Do not expose to Hydrated Lime or water. Use dry chemical or carbon dioxide extinguishers.
Diesel Fuel	Extremely flammable. Not soluble, recommended dry chemical, foam, carbon dioxide or smothering techniques for putting out fire. Use water spray for cooling fire-exposed containers to prevent pressure rupture, although take caution as cool water on hot metal could cause container rupture.
Gasoline	Extremely flammable. Not soluble. Dry chemical, foam, or carbon dioxide should be used to extinguish fire. Vapor forms explosive mixture with air, water can be used to disperse the vapors. Use water spray for cooling fire-exposed containers, although take caution as cool water on hot metal could cause container rupture.
Propane	Extremely flammable and explosive. Dry chemical, foam, or carbon dioxide fire extinguishers should be used. Stop flow of gas first. Eliminate sources of ignition. Use water spray to cool fire-exposed containers, although take caution as cool water on hot metal could cause container rupture. Vapor is heavier than air and may collect at lower levels.
Barium Chloride	No special response notes.
Anti-Scalant (NS 1100)	Extremely slippery. Dry chemical, foam, or carbon dioxide fire extinguishers should be used.
Sludge or Process Solution	Contact operator to determine which stage of treatment system solution is from before taking action. Respond accordingly to assumed chemical composition.

DMC's leases to the property where the WTP is located were terminated by the Bureau of Indian Affairs in 1991. DMC's compliance with this plan is therefore contingent on its continuing to being given access to the site by the BIA and the Spokane Indian Tribe. DMC notes that there are activities carried out at the mine site by other entities, such as the Spokane Indian Tribe, over which DMC has no control. These entities or individuals also store certain materials at the mine site, and DMC similarly has no authority to control how these materials are stored or used. Thus, DMC is unable to include management of these activities and materials in this plan, and disclaims responsibility for any contribution to runoff that might potentially results from these activities or materials.

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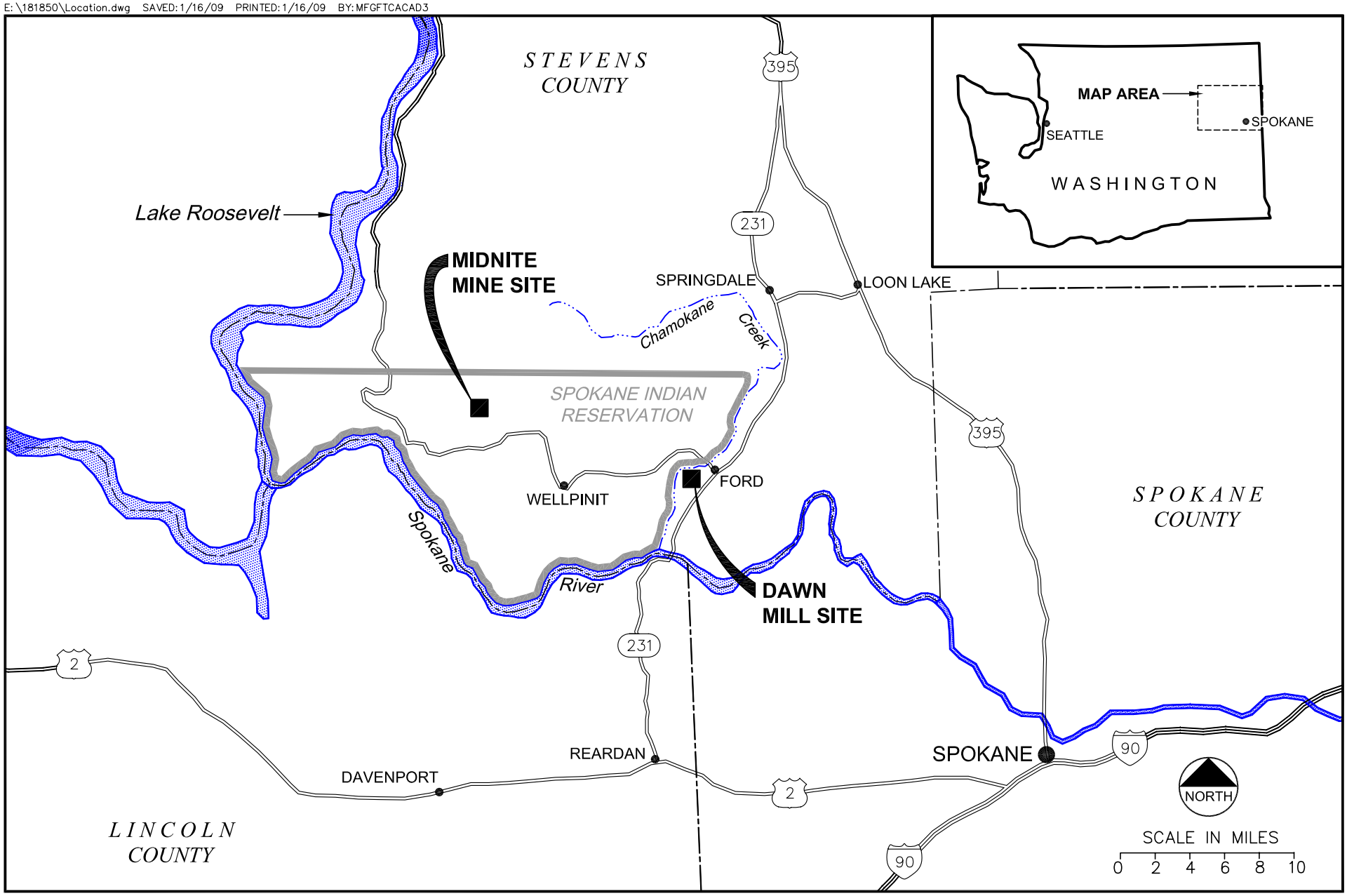

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January 2009

Figure 2-1
Midnite Mine Site Location Map

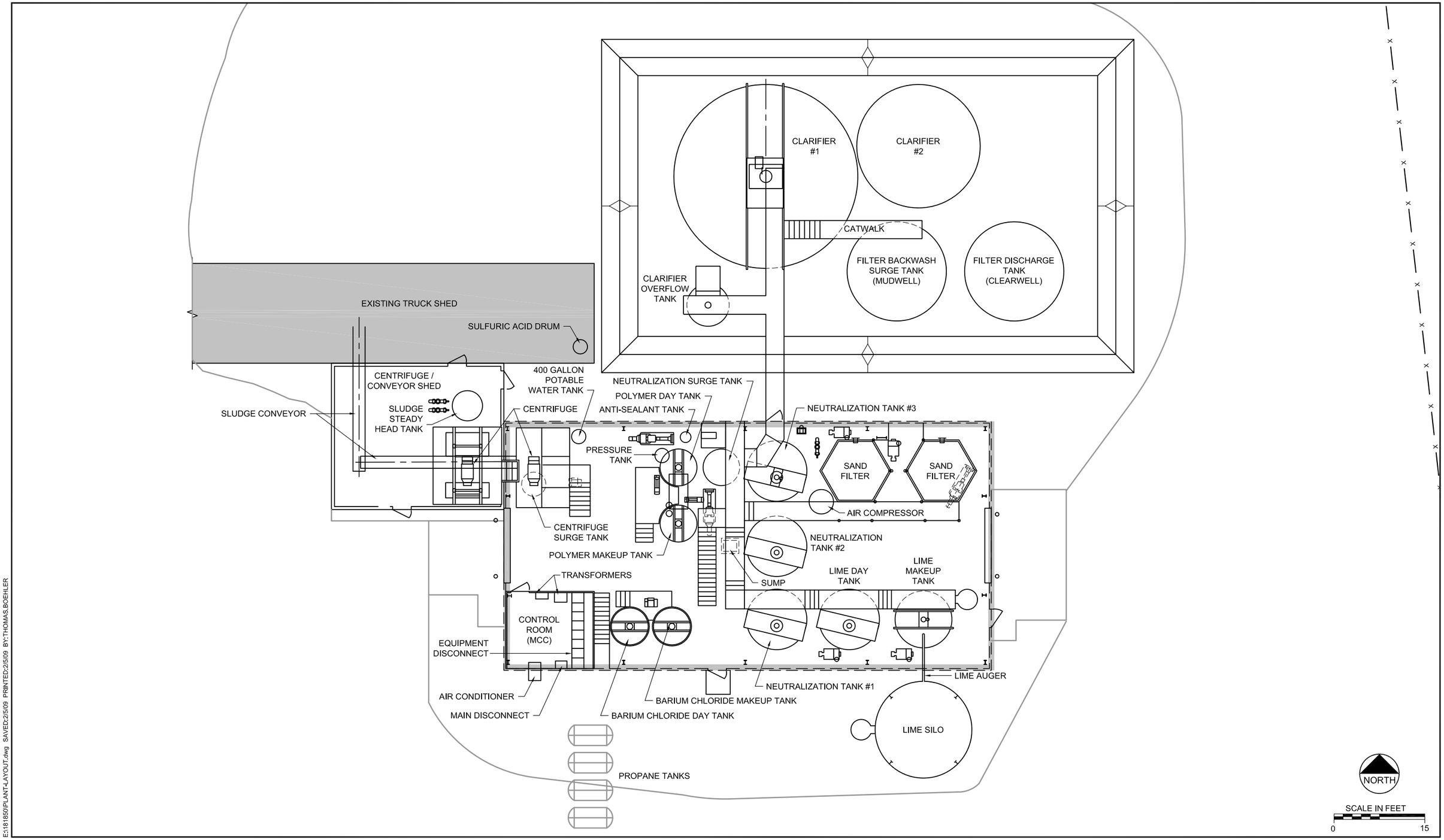

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Figure 2-2
Dawn Mining Company
Plant Layout

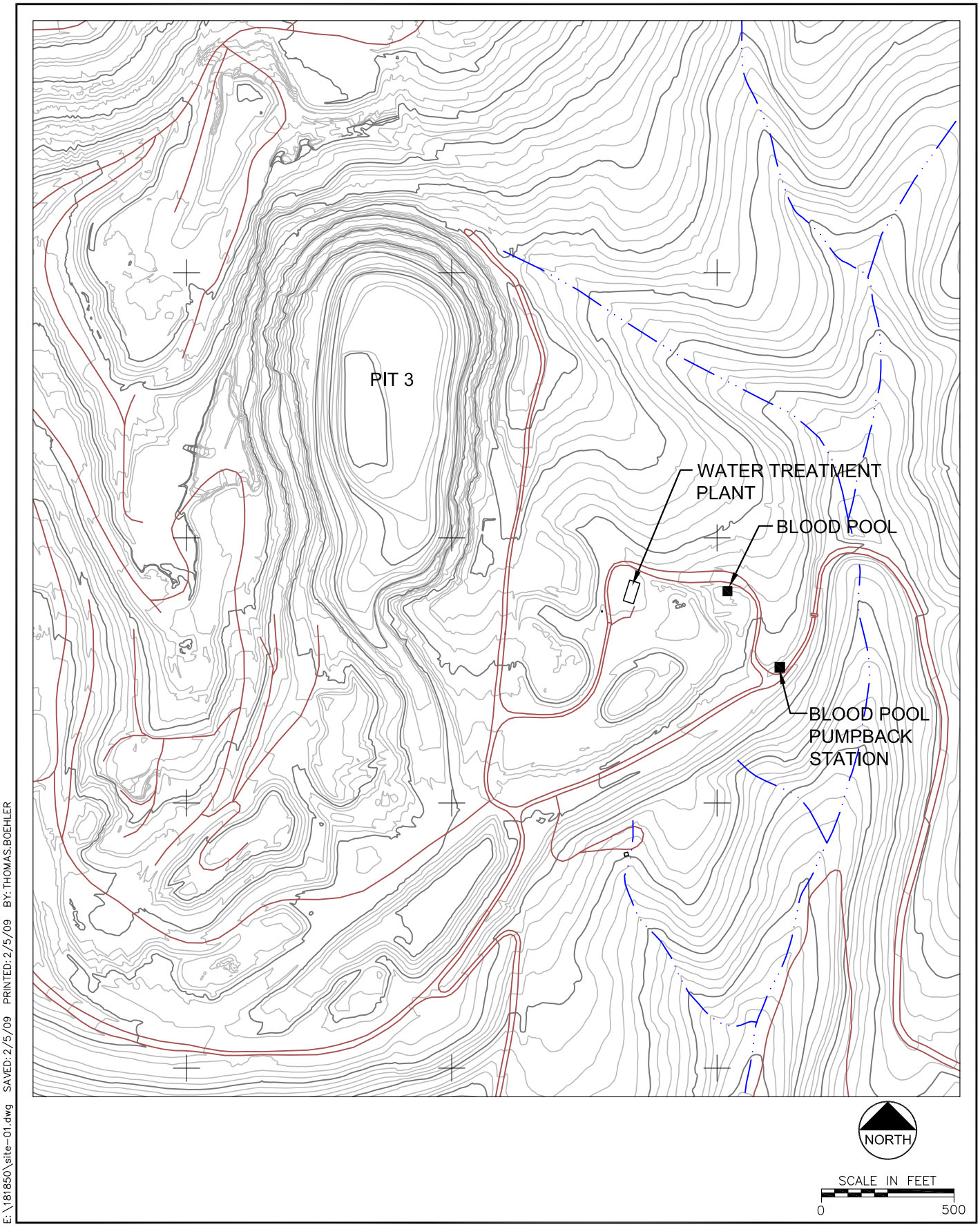

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Figure 2-3
Dawn Mining Company Plant Location

3.0 MATERIAL AND WASTE INVENTORY

During the operation of the Midnite WTP, the facility will store the following materials and associated estimated maximum quantities shown in Table 3-1.

Table 3-1. Material and Waste Inventory

Material	Form	Estimated Maximum Quantity	Reportable Quantity(1)
Hydrated Lime	Dry Bulk	50 tons	100 lbs (2)
Flocculant	Dry Bulk 50# Bags	800 lbs	100 lbs (2)
Sulfuric Acid	Bulk Liquid	100 gal (1,535 lbs)	1000 lbs
Diesel Fuel	Bulk Liquid	300 gal	504 gal
Lube Oil and Grease	Tube and Quart Containers	15 gal oil, 170 ounces grease	100 lbs (2)
Gasoline	Bulk Liquid	300 gal storage tank	32 gal
Propane	Bulk Liquid	3000 gal	10 lbs
Barium Chloride	Dry Bulk 50# Bags	500 gal	100 lbs (2)
Anti-Scalant	Bulk Liquid 55 Gallon Drum	100 gal (1000 lbs)	5000 lbs
Sludge (filter cake)	Filter Cake	25 lbs	100 lb (2)
Sodium Sulfate	Dry Bulk	500 lbs	100 lb (2)

(1) From CFR Title 40 Part 302.4
(2) Not listed in CFR Title 40 Part 302.4. According to CFR Title 40 Part 302.4, if not listed then Reportable Quantity = 100 lbs

The "reportable quantity" listed in Table 3-1 reflects that amount of material which, if spilled, triggers the notification requirement of 40 CFR Part 302.4.

Additional details on select materials and waste listed in Table 3-1 are provided below.

Lime, $Ca(OH)_2$: The water treatment plant uses approximately 2 ½ tons of lime every day of operation. DMC mixes its own lime slurry on-site, using solid lime hydrate, and water. The mixing occurs in a tank in the main building of the water treatment plant. At present, the lime hydrate is delivered to the facility from the Dawn millsite on an as needed basis in a tanker truck and is pneumatically transferred by trained personnel directly into the Lime Silo situated adjacent to the water treatment building (Figure 2-2). This method of pneumatic transference minimizes the potential for spills, including spills that could potentially come into contact with stormwater runoff. When needed for water treatment, the lime hydrate is transferred using an auger to the lime mixing tank inside the main building.

Flocculant: The water treatment plant uses approximately 36 pounds of polyacrylamide flocculant each day of operation. This material is delivered to the facility from the Dawn millsite by truck on an as-needed basis. Dawn currently uses Neo Solutions, Inc. NS 6852 as a flocculant. The material arrives in solid form in 50-pound bags which are unloaded inside the main building by hand where a solution is mixed and stored inside the treatment plant building. To the extent that storage is needed, the bags are stored on pallets inside the main building to prevent contact with stormwater and minimize the potential for uncontrolled spills.

Sulfuric acid: The water treatment plant uses approximately 1 gallon of sulfuric acid every day of operation. The concentrated sulfuric acid (approximately 93% by weight) is delivered to the facility

in liquid form in 55-gallon drums which are stored inside the main building to prevent contact with stormwater and minimize the potential for uncontrolled spills.

Diesel Fuel: The water treatment plant uses approximately 25 gallons of diesel fuel for equipment at the WTP every day of operation. The diesel fuel is delivered to the facility in liquid form in 55-gallon drums which are stored near Pit 4. The diesel fuel and pump are secondarily contained to minimize the potential for uncontrolled spills. The maximum amount stored on site is approximately 300 gallons.

Lube Oil and Grease: The water treatment plant uses approximately 6 liquid ounces of lube oil and grease for maintenance of the equipment at the WTP every day of operation. The maximum amount of lube oil on site is approximately 15 gallons and the maximum amount of grease on site is approximately 170 ounces. The lube oil and grease are delivered to the facility in quart and tube containers which are stored inside the main building to prevent contact with stormwater and minimize the potential for uncontrolled spills.

Gasoline: The water treatment plant uses approximately 2 gallons of gasoline for equipment at the WTP every day of operation. The gasoline is stored on site in a 300 gallon tank next to the WTP.

Propane: The water treatment plant usage of propane varies as the seasonal temperature fluctuates. The propane is stored in two-1000 gallon tanks and two-500 gallon tanks and delivered on an as needed basis.

Barium chloride: The water treatment plant uses approximately 27 pounds of barium chloride per day of operation. The barium chloride is delivered to the facility from the Dawn millsite on an as needed basis in crystalline form in 50-pound bags which are unloaded inside the treatment plant building where a solution is mixed and stored in the treatment plant building. To the extent that storage is needed, the bags are stored on pallets inside the main building to prevent contact with stormwater and minimize the potential for uncontrolled spills.

Anti-scalant: The water treatment plant uses approximately 4 gallons of anti-scalant per day of operation. Dawn currently uses Neo Solutions Inc, NS 1100, which is a polyacrylic acid in liquid form. The anti-scalant is delivered as needed in 55-gallon barrels. It is and will continue to be stored inside the treatment plant in barrels.

Sludge (Filter cake): The water treatment plant generates a sludge-like product called filter cake. Approximately 10 to 12 tons of filter cake are generated each day during water treatment plant operations.

Sodium Sulfate: The water treatment plant may keep sodium sulfate on site in case of a barium chloride spill. The sodium sulfate can be used to precipitate the barium chloride and aid in the pickup in case of a spill.

4.0 SPILL CONTAINMENT, PREVENTION, AND RESPONSE

4.1 Good Housekeeping

The water treatment plant is the only portion of the facility where active operations are conducted by DMC. It is current practice to maintain this facility in a clean, orderly manner. Basic cleanup procedures (daily inspection of loading and unloading areas and storage areas, prompt cleanup of spills or leaks) will continue to be followed. In addition, in keeping with current practice, DMC will not store large amounts of chemicals aside from hydrated lime in the area for extended periods of time.

4.2 Spill Prevention and Response

The area of the water treatment plant is the only portion of the mine site where DMC's activities could result in spills that could potentially contribute pollutants to waters of the United States. Procedures are in place to prevent spills to the environment. These procedures, which are described in more detail below, include direct pneumatic transference of lime from the tanker truck to the enclosed tank (Lime Silo) and subsequently to the lime mixing tank, handling chemicals only in indoor areas, and use of a floor sump and pump-back system to contain spills. In addition, all outside tanks that are a part of the water treatment system are surrounded by a plastic-lined berm that has the capacity to contain the volume of all of the outdoor tanks. Any liquid accidentally released from the water treatment plant due to a catastrophic failure of the tanks inside or outside the water treatment plant, is controlled and conveyed by drainage channels. These drainage channels divert runoff either directly into Pit No. 3, or to the Blood Pool pump-back system located south east of the WTP (see Figure 2-3). Water captured by the pump-back system is pumped into Pit No. 3. If the supply line to the process plant from the pit breaks or ruptures, the low level alarm in the plant will sound alerting the operator of the problem. The operator will immediately shut the power off to the feed pump and will not restart it until the problem has been rectified.

The treatment plant building is designed into three separate sections: the main building, the conveyor room, and the truck shed. The main building houses most of the treatment plant equipment (filters, agitators, clarifiers, tanks, etc.). Most of the on site chemicals used in the water treatment process are also stored in this building. The floor of the main building is sloped such that any liquid spills drain to a sump in the center of the floor (Figure 2-2). The floor sump is equipped with a dedicated pump that is capable of pumping approximately 60 gallons per minute back into the water treatment circuit. All dry chemicals stored in the main building are stacked on pallets to keep them off of the floor. Accidental spills of dry material will be containerized by trained professionals and reused in the water treatment process if possible.

The neutralization surge tank, the filter backwash surge tank, and the filter discharge tank are the most likely tanks in the plant building that could overflow due to a malfunction of some element of the process. If overflow was to occur, the high level tank volume alarm would sound to alert the operator to the problem. Any process water that was released would be captured in the plant sump. The operator would direct the flow from the sump to the proper tank as directed in Table 4-1 by manually changing the direction of flow at the valve.

Should tank overflow occur the operator is to:

1. Turn off the mine pit pumps that bring water into the plant process circuit and place the plant process on stand-by mode.
2. Determine if the sump pumping is at a rate sufficient to control the overflow volume. If it is not, the installed sump pump pumping will be augmented by placing an auxiliary sump pump in the sump.
3. Direct the sump pump and auxiliary sump pump flows to the proper tank as directed in Table 4-1 by manually changing the direction of flow at the valve.
4. Determine if the predetermined placement of water pumped from the sump is appropriate in terms of the volume required to store the overflow and, if not, direct the sump pumped water to another tank in the process or to Pit 3, depending on the process stage from which the overflow water is coming.
5. Determine the cause of the overflow. Correct the problem. Restart the process.

Table 4-1. Overflowing Tank Sump Pump Discharge Locations

Overflowing Tank	Sump Pump and Auxiliary Pump Discharge Location
Lime Slaker Agitator Tank	Lime Day Tank
Lime Day Tank	Lime Day Tank
Barium Chloride Container	Neutralization Tank #1
Neutralization Tank #1	Neutralization Tank #1 or Pit 3
Neutralization Tank #2	Neutralization Tank #1 or Pit 3
Neutralization Tank #3	Neutralization Surge Tank or Pit 3
Neutralization Surge Tank	Neutralization Surge Tank or Pit 3
Clarifier #1	Clarifier O/F Tank or Pit 3
Clarifier #2	Neutralization Surge Tank or Pit 3
Acid Container	Neutralization Tank #1
Downflow Sand Filters	Clarifier O/F Tank or Pit 3
Filter Discharge Tank	Clarifier O/F Tank or Pit 3
Filter Backwash Surge Tank	Neutralizaiton Tank #1 or Pit 3
Sludge Steady Head Tank	Neutralization Surge Tank
Unlisted Tanks or Unknown Source	Neutralization Tank #1 or Pit 3

The conveyor room is the area between the main building and the truck shed. As mentioned previously, the water treatment plant generates a sludge-like product called filter cake. This substance is loaded by conveyor belt into dump trucks for transportation off-site. In the conveyor room, filter cake is transported by conveyor belt from the main building to the truck shed. The floor of the conveyor room is designed in a similar manner as the floor of the main building; i.e., sloped so that liquid will drain to a sump that is equipped with a dedicated pump that pumps fluid back into the water treatment cycle.

The truck shed is where the filter cake is loaded onto trucks for disposal. The trucks, while being loaded, are parked on a cement floor in a covered area to minimize the potential for spills to the outside environment. The floor of this area is sloped and equipped with a floor sump to capture any spillage before it can exit the building. Filter cake that spills in the truck shed is hosed into the floor sump. Any collected material is pumped back into the water treatment circuit by a dedicated pump.

Outside, and immediately adjacent to the treatment plant, are several tanks used in the water treatment process (e.g., clarifiers) and for chemical storage. These tanks are surrounded by a plastic lined berm that is capable of containing the entire volume of all the tanks. In the event of

a catastrophic failure of the outdoor tanks, the plastic lined berm would contain the spilled material which would then be pumped back into the water treatment circuit.

All stormwater that falls on the plant site drains to one of three areas as listed below:

- to Pit No. 3 via a drainage channel that parallels the road to the WTP;
- to the Blood Pool via overland flow; or
- to the Blood Pool pump-back station via a haul road drainage channel (see Figure 2-3).

Water that is captured by the Blood Pool or by the Blood Poll pump-back station is pumped into Pit No. 3 for eventual treatment in the WTP.

4.3 Spill Response Actions

Spills larger than the reportable quantities listed in Table 3-1 will be reported to the National Response Center (Section 5.0).

The following PPE should be worn when cleaning up any spill:

- NIOSH approved respirators for dust and radionuclides
- Rubber gloves
- Face shields
- Hard hats/helmets
- Protective eyewear
- Waterproof suit

4.3.1 Hydrated Lime Spill

In the event of a spill of hydrated lime requiring more than one person to clean up, a response team will be activated and dispatched to the scene from the plant site. The hydrated lime may be a dry powder or in slurry form. The response team will have equipment to retrieve the product from the spill site.

The response team and operator will wear any necessary personal protective equipment (PPE) deemed appropriate by the emergency response supervisor in addition to those listed above at the beginning of section 4.3.

For a spill of dry hydrated lime powder, reclaim the hydrated lime into a closed container for normal use or disposal as deemed appropriate. Any remaining dry material will be scraped up with the contaminated soil or surrounding material and disposed of as a hazardous substance. The remaining material will be diluted with water, then an inert absorbent material (e.g. Peat Sorb) will be added to absorb the liquid which will then be picked up and containerized for product disposal. Flush area with water and collect rinsate for disposal.

In the event that the hydrated lime is exposed to solutions (water, rain, snow, process solution, etc.) creating a slurry or is already at a slurry consistency, the resulting flow will be dammed near the site of the contamination using soil. An inert absorbent material (e.g. Peat Sorb) will be added to the ponded flow to absorb the liquid, thereby creating a sludge-like product. The

sludge will be picked up and containerized for disposal. The “spill area” will be flushed with water, and the rinsate will be collected for disposal.

The specific response and action taken by the operator and emergency response team will be dictated by weather conditions and will follow the MSDS procedures. A brief summary of first aid responses and special response notes from the MSDS forms are provided in tables 2-1 and 2-2. See Attachment A for the complete MSDS forms.

4.3.2 Sulfuric Acid Spill Response Action

In the event of an accident involving sulfuric acid, the emergency response team will be activated and dispatched to the scene from the plant site.

The response team and operator will wear any necessary personal protective equipment (PPE) deemed appropriate by the emergency response supervisor in addition to those listed above at the beginning of section 4.3. Because of the high concentration of the sulfuric acid neoprene gloves and neoprene boots should also be worn when handling sulfuric acid.

To prevent the spill from spreading laterally, an earthen dike or some impermeable materials suitable for containing sulfuric acid will be constructed and will be of sufficient size to intercept the spill and impacted water. The spill and any impacted water will be pumped back to a liquid containment facility. If spills of a high concentration of sulfuric acid are believed to still be prevalent after the initial pumping the free liquid shall be collected using an inert absorbent material (e.g. Peat Sorb) and containerized. After as much of the spill and impacted water as is possible has been collected and removed from the scene the spill will be diluted or neutralized. The spill will be neutralized by mixing a weak solution using hydrated lime from the bulk storage facility located on site and carefully adding the solution to the spilled area being aware of any violent chemical reaction that may take place. Caution should be taken when neutralizing with hydrated lime as a chemical reaction will occur between the hydrated lime and sulfuric acid. Neutralization may take 1-2 hours to complete. The additional liquid should be pumped back to a separate liquid containment facility. An inert absorbent material (e.g. Peat Sorb) should be used to collect any remaining liquid. This process should be repeated until the sulfuric acid has been removed from the scene. If necessary, downstream water will be treated to neutralize acid.

The specific response and action taken by the operator and emergency response team will be dictated by weather conditions and will follow the MSDS procedures. A brief summary of first aid responses and special response notes from the MSDS forms are provided in Tables 2-1 and 2-2. See Attachment A for the complete MSDS forms.

4.3.3 Flocculant Spill Response Actions

In the event of an accident involving flocculent, the emergency response team will be activated and dispatched to the scene from the plant site.

The response team and operator will wear any necessary personal protective equipment (PPE) deemed appropriate by the emergency response supervisor in addition to those listed above at the beginning of Section 4.3.

For a dry spill of flocculant, reclaim the product by using a vacuum into a closed container for normal use or disposal as deemed appropriate. Any remaining dry material will be scraped up with the contaminated soils and disposed of as a hazardous substance. The remaining material

will be diluted with water. Caution should be taken as flocculant solution is extremely slippery and could constitute a fall hazard. Add an inert absorbent material (e.g. Peat Sorb) to absorb the liquid and then pick up and containerize for product disposal. Flush area with water and collect rinsate for disposal.

To prevent the flocculent spill in solution from spreading laterally an earthen dike or some impermeable materials (plastic liners, etc.) will be constructed and will be of sufficient size to intercept the spill and impacted water. Caution should be taken as flocculant solution is extremely slippery and could constitute a fall hazard. Add an inert absorbent material (e.g. Peat Sorb) to absorb the liquid and pick up and containerize for product disposal. Flush area with water and collect the rinsates for disposal.

The specific response and action taken by the operator and emergency response team will be dictated by weather conditions and will follow the MSDS procedures. A brief summary of first aid responses and special response notes from the MSDS forms are provided in Tables 2-1 and 2-2. See Attachment A for the complete MSDS forms.

4.3.4 Barium Chloride Spill Response Action

In the event of an accident involving barium chloride, the emergency response team will be activated and dispatched to the scene from the plant site.

The response team and operator will wear any necessary personal protective equipment (PPE) deemed appropriate by the emergency response supervisor in addition to those listed above at the beginning of section 4.3. A NIOSH approved respirator is highly recommended when handling Barium Chloride.

For a dry spill of barium chloride, reclaim the product into a closed container for normal use or disposal as a hazardous substance. Dilute the remaining material with water and sodium sulfate, then add an inert absorbent material (e.g. Peat Sorb) to adsorb the remaining liquid and pick up and containerize for product disposal. Flush area with water and collect rinsates for disposal.

To prevent the spill in solution from spreading laterally, an earthen dike or some impermeable materials (plastic liners, etc.) will be constructed and will be of sufficient size to intercept the spill and impacted water. The bulk of the collected solution should be pumped back to a liquid containment facility. Dilute the remainder with water, then add an inert absorbent material (e.g. Peat Sorb) to the remaining liquid and pick up and containerize for product recovery or disposal. Flush area with water and collect the rinsates for disposal.

The specific response and action taken by the operator and emergency response team will be dictated by weather conditions and will follow the MSDS procedures. A brief summary of first aid responses and special response notes from the MSDS forms are provided in tables 2-1 and 2-2. See Attachment A for the complete MSDS forms.

4.3.5 Anti-Scalant Spill Response Action

In the event of an accident involving anti-scalant, the emergency response team will be activated and dispatched to the scene from the plant site.

The response team and operator will wear any necessary personal protective equipment (PPE) deemed appropriate by the emergency response supervisor in addition to those listed above at the beginning of Section 4.3.

For anti-scalant spills do not flush with water, instead construct an earthen dike or use some impermeable material (plastic liners, etc.) to contain the spill area and soak up with an inert absorbent material (e.g. Peat Sorb). Caution should be taken as anti-scalant solution is extremely slippery and could constitute a fall hazard.

The specific response and action taken by the operator and emergency response team will be dictated by weather conditions and will follow the MSDS procedures. A brief summary of first aid responses and special response notes from the MSDS forms are provided in Tables 2-1 and 2-2. See Attachment A for the complete MSDS forms.

4.3.6 Process Solution Spill Response Action

For purposes of this Contingency Plan, process solutions are defined as any solution from the water treatment process that has not completed the entire treatment process.

4.3.6.1 Response Action Inside Water Treatment Building

In the event of an accident involving process solution, the emergency response team will be activated and dispatched to the scene.

The response team and operator will wear any necessary personal protective equipment (PPE) deemed appropriate by the emergency response supervisor in addition to those listed above at the beginning of Section 4.3.

For process solution spills contained in the water treatment process area, the solution will be collected in the various floor sumps located throughout the treatment plant. The process solution will be pumped back into the treatment process line in the appropriate tank depending on the nature of the spill.

After the spilled process solution has been evacuated from the floor, the area affected by the spill is to be flushed with water as deemed appropriate and the rinsates collected and pumped to the appropriate tank in the treatment process line or to the neutralization tank #1 depending on the nature of the spill and summarized in Table 4-1.

4.3.6.2 Response Actions Outside Water Treatment Building

In the event of an accident involving process solution outside the WTP building, the emergency response team will be activated and dispatched to the scene from the plant site.

The response team and operator will wear any necessary personal protective equipment (PPE) deemed appropriate by the emergency response supervisor in addition to those listed above at the beginning of Section 4.3.

To prevent the spill from spreading laterally outside the clarifier berm area, an earthen dike or some impermeable materials (plastic liners, etc.) will be constructed and will be of sufficient size to intercept the spill and impacted water. Collected water will be pumped back to the beginning of the water treatment process line.

If the outside spill involves acid, then downstream water will be treated to neutralize acid downstream of the collection dam should it be necessary. The spill will be neutralized utilizing hydrated lime from the bulk storage facility located on the site or acid depending on the pH of the spill. All affected soils once neutralized, will be transported to the mill for treatment or to the tailings impoundment for disposal as deemed appropriate. The solutions will be transferred to the water treatment plant for processing.

Specific responses and actions of the team will follow the MSDS procedures for acids since the process solutions depend on the pH and nature of the solution. The specific response and action taken by the operator and emergency response team will be dictated by weather conditions and will follow the MSDS procedures. A brief summary of first aid responses and special response notes from the MSDS forms are provided in Tables 2-1 and 2-2. See Attachment A for the complete MSDS forms of the individual chemicals on site.

4.3.7 Fuels Spills Response Actions

Fuels, including diesel, gasoline, propane, and lubrications oils (considered as a fuel in this discussion) must be handled carefully to avoid spills. Personal protective equipment (PPE) deemed appropriate by the emergency response supervisor in addition to those listed above at the beginning of section 4.3 should be worn at all times when handling a fuel spill. If a spill should occur, the following steps should be implemented at once.

If possible, all ignition sources in and adjacent to the spill site should be removed immediately. Keep upwind of leak while attempting to contain spill. If highly concentrated, evacuate area until the gas has dispersed. Fuel spills must then be contained as soon as possible after the loss has occurred to prevent spreading and to simplify cleanup procedures.

4.3.7.1 Land Spills

To prevent the spill from spreading laterally, construct an earthen dike or dam of sufficient size to intercept both the fuel and impacted water.

4.3.7.2 Water Spills

Contain the floating fuel with a boom, which is any device that will float on the water, thus preventing the spread of fuel. The boom contained in the kit may be used or constructed of logs or any readily available flotation device. Ideally, the boom will extend a few feet into the water. It is noted that there are no streams or unconfined surface water sources of significant proportions on the site.

Deploy the boom across the channel, downstream from the spill; the higher the current, the more the acute angle needed between the boom and the shore. Spread an inert adsorbent material (e.g. Peat Sorb) on the upstream side of the boom to prevent fuel from passing through joints or gaps. Fuel coming from upstream should strike the boom and be diverted to the shore where it can be recovered by Emergency Response personnel.

4.3.8 Sludge Spill Inside the Plant

If sludge (filter cake) should be spilled inside the plant:

1. To the maximum extent practical the sludge will be shoveled up and placed back in the process at the Neutralization Surge Tank.
2. After the solids have been recovered to the maximum extent practical, the floor in the area of the spill will be washed down to the sump where the sludge and wash water will be pumped to the Neutralization Tank #1.

All other sludge spills will be addressed after the Residuals Management Plan is finalized. The SPCC will be updated at that time and the appropriate procedures will be referenced.

4.4 Cleanup

After containment and neutralization, the impacted material should be eliminated for containment and neutralization continued until contamination is reduced to acceptable levels. Cleanup may involve removal and disposal of contaminated material. All cleanup activities should be carefully planned and recorded to establish a clear record of what actions were taken and where and when the actions occurred.

4.5 Monitoring

Immediately following a spill event, potentially affected surface waters and water supplies will be sampled and tested for residual chemicals. Samples will be collected and sent to a commercial laboratory for analysis. Frequent monitoring of all potentially affected sites should be continued until it has been determined the spill has been contained, neutralized, and no further contamination exists.

5.0 GENERAL EMERGENCY PROCEDURES

The emergency personnel, procedures, and contacts for a spill incident were discussed in Section 4 of the Contingency Plan. Emergency contacts are listed below for ease of reference.

General Emergency Numbers:

Spokane Tribal Police Department and Ambulance	509-258-4400
Local Law Enforcement (Stevens County Sheriff Dispatch)	509-684-2555

Hospital: Sacred Heart Medical Center: 509-455-3131

Washington Poison Control Center: 800-222-1222

Corporate Resources:

Site Manager

	(office)	509-258-4511
Bob Nelson	(cell)	(b) (6)
	(home)	(b) (6)
	(pager)	509-889-6687

WTP Site Supervisor

	(office)	509-258-4511
Don Plummer	(pager)	509-889-6688
	(home)	(b) (6) (

Site Operations Manager

	(office)	509-258-4511
Bobby Nelson	(Home)	(b) (6)
	(pager)	509-889-6686

EPA
EPA Regional Project Manager
Ellen Hale
EPA, Region 10 (ECL-113)
1200 Sixth Avenue, Suite 900
Seattle, Washington 98101
206-553-1215

EPA Emergency Response Unit, Region 10
206-553-1263

National Response Center (for spills greater than reportable quantity)
800-424-8802

Other Resources:

RCRA, Superfund & EPCRA Hotline	800-424-9346
U.S. EPA Environmental Response Team	732-321-6660
Spokane Tribe of Indians	

Regular Mail
Spokane Tribe of Indians
Natural Resources Department
Attn: Randy Connolly, Superfund Coordinator
PO Box 480
Wellpinit, Washington 99040

or

Express Mail
Spokane Tribe of Indians
Natural Resources Department
Attn: Randy Connolly, Superfund Coordinator
6290-B Ford-Wellpinit Road
Wellpinit, Washington 99040

6.0 EMPLOYEE TRAINING

Because of the limited nature of the operations being carried out by DMC at the mine and the limited number of people who may be involved in implementing this SPCC plan, a formal program of employee training is not needed to implement the plan. With respect to any persons other than the Site Manager who may be involved in plan implementation, such persons will be informed of the components and goals of the plan as it relates to their functions prior to beginning work on the plan. The Site Manager will update WTP employees on any changes in the SPCC plan.

7.0 PREVENTATIVE MAINTENANCE AND INSPECTIONS

The plastic-lined berms and the drainage channels are and will continue to be visually inspected on an annual basis and any repairs or maintenance will be carried out. The floor sumps and pumping systems associated with the plant will be checked on a routine basis during operation periods. All areas where chemicals are stored will be inspected weekly to ensure that there are no leaking containers or other conditions that could result in spills. Records of spills or any potential problems detailed during inspections, as well as any follow-up measures, will be kept at DMC's offices in Ford, Washington.

8.0 SECURITY

The Midnite Mine WTP has an existing barbed wire fence surrounding the facility. There are two gates, one to the pump station and one to the access road to the pit area and to Wellpinit. Access to the water treatment plant is limited by the barbed wire fence, one road to the site, and the remoteness of the site. Gates are kept locked except when plant personnel or delivery persons are entering or leaving the facility. No unauthorized persons are allowed access to the WTP area.

In accordance with the ROD Section 12.2.5, the existing barbed wire fence will be replaced with a chain-linked fence and new gates. Warning signs will be posted along the fence and at gates. Access to the WTP will be restricted. The new fencing and signage will be outlined in a Fencing/Signage Plan to be submitted at a later date.

A plant operator is present on site while treatment operations are in progress. When operations are not in progress, the doors to the facility are kept locked to prevent accidental entry. At night, the site is kept well lit.

REFERENCES

Shepherd Miller, Inc. (SMI), 1996. *Best Management Practices Plan for the Midnite Mine Water Treatment Plant, Wellpinit, Washington.* Prepared for Dawn Mining Company. April 29.

U.S. Environmental Protection Agency (EPA), 1995. *Midnite Mine NPDES Permit WA 002572-1.* October.

ATTACHMENT A
MSDS SHEETS

GRAYMONT

MATERIAL SAFETY DATA SHEET

SECTION I - CHEMICAL PRODUCT AND COMPANY INFORMATION

Product Name: **HIGH CALCIUM HYDRATED LIME**	**WHMIS – CLASSIFICATION: D2A / D2B: MATERIALS CAUSING OTHER TOXIC EFFECTS E: CORROSIVE MATERIAL**

MANUFACTURER'S AND SUPPLIER'S NAME:

GRAYMONT (NB) INC	4634, Route 880, Havelock, New Brunswick, E4Z 5K8.
GRAYMONT (QC) INC.	25, rue De Lauzon, Boucherville (Québec), J4B 1E7.
GRAYMONT (PA) INC.	965, East College avenue, Pleasant Gap, PA 16823
GRAYMONT (WESTERN CANADA) INC.	190 – 3025, 12 Street N.E., Calgary, Alberta, T2E 7J2
GRAYMONT (WESTERN US) INC.	3950 South, 700 East, Suite 301, Salt Lake City, Utah 84107

EMERGENCY TEL. No.: (613) 996 – 6666 CANUTEC (Canada) (800) 424 – 9300 CHEMTREC (US)

Chemical Name	Chemical Family	Chemical Formula
Calcium hydroxide	**Alkaline earth hydroxide**	**Complex mixture - mostly $Ca(OH)_2$**
Molecular Weight	Trade Name and Synonyms	Material Use
$Ca(OH)_2$ = 74.096	**Hydrated Lime, Lime, Slaked lime, Lime Putty, Lime Slurry, Milk of Lime, Calcium Hydroxide**	**Neutralization, Flocculation, Stabilization, absorption**

SECTION II - COMPOSITION AND INFORMATION ON INGREDIENTS

Hazardous Ingredients	Approximate Concentration (% by weight)	C.A.S. Number	Exposure limits (mg/m^3)					
			OSHA PEL	ACGIH TLV	RSST VEMP	MSHA PEL (Note 2)	NIOSH REL	NIOSH IDLH
(Complex Mixture)	(% by weight)		(TWA) 8/40h	(TWA) 8/40h	(TWA) 8/40h	(TWA) 8/40h	(TWA) 10/40h	
Calcium hydroxide	**92 to 100**	**1305-62-0**	**15 (tot dust) 5 resp dust**	**5**	**5**	**5**	**5**	**N/A**
Crystalline Silica, Quartz	**0.1 to 1**	**14808-60-7**	**$10/(\%SiO_2)+2$ respirable silica dust**	**0.025 respirable silica dust**	**0.1 respirable silica dust**	**$10/(\%SiO_2)+2$ respirable silica dust**	**0.05 respirable free silica**	**50**
Crystalline Silica, Quartz	**0 to 0.1 (Note 1)**	**14808-60-7**	**$10/(\%SiO2)+2$ respirable silica dust**	**0.025 respirable silica dust**	**0.1 respirable silica dust**	**$10/(\%SiO2)+2$ (respirable silica dust)**	**0.05 respirable free silica**	**50**

(Note 1): Concentration of crystalline silica in a series of lime products will vary from source to source. It was not detected on some samples (< 0.1% w/w). Therefore two ranges are being disclosed. **(Note 2)**: ACGIH TLV Version 1973 has been adopted by the Mine Safety Health Administration (MSHA) as the regulatory Exposure Standard.

SECTION III - PHYSICAL AND CHEMICAL DATA

Physical State	Odor and Appearance		Odor Threshold (p.p.m.)	Specific Gravity
Gas ☐ Liquid ☐ Solid ☑	**Slight earthy odor – Fine white powder**		**Not applicable**	**2.3 – 2.4**
Vapor Pressure (mm)	Vapor Density (Air = 1)	Evaporation Rate	Boiling Point (°C)	Melting Point (°C)
Not applicable	**Not applicable**	**Not applicable**	**Not applicable**	**Not applicable**
Solubility in Water (20°C)	Volatiles (% by volume)	pH (25 °C)	Bulk Density (kg/m^3)	Coefficient of water/oil distribution
0.165g/100g Sat.soln	**Not applicable**	**Sat. soln $Ca(OH)_2$ 12.45**	**320 - 690**	**Not applicable**

SECTION IV - FIRE OR EXPLOSION HAZARD DATA

Flammability

Yes ☐ No ☑ If yes, under which conditions?

Extinguishing Media

Calcium Hydroxide does not burn. Use extinguishing media appropriate to surrounding fire conditions.

Special Fire Fighting Procedures

Not applicable

Flash point (°C) and Method	Upper flammable limit (% by volume)	Lower flammable limit (% by volume)
Not applicable	**Not applicable**	**Not applicable**
Auto Ignition Temperature (°C)	TDG Flammability Classification	Hazardous Combustion Products
Not applicable	**Non-flammable**	**None**

Dangerous Combustion Products **None**

EXPLOSION DATA

Sensitivity to Chemical Impact	Rate of Burning	Explosive Power	Sensitivity to Static Discharge
Not applicable	**Not applicable**	**Not applicable**	**Not applicable**

SECTION V - REACTIVITY DATA

Chemical Stability		
Yes ☐ No ☑	If no, under which conditions?	**Absorbs carbon dioxide in the air to form calcium carbonate.**
Incompatibility to other substances		
Yes ☑ No ☐	If so, which ones?	**Boron tri-fluoride, chlorine tri-fluoride, ethanol, fluorine, hydrogen fluoride, phosphorus pentoxide; and acids (violent reaction with generating heat and possible explosion in confined area).**
Reactivity		
Yes ☑ No ☐	If so, under which conditions?	**Reacts violently with strong acids. Reacts chemically with acids and many other compounds and chemical elements to form calcium based compounds. Explosive when mixed with nitro organic compounds.**
Hazardous Decomposition Products		**Thermal decomposition at 540°C will produce calcium oxide and water.**
Hazardous Polymerization Products		**Will not occur.**

SECTION VI - TOXICOLOGICAL PROPERTIES

Route of Entry

☑ Skin Contact ☐ Skin Absorption ☑ Eye Contact ☑ Acute Inhalation ☐ Chronic Inhalation ☑ Ingestion

Effects of Acute Exposure to Product

Skin	**Severe irritation of mucous and skin, removes natural skin oils.**
Eyes	**Severe eye irritation, intense watering of the eyes, possible lesions, possible blindness when exposed for prolonged period. Eye-Rabbit-10mg/ 24 h – Severe.**
Inhalation	**If inhaled in form of dust, irritation of breathing passages, cough, sneezing.**
Ingestion	**If ingested: pain, vomiting blood, diarrhea, collapse, drop in blood pressure (indicates perforation of esophagus or stomach).**

Effects of Chronic Exposure to Product:

Contact dermatitis. Following repeated or prolonged contact, this product can cause redness, desquamation and fissures. This product may contain trace amounts of crystalline silica. Excessive inhalation of respirable crystalline silica dust may result in respiratory disease, including silicosis, pneumoconiosis and pulmonary fibrosis.

LD_{50} of Product (Specify Species and Route)	Irritancy of Product	Exposure limits of Product
(Food grade $Ca(OH)_2$: 7340mg/kg) (Rats, ingestion)	**Severe to moist tissues**	**Unavailable**
LC_{50} of Product (Specify Species)	Sensitization to Product	Synergistic materials
Unavailable	**None**	**None reported**

SECTION VI - TOXICOLOGICAL PROPERTIES (Cont'd)

☑ *Carcinogenicity* ☐ *Reproductive effects* ☐ *Tératogenicity* ☐ *Mutagenicity*

Calcium Hydroxide is not listed as a carcinogen by ACGIH, MSHA, OSHA, NTP or IARC. It may, however, contain trace amounts of Crystalline Silica listed carcinogens by these organizations.

Crystalline Silica, which inhaled in the form of quartz or crystobalite from occupational sources, is classified by IARC as (Group 1) carcinogenic to humans.

Silica, crystalline (Airborne particles of respirable size) is regulated under California's Safe Drinking Water and Toxic Enforcement Act of 1986. (Proposition 65).

NIOSH considers crystalline silica to be potential occupational carcinogen as defined by the OSHA carcinogen policy [29 CFR 1990].

NTP lists respirable Crystalline Silica as known to be human carcinogens based on sufficient evidence of carcinogenicity in humans.

ACGIH lists respirable Crystalline Silica (quartz) as suspected human carcinogen (A-2).

RSST lists respirable Crystalline Silica (quartz) as suspected human carcinogen.

SECTION VII - PREVENTIVE MEASURES

Personal Protective Equipment (PPE)	**Wear clean, dry gloves, full length pants over boots, long sleeved shirt buttoned at the neck, head protection and approved eye protection selected for the working conditions.**

Gloves (Specify)	Respiratory (Specify)	Eyes (Specify)	Footwear (Specify)
Gauntlets Cuff style	**NIOSH approved (N/R/P95) dust respirator**	**ANSI, CSA or ASTM approved safety glasses with side shields. Tight fitting dust goggles should be worn when excessive (visible) dust conditions are present. Do not wear contact lenses without tight fitting goggles when handling this chemical.**	**Resistant to caustics**

Clothing (Specify)	Other (Specify)
Fully covering skin	**Evaluate degree of exposure and use PPE if necessary. After handling lime, employees must shower. If exposed daily, use oil, Vaseline, silicone base creme etc. to protect exposed skin, particularly neck, face and wrists.**

Engineering Controls (e.g. ventilation, enclosed process, specify)

Enclose dust sources; use exhaust ventilation (dust collector) at handling points, keep levels below Max. Concentration Permitted.

SECTION VII - PREVENTIVE MEASURES (Cont'd)

Leak and Spill Procedure

Limit access to trained personnel. Use industrial vacuums for large spills. Ventilate area.

Waste Disposal

Transport to disposal area or bury. Review Federal, Provincial and local Environmental regulations.

Handling Procedures and Equipment

Avoid skin and eye contact. Minimize dust generation. Wear protective goggles and in cases of insufficient ventilation, use anti-dust mask. An eye wash station and safety shower should be readily available where this material or its water dispersions are used. Contact lenses should not be worn when working with this chemical.

Storage Requirements

Keep tightly closed containers in a cool, dry and well-ventilated area, away from acids. Keep out of reach of children.

Special Shipment Information

Calcium Hydroxide is neither regulated by the Transportation of Dangerous Goods (TDG) Regulations (Canada) nor by the Hazardous Materials Regulations (USA).

SECTION VIII - FIRST AID MEASURES

Skin

Carefully and gently brush the contaminated body surfaces in order to remove all traces of lime. Use a brush, cloth or gloves. Remove all lime-contaminated clothing. Rinse contaminated area with lukewarm water for 15 to 20 minutes. Consult a physician if exposed area is large or if irritation persists.

Eyes

Immediately rinse contaminated eye(s) with gently running lukewarm water (saline solution is preferred) for 15 to 20 minutes. In the case of an embedded particle in the eye, or chemical burn, as assessed by first aid trained personnel, contact a physician.

Inhalation

Move source of dust or move victim to fresh air. Obtain medical attention immediately. If victim does not breathe, give artificial respiration.

Ingestion

If victim is conscious, give 300 ml (10 oz) of water, followed by diluted vinegar (1 part vinegar, 2 parts water) or fruit juice to neutralize the alkali. Do not induce vomiting. Contact a physician immediately.

General Advise

Consult a physician for all exposures except minor instances of inhalation.

SECTION IX - REGULATORY INFORMATION

Superfund Amendments and Reauthorization Act of 1986 (SARA Title III). / The Emergency Planning and "Community Right-to-Know" Act (EPCRA). / Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). / Resource Conservation and Recovery Act (**RCRA**).

Component Calcium Hydroxide has been reviewed against the following regulatory listings:

- **SARA Section 302 – Emergency Planning Notification. Extremely Hazardous Substances (EHS) List and Threshold Planning Quantity (TPQ). (40 CFR, Part 355, Section 30) : Not listed.**
- **SARA Section 304 – Emergency Release Notification. Extremely Hazardous Substances (EHS) and Reportable Quantity (RQ) List. (40 CFR, Part 355, Section 40) : Not listed.**
- **SARA Section 311/312 – Hazard Categories (40 CFR, Part 370) : This product is regulated under CFR 1910.1200 (OSHA Hazard Communication) as Immediate (Acute) Health Hazards – Irritant.**
- **SARA Section 313 – Toxics Release Inventory (TRI). Toxic Chemical List (40 CFR, Part 372). Not listed.**
- **CERCLA – Hazardous Substance (40 CFR, Part 302): Not listed in Table 302.4.**
- **RCRA – Hazardous Waste Number (40 CFR, Part 261, Subpart D): Not listed.**
- **RCRA – Hazardous Waste Classification (40 CFR, Part 261, Subpart C): Not classified.**

CWA 311. - Clean Water Act List of Hazardous Substances.

Calcium Hydroxide has been withdrawn from the Clean Water Act (CWA) list of hazardous substances. (11/13/79) (44FR65400)

California Proposition 65.

Component Calcium Hydroxide does not appear on the above regulatory listing. This product may contain small amounts of crystalline silica. Silica, crystalline (Airborne particles of respirable size) is regulated under California's Safe Drinking Water and Toxic Enforcement Act of 1986. (Proposition 65)

Transportation - Hazardous Materials Regulations (USA) & Transportation of Dangerous Goods (TDG) Regulations (Can).

Calcium Hydroxide does not appear on the above regulatory listings

Toxic Substances Control Act (TSCA).

All naturally occurring components of this product are automatically included in the USEPA TSCA Inventory List per 40 CFR 710.4 (b). All other components are one the USEPA TSCA Inventory List. Calcium Hydroxide is exempt from reporting under the inventory update rule.

Canadian Environmental Protection Act (CEPA) – Substances Lists (DSL/NDSL).

Calcium Hydroxide appears on the Domestic Substances List (DSL).

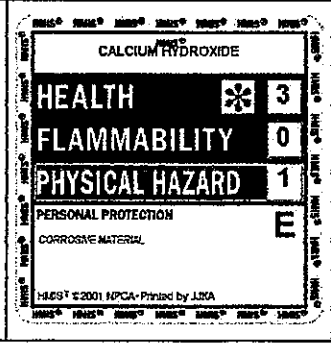
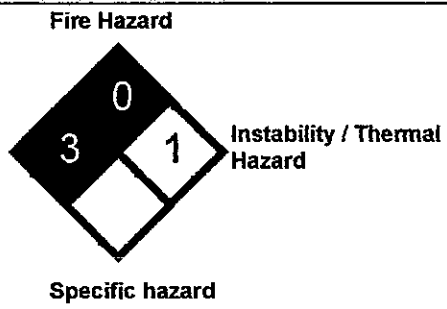
ANSI/NSF 60 - Drinking Water Treatment Additives.

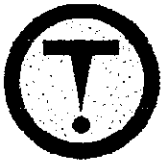
Hydrated Lime has been investigated with respect to elements identified by EPA as toxic and it has been classified for use in direct contact with drinking water. (in accordance with Standard ANSI/NSF 60). For a list of classified products, refer to Underwriters Laboratories Inc.'s Online Certifications Directory.

FDA - U.S. Food and Drug Administration, Department of Health and Human Services.

Calcium Hydroxide has been determined as "Generally Recognized As Safe" (GRAS) by FDA. See 21CFR184.1205. (CFR Title 21 Part 184 - - Direct food substances affirmed as generally recognized as safe).

SECTION X - OTHER INFORMATION

Hazardous Materials Identification System (U.S.)		National Fire Protection Association (U.S.) 

WHMIS – Classification: **"E" Corrosive Materials.**	WHMIS – Classification: **"D2A" and "D2B" Materials causing other toxic effects.**
Symbol:	Symbol: 

Additional Information/Comments:

The technical data contained herein is given as information only and is believed to be reliable. GRAYMONT makes no guarantee of results and assumes no obligation or liability in connection therewith.

Sources Used:

NFPA, NLA, TDG, CSST, RSST, (LSRO-FASEB), Hazardous Products Act, Environment Canada, Enviroguide, OSHA, ACGIH, IARC, NIOSH, CFR, NTP, HSDB, EPA SRS, Chemistry and Technology of Lime and Limestone (John Wiley and Sons, Inc.), Lime and Limestone (WILEY-VCH).

SECTION XI - PREPARATION INFORMATION

Prepared by:	Telephone number:	Date :
GRAYMONT (QC) INC. **Technical Services**	**(450) 449-2262**	**September 2006**

An electronic version of this MSDS is available at: www.graymont.com under the PRODUCTS section.

MATERIAL SAFETY DATA SHEET

Rev. Date : 7/30/02

1. IDENTIFICATION OF THE PRODUCT AND THE COMPANY

Product Name : **NS 6852**

Company : Neo Solutions, Inc.
P.O. Box 26
Beaver, PA 15009

Emergency Telephone Number : (724) 728-1847 Fax : (724) 728-3440

Product Use : Process aid for industrial applications.

2. COMPOSITION / INFORMATION ON INGREDIENTS

Identification of the preparation : Anionic water-soluble polymer.

3. HAZARDS IDENTIFICATION

Aqueous solutions or powders that become wet render surfaces extremely slippery.

4. FIRST AID MEASURES

Inhalation : Move to fresh air.

Skin contact : Wash with water and soap as a precaution. In case of persistent skin irritation, consult a physician.

Eye contact : Rinse thoroughly with plenty of water, also under the eyelids. In case of persistent eye irritation, consult a physician.

Ingestion : The product is not considered toxic based on studies on laboratory animals.

5. FIRE-FIGHTING MEASURES

Suitable extinguishing media : Water, water spray, foam, carbon dioxide (CO_2), dry powder.

Special fire-fighting precautions : Aqueous solutions or powders that become wet render surfaces extremely slippery.

Special protective equipment for firefighters : No special protective equipment required.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions :	No special precautions required.
Environmental precautions :	Do not contaminate water.
Methods for cleaning up :	Do not flush with water. Clean up promptly by scoop or vacuum. Keep in suitable and closed containers for disposal. After cleaning, flush away traces with water.

7. HANDLING AND STORAGE

Handling :	Avoid contact with skin and eyes. Avoid dust formation. Do not breathe dust. Wash hands before breaks and at the end of workday.
Storage :	Keep in a dry, cool place (0 - 35 °C).

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Engineering measures to reduce exposure :	Use local exhaust if dusting occurs. Natural ventilation is adequate in absence of dusts.
Personal protection equipment :	
- Respiratory protection :	Dust safety masks are recommended where concentration of total dust is more than 10 mg / m^3.
- Hand protection :	Rubber gloves.
- Eye protection :	Safety glasses with side-shields. Do not wear contact lenses.
- Skin and body protection :	Chemical resistant apron or protective suit if splashing or repeated contact with solution is likely.
Hygiene measures :	Wash hands before breaks and at the end of workday. Handle in accordance with good industrial hygiene and safety practice.

9. PHYSICAL AND CHEMICAL PROPERTIES

Form :	granular solid
Color :	white
Odor :	none
pH :	4 - 9 @ 5 g/L (for product series. See Technical Bulletin for specific value)
Melting point (°C) :	Not applicable.
Flash point (°C) :	Not applicable.
Autoignition temperature (°C) :	Not applicable.
Vapor pressure (mm Hg) :	Not applicable.
Bulk density :	See Technical Bulletin.
Water solubility :	See Technical Bulletin.
Viscosity (mPa's) :	See Technical Bulletin.

10. STABILITY AND REACTIVITY

Stability :	Product is stable, no hazardous polymerization will occur.
Materials to avoid :	Oxidizing agents may cause exothermic reactions.
Hazardous decomposition products :	Thermal decomposition may produce : nitrogen oxides (NOx), carbon oxides.

11. TOXICOLOGICAL INFORMATION

Acute toxicity :

- Oral :	LD50 / oral / rat > 5000 mg/kg
- Dermal :	The results of testing on rabbits showed this material to be non-toxic even at high dose levels.
- Inhalation :	The product is not expected to be toxic by inhalation.

Irritation :

- Skin :	The results of testing on rabbits showed this material to be non-irritating to the skin.
- Eyes :	Testing conducted according to the Draize technique showed the material produces no corneal or iridial effects and only slight transitory conjuctival effects similar to those which all granular materials have on conjuctivae.
Sensitization :	The results of testing on guinea pigs showed this material to be non-sensitizing.
Chronic toxicity :	A two-year feeding study on rats did not reveal adverse health effects. A one-year feeding study on dogs did not reveal adverse health effects.

12. ECOLOGICAL INFORMATION

Acute aquatic toxicity :

- Fish :	LC50 / Danio rerio / 96 hours > 100 mg/L (OECD 203)
- Daphnids :	EC50 / Daphnia magna / 48 hours > 100 mg/L (OECD 202)
- Algae :	IC50 / Scenedesmus subspicatus / 72 hours > 100 mg/L (OECD 201)
- Hydrolysis :	Does not hydrolyze.
- Biodegradation :	Not readily biodegradable.
- $LogP_{ow}$:	0
- Bioaccumulation :	Does not bioaccumulate.

13. DISPOSAL CONSIDERATIONS

Waste from residues / unused products : In accordance with local and national regulations.

Contaminated packaging : Rinse empty containers with water and use the rinse water to prepare the working solution. Can be landfilled or incinerated, when in compliance with local regulations.

14. TRANSPORT INFORMATION

Remarks : Not classified as dangerous in the meaning of transport regulations.

15. REGULATORY INFORMATION

This product is not a hazardous article and need not be labeled according to EC-Directives as amended.

Inventory status :

EINECS (Europe) : Existing polymer according to the definition in the 7th Amendment to Directive 67 / 548 / EEC. All starting materials and additives are listed in EINECS.

TSCA (USA) : Complies with all applicable rules or orders under TSCA.

DSL (Canada) : All components listed on inventory.

AICS (Australia) : All components listed on inventory.

MITI (Japan) : All components listed on inventory.

ECL (Korea) : All components listed on inventory.

NEPA (China) : All components listed on inventory.

PICCS (Philippines) : All components listed on inventory.

16. OTHER INFORMATION

Further information :

This MSDS was prepared in accordance with the following :

Council Directive 92 / 32 / EEC of 30 April 1992 amending for the seventh time Directive 67 / 548 / EEC on the approximation of the laws, regulations, and administrative provisions relating to the classification, packaging, and labeling of dangerous substances and all subsequent adaptations to technical progress.

[illegible] EC of the European Parliament and its [illegible] approximation of the [illegible]s, regulations, and administrative provisions of the Member States relating to the classification, packaging, and labeling of dangerous preparations.

Commission Directive 2001 / 58 / EC of 27 July 2001 amending for the second time Directive 91 / 155 / EEC defining and laying down the detailed arrangements for the system of specific information relating to dangerous preparations in implementation of Article 14 of European Parliament and Council Directive 1999 / 45 / EC and relating to dangerous substances in implementation of Article 27 of Council Directive 67 / 548 / EEC (safety data sheets).

ISO 11014-1 : Material Safety Data Sheet for Chemical Products.

Person to contact : Product Manager

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information, and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal, and release, and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process unless specified in the text.

teckcominco

SULFURIC ACID
MATERIAL SAFETY DATA SHEET

SECTION 1. PRODUCT AND COMPANY IDENTIFICATION

Product Identity: Sulfuric Acid (93 percent)

Manufacturer:
Teck Cominco Metals Ltd.
Trail Operations
Trail, British Columbia
V1R 4L8
Emergency Telephone: 250-364-4214

Supplier:
Teck Cominco American Incorporated
Industrial Chemicals
15918 East Euclid Avenue
P.O. Box 3087
Spokane, WA 99216-1815

MSDS Preparer:
Teck Cominco Limited
600 - 200 Burrard Street
Vancouver, British Columbia
V6C 3L9

Date of Last Review/Edit: September 21, 2001.

Product Use: Used in the manufacturing of chlorine dioxide (a pulp and paper bleaching chemical), in the manufacturing of phosphate and sulphate fertilizers, in the manufacturing of metal sulfates, as a metal pickling chemical and as a component of lead storage batteries.

SECTION 2. COMPOSITION / INFORMATION ON INGREDIENTS

Hazardous Ingredient	Approximate Percent by Weight	C.A.S. Number	Occupational Exposure Limits (OELs)		LD_{50} / LC_{50} Species and Route	
Sulfuric Acid	93	7664-93-9	OSHA PEL	1 mg/m^3	LD_{50} ori-rat	2140 mg/kg
			ACGIH TLV	1 mg/m^3	LC_{50} ihl-rat	510 mg/m^3/2H
			NIOSH REL	1 mg/m^3	LC_{50} ihl-mouse	320 mg/m^3/2H

NOTE: OELs for individual jurisdictions may differ from OSHA PELs. Check with local authorities for the applicable OELs in your jurisdiction. OSHA - Occupational Safety and Health Administration; ACGIH - American Conference of Governmental Industrial Hygienists; NIOSH - National Institute for Occupational Safety and Health. OEL – Occupational Exposure Limit, PEL – Permissible Exposure Limit, TLV – Threshold Limit Value, REL – Recommended Exposure Limit.

Trade Names and Synonyms: Oil of vitriol, vitriol brown oil, battery acid, matting acid, H_2SO_4.

SECTION 3. HAZARDS IDENTIFICATION

Emergency Overview: A strong mineral acid present as a colorless and odorless oily liquid when pure but may appear yellow to dark brown when impure. Extremely corrosive to all body tissues, causing rapid tissue destruction and serious chemical burns. Skin or eye contact requires immediate first aid. Can decompose at high temperatures forming toxic gases such as sulfur oxides. Non-flammable but reacts violently with water generating large amounts of heat with potential for spattering of the acid. Can react with combustible materials to generate heat and ignition. Reacts with most metals, particularly when diluted with water, to form flammable hydrogen gas which may create an explosion hazard. It is highly toxic to aquatic organisms and plant life but does not bioaccumulate or concentrate in the food chain.

Potential Health Effects: Sulfuric acid is not very volatile and workplace exposures are therefore primarily due to accidental splashes or to processes or actions that generate an acid mist. It is extremely corrosive to all body tissues, causing rapid tissue destruction and serious chemical burns on contact with the skin or eyes. Skin or eye contact requires immediate first aid. Inhalation of sulfuric acid mist or fumes may produce irritation of the nose, throat and respiratory tract. High levels of acid mist are also irritating to the skin and eyes. Chronic inhalation of acid mist may cause pitting and erosion of tooth enamel. Sulfuric acid is not listed as a carcinogen by OSHA, NTP, IARC, ACGIH or the EU. IARC, the ACGIH and the NTP have concluded there is sufficient evidence that occupational exposure to strong inorganic acid mists containing sulfuric acid is carcinogenic or potentially carcinogenic to humans. (see Toxicological Information, Section 11)

Potential Ecological Effects: A strong mineral acid that could pose a significant threat to nearby watercourses. It is highly toxic to aquatic organisms and plant life but does not bioaccumulate or concentrate in the food chain. (see Ecological Information, Section 12)

EU Risk Phrase: R35 - Causes severe burns.

SECTION 4. FIRST AID MEASURES

Eye Contact: Immediately flush with warm, running water, including under the eyelids, for at least 15 minutes. Seek medical attention immediately. Flushing must begin immediately if permanent eye tissue damage is to be avoided.

Skin Contact: Immediately remove contaminated clothing and footwear under shower and thoroughly flush affected area. Seek immediate medical attention. Discard contaminated clothing, shoes and leather goods (e.g. watch bands, belts, etc.).

Inhalation: Remove victim from exposure area to fresh air immediately. If breathing has stopped, give artificial respiration. Medical oxygen may be administered, if available, where breathing is difficult. Seek medical attention immediately.

Ingestion: If victim is conscious and can swallow, dilute stomach contents with 2 to 4 cupfuls of water or milk. Do not induce vomiting. Seek medical attention immediately and bring a copy of this MSDS. Never give anything by mouth to an unconscious person.

SECTION 5. FIRE FIGHTING MEASURES

Fire and Explosion Hazards: Sulfuric acid is not flammable or combustible. However, fires may result from the heat generated by contact of concentrated sulfuric acid with combustible materials. Sulfuric acid reacts with most metals, especially when diluted with water, to produce hydrogen gas which can accumulate to explosive concentrations inside confined spaces. It reacts violently with water and organic materials evolving a considerable amount of heat and is very hazardous when in contact with carbides, cyanides, and sulfides.

Extinguishing Media: Use dry chemical or carbon dioxide extinguishers. Use water spray to cool fire-exposed containers. Use water only if absolutely necessary and DO NOT USE WATER DIRECTLY ON ACID as a violent reaction may occur resulting in spattering of the acid.

Fire Fighting: Fire fighters must be fully trained and wear full protective clothing including an approved, self-contained breathing apparatus which supplies a positive air pressure within a full facepiece mask. For fires close to a spill or where vapors are present, use acid-resistant personal protective equipment.

Flashpoint and Method: Not Applicable.

Upper and Lower Flammable Limit: Not Applicable.

Autoignition Temperature: Not Applicable.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Procedures for Cleanup: Control source of release if possible to do safely. Contain spill, isolate hazard area, and deny entry to unauthorized personnel. Dike area around spill and pump uncontaminated acid back to process if possible. Neutralize spilled material with alkali such as sodium carbonate or sodium bicarbonate, soda ash, lime or limestone granules. Allow to stand for 1-2 hours to complete neutralization, then absorb any liquid in solid absorbent such as vermiculite or clay absorbents. Place spilled material in suitable labeled containers for final disposal. Treat or dispose of waste spilled material in accordance with all local, regional and national regulations.

Personal Precautions: Acid resistant protective clothing and gloves. Sleeves and pant legs and should be worn outside, not tucked into gloves and rubber boots. Use close-fitting safety goggles or a combination of safety goggles and a faceshield where splashing is a possibility. Respiratory protection equipment should be worn where exposure to hazardous levels of mist or fume is possible.

Environmental Precautions: This product can pose a threat to the environment. Contamination of soil and water should be prevented. Dike area to prevent flow to streams or sewers. Neutralize and dispose of in accordance with all applicable regulations.

SECTION 7. HANDLING AND STORAGE

Store in a dry, cool, well-ventilated area away from incompatible substances. Keep in tightly closed containers which are appropriately labeled. Do not allow contact with water. Do not store near alkaline substances. Always practice good personal hygiene. Refrain from eating, drinking, or smoking in work areas. Thoroughly wash hands before eating, drinking, or smoking.

EU Safety Phrase(s): S26 - in case of contact with eyes, rinse immediately with plenty of water and seek medical advice; S30 - never add water to this product.

SECTION 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Protective Clothing: Protective clothing and gloves as well as glasses, goggles or face shield. Appropriate protective clothing should be worn where any possibility exists that skin contact can occur. Use close-fitting safety goggles or a combination of safety goggles and a faceshield where any possibility exists that eye contact can occur. An eyewash and quick drench should be provided. Workers should wash immediately when skin becomes contaminated and at the end of each work shift.

Ventilation: Use adequate local or general ventilation to maintain the concentration of sulfuric acid aerosol mists below recommended occupational exposure limits.

Respiratory Protection: Where sulfuric acid mists are generated and cannot be controlled to within acceptable levels, use appropriate NIOSH-approved respiratory protection equipment (a combination of a 42CFR84 Class N, R or P-100 particulate filter and an acid gas cartridge).

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance: Clear, Colorless, Oily Liquid	**Odor:** Odorless when cold	**Physical State:** Liquid	**pH:** Concentration dependant <0.1 (93% Sol'n), 0.3 (5% or 1N Sol'n)
Vapor Pressure: <0.001 mm Hg @ 20°C	**Vapor Density:** 1.2 kg/m^3	**Boiling Point/Range:** 280°C	**Freezing/Melting Point/Range:** -35°C
Specific Gravity: 1.84	**Evaporation Rate:** Not Applicable	**Coefficient of Water/Oil Distribution:** No Data Available	**Odor Threshold:** > 1 mg/m^3

Solubility in Water:
Completely soluble with generation of heat

SECTION 10. STABILITY AND REACTIVITY

Stability & Reactivity: Stable under normal temperatures and pressures. Decomposes at 340° C into sulfur trioxide and water. Extremely reactive with metals, alkalis and many other organic and inorganic chemicals. Hazardous gases such as hydrogen cyanide, hydrogen sulfide and acetylene are evolved on contact with chemicals such as cyanides, sulfides and carbides. Contact with combustible organic matter may cause fire or explosion. Dilution with water generates excessive heat and spattering or boiling may occur. Always add acid to water, NEVER ADD WATER TO ACID.

Incompatibilities: Combustible materials, organic materials, oxidizers, amines, bases, water, excess heat, and metals.

Hazardous Decomposition Products: Sulfur dioxide, sulfur trioxide.

SECTION 11. TOXICOLOGICAL INFORMATION

General: Concentrated sulfuric acid exerts a strong corrosive action on all tissues due to its severe dehydration action (removing water from tissues). The severity of the chemical burn produced by the concentrated acid is proportional to the strength of the acid and the duration of contact. Burns are deep but typically not severely painful. Prolonged exposure to dilute solutions or acid mists may lead to irritation of the eyes and skin causing chronic conjunctivitis and dermatitis. Inhalation of sulfuric acid mist or fumes may result in irritation of the respiratory tract possibly leading to laryngeal spasm. Asthmatics may be more sensitive to inhaling sulfuric acid mists. IARC and the ACGIH have concluded there is sufficient evidence that occupational exposure to strong inorganic acid mists containing sulfuric acid is carcinogenic or potentially carcinogenic to humans.

Acute:
Skin/Eye: Splashes can cause severe eye burns and may cause irreversible eye injury and possible blindness. Skin contact results in severe burns and may result in permanent scarring. High levels of sulfuric acid mists and aerosols are also irritating to the eyes and skin.

Inhalation: Inhalation may cause severe irritation of the respiratory tract with sore throat, coughing, shortness of breath, laryngeal spasm and delayed lung edema. These symptoms may be aggravated by physical exertion.

Ingestion: Ingestion is unlikely in industrial use but will result in severe burns to the mouth, throat, esophagus and stomach which could lead to permanent damage to the digestive tract. Small amounts of acid can also enter the lungs during ingestion or subsequent vomiting and cause serious lung injury.

Chronic: Prolonged exposure to dilute solutions or mists may result in eye irritation (chronic conjunctivitis) and produce skin dermatitis. Exposure to high concentrations of acid mist has caused erosion and discoloration of the anterior teeth. Sulfuric acid is

not listed as a carcinogen by OSHA, National Toxicology Program (NTP), International Agency for Research on Cancer (IARC), ACGIH or the EU. IARC has concluded that there is sufficient evidence that occupational exposure to strong inorganic acid mists containing sulfuric acid is carcinogenic to humans, resulting in an increased incidence of primarily laryngeal cancers. The ACGIH list strong inorganic acid mists containing sulfuric acid as a suspect human carcinogen (A2) and the NTP have recently re-classified strong inorganic acid mists containing sulfuric acid to a known human carcinogen. OSHA and the EU do not list sulfuric acid mist as a carcinogen.

SECTION 12. ECOLOGICAL INFORMATION

Sulfuric acid is very corrosive and can be harmful to aquatic and terrestrial life. Keep out of water. Neutralize any spills to ground.

SECTION 13. DISPOSAL CONSIDERATIONS

Do not wash down drain or allow to reach natural watercourses. Dispose of neutralized waste consistent with regulatory requirements. If neutralized with lime rock or soda ash, good ventilation is required during neutralization because of the release of carbon dioxide gas.

SECTION 14. TRANSPORT INFORMATION

Proper Shipping Name - Transport Canada.....Sulphuric acid
Proper Shipping Name - U.S. DOT.....Sulfuric acid
Transport Canada Hazard Classification.....8 (9.2), Packing Group II
U.S. DOT Hazard Classification.....8, Packing Group II
Transport Canada and U.S. DOT Product Identification Number.....UN1830
Marine Pollutant.....No
IMO Classification.....8

SECTION 15. REGULATORY INFORMATION

U.S.
Listed on TSCA Inventory.....Yes
Hazardous Under Hazard Communication Standard.....Sulfuric Acid Yes
CERCLA Section 103 Hazardous Substances..... Sulfuric Acid ..Yes RQ: 1000 pounds
EPCRA Section 302 Extremely Hazardous Substance.....Yes RQ: 1000 pounds
.....Threshold Planning Quantity: 1000 pounds
EPCRA Section 311/312 Hazard Categories
Immediate (Acute) Health Hazard - Corrosive
Immediate (Acute) Health Hazard - Highly Toxic

EPCRA Section 313 Toxic Release Inventory
Sulfuric Acid CAS NO. 7664-93-9 Percent by Weight 93

CANADIAN:
Listed on Domestic Substances List:.....Yes
WHMIS Classification.....Controlled Product, Classification D1A (Immediate & Serious Toxic Effects), E (Corrosive Material)

EUROPEAN UNION:
Listed on the European Inventory of Existing Commercial Chemical Substances (EINECS).....Yes
EU Classification: .....Corrosive

SECTION 16. OTHER INFORMATION

The information in this Material Safety Data Sheet is based on the following references:

- American Conference of Governmental Industrial Hygienists, 1991, Documentation of the Threshold Limit Values and Biological Exposure Indices, 6th Edition plus updates.
- American Conference of Governmental Industrial Hygienists, 1996, Guide to Occupational Exposure Values.
- American Conference of Governmental Industrial Hygienists, 1999, Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices.
- Canadian Centre for Occupational Health & Safety CHEMINFO Record No. 122 - Sulfuric Acid, 1998-08
- Clayton and Clayton, 1994, Patty's Industrial Hygiene and Toxicology, Fourth Edition.
- European Economic Community, Commission Directives 91/155/EEC, 93/21/EEC, and 67/548/EEC.
- Industry Canada, Controlled Products Regulations SOR/88-66, as amended.

- Lewis, Richard J., Sr., 1991, Hazardous Chemicals Desk Reference, Second Edition.
- Merck & Co., Inc., 1989, The Merck Index, An Encyclopedia of Chemicals, Drugs, and Biologicals, Eleventh Edition.
- National Library of Medicine, National Toxicology Information Program, 1996, Hazardous Substance Data Bank.
- Sax, N. Irving, 1984, Dangerous Properties of Industrial Materials, Sixth Edition.
- U.S. Department of Health and Human Services, Public Health Service, Agency for Toxic Substances and Disease Registry, 1994, Office, 1996, Integrated Risk Information System.
- U.S. Occupational Safety and Health Administration, 1989, Code of Federal Regulations, Title 29, Part 1910.

Notice to Reader

Although reasonable precautions have been taken in the preparation of the data contained herein, it is offered solely for your information, consideration and investigation. Teck Cominco American Incorporated extends no warranty and assumes no responsibility for the accuracy of the content and expressly disclaims all liability for reliance thereon. This material safety data sheet provides guidelines for the safe handling and processing of this product; it does not and cannot advise on all possible situations. Therefore, your specific use of this product should be evaluated to determine if additional precautions are required. Individuals exposed to this product should read and understand this information and be provided pertinent training prior to working with this product.

CENEX, Inc. P.O. Box 64089 St. Paul, Minnesota 55164-0089 Phone (612) 451-5151

DATE FEB 1994

MATERIAL SAFETY DATA SHEET

SECTION I

MANUFACTURERS NAME: CENEX, INC.
ADDRESS: PO BOX 64089, ST PAUL MN 55164-0089
TELEPHONE NO: (612) 451-5151
EMERGENCY TELEPHONE: (800) 424-9300 (CHEMTREC)
CHEMICAL NAME & SYNONYMS: PETROLEUM DISTILLATE
TRADE NAME & SYNONYMS: #2 FUEL OIL, #2 DIESEL FUEL, FIELDMASTER XL, #2 BURNER FUEL, 2X-1 BURNER FUEL, D-GRADE

SECTION II INGREDIENTS & HAZARDS

This material is hazardous as defined by OSHA's Hazard Communication Standard 29 CFR 1910.1200.

	CONCENTRATION %	C.A.S. NUMBER
Hazardous Ingredients:		
Complex Mixture of Paraffinic, Olefinic, Naphthenic, and Aromatic Hydrocarbons.	>99	68476-30-2

Hazardous Physical Properties:
Class II Combustible Liquid-NFPA

SECTION III PHYSICAL DATA

Boiling Point (F): Range 370-700

Vapor Pressure @ 68 F. (mmHg): 1-2

Solubility In Water: Negligible

Specific Gravity: 0.82-0.88

Percent Volatile: Nil
(By Volume %)

Vapor Density (Air=1): >1

Appearance & Odor: Mobile liquid with mild petroleum odor. Contains mandated dye.

SECTION IV FIRE & EXPLOSION DATA

Flash Point (F.): 100 minimum (P.M.)

Autoignition Temp (F.): 490

Flammability Limits: LFL 0.4%
UFL 8.0%

Extinguishing Media: Dry chemical, carbon dioxide, foam, water spray or fog. Use a smothering technique for extinguishing fire. A forced stream of water could scatter flames of burning fuels. Flammable vapors will be emitted from heated liquid.

Special Fire Fighting Procedures: Use water spray for cooling fire-exposed containers to prevent pressure rupture. Water runoff to sewer may carry combustible fuels and create a fire or explosion hazard. Firefighters should use self-contained breathing apparatus and protective clothing.

Unusual Fire & Explosion Hazards: Combustion by-products may contain carbon monoxide and other toxic materials.

NFPA Rating: Health 1 Fire 2 Reactivity 0

SECTION V HEALTH HAZARD DATA

Primary Route(s) of Exposure/Entry: Skin, Inhalation

TLV-TWA: 10 ppm; STEL 15ppm (Naphthalene)
PEL: 400 ppm TWA for Petroleum Distillates

Inhalation of excessive vapor or mist is irritating to respiratory passages and can lead to headache, dizziness, nausea, stupor, convulsions or loss of consciousness, depending on concentration and time of exposure. High vapor concentration or liquid contact can irritate eyes. Prolonged or repeated contact with skin can cause defatting, irritation, and dermatitis. Petroleum middle distillates have been shown to produce skin tumors in mice following repeated skin exposure without washing or removal. Also prolonged or repeated inhalation exposure to high concentrations has caused liver tumors in mice and adverse kidney effects in male rats. The exact relationship between these results and human health is not known. On the basis of animal studies, NIOSH recommends that whole diesel exhaust be regarded as potential carcinogen. Swallowing can cause gastro intestinal irritation, nausea, vomiting and diarrhea.

Aspiration into the lungs may cause pulmonary edema and chemical pneumonitis.

This material is not listed as a carcinogen by the NTP, IARC or OSHA.

SECTION VI EMERGENCY & FIRST AID INFORMATION

EYE CONTACT: Promptly flush with plenty of running water for at least 15 minutes, including under eyelids. Call a physician.

SKIN CONTACT: Remove contaminated clothing. Wash affected area with soap and water. If irritation develops, consult a physician.

INHALATION: Remove victim to fresh air. If breathing is difficult, administer oxygen. If breathing has stopped, give artificial respiration. Call a physician.

INGESTION: Contact a physician! Aspiration hazard! Do not induce vomiting. If spontaneous vomiting occurs, hold the victim's head lower than hips to help prevent pulmonary aspiration. Seek medical assistance for further treatment. Give two glasses of water. Never give anything by mouth to an unconscious person.

SECTION VII REACTIVITY DATA

This is a stable material in closed containers under normal storage and handling conditions. It does not polymerize. Heating greatly increases the flammability hazard of this OSHA Class II combustible liquid.

Stability: Stable X Unstable_____
Conditions To Avoid: Heat, flame and sparks.
Materials To Avoid: Oxidizing materials.
Hazardous Decomposition: Carbon monoxide and other toxic chemicals.
Hazardous Polymerization: May Occur_____ Will Not Occur X
Conditions To Avoid: N/A

Thermal-oxidative degradation can yield partial oxidation products, hydrocarbons, carbon monoxide and dioxide, and small amounts of sulfur dioxide (depending on sulfur content).

SECTION VIII SPILL OR LEAK PROCEDURES

Report spills as required to state and local authorities. Report spills that could reach any waterway to U.S. Coast Guard (800-424-8802). Advise National Response Center (800-424-8802) as required. In case of accident or road spill notify CHEMTREC (800-424-9300).

Notify safety personnel of leaks or spills. Remove sources of heat or ignition. Provide adequate explosion-proof ventilation. Clean-up personnel require protection against liquid contact and vapor inhalation. Dike to contain spill and collect liquid. Do not flush to sewer or surface water. Use absorbent material (sand, vermiculite) to pick up small spills and residues promptly to reduce fire or vapor hazard. Use non-sparking tools. Recover as much product as possible.

NOTE: Review fire and explosion hazards, use appropriate personal protective equipment.

Waste Disposal Method: May be disposed of through a licensed waste disposal company, by controlled incineration. Follow local, state and federal regulations.

SECTION IX SPECIAL PROTECTION INFORMATION

Use general and local exhaust ventilation (explosion-proof) to keep vapors below the TLV requirements in the workplace. Appropriate NIOSH respirator should be available for non-routine or emergency use when vapors are above the TLV.
Wear protective rubber gloves or prevent repeated or prolonged contact & safety glasses if splashing of liquid may occur. Additional protective clothing may be required depending on working conditions. Launder work clothes at least weekly and when contaminated before reuse. Eyewash stations and washing facilities should be available to areas of use and handling.

SECTION X TRANSPORTATION,STORAGE,SPECIAL PRECAUTIONS & COMMENTS

Storage Information: Store in closed containers in a well-ventilated area away from sources of heat, ignition and strong oxidizing agents. Protect containers from physical damage. Outdoor or detached storage preferred. Prevent static electric sparks and use explosion-proof electrical services.

Ground and bond containers to prevent static sparks when transferring material. No smoking in areas of use. Storage conditions must meet requirements for an OSHA Class II Combustible Liquid. Avoid prolonged or repeated skin contact and breathing of vapors or mists. Follow good hygienic practice in the use of this material. Launder oily rags before reuse. Wash hands and exposed skin frequently during work day. Do not weld or use cutting torch on empty containers since product residue may exhibit hazards associated with the material.

Proper Shipping Name: Fuel Oil
Hazard Class: Combustible Liquid
UN/NA No: NA 1993
DOT Label: None
DOT Placard: Combustible

SECTION XI REGULATORY INFORMATION, (NOT ALL INCLUSIVE)

SARA Title III Sections 302, 304, 311, 312, 313.
Section 302/304-Extremely Hazardous Substances (40 CFR 355) this material is not known to contain greater than 1.0% of any extremely hazardous substance. Section 311/312 MSDS and OSHA's Hazard Communication Standard (40 CFR 370). Under OSHA's Hazard Communication Standard (29 CFR 1910.1200) this product should be reported under the following EPA hazard categories:

__X__ Acute (immediate) Health Hazard
__X__ Chronic (delayed) Health Hazard
__X__ Fire
_____ Sudden Release of Pressure
_____ Reactive
_____ Not Applicable

Section 313 Toxic Chemical Components (40 CFR 372). This product contains the following chemicals at a concentration of 1.0% or greater if hazardous (0.1% or greater for carcinogens) identified as toxic and is subject to toxic chemical release reporting requirements.

Component	C.A.S. No	Approx Percent
Naphthalene	91-20-3	1-3
Biphenyl	92-52-4	0.5-1.5
1,2,4 Trimethylbenzene	95-63-6	0.5-2.0
Xylene	1330-20-7	1.0-2.5

The chemical ingredients in this material are on the U.S. Toxic Substance Control Act inventory and/or otherwise are in compliance with TSCA.

Federal Water Pollution Control Act, Clean Water Act, 40 CFR 401.15, 40 CFR 116.

This product contains the following components which is considered hazardous if spilled in navigable waters.

Component	Reportable Quantity
Petroleum Hydrocarbon	Film or sheen upon the water surface or discoloration of the water or shoreline

The information contained herein is based on data considered accurate. However, no warranty is expressed or implied regarding the accuracy of these data or the results to be obtained from the use thereof.
Vendor assumes no responsibility for injury to vendee or third persons proximately caused by the material if reasonable safety procedures are not adhered to as stipulated in the data sheet. Additionally, vendor assumes no responsibility for injury to vendee or third persons proximately caused by abnormal use of the material even if reasonable safety procedures are followed. Furthermore, vendee assumes the risk in his use of the material.

5-14-99

CONOCO®

MSDS MATERIAL SAFETY DATA SHEET

GASC0001 Revised 5-DEC-1997 Printed 10-DEC-1997

Gasoline, Unleaded

CHEMICAL PRODUCT/COMPANY IDENTIFICATION

Tradenames and Synonyms

Gasoline, Mid-Grade Unleaded
Gasoline, Premium Unleaded
Gasoline, Regular Unleaded
Gasoline, Super Unleaded
Gasoline, Premium Reformulated
Gasoline, Regular Reformulated
Gasoline, Oxygenated Program Reformulated
Blend Stock, Premium Reformulated
Blend Stock, Regular Reformulated

Company Identification

MANUFACTURER/DISTRIBUTOR
Conoco, Inc.
P.O. Box 2197
Houston, TX 77252

PHONE NUMBERS

Product Information	1-281-293-5550
Transport Emergency	CHEMTREC 1-800-424-9300
Medical Emergency	1-800-441-3637

COMPOSITION/INFORMATION ON INGREDIENTS

Components

Material	CAS Number	%
Gasoline		100
including:		
* Benzene	71-43-2	0.1-4.9
* Ethyl Benzene	100-41-4	2
* Cumene	98-82-8	1
* Pseudocumene	95-63-6	2

(Continued)

COMPOSITION/INFORMATION ON INGREDIENTS (Continued)

* Xylenes	1330-20-7 -12	
* Toluene	108-88-3 -15	
*MTBE (Methyl Tertiary Butyl Ether)	1634-04-4	0-17.5

* Disclosure as a toxic chemical is required under Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR part 372.

HAZARDS IDENTIFICATION

Potential Health Effects

Primary Routes of Entry: Skin, inhalation

Studies of industry employees have indicated that workers exposed many years to high concentrations of benzene have a higher incidence of acute myelogenous leukemia. Benzene can also be toxic to the blood and blood-forming tissues.

The product may cause irritation to the eyes, nose, throat, lungs, and skin after prolonged or repeated exposure. Extreme overexposure or aspiration into the lungs may cause lung damage or death. Overexposure may cause weakness, headache, nausea, confusion, blurred vision, drowsiness, and other nervous system effects; greater overexposure may cause dizziness, slurred speech, flushed face, unconsciousness, and convulsions.

Inhalation of xylene can cause nausea, headache, weakness, dizziness, confusion, incoordination, and loss of consciousness; skin sensitization has occasionally occurred. Ingestion can cause gastrointestinal irritation and symptoms of central nervous sytem depression; aspiration into the lungs may be lethal. High exposures can cause skin, eye, nose, and throat irritation; heart stress; anemia; respiratory difficulties; bleeding from mucosal surfaces; liver and kidney effects; and death.

Methyl tertiary butyl ether (MTBE) may cause irritation to the eyes, skin and lungs after prolonged or repeated exposure. The odor of MTBE may be offensive and possibly cause headaches, difficult breathing, skin and eye irritation, dizziness, and indigestion.

Combustion Product:
Carbon monoxide is a gas that can result from incomplete combustion of hydrocarbons, from detoxification of some chemicals like methylene chloride, tobacco smoke, and even from natural body processes. Carbon monoxide binds tightly to hemoglobin and interferes with oxygen transport to body tissues. Overexposure can cause headache, nausea, nervous system depression, coma, and death.

(Continued)

HAZARDS IDENTIFICATION (Continued)

Carcinogenicity Information

The following components are listed by IARC, NTP, OSHA or ACGIH as carcinogens.

Material	IARC	NTP	OSHA	ACGIH
Benzene	X	X	X	X

DuPont controls the following materials as carcinogens: ^^
Benzene.

FIRST AID MEASURES

First Aid

INHALATION

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.

SKIN CONTACT

Wash skin thoroughly with soap and water. If irritation develops and persists, consult a physician.

EYE CONTACT

In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Call a physician.

INGESTION

If swallowed, do not induce vomiting. Immediately give 2 glasses of water. Never give anything by mouth to an unconscious person. Call a physician.

Notes to Physicians

Activated charcoal mixture may be beneficial. Suspend 50 g activated charcoal in 400 mL water and mix well. Administer 5 mL/kg, or 350 mL for an average adult.

THIS MATERIAL MAY MAKE THE HEART MORE SUSCEPTIBLE TO ARRHYTHMIAS. Catecholamines such as adrenaline, and other compounds having similar effects, should be reserved for emergencies and then used only with special caution.

(Continued)

FIRE FIGHTING MEASURES

Flammable Properties

Flash Point	As low as -50 F
Method	TCC
Flammable limits in Air, % by Volume	
LEL	< 1
UEL	8
Autoignition	536-853

Vapor forms explosive mixture with air. Vapors or gases may travel considerable distances to ignition source and flash back.

Extinguishing Media

Foam, Dry Chemical, CO2.

Fire Fighting Instructions

Water may be ineffective to extinguish but water should be used to keep fire-exposed containers cool. If a leak or spill has not ignited, use water spray to disperse the vapors and to protect personnel attempting to stop a leak. Water spray may be used to flush spills away from sources of potential ignition.

Highly flammable. Products of combustion may contain carbon monoxide, carbon dioxide, and other toxic materials. Do not enter enclosed or confined space without proper protective equipment including respiratory protection.

ACCIDENTAL RELEASE MEASURES

Safeguards (Personnel)

NOTE: Review FIRE FIGHTING MEASURES and HANDLING (PERSONNEL) sections before proceeding with clean-up. Use appropriate PERSONAL PROTECTIVE EQUIPMENT during clean-up.

Remove source of heat, sparks, flame, impact, friction and electricity including internal combustion engines and power tools. If equipment is used for spill cleanup, it must be explosion proof and suitable for flammable liquid and vapor.

NOTE: Vapors released from the spill may create an explosive atmosphere.

Initial Containment

Dike spill. Prevent material from entering sewers, waterways or low areas.

Spill Clean Up

Soak up with sawdust, sand, oil dry or other absorbent material.

(Continued)

HANDLING AND STORAGE

Handling (Personnel)
Avoid breathing vapors or mist. Avoid contact with eyes, skin, or clothing. Wash thoroughly after handling. Wash clothing after use.

Handling (Physical Aspects)
Use of non-sparking and explosion-proof equipment may be necessary depending on type of operation. Keep away from heat, sparks and flames. Close container after each use.

Storage
Store in accordance with National Fire Protection Association recommendations.

EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls
Keep container tightly closed.

VENTILATION
Storage and use areas should be well ventilated. Explosion proof mechanical ventilation should be used in enclosed areas.

Personal Protective Equipment
RESPIRATORY PROTECTION
A NIOSH/MSHA approved air purifying respirator with an organic vapor cartridge or canister may be permissible under certain circumstances where airborne concentrations are expected to exceed exposure limits. Protection provided by air purifying respirators is limited. Use a positive pressure, air supplied respirator if there is any potential for an uncontrolled release, exposure levels are not known, or any other circumstances where air purifying respirators may not provide adequate protection. Proper respirator selection should be determined by adequately trained personnel and based on the contaminant(s), the degree of potential exposure, and published respirator protection factors.

PROTECTIVE GLOVES
Should be worn when the potential exists for prolonged or repeated exposure. NBR recommended.

EYE PROTECTION
Chemical splash goggles or face shield for spray/mists or if splashing can occur.

OTHER PROTECTIVE EQUIPMENT
Sufficient protective clothing to minimize skin exposure.

 # Exposure Guidelines
Applicable Exposure Limits
Benzene

PEL	(OSHA)	1 ppm, 8 Hr. TWA
		5 ppm, STEL

(Continued)

EXPOSURE CONTROLS/PERSONAL PROTECTION (Continued)

	0.5 ppm, Action Level
TLV (ACGIH)	0.5 ppm, 1.6 mg/m3, 8 Hr. TWA, Skin, A1
	STEL 2.5 ppm, 8 mg/m3, A1
AEL * (DuPont)	1 ppm, 8 & 12 Hr. TWA
	5 ppm, 15 minute TWA
Ethyl Benzene	
PEL (OSHA)	100 ppm, 435 mg/m3, 8 Hr. TWA
TLV (ACGIH)	100 ppm, 434 mg/m3, 8 Hr. TWA
	STEL 125 ppm, 543 mg/m3
AEL * (DuPont)	None Established
Cumene	
PEL (OSHA)	50 ppm, 245 mg/m3, 8 Hr. TWA, Skin
TLV (ACGIH)	50 ppm, 246 mg/m3, 8 Hr. TWA, Skin
AEL * (DuPont)	None Established
Pseudocumene	
PEL (OSHA)	25 ppm, 125 mg/m3, 8 Hr. TWA
TLV (ACGIH)	25 ppm, 123 mg/m3, 8 Hr. TWA
AEL * (DuPont)	None Established
Xylenes	
PEL (OSHA)	100 ppm, 435 mg/m3, 8 Hr. TWA
TLV (ACGIH)	100 ppm, 434 mg/m3, 8 Hr. TWA, A4
	STEL 150 ppm, 651 mg/m3, A4
AEL * (DuPont)	100 ppm, 8 & 12 Hr. TWA
	150 ppm, 15 minute TWA
Toluene	
PEL (OSHA)	200 ppm, 8 Hr. TWA
	300 ppm, Ceiling
	500 ppm - 10 Min. Max.
TLV (ACGIH)	50 ppm, 188 mg/m3, 8 Hr. TWA, Skin, A4
AEL * (DuPont)	50 ppm, 8 & 12 Hr. TWA
MTBE (Methyl Tertiary Butyl Ether)	
PEL (OSHA)	None Established
TLV (ACGIH)	40 ppm, 144 mg/m3, 8 Hr. TWA, A3
AEL * (DuPont)	None Established

* AEL is DuPont's Acceptable Exposure Limit. Where governmentally imposed occupational exposure limits which are lower than the AEL are in effect, such limits shall take precedence.

PHYSICAL AND CHEMICAL PROPERTIES

Physical Data

Boiling Point	85-437 F (29-225 C)
Vapor Pressure	200-475 mm Hg @ 68 F (20 C)
Vapor Density	>1 (AIR = 1)
% Volatiles	(by volume) 100
Solubility in Water	May be slightly soluble
Odor	Gasoline
Form	Liquid

(Continued)

PHYSICAL AND CHEMICAL PROPERTIES(Continued)

Color	*
Specific Gravity	0.7-0.77

*Color : Water white to straw yellow
(Super/premium may be dyed red.)

STABILITY AND REACTIVITY

Chemical Stability
Stable.

Conditions to Avoid
Avoid undue exposure to air. Avoid heat, sparks, and flame.

Incompatibility with Other Materials
Incompatible or can react with strong oxidizers.

Decomposition
Carbon monoxide may be formed from incomplete combustion.

Polymerization
Polymerization will not occur.

TOXICOLOGICAL INFORMATION

Animal Data
Animal studies have shown that prolonged or repeated inhalation exposures to high concentrations of some petroleum distillates have caused liver tumors in mice and kidney damage and tumors in male rats. However, kidney effects were not seen in similar studies involving female rats, guinea pigs, dogs, or monkeys. Present studies indicate the kidney effects will only occur in male rats. Also, human studies do not indicate this peculiar sensitivity for kidney damage and studies reported in 1992 showed that this particular type of rat kidney damage is not useful in predicting a human health hazard. The significance of liver tumors in mice exposed to high doses of chemicals is highly speculative and probably not a good indicator for predicting a potential human carcinogenic hazard.

One published study reports limited data suggesting long-term ingestion of 500 mg/kg of toluene caused increased malignant tumors in rats. Other more extensive inhalation studies demonstrated no carcinogenic effects in animals. Animal studies with toluene have failed to demonstrate birth defects in rats and mice. However, toluene has been shown to cause delayed growth and extra ribs in the offspring of rats and mice at inhaled doses (266-399 ppm) that were non-toxic to the mother. Toluene has not been conclusively shown to cause adverse reproductive effects in humans. Toluene overexposure may also cause cardiac irregularities and hearing loss (animal data).

(Continued)

TOXICOLOGICAL INFORMATION (Continued)

Mice and rats were exposed 6 hours daily to MTBE (400, 3000, or 8000 ppm) for 82-105 weeks; no toxicity occurred at 400 ppm (except some kidney damage in male rats) but the two higher concentrations caused a toxic response that included decreased body weight, ataxia, reduced startle response, kidney damage and tumors (only male rats), and liver tumors (female mice in only the 8000 ppm exposed group). High exposure hydrocarbon-induced male rat kidney tumors and mouse liver tumors are probably not useful in predicting a significant human health hazard; future animal studies will further evaluate this tumorigenic response to MTBE. Animal studies involving daily exposure (3000 ppm) showed no significant reproductive toxicity or nerve damage. In mice daily exposure above 1000 ppm caused material toxicity, cleft palate, and increased skeletal variations in newborn mice but the presence of maternal toxicity limits the significance of these findings.

XYLENE:

Eye:
Animal testing indicates this material is an eye irritant.

Skin:
ALD, rabbit: 4,320 mg/kg (Moderately toxic)
Animal testing indicates this material is a moderate to severe skin irritant. This material has not been tested for skin sensitization. Single exposure to high doses caused: Narcosis.

Ingestion:
LD50, rat: 4,500 mg/kg (Slightly toxic).
Single exposure caused: Prostration and incoordination.
Repeated exposure caused: Shallow respiration, prostration, liver and kidney effects, reduced weight gain, and altered hematology and clinical chemistry. Long-term exposure caused: Decreased body weight and histopathological changes of the liver.

Inhalation:
4 hour, LC50, rat: 6,700 ppm (Very low toxicity).
Single exposure caused: Upper respiratory tract irritation, behavioral effects, incoordination, prostration, altered respiratory rate, low blood pressure, and altered hematology.
Repeated exposure caused: Incoordination; decreased response to sound; histopathological changes of the liver, kidneys, adrenals, heart, spleen, lungs, and bone marrow; altered hematology; [illegible] exposure caused: Liver effects.

Additional Toxicological Effects of Xylene:
One published study reports limited data suggesting high oral doses caused an increase in malignant tumors in rats. However, other more extensive animal studies have demonstrated no evidence of carcinogenicity.

Animal data show developmental effects only at or near levels producing other toxic effects in the adult animal. Reproductive data on adult animals show: No change in reproductive

(Continued)

TOXICOLOGICAL INFORMATION(Continued)

performance. Tests have shown that this material does not cause genetic damage in bacterial or mammalian cell cultures, or in animals. In animal testing, this material has not caused permanent genetic damage in reproductive cells of mammals (has not produced heritable genetic damage).

ECOLOGICAL INFORMATION

Ecotoxicological Information

AQUATIC TOXICITY:

Toluene
Moderately toxic.
96 hour LC50 - Fathead minnows: 31.7 mg/L.

Xylenes
Moderately toxic.
96 hour LC50 - Fathead minnows: 24-42 mg/L.

MTBE (Methyl Tertiary Butyl Ether)
Low toxicity.
96 hour LC50 - Fathead minnows: 706 mg/L

DISPOSAL CONSIDERATIONS

Waste Disposal

Treatment, storage, transportation, and disposal must be in accordance with applicable Federal, State/Provincial, and Local regulations. Do not flush to surface water or sanitary sewer system.

By itself, the liquid is expected to be a RCRA ignitable hazardous waste.

TRANSPORTATION INFORMATION

Shipping Information

DOT

Proper Shipping Name	Gasoline
Hazard Class	3
[illegible] (UN/NA)	UN1203
Packing Group	[illegible]
DOT Label(s)	Flammable liquid
DOT Placard	Flammable

(Continued)

REGULATORY INFORMATION

U.S. Federal Regulations

OSHA HAZARD DETERMINATION
This material is hazardous as defined by OSHA's Hazard Communication Standard, 29 CFR 1910.1200.

CERCLA/SUPERFUND
Not applicable; this material is covered by the CERCLA petroleum exclusion. Releases are not reportable.

SARA, TITLE III, 302/304
This material is not known to contain extremely hazardous substances.

TITLE III HAZARD CLASSIFICATIONS SECTIONS 311, 312

Acute : Yes
Chronic : Yes
Fire : Yes
Reactivity : No
Pressure : No

SARA, TITLE III, 313
This material contains the following chemical(s) at a level of 1.0% or greater (0.1% for carcinogens) on the list of Toxic Chemicals and is subject to toxic chemical release reporting requirements:

Toxic Chemical(s) See Composition Section

TSCA
Material and/or components are listed in the TSCA Inventory of Chemical Substances (40 CFR 710).

RCRA
This material, when discarded or disposed of, is not specifically listed as a hazardous waste in Federal regulations; however, it meets criteria for being ignitable according to U. S. EPA definitions (40 CFR 261). This material could also become a hazardous waste if it is mixed with or comes in contact with a listed hazardous waste. If it is a hazardous waste, regulations at 40 CFR 262-266 and 268 may apply.

CLEAN WATER ACT
The material contains the following ingredient(s) which is considered hazardous in addition [illegible] navigable waters and therefore reportable to the National Response Center (1-800-424-8802).

Ingredient(s)	Petroleum Hydrocarbons
Reportable Quantity	Film or sheen upon, or discoloration of, any water surface

(Continued)

REGULATORY INFORMATION (Continued)

State Regulations (U.S.)

CALIFORNIA "PROP 65"
The material contains ingredient(s) known to the State of California to cause cancer, birth defects, or other reproductive harm. Read and follow all label directions.

Ingredient	Benzene, Toluene, Unleaded Gasoline (Wholly Vaporized)

PENNSYLVANIA WORKER & COMMUNITY RIGHT TO KNOW ACT
This material may contain the following ingredient(s) subject to the Pennsylvania Worker and Community Right to Know Hazardous Substances List.

Ingredient	Benzene
Category	Special Hazardous Substance, Environmental Hazard
Ingredient	Gasoline
Category	Hazardous Substance
Ingredient	Cumene
Category	Environmental Hazard, Hazardous Substance
Ingredient	Ethyl Benzene, Pseudocumene, MTBE, Toluene, Xylene
Category	Environmental Hazards

Canadian Regulations

CLASS B Division 2 - Flammable Liquid.

CLASS D Division 2 Subdivision A - Very Toxic Material. Carcinogen.

CLASS D Division 2 Subdivision B - Toxic Material. Chronic Toxic Effects, Skin or Eye Irritant.

Transport/Medical Emergency Phone Number: 1-613-348-3616

OTHER INFORMATION

NFPA, NPCA-HMIS

NFPA Rating

Health	1
Flammability	3
Reactivity	0

NPCA-HMIS Rating

Health	2 (Chronic Health Effects)
Flammability	3
Reactivity	0

Personal Protection rating to be supplied by user depending on use conditions.

Additional Information

Product Use : Automotive Gasoline

(Continued)

PETROLANE MATERIAL SAFETY DATA SHEET

18

P.O. Drawer 1410 - 1600 E. Hill St., Long Beach, CA 90801
Contact: Safety Department - Telephone: (213) 427-5471

February 1989

WARNING STATEMENT

DANGER! Extremely Flammable. Keep away from heat, sparks and open flame. Vapor reduces oxygen available for breathing and may cause suffocation in confined spaces. Use only with adequate ventilation. Odor may not provide adequate warning of potentially hazardous concentrations. Vapor is heavier than air and collects in low levels. Liquid may cause freeze burn similar to frostbite.

I. Product Identification

Product Name: Petrolane Propane
Chemical Name: Propane
Synonyms: LP-Gas, Bottled Gas
Chemical Family: Paraffinic Hydrocarbon
Chemical Formula: C_3H_8
DOT Proper Shipping Name: Liquefied Petroleum Gas
DOT Hazard Class: Flammable Gas
DOT I.D. Number: UN1075

Transportation Emergency Telephone:
800-424-9300 (CHEMTREC)

NFPA Classification:

Health	1	Slightly Toxic
Fire	4	Extremely Flammable
Reactivity	0	Stable

II. Hazardous Ingredients

Component	CAS Number	%	OSHA PEL	ACGIH TLV
Ethane	74-84-0	0-6	None established	Simple asphyxiant
Propane	74-98-6	87-97	1000 ppm (8hr)	Simple asphyxiant
Propylene	115-07-1	0-5	None established	Simple asphyxiant
Butane	106-97-8	0-2.5	None established	800 ppm (8 hr)

III. Physical Data

Boiling Point: -44°F
Melting Point: -309°F
Vapor Pressure: 208 psig (max.) @ 100°F
Vapor Density (Air=1): 1.5
Specific Gravity (H_2O=1): 0.504

% Volatile by Volume: 100%
Solubility in Water: Insoluble
Evaporation Rate(Bu Ac=1): N/A
Gas Volume @ Atm. Pressure & 60°F (Cu. ft. gas/gal. liquid): 36.4

Appearance and Odor: Colorless, odorless in pure form.
Propane contains a foul smelling, skunk-like warning agent(odorant). The odorant is effective, in most instances, but not everyone can smell the odor. The ability of people to detect odors varies widely. Also, certain chemical reactions with material in the propane system can reduce the propane odor level. No odorant will be 100% effective in all circumstances. If odor level appears to be weak, notify propane supplier immediately.

IV. Fire and Explosion Data

Flash Point (Method Used): -156°F (estimated)
Flammable Limits (% Volume in Air): Lower 2.1% Upper 9.5%

Extinguishing Media: Dry chemical, foam or CO_2 for small fires. Stop flow of gas first.

Special Fire Fighting Procedures and Precautions: Elimimate sources of ignition. Evacuate area. Notify fire department. Allow only trained, properly protected personnel in area. Shut off source of gas, if possible. Allow fire to burn itself out after gas flow is shut off. High volume water supply can be used to cool heat-exposed pressure containers and nearby equipment. Approach a flame enveloped container from the side, never the head ends. Use extreme caution when applying water to a container which has been exposed to heat or flame for more than a short time. Shock of cool water on hot metal could cause container rupture. For uncontrollable fires and when flame is impinging on container, withdraw all personnel and evacuate surrounding vicinity immediately.

Unusual Fire and Explosion Hazards: Products of combustion may yield carbon monoxide, a toxic gas. Uncontrolled vapors spread rapidly, are heavier than air and are extremely flammable.

V. Reactivity Data

Stability: Stable Conditions to Avoid: High heat, sparks, open flame
Materials to Avoid: Strong oxidizing agents
Hazardous Decomposition Products: Incomplete combustion can cause carbon monoxide, a toxic gas.
Hazardous Polymerization: Will not occur Conditions to Avoid: None

VI. Health Hazard Data

Product is not listed as carcinogenic by NTP, IARC or OSHA. Product may contain a trace, but detectable amount of benzene, a chemical listed by the State of California and known to cause cancer or reproductive toxicity.

Routes of Entry / Acute Effects of Overexposure:

Inhalation: Exposure to high concentrations of the vapor causes dizziness, drowsiness, nausea or unconsciousness due to anesthetic properties.

Skin Contact: Liquid can cause freeze burns similar to frostbite if contact with skin occurs. No skin absorption is expected.

Eye Contact: Liquid can cause freeze burns if contact with eyes occurs.

Ingestion: Ingestion is not expected to occur in normal use.

Chronic Effects of Overexposure: No abnormal reactions reported following exposure to 1000 ppm for 8 hours per day, 5 days per week, for 2 weeks.

Medical Conditions Generally Aggravated by Exposure: Persons with chronic respiratory diseases should avoid exposure.

VII. Emergency and First Aid Procedures

Eye Contact: Flush with water. Obtain medical assistance if contact with liquid has occurred.

Skin Contact: If freeze burn occurs, remove contaminated clothes, shoes and jewelry. Immerse burned area in warm (not hot) water. Keep immersed. Call for medical assistance.

Inhalation: Remove victim from further exposure and into fresh air. Provide oxygen if breathing is labored. If victim is unconscious, seek immediate medical attention. If breathing has stopped, give artificial respiration.

Ingestion: Not expected to occur in normal use.

VIII. Spill or Leak Procedures

Product is extremely flammable. Vapor is heavier than air and may collect at lower levels. Flammable concentrations may be present below nose level. If there is a leak but no fire, do not light the escaped gas. Eliminate all ignition sources. Do not smoke, use a nearby phone or actuate electrical switches. Evacuate the area. If possible, remove leaking container to safe area. Stop flow of gas or allow vapor to disperse in a safe area. Water spray can be used to help dilute vapor concentration in air.

Dispose of gas only by controlled burning in compliance with local laws and regulations.

IX. Handling and Storage Precautions

Store in an authorized location (outside, detached storage is preferred) with adequate ventilation. Keep away from heat and ignition sources. Inspect cylinders frequently for leaks, dents, gouges and corrosion with emphasis on bottom of cylinder. Store cylinders in upright position or with pressure relief valves in vapor space. Do not drop or abuse cylinders. Keep container valve closed and plugged when not in use. Install protective caps when cylinders are not connected for use. Empty containers retain some residue, so they should be treated as if they are full.

X. Personal Protection Information

Ventilation: Use adequate ventilation to maintain exposures below recommended limits.

Respiratory Protection: Use a NIOSH approved respirator if area is thought to contain unknown concentration of gas.

Eye Protection: Use safety goggles or safety glasses with side shields.

Protective Clothing: No special garments are necessary, but avoid skin contact with liquid because of possibility of freeze burn. Propane resistant gloves are recommended.

XI. Communication with Employees and Purchasers

This Material Safety Data Sheet (MSDS) alerts the reader to the potential safety and health hazards of propane. It also contains valuable reference material relating to the safe use and handling of the product. Make sure that this information is shared with all employees and purchasers who use or handle the product. It is an important part of the OSHA hazard communication program.

This information is believed to be accurate as of the date of issue, but is offered without guarantee. Conditions of use and suitability for use are beyond Company control, therefore, all risks of use of the product are assumed by the user. COMPANY EXPRESSLY DISCLAIMS ALL WARRANTIES OF EVERY KIND INCLUDING WARRANTIES OF MERCHANTIBILITY AND FITNESS FOR ANY PARTICULAR PURPOSE. Company assumes no responsibility for any injuries or damages caused by the product even if safety procedures are followed as outlined herein. Nothing herein is intended to be construed as permission or recommendation for use of the product in any manner which might infringe existing patents.

5-21-99

93623-349

Aslchem International Inc.
100-9451 Van Horne Way,
Richmond, B.C.,
Canada V6X 1W2

Material Safety Data Sheet

Material: Barium Compounds, N.O.S. (Barium Chloride, Dihydrate)
PIN No.: UN1564

24 Hours Emergency Telephone Number = Canutec Call Collect (613)996-6666

Hazard Rating: National Fire Protection Association
4 = Extreme, 3 = High, 2 = Moderate, 1 = Slight, 0 = Insignificant, * = Chronic Health Hazard (See Sec. 6)
Fire = 0 Health = 2 Reactivity = 0 Special = None

SECTION 1. Identification of Product

Trade Name/Chemical Name:
Barium Chloride, Dihydrate

Synonyms:
Barium Dichloride

Chemical & Physical State: Solid

Molecular Formula: $BaCl_2 \cdot 2H_2O$

Chemical Family: Inorganic Salt

CAS No.: 10361-37-2

SECTION 2. Physical Properties

Appearance & Odour:
Odourless, white crystals

Boiling Point (degree C):
1560

Freezing Point (degree C):
963

Vapour Pressure (mm Hg):
< 0.1 mm Hg @ 20 Degree C

Specific Gravity (water = 1 at 4 degree C): 3.097

Bulk Density: N/A

Vapour Density (Air = 1): N/A

Solubility in Water: Not applicable

Other Solvents: Not applicable

pH: 5.0 - 8.0 (5% Solution)

SECTION 3. Fire & Explosion Hazard Data

Flash Point (degree C) & Method:
Non flammable

Autoignition Temperature (degree C):
Not applicable

Flammable Limits (% by vol. in air):
None

Lower: N/App
Upper: N/App

Would any material saturated with this product be subject to spontaneous combustion?
[X] Yes [ ] No Materials: Barium Oxide, Hydrochloric Acid, Hydrogen Chloride Gas

Fire Extinguishing Media: Use any means suitable for surrounding fire.
Fire Fighting Procedures: Barium Chloride is toxic if ingested. Wash away any material which may have contacted the body with copious amount of water.
Other Fire or Explosion Hazards: None

Aslchem International Inc.
100-9451 Van Home Way,
Richmond, B.C.,
Canada V6X 1W2

Material Safety Data Sheet

Material: Barium Compounds, N.O.S. (Barium Chloride, Dihydrate)
PIN No.: UN1564

SECTION 4. Reactivity Data

Stability: [X] Stable [ ] Unstable

Conditions to Avoid: Decomposes with excessive heat
Incompatibility (materials to avoid): Strong oxidizers, metals, hydrides, hydroxides, nitrates, oxides, sulphates, and sulphides
Hazardous Decomposition or Combustion Products: Barium Oxide, Hydrochloric Acid, Hydrogen Chloride Gas

Hazardous Polymerization: [ ] May occur [X] Will not occur

SECTION 5. Health Hazard Data

Threshold Limit Value (TLV):
0.5 mg/m3 (as Ba)

LC50: N/A
LD50: LD50 (oral, rat), 118 mg/kg

Effects of Acute Exposure to Product: Barium chloride is toxic and an eye, skin and mucous membrane irritant. May be fatal if inhaled, swallowed or absorbed through the skin. Poisoning may affect the kidneys, cardiovascular and central nervous systems. Persons with chronic respiratory, cardiovascular or skin disease may be at an increased risk ffrom exposure.

Inhaled - May cause irritation of the respiratory tract with sore throat, coughing & laboured breathing. If sufficient amounts are absorted, symptoms may resemble those in acute ingestion.
In contact with eyes; May cause severe irritation
In contact with skin; May cause irritation & dermatitis. If sufficient amounts are absorbed, effects may occur as in acute ingestion.
Ingested; Poisonous when ingested. May cause vomiting and diarrhea.

Emergency and First Aid Procedures:
Inhalation - Remove from exposure area to fresh air immediately. If breathing has stopped, perform artificial respiration. Keep person warm and at rest. Treat symptomatically & supportively. Get medical attention immediately
Eyes- Wash eyes immediately with large amounts of water or normal saline, lifting upper & lower lids, until no evidence of chemical remains (approximately 15-20 minutes). Get medical attention immediately
Skin - Remove contaminated clothing and shoes immediately, wash affected area with soap or mild detergent and large amount of water until no evidence of chemical remains (approximately 15-20 minutes). Get medical attention immediately.
Ingestion - Induce vomiting immediately when soluble barium compounds are ingested. Treat supportively and symptomatically (Parmeggiani, Encyclopedia of Occupational Health & Safety, 3rd edition). Get medical attention immediately.

Asichem International Inc.
100-9451 Van Horne Way,
Richmond, B.C.,
Canada V6X 1W2

Material Safety Data Sheet

Material: Barium Compounds, N.O.S. (Barium Chloride, Dihydrate)
PIN No.: UN1564

SECTION 6. Special Protection Information

Ventilation Requirements:
Local exhaust ventilation required

Respiratory Protection: NIOSH/MSHA approved respirator

Skin Protection: Imervious rubber gloves, apron & general protective clothing

Eye Protection: Safety glasses or goggles / or full face shield

Other Protective Equipment: Ensure that emergency shower & eye wash facilities are in working order & within easy access.

SECTION 7. Special Requirements

Precaution in Handling and Storing: Avoid genreating dust. Avoid contact with skin, eyes & clothing. Follow routine safe handling procedures. Store in a tightly closed container in a cool, dry well-ventilated area. Store away from incompatible materials.
Other Precautions: Wear protective equipment when handling

SECTION 8. Spill or Leak Procedures

Steps to be taken in event of spill or release (in all cases notify applicable Government Authority if spill is significant): Shovel up spill and place in a suitable container for disposal. Wash site of spillage thoroughly with water & detergent.

Environmental Effects: Harmful to aquatic life in low concentrations. Prevent entry into potable water intakes & waterways. Human toxicity, critical concentration - 1.0 mg/l; fish toxicity, critical concentration - 10,000 mg/l

Neutralizing Chemicals: In some cases, Sodium Sulphate or Magnesium Sulphate can be used to precipitate Barium as insoluble Barium Sulphate.

Waste Disposal: Consult environmental authorities before taking any action. Observe all federal, provincial & local regulations when disposing of this substance.

SECTION 9. Transportation & Regulatory Information

Shipping Name: Barium [illegible] PIN: UN1564
[illegible] Marine Pollutant : Yes WHMIS: D1B, D2B

SECTION 10. References

1) SAX, N. Irving., Dangerous Properties of Industrial Chemicals. 6th Ed., 1984.
2) "Cheminfo", through "CCINFOdisc", Canadian Centre for Occupational Health and Safety, Hamilton, Ontario, Canada.

N/A : Not Available N/App : Not Applicable

"Information contained herein is provided without any warranty, and Asichem International will not be liable for any damage which may result from the use or reliance on any information contained herein"

724/728-1847
FAX: 724/728-3440

MATERIAL SAFETY DATA SHEET
NS 1100

1. IDENTIFICATION OF THE PRODUCT AND THE COMPANY

Product name : NS 1100

Supplier : Neo Solutions, Inc.
PO Box 26
Beaver, PA 15009

Emergency telephone # : 724/728-1847

2. COMPOSITION/INFORMATION ON INGREDIENTS

Description
Polyacrylic Acid - as acid or various neutralizations with sodium or ammonuim hydroxide.

3. HAZARDS IDENTIFICATION

Irritating to eyes and skin.
Spills produce extremely slippery surfaces.

HMIS & NFPA Ratings :

	HMIS	NFPA
Health :	1	1
Flammability :	0	0
Reactivity :	1	1

Special : To be determined by user

4. FIRST AID MEASURES

Inhalation : Move to fresh air. Consult a physician in case of irritation or other symptoms.

Skin contact : Wash off immediately with soap and plenty of water. In case of skin irritation, consult a physician.

Eye contact : Rinse with plenty of water. In case of persistent eye irritation, consult a physician.

Ingestion : Do not induce vomiting. Consult a physician if discomfort or other symptoms develop.

5. FIRE-FIGHTING MEASURES

Suitable extinguishing media
Foam, carbon dioxide (CO2), or dry chemical.

Special Fire-fighting precautions
Spills produce extremely slippery surfaces

Special protective equipment for firefighters
NIOSH approved self-contained breathing apparatus.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions
No special precautions required.

Environmental precautions
Avoid contaminating water.

Methods for cleaning up
Do not flush with water. Dam up. Soak up with inert absorbent material. If liquid has been spilt in large quantities clean up promptly by scoop or vacuum. Keep in suitable and closed containers for disposal. After cleaning, flush away traces with water.

7. HANDLING AND STORAGE

Handling
For good industrial hygiene, avoid contact with skin and eyes, avoid forming mist. Wash hands before breaks and at the end of the workday.

Storage
Keep in a dry, cool place (O - 30° C).

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Engineering measures to reduce exposure
Use local exhaust if misting occurs. Natural ventilation is adequate in absence of mists.

Personal protection equipment

Respiratory protection
In case of insufficient ventilation and/or misty conditions, wear NIOSH approved organic filter respirator.

Hand protection
Rubber gloves.

Eye protection
Safety glasses with side-shields. Splash-proof goggles if liquid contact is possible. Do not wear contact lenses.

Skin and body protection
Chemical resistant apron or protective suit if splashing or repeated contact with solution is likely.

Hygiene measures
Wash hands before breaks and at the end of workday. Handle in accordance with good industrial hygiene and safety practice

9. PHYSICAL AND CHEMICAL PROPERTIES

Form:	liquid
Color:	amber
pH:	3.0-10.0 @ 5 g/l for product series. See technical bulletin for specific value.
Flash point (°C) :	N/A
Vapor Pressure (mmHg) :	N/A
Bulk density :	See Technical bulletin
Water solubility :	Complete
Viscosity (mPa s) :	See Technical Bulletin.

10. STABILITY AND REACTIVITY

Stability : Product is stable, no hazardous polymerization will occur.

Materials to avoid : Strong oxidizing agents.

Hazardous decomposition products : May produce carbon dioxide and/orcarbon monoxide.

11. TOXICOLOGICAL INFORMATION

Irritation

- Skin : May cause irritation.

- Eyes : Irritating to eyes.

Sensitization : The product is not expected to be sensitizing.

12. ECOLOGICAL INFORMATION

Ecotoxicity

Ecological injuries are not known or expected under normal use.

Bioaccumulation

The product is not expected to bioaccumulate.

Persistence / degradability

No data available.

13. DISPOSAL CONSIDERATIONS

Waste from residues / unused products

Burn in an adequate incinerator or bury in landfill in accordance with all applicable regulations.

Contaminated packaging

Rinse empty containers with water and use the rinse water to prepare the working solution. Any disposal practice must be in compliance with all applicable regulations.

14. TRANSPORT INFORMATION

Not regulated by Department of Transportation.

15. REGULATORY INFORMATION

All components of this product are on TSCA and DSL inventories

RCRA status :	Not a hazardous waste.
Hazardous waste number :	Not applicable.
Reportable quantity (40 CFR 302) :	Not applicable.
Threshold planning quantity (40 CFR 355) :	Not applicable.
Toxic Chemical Release Reporting (40 CFR 302) :	Not applicable.

16. OTHER INFORMATION

This Material Safety Data Sheet, revised : 02/28/1996

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release, and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process unless specified in the text.

724/728-1847
FAX: 724/728-3440

TECHNICAL DATA SHEET

NS 1100

APPEARANCE	CLEAR LIQUID
IONIC CHARACTER	ANIONIC
CHARGE DENSITY	HIGH
MOLECULAR WEIGHT	LOW
SPECIFIC GRAVITY	1.2
pH	3.2–4.0
BULK VISCOSITY (cps)	50-300
APPROX. VISCOSITY @ 5 G/L ACTIVE CONTENT (cps)	SIMILAR TO WATER
FREEZING POINT (°C)	0
STORAGE TEMPERATURE (°F)	10 - 35
SHELF LIFE (months)	6

The data in this Technical Data Sheet is provided for information only. It is correct to the best of our knowledge, information and belief at the date of its publication. It does not constitute a specification and no liability is assumed nor freedom from any existing patents.

P.O. Box 26 Neo Solutions, Inc. Beaver, PA 15009-0026

Attachment P-2

Security Fence Alignment Plan and Monthly Fence Inspection Form

In order to manage the size of this 100% design report, this attachment only is included in the electronic submittal. This attachment describes current Site O&M activities, and has not been revised for this submittal.

Note: This security fence alignment and inspection plan addresses inspection, monitoring, and maintenance activities for the existing security fencing and will be used until the existing security fencing is removed during the implementation of the remedial action. This attachment will be replaced in its entirety when the final perimeter security fencing around the new water treatment plant and wildlife friendly fencing around the cover systems is installed.

Attachment 2

The primary access to the Midnite Mine Site is through gates located on the East Haul road and the West Access road. Signs are posted on the gates that provide access contact information. Personnel entering the gates are required to close and/or lock the gates, as applicable, behind them.

The gate on the East Haul road is equipped with an automated mechanism for gate opening and closing. The automated mechanism is activated by Dawn Mining Company radios, which operate on Federal Communications Commission (FCC) license channels.

The West Access road gate is secured with a chain and padlock to prevent unauthorized access. The combination to an interlocking padlock has been provided to EPA, Tribal, and BIA representatives.

This Monthly Fence Inspection Form (attached) is to be used for the required monthly inspection of the Midnite Mine site security fence. The completed copies are to be bound together and filed at the Dawn Mill Site office.

MONTHLY FENCE INSPECTION
MIDNITE MINE

Date:_____ Inspector(s):_____

Summary of Findings:_____

_____

_____

_____

_____

Evidence of Wildlife:_____

_____

_____

_____

Gates Secure? Issues?_____

_____

_____

_____

_____

_____

Maintenance Needed:_____

_____

_____

_____

Maintenance Completed:_____

_____

_____

_____

_____

_____

Signature:_____

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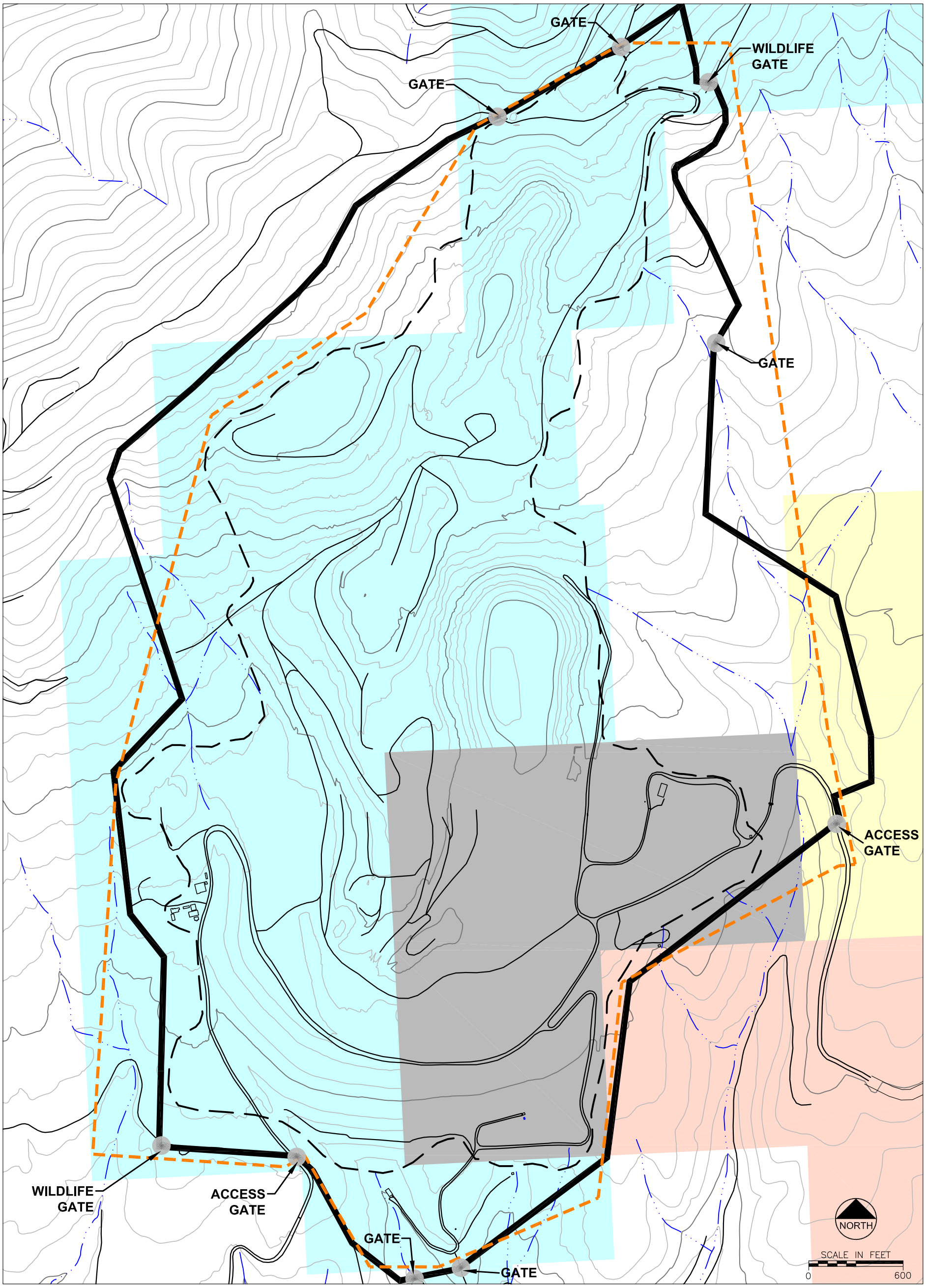

LEGEND

ROADS AND TRAILS	PROPOSED FENCE ALIGNMENT	ALLOTMENT NO. A320	TRIBAL LAND
BUILDINGS	AS-BUILT FENCE ALIGNMENT	ALLOTMENT NO. A317	
EXISTING NATURAL DRAINAGE	GATE LOCATION	TRIBAL LEASES	
MINED AREA BOUNDARY		BOYD LEASE	

Project No. 181850

August 2009

FIGURE 2-1
MIDNITE MINE
SECURITY FENCE ALIGNMENT PLAN AS-BUILT 8/5/09

Attachment P-3

Inspection and Maintenance of Site Access Roads and Culverts

In order to manage the size of this 100% design report, this attachment only is included in the electronic submittal. This attachment describes current Site O&M activities, and has not been revised for this submittal.

Note: The inspection and maintenance activities listed in this attachment will be used until the existing access roads and culverts are removed during the implementation of the remedial action. This attachment will be replaced in its entirety when the new final site access road is constructed.

Attachment 3

These inspection forms are to be used for the inspection of the Midnite Mine site access roads culverts, and sediment traps. These inspections are required to be performed quarterly or after major storm events. The completed copies are to be bound together and filed at the Dawn Mill Site office. A road inspection form should be filled out for every 500 feet of road and at critical locations (i.e. existence of flow diversion berms, steep cut or fill slopes, or sharp corners).

CULVERT INSPECTION FORM*
MIDNITE MINE

Date:_____ Inspector:_____

Culvert Number (see attached Index Map):_____

Culvert Condition (rust, holes, structural integrity, etc): ☐Poor ☐ Fair ☐ Good

Comments:_____

_____

_____

Inlet Condition: ☐Poor ☐ Fair ☐ Good

Comments:_____

_____

_____

Outlet Condition: ☐Poor ☐ Fair ☐ Good

Comments:_____

_____

_____

Stream Condition (stable, eroding, vegetated, etc.): ☐Poor ☐ Fair ☐ Good

Embankment Conditions (eroding, rilling, vegetation, seeps, etc.): ☐Poor ☐ Fair ☐ Good

Highwater marks?

Misalign channel? ☐ Yes ☐ No

Sediment accumulation (depth?):

Photo Log (photos with legend attached)

Photo Number and Subject: _____

Photo Location: _____

Direction Photo Taken (looking upstream/downstream, north or south, etc) _____

_____

*Quarterly Inspection or Following Major Storm Event Required

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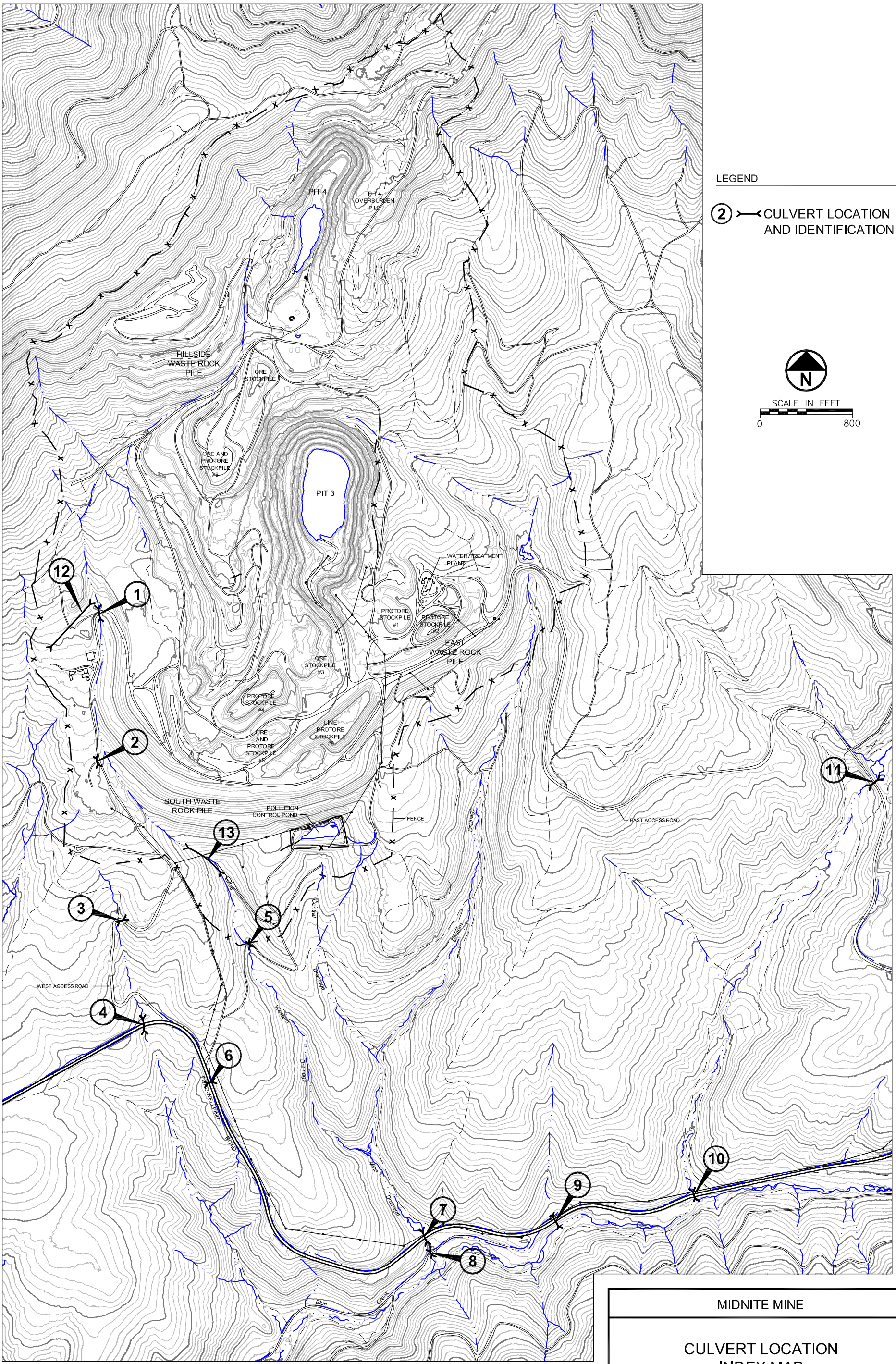


MIDNITE MINE

CULVERT LOCATION INDEX MAP

PROJECT:	181850
DATE:	DECEMBER 2010
FILE:	CULVERT MAP.DWG

TETRA TECH

ROAD INSPECTION FORM*
MIDNITE MINE

Date:_____ Inspector:_____

Road:_____ Chainage:_____
(distance from Wellpinit Road)

Road Surface

Surface Description:

West Haul Road
☐ Good ☐ Fair ☐ Poor

East Haul Road
☐ Good ☐ Fair ☐ Poor

Comments (rutting, wheel tracks, wash boarding, rilling, soft spots, potholes, dust):_____

_____

_____

_____

Is road surface smooth or firm? ☐ Yes ☐ No

Is erosion evident on the road surface? ☐ Yes ☐ No

Is there visible dust when a vehicle passes at normal speed? ☐ Yes ☐ No

Does the road drain properly? ☐ Yes ☐ No

Are road sediments being transported to natural drainage? ☐ Yes ☐ No

Describe Drainage Conditions:_____

_____

Roadside Ditches

Is there evidence of erosion in the ditch? ☐ Yes ☐ No

Do sediment traps exist in the ditch? ☐ Yes ☐ No

Are sediment traps working properly? ☐ Yes ☐ No

Has the cutslope been undercut or deposited sediment in the ditch? ☐ Yes ☐ No

ROAD INSPECTION FORM CONTINUED*
MIDNITE MINE

Flow Diversion Berms

Location Description of Flow Diversion Berm: _____

What is the condition of the flow diversion berm? _____

Is the flow diversion berm in need of repair? ☐ Yes ☐ No

Describe repair and if repair was performed and when: _____

Cut/Fill Slope Conditions

Cutslope Height (ft): _____

Slope Ratio (1:1)? _____

Material ☐ Rock ☐ Soil ☐ Vegetation ☐ Other

Are seeps present? ☐ Yes ☐ No

Is the cutslope stable? ☐ Yes ☐ No Eroding? ☐ Yes ☐ No

Fill Slope Ratio (2:1) _____

Is the fill slope stable? ☐ Yes ☐ No Eroding? ☐ Yes ☐ No

Photo Log (photos with legend attached)

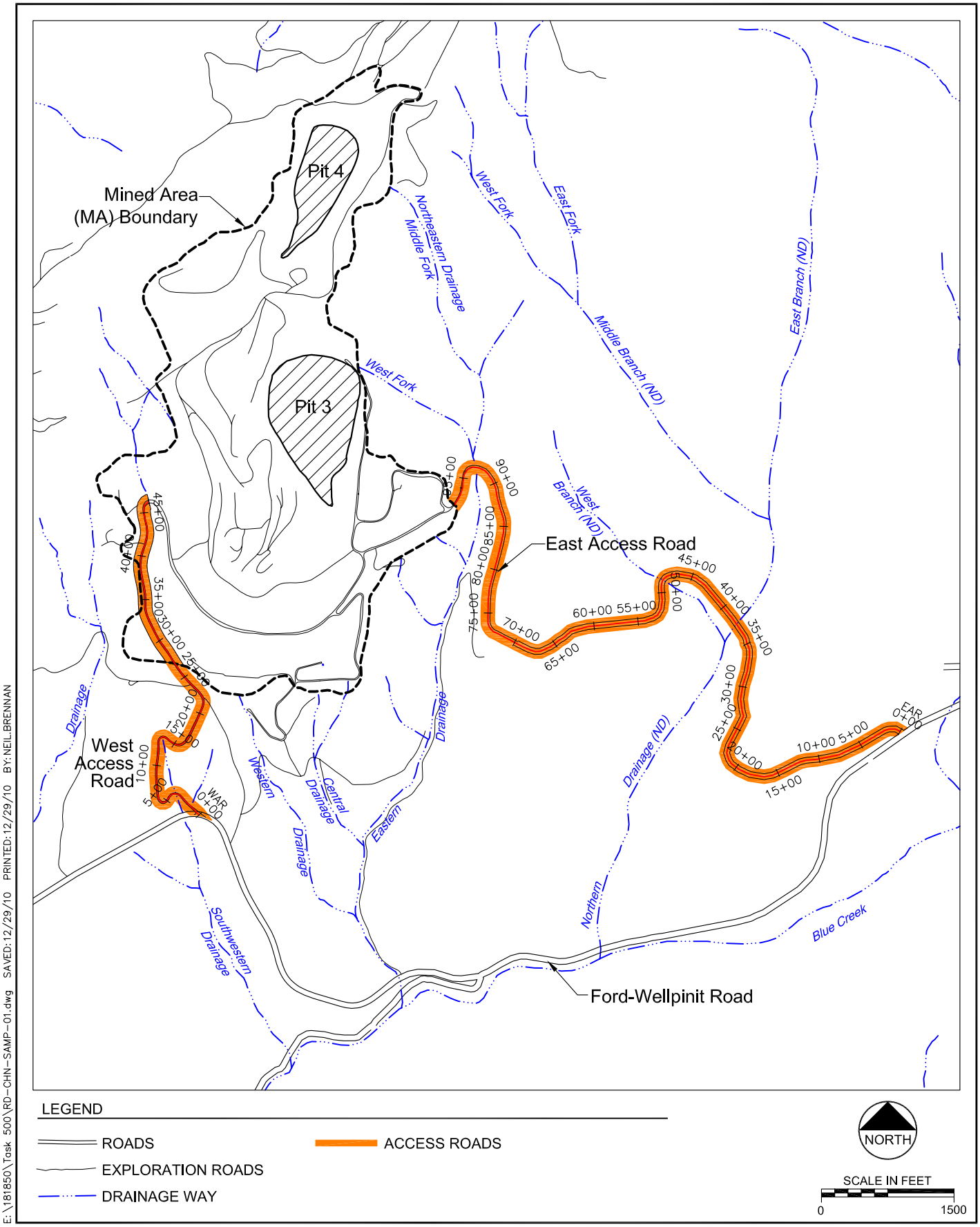
Photo Number and Subject: _____

Photo Location: _____

Direction Photo Taken (looking upstream/downstream, north or south, etc) _____

_____

*Quarterly Inspection or Following Major Storm Event Required



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Project No. 181850/Task 504

June 2010

ACCESS ROAD INDEX MAP

SEDIMENT TRAP INSPECTION FORM*
MIDNITE MINE

Inspector's Name:_____ Date:_____ Time:_____

Sediment Trap Number (see Location Index Map):_____

Location Description:_____

_____

Weather Conditions:_____

Date of Last Precipitation: _____

Score the following on a 1 to 5 scale
1 = poor condition (significant problems) 5 = excellent condition (no problem)

Accumulation of Debris/Sediment	1	2	3	4	5
Vegetation Conditions	1	2	3	4	5
Bank Erosion/Breach	1	2	3	4	5
Side Slope Erosion	1	2	3	4	5
Spillway Condition	1	2	3	4	5
Downstream of Spillway Condition	1	2	3	4	5
Other _____	1	2	3	4	5

Inspection Summary (explain if maintenance is needed and to what extent, attached sketches if necessary)

_____

_____

_____

_____

_____

Photo Log (photos with legend attached)

Photo Number and Subject: _____

Photo Location: _____

Direction Photo Taken (looking upstream/downstream, north or south, etc) _____

_____

*Quarterly inspection and following major storm events is required

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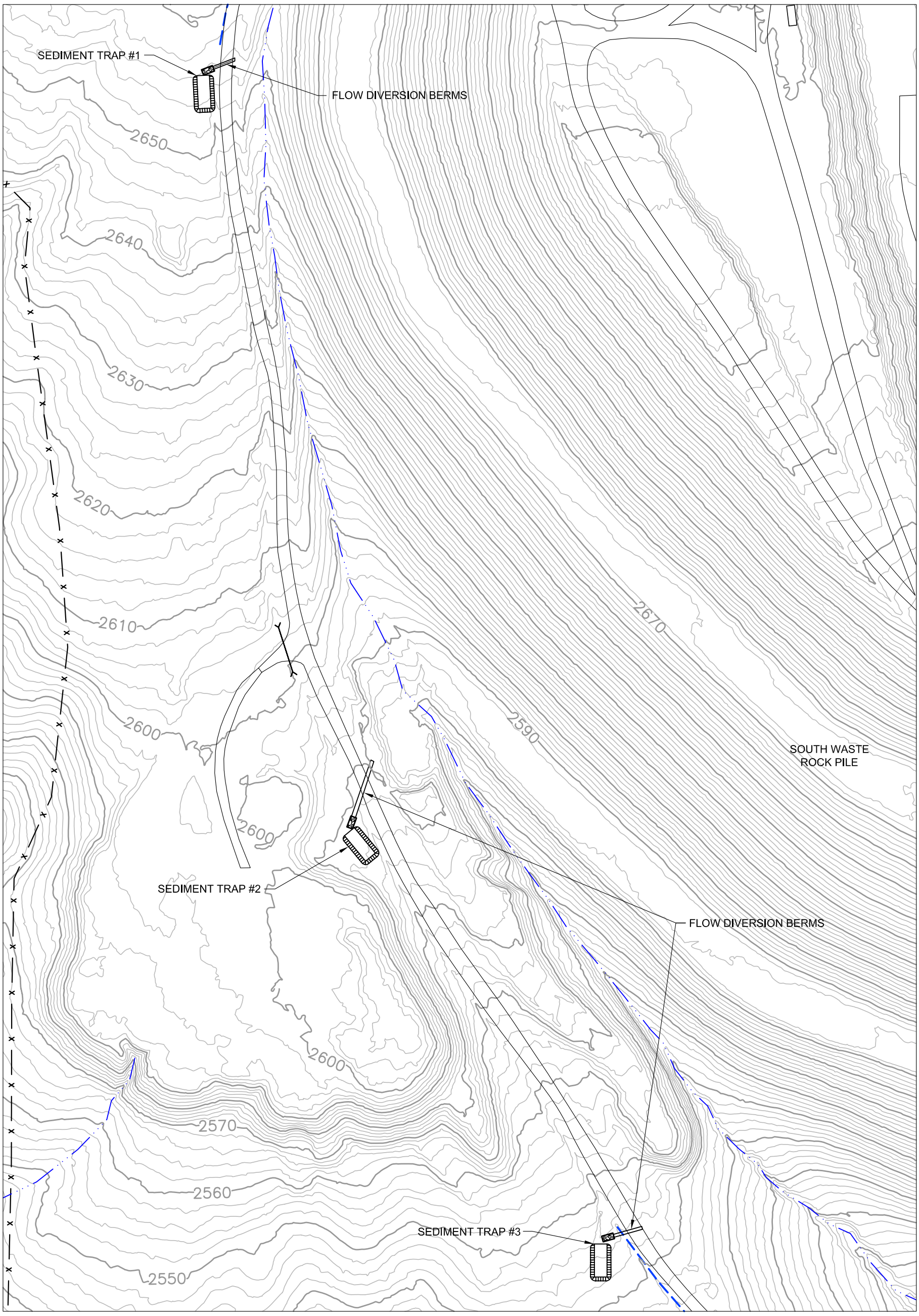

NORTH

SCALE IN FEET

0 100'

MIDNITE MINE

SEDIMENT TRAP
LOCATION INDEX MAP

PROJECT:	181850
DATE:	DECEMBER 2010
FILE:	SEDIMENT TRAP MAP.DWG

TETRA TECH

Attachment P-4

Routine Inspection and Maintenance for the Surface Water Diversions

In order to manage the size of this 100% design report, this attachment only is included in the electronic submittal. This attachment describes current Site O&M activities, and has not been revised for this submittal.

Note: The inspection and maintenance activities listed in this attachment will be used until the existing surface water diversion facilities are removed during the implementation of the remedial action. This attachment will be replaced in the final design documents to address new inspection and maintenance requirements associated with the final surface water control facilities.

Attachment 4

These inspection forms are to be used for the required inspections of the diversion channels and rock check dams. These inspections are required to be performed quarterly or after major storm events. The completed copies are to be bound together and filed at the Dawn Mill Site office.

DIVERSION CHANNEL INSPECTION FORM*
MIDNITE MINE

Inspectors Name:_____ Date:_____ Time:_____

Diversion Channel Number (see Location Index Map):_____

Location Description:_____

_____

Weather Conditions:_____

Date of Last Precipitation: _____ Approximate Amount (inches):_____

Type of Channel (circle one): Grass-lined Riprap-lined Bare Soil Other

Score the following on a 1 to 5 scale
1 = poor condition (significant problems) 5 = excellent condition (no problem)

Uniform Channel Shape	1	2	3	4	5
Accumulation of Debris/Sediment	1	2	3	4	5
Accumulation of Vegetation	1	2	3	4	5
Bank Erosion/Breach	1	2	3	4	5
Side Slope Erosion	1	2	3	4	5
Upland Debris/Sediment Accumulation	1	2	3	4	5
Upland Erosion	1	2	3	4	5
Other _____	1	2	3	4	5

Inspection Summary (explain if maintenance is needed and to what extent, attached sketches if necessary)

_____

_____

_____

_____

_____

Photo Log (photos with legend attached)

Photo Number and Subject: _____

Photo Location: _____

Direction Photo Taken (looking upstream/downstream, north or south, etc) _____

_____

*Quarterly Inspection or Following Major Storm Event Required

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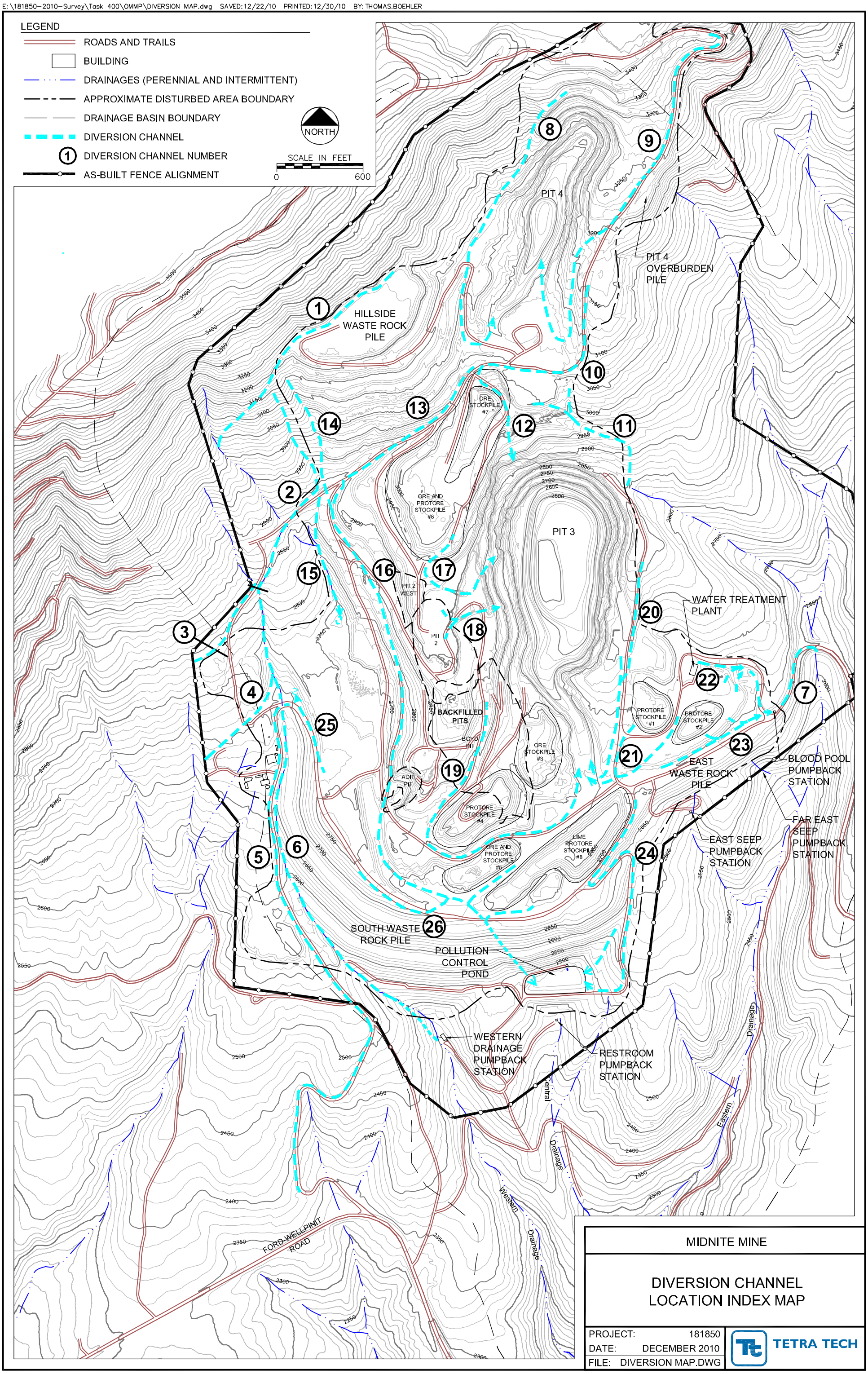

MIDNITE MINE

DIVERSION CHANNEL LOCATION INDEX MAP

PROJECT:	181850
DATE:	DECEMBER 2010
FILE:	DIVERSION MAP.DWG

TETRA TECH

ROCK CHECK DAM INSPECTION FORM*
MIDNITE MINE

Inspector's Name:_____ Date:_____ Time:_____

Rock Check Dam Number (see Location Index Map):_____

Location Description:_____

_____

Weather Conditions:_____

Date of Last Precipitation: _____

Score the following on a 1 to 5 scale
1 = poor condition (significant problems) 5 = excellent condition (no problem)

Accumulation of Debris/Sediment	1	2	3	4	5
Condition of Rock	1	2	3	4	5
Spillway Condition	1	2	3	4	5
Evident of Breaching or Flanking	1	2	3	4	5
Condition of underlying fabric	1	2	3	4	5
Other _____	1	2	3	4	5

Inspection Summary (explain if maintenance is needed and to what extent, attached sketches if necessary)

_____

_____

_____

_____

_____

Photo Log (photos with legend attached)

Photo Number and Subject: _____

Photo Location: _____

Direction Photo Taken (looking upstream/downstream, north or south, etc) _____

_____

*Quarterly inspection and following major storm events is required

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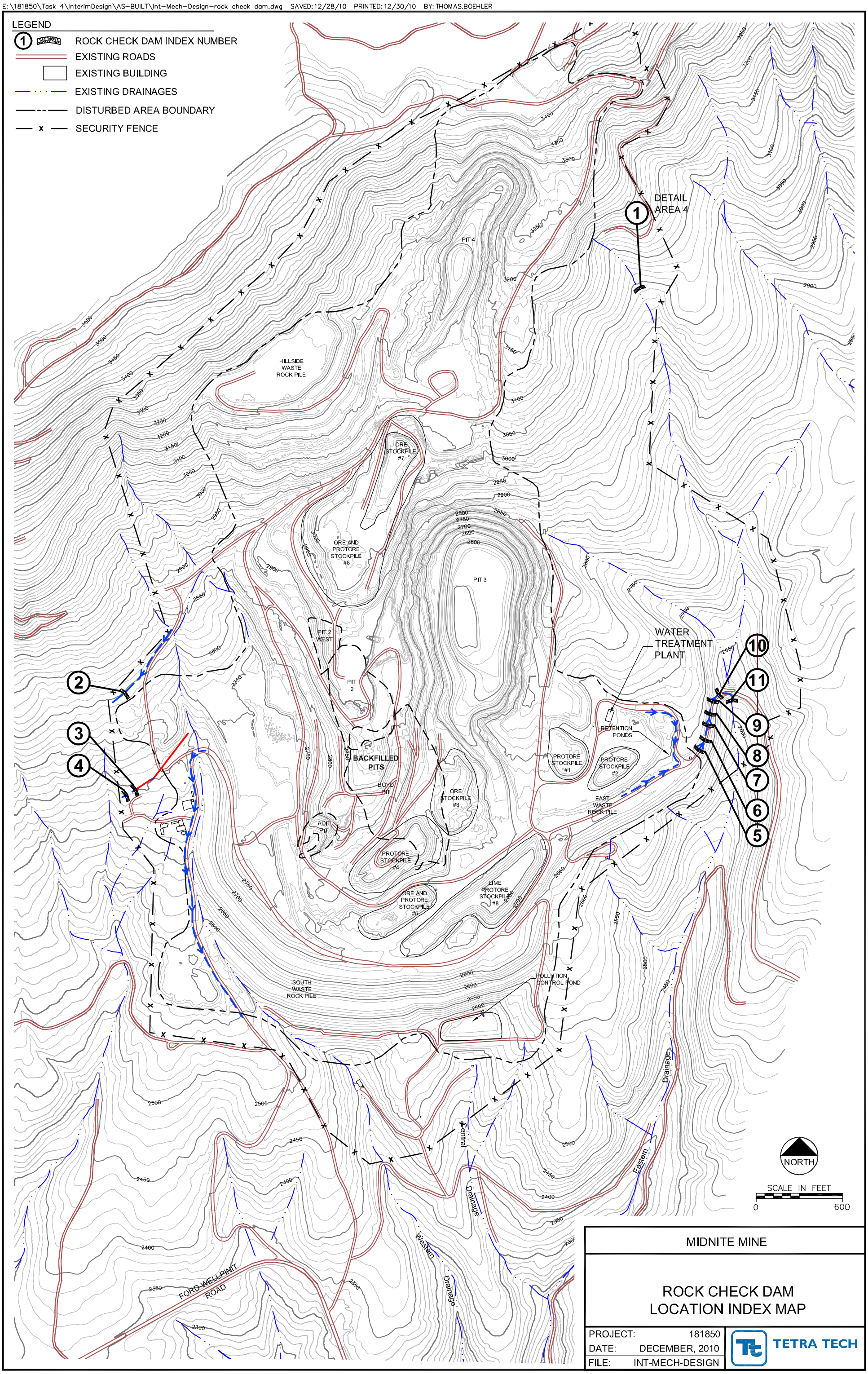

MIDNITE MINE

ROCK CHECK DAM
LOCATION INDEX MAP

PROJECT:	181850
DATE:	DECEMBER, 2010
FILE:	INT-MECH-DESIGN

TETRA TECH

Attachment P-5

Routine Inspection and Maintenance for the Alluvial Groundwater Collection System

In order to manage the size of this 100% design report, this attachment only is included in the electronic submittal. This attachment describes current Site O&M activities, and has not been revised for this submittal.

Note: The inspection and maintenance activities listed in this attachment will be used until the existing groundwater collection systems in the Far East, Central, and Western Drainages are removed during the implementation of the remedial action. This attachment will be replaced in its entirety when the final groundwater controls are installed at the site.

Alluvial Groundwater Collection System

Prepared for:

Dawn Mining Company

P.O. Box 250
Ford, Washington 99013

and

Newmont USA Limited

6363 S. Fiddler's Green Circle
Greenwood Village, Colorado 80111

Prepared by:

Tetra Tech

3801 Automation Way, Suite 100
Fort Collins, Colorado 80525
(970) 223-9600
Fax (970) 223-7171
Tetra Tech Project No. 114-181850

December 30, 2010

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Appendix C: Manufacturer's Operations and Maintenance Manuals

1.0 INTRODUCTION

This Plan describes the operation, maintenance and monitoring of the alluvial groundwater wells (PBC-01, PBC-02, PBC-03, PBW-01, and PBW-02) installed in 2010 as part of the Interim Mechanism (IM) Work at the Midnite Mine. These groundwater wells were installed in the Central and Western Drainages. An existing well (MWED-05) near the Far East Seep will also be pumped as part of the IM Work. Groundwater pumped from these alluvial wells will be discharged into the existing water collection system at the Midnite Mine which includes the water collection systems at the Water Treatment Plant (WTP). All background operations related to this OM&M Plan can be found in Attachment 1: Operation, Maintenance and Monitoring (OM&M) Plan for the Midnite Mine Water Collection System and Water Treatment Plant for the Phase I RD/RA: Interim Water Management for the Midnite Mine.

2.0 DESCRIPTION, OPERATION AND CONTROL OF ALLUVIAL GROUNDWATER COLLECTION SYSTEM

The alluvial groundwater collection systems are described in this section and include overall process descriptions, process controls, major components, start-up procedures, and normal, alternate, and emergency operations. The systems which are described in the section include the following:

- Central Drainage Alluvial Groundwater Wells
- Western Drainage Alluvial Groundwater Wells
- Far East Seep Alluvial Groundwater Well

2.1 Alluvial Groundwater Collection System

This alluvial groundwater collection system was designed and implemented to extract alluvial groundwater and convey to the water treatment plant.

Figure 1 presents the Central Drainage alluvial well locations, Figure 2 presents the Western Drainage well locations, and Figure 3 presents the Far East Seep well locations. Alluvial groundwater collected in the Central Drainage is pumped to the Restroom Pumpback Station, alluvial groundwater collected in the Western Drainage is pumped to the Western Drainage Pumpback Station, and alluvial groundwater collected at the Far East Seep is pumped to the Far East Seep Pump Station. Water collected in the Western Drainage Pump Station and Restroom Pumpback Station is pumped to the Pollution Control Pond (PCP). Water from combined sources collected in the PCP is then pumped to Pit 3. During the very limited portion of the year when water flows into the Far East Seep system, the water collected at the Far East Seep Pump Station is pumped to the East Seep Pump Station and then to Pit 3. Higher flows collected during this period are pumped to the Blood Pool Pump Station and then to Pit 3. Both of these pump stations operate only during high flow periods, typically during snowmelt.

2.1.1 Alluvial Groundwater Collection System for the Central Drainage

Three pumping wells (PBC-01, PBC-02, and PBC-03) and three monitoring wells (MWCD-02, MW-02, and MWED-01) are located in the Central Drainage (Figure 1). The pumping wells have electric submersible pumps which pump groundwater to the Restroom Pumpback Station.

2.1.1.1 Control

The Central Drainage Alluvial Groundwater Well system consists of three separate wells each with pump, pump power supply, flow meter, and flow analyzer that convey groundwater to the Restroom Pumpback Station. The submersible pumps run continuously and there are no pump controls.

2.1.1.2 Major Components

- Electric submersible pumps (3)
- Pump power supply (3)
- Flow meter (3)
- Flow analyzer (3)

See Appendix A for more detailed information on pumps, instrumentation, and power.

2.1.1.3 Laboratory or Onsite Testing Controls

There are no laboratory or onsite testing controls associated with this system.

2.1.1.4 Start Up

This system runs continuously. Therefore, a specific start up procedure is not applicable to this system.

2.1.1.5 Normal Operation

The alluvial pumping wells will be checked approximately once a week. During periods of increased runoff and/or rapidly increasing water levels the alluvial wells may be checked more frequently. The checks will consist of:

1. Verify that there is discharge to the pumpback station from each well's piping.
2. Verify that the flow meters and flow analyzers are operational and record the instantaneous discharge, totalizing discharge, and time of observation for each well.
3. Measure each well's discharge with a calibrated container and a stop watch.
4. Compare the measured flow to the flow analyzer's instantaneous discharge.
5. All data will be recorded on a Central Drainage Alluvial Groundwater Discharge Data Sheet (Appendix B).

2.1.1.6 Alternate Operation

If the flow meter/flow analyzer malfunctions and is sent to the manufacturer for repair/calibration, it will be removed from the discharge line and replaced with an appropriately sized pipe. Normally scheduled manual discharge measurements (calibrated container and stopwatch) will be used to document discharge until the flow meter/flow analyzer is returned to service.

2.1.1.7 Emergency Operation and Failsafe Features

There are no emergency operations associated with the alluvial well system.

2.1.2 Alluvial Groundwater Collection System for the Western Drainage

Two pumping wells (PBW-01and PBW-02) and three monitoring wells (MWWD-01, MWWD-02, and MW-1) are located in the Western Drainage (Figure 2). The pumping wells have electric submersible pumps which pump groundwater to the Western Drainage Pumpback Station.

2.1.2.1 Control

The Western Drainage Alluvial Groundwater Well system consists of two separate wells, each with pump, pump power supply, flow meter, and flow analyzer that convey groundwater to the Western Drainage Pumpback Station. The submersible pumps run continuously and there are no pump controls.

2.1.2.2 Major Components

- Electric submersible pumps (2)
- Pump power supply (2)
- Flow meter (2)
- Flow analyzer (2)

See Appendix A for more detailed information on pumps, instrumentation, and power.

2.1.2.3 Laboratory or Onsite Testing Controls

There are no laboratory or onsite testing controls associated with this system.

2.1.2.4 Start Up

This system runs continuously. Therefore, a specific start up procedure is not applicable to this system.

2.1.2.5 Normal Operation

The alluvial pumping wells will be checked approximately once a week. During periods of increased runoff and/or rapidly increasing water levels the alluvial wells may be checked more frequently. The checks will consist of:

1. Verify that there is discharge to the pumpback station from each well's piping.
2. Verify that the flow meters and flow analyzers are operational and record the instantaneous discharge, totalizing discharge, and time of observation for each well.
3. Measure each well's discharge with a calibrated container and a stop watch.
4. Compare the measured flow to the flow analyzer's instantaneous discharge.
5. All data will be recorded on a Western Drainage Alluvial Groundwater Discharge Data Sheet (Appendix B).

2.1.2.6 Alternate Operation

If the flow meter/flow analyzer malfunctions and is sent to the manufacturer for repair/calibration, it will be removed from the discharge line and replaced with an appropriately sized pipe. Normally scheduled manual discharge measurements (calibrated container and stopwatch) will be used to document discharge until the flow meter/flow analyzer is returned to service.

2.1.2.7 Emergency Operation and Failsafe Features

There are no emergency operations associated with the alluvial well system.

2.1.3 Alluvial Groundwater Collection System for the Far East Seep

One pumping well (MWED-05) is located at the Far East Seep (Figure 3). The pumping well has an electric submersible pump which pumps groundwater to the Far East Seep Pumpback Station.

2.1.3.1 Control

The Far East Seep Alluvial Groundwater Well system consists of one well with pump, pump power supply, pump controller, flow meter, and flow analyzer that convey groundwater to the Far East Seep Pumpback Station. The submersible pump has a controller that turns the pump on and off. The controller turns the pump on when the water level reaches the high water level sensor and turns the pump off when the water level reaches the low water level sensor.

2.1.3.2 Major Components

- Electric submersible pumps (1)
- Pump controller
- Pump power supply (1)
- Flow meter (1)
- Flow analyzer (1)

See Appendix A for more detailed information on pumps, instrumentation, and power.

2.1.3.3 Laboratory or Onsite Testing Controls

There are no laboratory or onsite testing controls associated with this system.

2.1.3.4 Start Up

This system is on continuously. Therefore, a specific start up procedure is not applicable to this system.

2.1.3.5 Normal Operation

The alluvial pumping wells will be checked approximately once a week. During periods of increased runoff and/or rapidly increasing water levels, the alluvial wells may be checked more frequently. The checks will consist of:

1. Verify that there is discharge to the pumpback station from the well's piping. The pump may not operate due to the Abyss controller if the water level in the well is not high enough. Compare the measured water level to the depth of the pump on sensor to verify if the pump should be running.
2. Verify that the flow meter and flow analyzer are operational and record the instantaneous discharge, totalizing discharge, and time for the well.
3. Measure the well's discharge with a calibrated container and a stop watch.
4. Compare the measured flow to the flow analyzer's instantaneous discharge.
5. All data will be recorded on the Far East Seep Alluvial Groundwater Discharge Data Sheet (Appendix B).

2.1.3.6 Alternate Operation

If the flow meter/flow analyzer malfunctions and is sent to the manufacturer for repair/calibration, it will be removed from the discharge line and replaced with an appropriately sized pipe. Normally scheduled manual discharge measurements (calibrated container and stopwatch) will be used to document discharge until the flow meter/flow analyzer is returned to service.

2.1.3.7 Emergency Operation and Failsafe Features

There are no emergency operations associated with the alluvial well system.

3.0 TROUBLESHOOTING AND COMMON OPERATING PROBLEMS FOR ALLUVIAL GROUNDWATER WELLS

The alluvial groundwater collection system's most common operating problems are detailed in this section.

3.1.1 Common Operating Problems for Central Drainage Alluvial Wells

1. Description of Problem: Lack of discharge.

   Probable Causes and Control Techniques

   A. Check that there is power (120 volts) to the power supply and power (12 volts) to the pump using a volt/ohm meter. Remedy: If there is power (120-volts) into the power supply but not to the pump replace the power supply.

   B. There is power to the pump but the pump does not run. Remedy: Repair or replace the submersible pump.

2. Description of Problem: The flow meter/flow analyzer does not function.

   A. Check that there is power to the flow meter/flow analyzer. Remedy: Connect to power.

   B. There is power to the flow meter/flow analyzer but it does not function. Remedy: Refer to manufacturer's manual for troubleshooting.

3. Description of Problem: The difference between the measured discharge and the flow analyzer discharge is more than 25%. Remedy: Refer to manufacturer's manual for troubleshooting.

3.1.2 Common Operating Problems for Western Drainage Alluvial Wells

1. Description of Problem: Lack of discharge.

   Probable Causes and Control Techniques

   A. Check that there is power (120 volts) to the power supply and power (12 volts) to the pump using a volt/ohm meter. Remedy: If there is power (120-volts) into the power supply but not to the pump replace the power supply.

   B. There is power to the pump but the pump does not run. Remedy: Repair or replace the submersible pump.

2. Description of Problem: The flow meter/flow analyzer does not function.

   A. Check that there is power to the flow meter/flow analyzer. Remedy: Connect to power.

   B. There is power to the flow meter/flow analyzer but it does not function. Remedy: Refer to manufacturer's manual for troubleshooting.

3. Description of problem: The difference between the measured discharge and the flow analyzer discharge is more than 25%. Remedy: Refer to manufacturer's manual for troubleshooting.

3.1.3 Common Operating Problems for Far East Seep Alluvial Well

1. Description of Problem: Lack of discharge.

   Probable Causes and Control Techniques

   A. Check that there is power (120 volts) to the power supply and power (12 volts) to the pump controller using a volt/ohm meter. Remedy: If there is power (120-volts) into the power supply but not to the pump controller replace the power supply.

   B. There is power to the pump controller but no power to the pump. Remedy: The pump may not operate due to the Abyss controller if the water level in the well is not high enough to contact the high water level sensor. Compare the measured water level to the depth of the pump on sensor to verify if the pump should be running.

   C. The water level is between the two sensors but total discharge readings or other observations indicate that the pump may not be operational. Remedy: Lower the high water sensor down to the water and verify that there is then power to the pump and the pump runs.

   D. Refer to manufacturer's manual for troubleshooting.

   E. There is power to the pump but the pump does not run. Remedy: Repair or replace the submersible pump.

2. Description of Problem: The flow meter/flow analyzer does not function.

   A. Check that there is power to the flow meter/flow analyzer. Remedy: Connect to power.

   B. There is power to the flow meter/flow analyzer but it does not function. Remedy: Refer to manufacturer's manual for troubleshooting.

3. Description of Problem: The difference between the measured discharge and the flow analyzer discharge is more than 25%. Remedy: Refer to manufacturer's manual for troubleshooting.

4.0 PERSONNEL

All background operations can be found in Attachment 1: Operation, Maintenance and Monitoring (OM&M) Plan for the Midnite Mine Water Collection System and Water Treatment Plant for the Phase I RD/RA: Interim Water Management for the Midnite Mine.

5.0 ALLUVIAL GROUNDWATER PUMPING MONITORING AND STANDARDS

5.1 Purpose

There is not a laboratory testing program associated with the alluvial groundwater wells. The operations of the alluvial pumping wells will be checked approximately once a week (see Section 2.1.1.5). During periods of increased runoff and/or rapidly increasing water levels, the operations alluvial wells may be checked more frequently. All data will be recorded on Alluvial Groundwater Discharge Data Sheets (Appendix B).

All records and reporting operations can be found in Attachment 1: Operation, Maintenance and Monitoring (OM&M) Plan for the Midnite Mine Water Collection System and Water Treatment Plant for the Phase I RD/RA: Interim Water Management for the Midnite Mine.

6.0 ANNUAL OPERATION AND MAINTENANCE COSTS

The annual operation and maintenance costs for the Midnite Mine Water Treatment Plant Facility are summarized in Attachment 1: Operation, Maintenance and Monitoring (OM&M) Plan for the Midnite Mine Water Collection System and Water Treatment Plant for the Phase I RD/RA: Interim Water Management for the Midnite Mine.

7.0 MAINTENANCE

7.1 General

There is not a formal maintenance program for the alluvial groundwater well system. Pumps, controllers, power supplies, flow meter/flow analyzer will be replaced/repaired as needed. The flow meter/flow analyzer manufacturer recommends a yearly factory calibration.

Manufacturer's maintenance manuals are generally the best guide for preventative maintenance instructions. These manuals are included in Appendix C, and the maintenance procedures shall be followed, as applicable.

8.0 EMERGENCY OPERATING AND RESPONSE PROGRAM

The purpose of this section is to provide a response program for the operators in the case of an emergency situation during the operation of the Midnite Mine Water Treatment Plant (WTP). All background operations can be found in Attachment 1: Operation, Maintenance and Monitoring (OM&M) Plan for the Midnite Mine Water Collection System and Water Treatment Plant for the Phase I RD/RA: Interim Water Management for the Midnite Mine.

9.0 SITE SAFETY

A complete discussion of health and safety for the WTP is included in the *Health and Safety Plan for the Phase I RD/RA: Interim Water Management for the Midnite Mine.* This document shall be kept onsite at the WTP with this OM&M Manual.

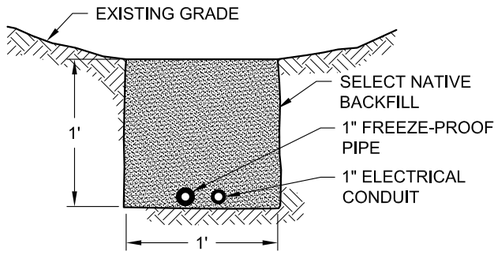
10.0 UTILITIES

The purpose of the utilities systems at the Midnite Mine WTP is to provide service to the various motors, instruments and components and to provide communication service. All background operations can be found in Attachment 1 Operation, Maintenance and Monitoring (OM&M) Plan for the Midnite Mine Water Collection System and Water Treatment Plant for the Phase I RD/RA: Interim Water Management for the Midnite Mine.

11.0 REFERENCES

U.S. Environmental Protection Agency (EPA), 2008b. Statement of Work for Phase I RD/RA: Interim Water Management for the Midnite Mine Superfund Site, Spokane Indian Reservation, Washington. November 7.

FIGURES



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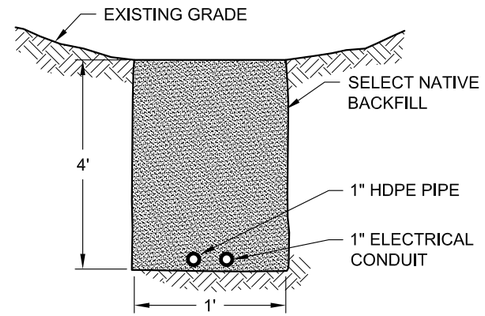

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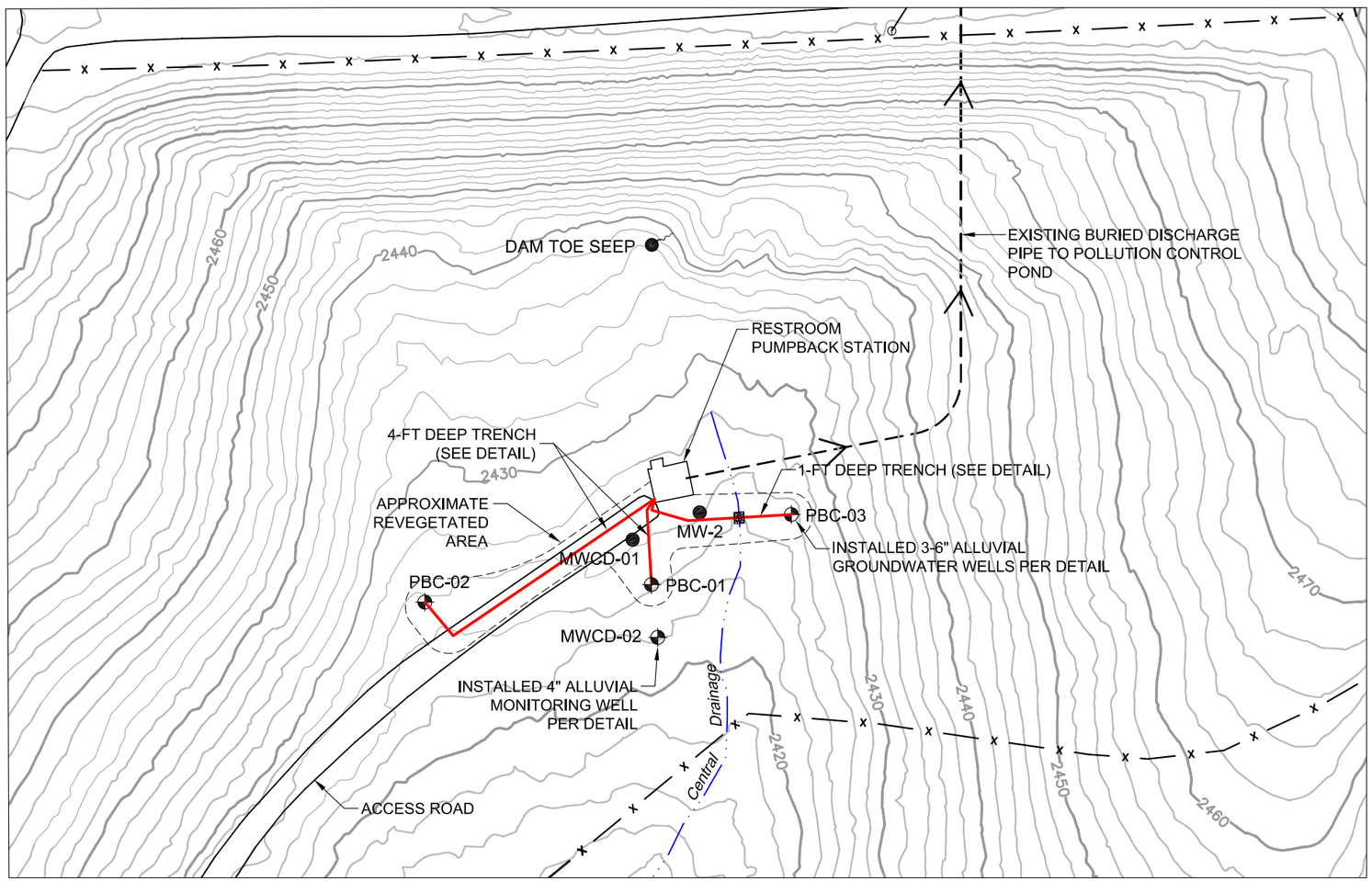
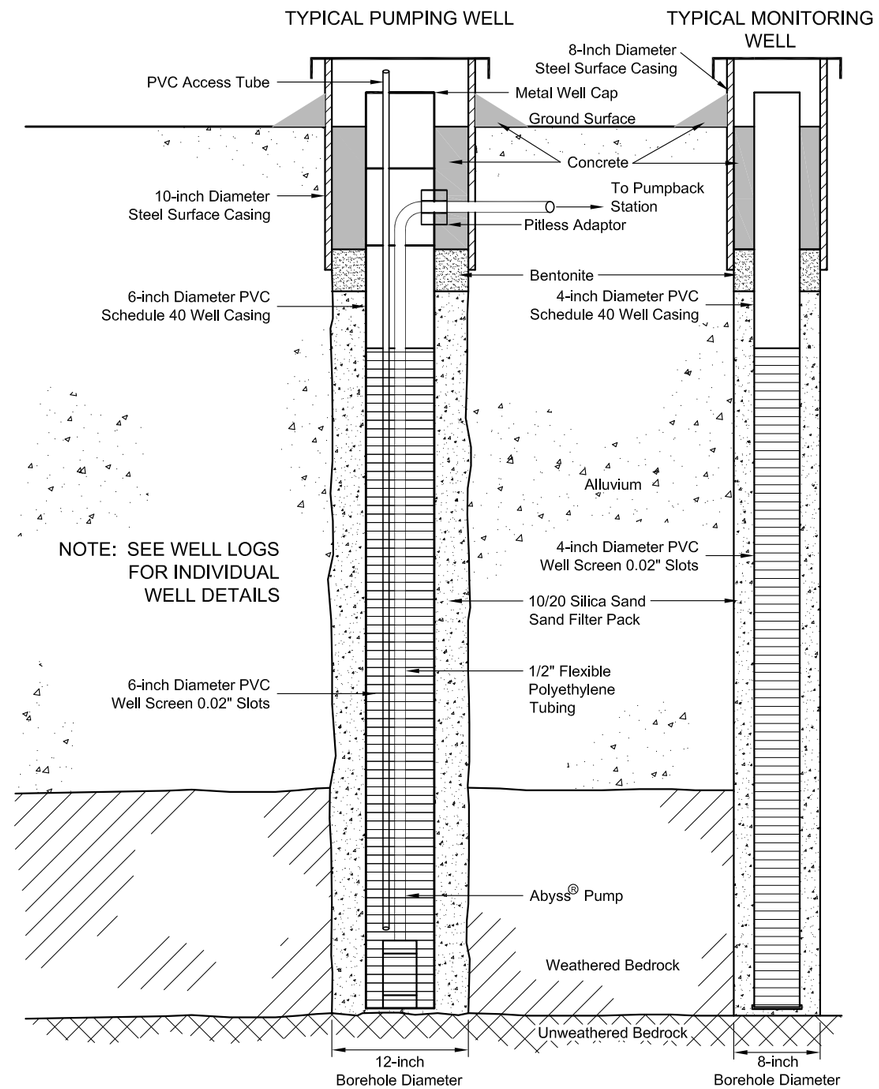


ALLUVIAL GROUNDWATER WELLS
CENTRAL DRAINAGE

SCALE: 1" = 50'

NORTH

SCALE IN FEET
0 50



NOT TO SCALE

NOTE: SEE WELL LOG DETAILS FOR INDIVIDUAL WELL SPECIFICATIONS

REVISION	DESCRIPTION	DATE
0	AS-BUILT	12/20/10

MIDNITE MINE

FIGURE 1
CENTRAL DRAINAGE
ALLUVIAL GROUNDWATER WELLS

PROJECT: 181850
DATE: DECEMBER, 2010
FILE: INT-MECH-WD-CD

TETRA TECH

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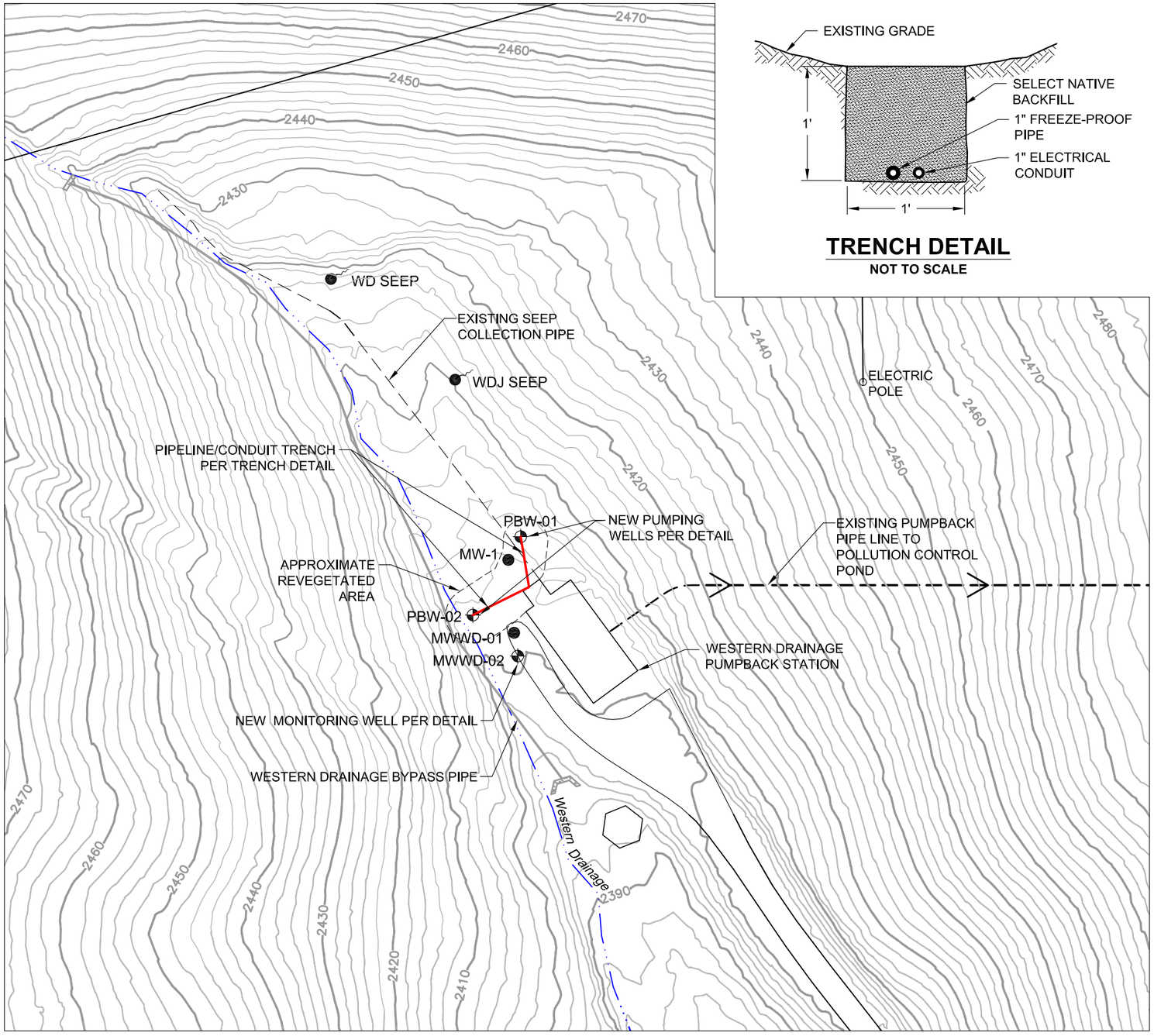

TRENCH DETAIL

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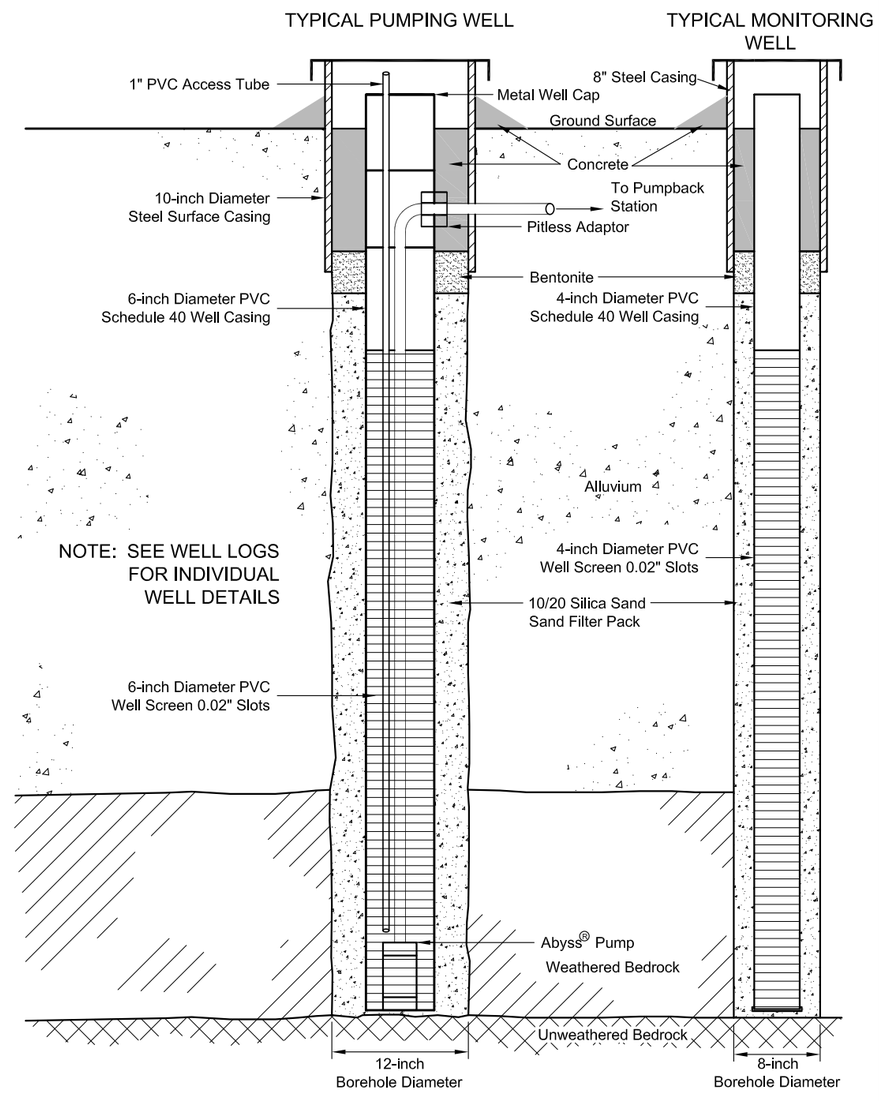

NOT TO SCALE

NOTE: SEE WELL LOG DETAILS FOR INDIVIDUAL WELL SPECIFICATIONS

ALLUVIAL GROUNDWATER WELLS
WESTERN DRAINAGE

SCALE: 1" = 50'

NORTH

SCALE IN FEET 0 50

REVISION	DESCRIPTION	DATE
0	AS-BUILT	12/20/10

MIDNITE MINE

FIGURE 2
WESTERN DRAINAGE
ALLUVIAL GROUNDWATER WELLS

PROJECT: 181850
DATE: DECEMBER, 2010
FILE: INT-MECH-WD-CD

TETRA TECH

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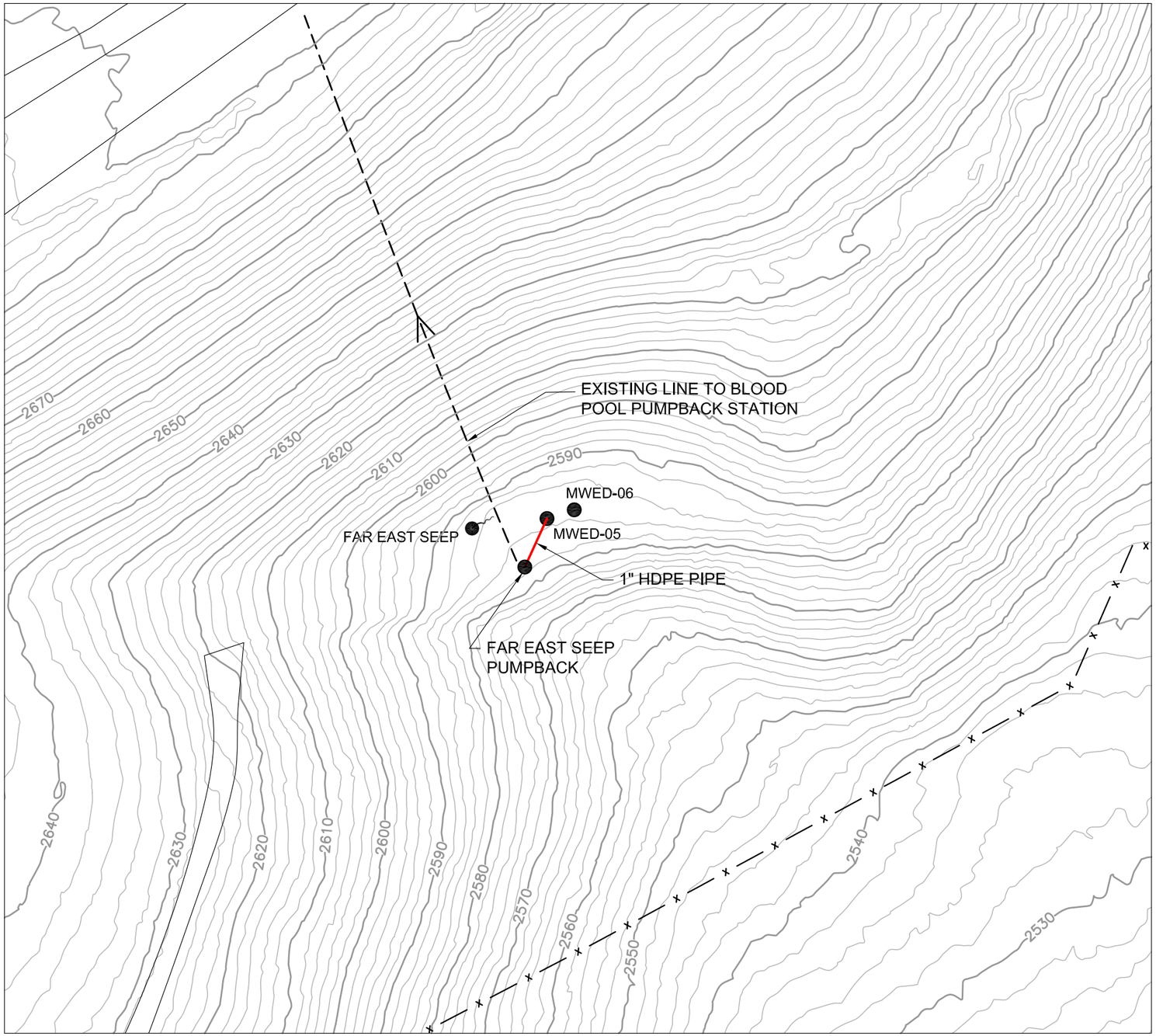


ALLUVIAL GROUNDWATER WELL
FAR EAST SEEP DRAINAGE

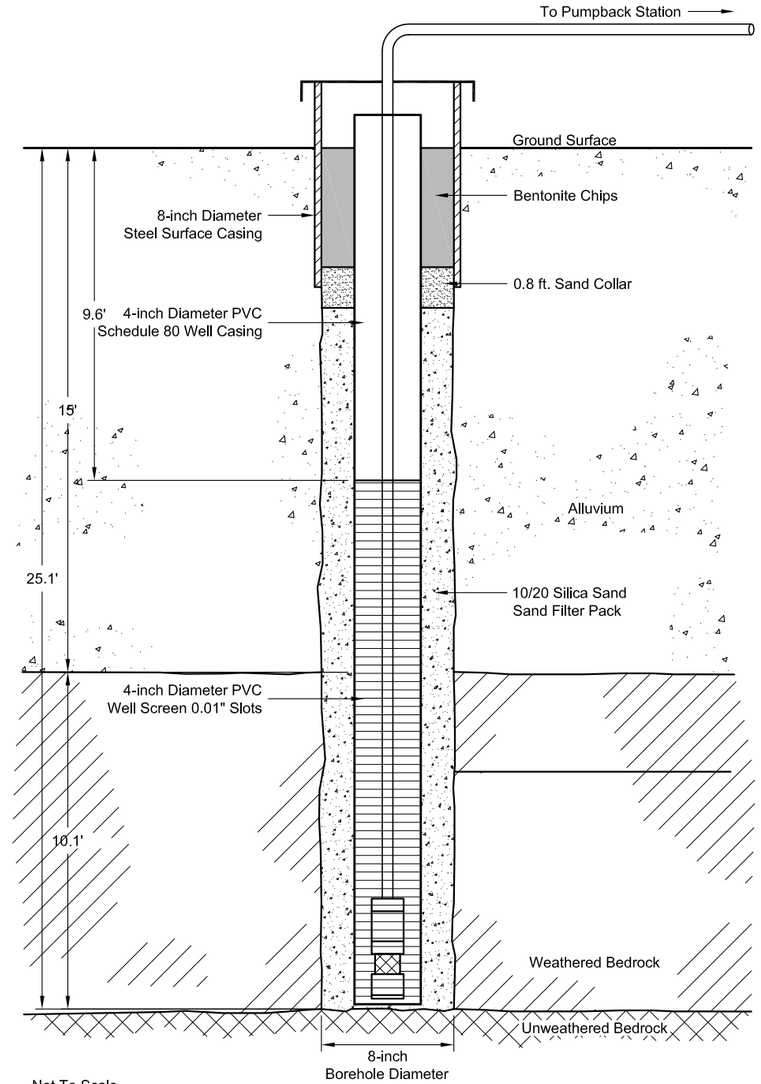
SCALE: 1" = 50'

NORTH

SCALE IN FEET

0 50

EXISTING WELL MWED-05



Not To Scale

TEMPORARY PUMP INSTALLATION NON-FREEZING CONDITIONS ONLY

REVISION	DESCRIPTION	DATE
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MIDNITE MINE

FIGURE 3
FAR EAST SEEP DRAINAGE
ALLUVIAL GROUNDWATER WELL

PROJECT: 181850
DATE: DECEMBER, 2010
FILE: INT-MECH-ED

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APPENDIX A
GENERAL OPERATING AND EQUIPMENT CRITERIA

1.0 ALLUVIAL GROUNDWATER WELLS

1.1 Central Drainage Alluvial Groundwater Wells

- Pumps
  - Electric Submersible Pump:

    Proactive Environmental Products Abyss® Pump
    12-volt
    Approximately 0.7 gpm
    Can run dry without damaging pump

  - Regulated DC Power Supply:

    Pyramid Gold Series Model: PS-21K

  - Flow Meter:

    Blancett® Model B110-375 Turbine Flow Meter
    316 stainless steel
    3/8” bore, 1” Male NPT

  - Flow Analyzer:

    NUFLO™ MC-III™ WP Flow Analyzer

- Power
  - 15 kva pole mount transformer
  - 50 amp. 230v. single phase service
  - 230v. transfer switch
  - Kohler Power System 8.5Res, 8.5 kw Automatic start generator

1.2 Western Drainage Alluvial Groundwater Wells

- Pumps
    - Electric Submersible Pump:

      Proactive Environmental Products Abyss® Pump
      12-volt
      Approximately 0.7 gpm
      Can run dry without damaging pump

    - Regulated DC Power Supply:

      Pyramid Gold Series Model: PS-21K

    - Flow Meter:

      Blancett® Model B110-375 Turbine Flow Meter
      316 stainless steel
      3/8” bore, 1” Male NPT

    - Flow Analyzer:

      NUFLO™ MC-III™ WP Flow Analyzer

- Power
    - 3 phase, 15 KVA pole mount transformers
    - 200 amp. 480v. 3 phase service
    - Asco series 300, 70 amp. automatic transfer switch
    - Lima Silver Eagle 35 kw diesel generator set

1.3 Far East Seep Pump Station

- Pump
    - Electric Submersible Pump:

      Proactive Environmental Products Mini-Monsoon® Pump
      12-volt
    - Pump Controler

      Proactive Environmental Products Abyss Controller
      With dry shut off sensor Probes

    - Regulated DC Power Supply:

      Pyramid Gold Series Model: PS-21K

    - Flow Meter:

Blancett® Model B110-375 Turbine Flow Meter
316 stainless steel
3/8” bore, 1” Male NPT

- Flow Analyzer:

  NUFLO™ MC-III™ WP Flow Analyzer

- Power.
  - Feeds off of Blood Pool electrical system
  - 230v. transfer switch
  - Generator Power Fed from Blood Pool Pump Station

APPENDIX B
ALLUVIAL GROUNDATER PUMPING DATA SHEETS

Central Drainage (Restroom Seep) Alluvial Groundwater Discharge Data Sheet

Page:

	Depth to Water (ft)	Flow Meter		Discharge Measurement		Initials	Notes
		Total Gallons	GPM	Volume/Time	GPM		
Date/Time:							
PBC-01							
PBC-02							
PBC-03							
MWCD-02							
Date/Time:							
PBC-01							
PBC-02							
PBC-03							
MWCD-02							
Date/Time:							
PBC-01							
PBC-02							
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PBC-02							
PBC-03							
MWCD-02							
Date/Time:							
PBC-01							
PBC-02							
PBC-03							
MWCD-02							

Western Drainage Alluvial Groundwater Discharge Data Sheet

Page:

	Depth to Water (ft)	Flow Meter		Discharge Measurement		Initials	Notes
		Total Gallons	GPM	Volume/Time	GPM		
Date/Time:							
PBW-01							
PBW-02							
MWWD-02							
Date/Time:							
PBW-01							
PBW-02							
MWWD-02							
Date/Time:							
PBW-01							
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PBW-01							
PBW-02							
MWWD-02							
Date/Time:							
PBW-01							
PBW-02							
MWWD-02							

Far East Seep Drainage Alluvial Groundwater Discharge Data Sheet

Page:

	Depth to Water (ft)	Flow Meter		Discharge Measurement		Initials	Notes
		Total Gallons	GPM	Volume/Time	GPM		
Date/Time:							
MWED-05							
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APPENDIX C
MANUFACTURER OPERATIONS AND MAINTENANCE MANUALS

Appendix C
Manufacturer Operations and Maintenance Manuals
Index

1. Proactive Environmental Products Abyss® Pump
2. Pyramid Gold Series Model: PS-21K
3. Blancett® Model B110-375 Turbine Flow Meter Product Sheet
4. Blancett® Model B110-375 Turbine Flow Meter Installation & Instruction Manual
5. NUFLO™ MC-III™ WP Flow Analyzer
6. Proactive Environmental Products Abyss Controller

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Attachment P-6

Routine Inspection and Maintenance for Ponds and Tanks

In order to manage the size of this 100% design report, this attachment only is included in the electronic submittal. This attachment describes current Site O&M activities, and has not been revised for this submittal.

Note: The inspection and maintenance activities listed in this attachment will be used until the existing ponds and tanks are removed during the implementation of the remedial action.

ATTACHMENT 6
EXISTING PONDS AND TANKS

Attachment 6

These inspection forms are to be used for the required inspections of existing ponds and tanks. These inspections are required to be performed quarterly or after major storm events. The completed copies are to be bound together and filed at the Dawn Mill Site office.

POND AND TANK INSPECTION FORM*
MIDNITE MINE

Inspector's Name:_____ Date:_____ Time:_____

Pond or Tank Number (see Location Index Map):_____

Location Description:_____

_____

Weather Conditions:_____

Date of Last Precipitation: _____

Score the following on a 1 to 5 scale
1 = poor condition (significant problems) 5 = excellent condition (no problem)

Accumulation of Debris/Sediment	1	2	3	4	5
Conditions of Pipes	1	2	3	4	5
Embankment Condition	1	2	3	4	5
Side Slope Erosion	1	2	3	4	5
Spillway Condition	1	2	3	4	5
Tank Condition	1	2	3	4	5
Manhole Condition	1	2	3	4	5
Other _____	1	2	3	4	5

Inspection Summary (explain if maintenance is needed and to what extent, attached sketches if necessary)

_____

_____

_____

_____

_____

Photo Log (photos with legend attached)

Photo Number and Subject: _____

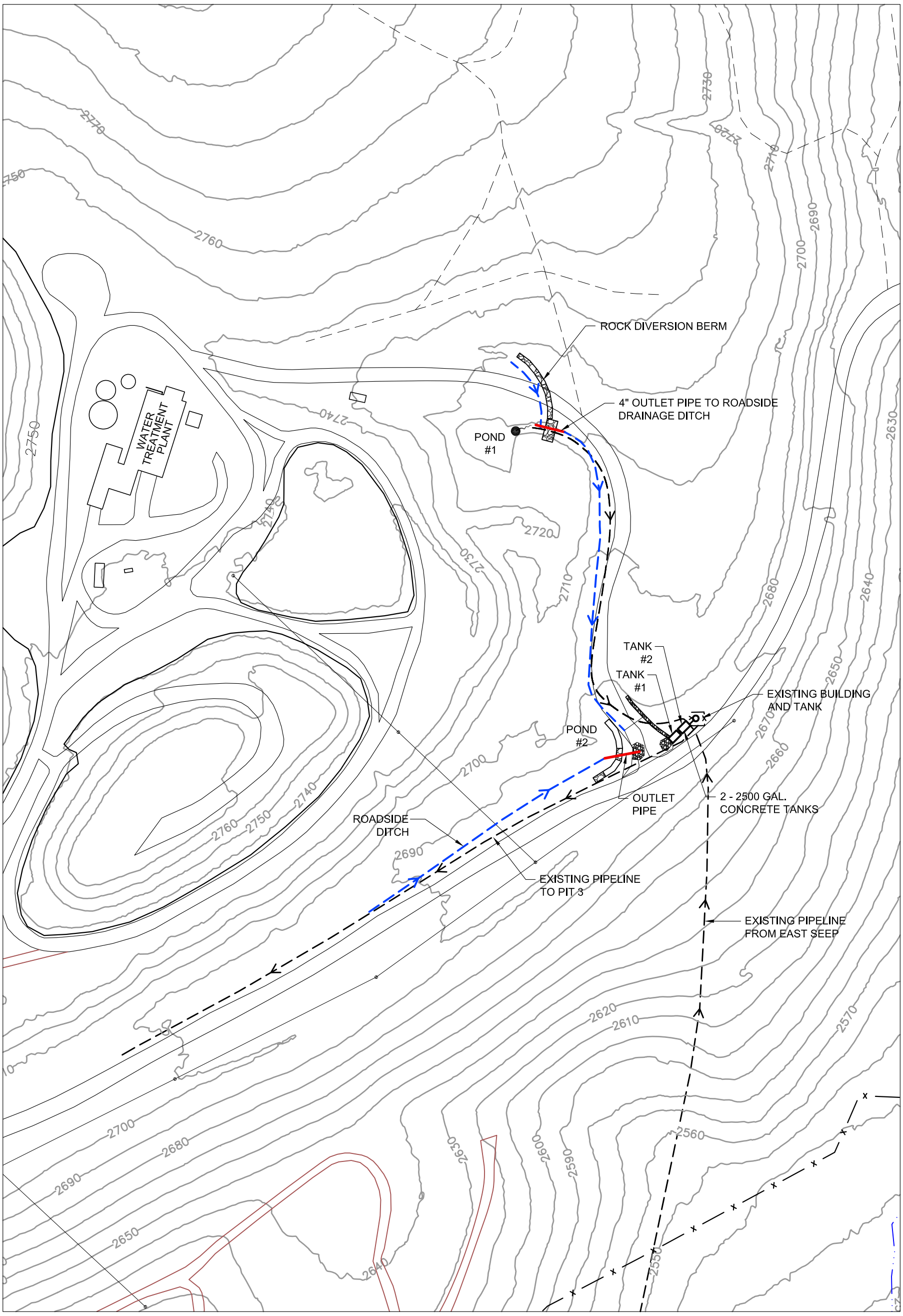
Photo Location: _____

Direction Photo Taken (looking upstream/downstream, north or south, etc) _____

_____

*Quarterly inspection and following major storm events is required

E:\181850-2010-Survey\Task 400\OMMP\POND & TANK MAP.dwg SAVED:12/22/10 PRINTED:12/29/10 BY:TONY.DAVIS



NORTH

SCALE IN FEET

0 100'

MIDNITE MINE

POND AND TANK
LOCATION INDEX MAP

PROJECT:	181850
DATE:	DECEMBER 2010
FILE:POND & TANK MAP.DWG	

TETRA TECH

Attachment P-7

Routine Inspection and Maintenance for the Filter Press

In order to manage the size of this 100% design report, this attachment only is included in the electronic submittal. This attachment describes current Site O&M activities, and has not been revised for this submittal.

Note: This OM&M Plan addresses inspection, monitoring, and maintenance activities associated with the filter press. This attachment will be incorporated in its entirety into the OM&M Plan for new water treatment plant.

Attachment 7

The general filter press operations and maintenance manuals are contained in this attachment. These manuals will be supplemented with additional information after installation and testing of the filter press.

The information in this attachment is in general supplemental to Attachment 1: Operation, Maintenance and Monitoring (OM&M) Plan for the Midnite Mine Water Collection System and Water Treatment Plant for the Phase I RD/RA: Interim Water Management for the Midnite Mine and specifically applied to the sections as defined below.

The following information is supplemental to Attachment 1, Section 2.6:

2.6.1 Sludge Dewatering

Sludge from the clarifier #1 is fed to a steady head tank and pumped to the either the filter press or centrifuge(s) for dewatering and final removal from the system.

The liquid discharge (centrate) is pumped back to the neutralization surge tank, and the sludge discharge disposed as described in Section 2.7,Sludge Transport and Final Disposal.

Sludge dewatering follows primary solid liquid separation in the clarifiers. After the sludge is filtered and discharged from the filter press or centrifuge(s) as a solid cake, it will be containerized and transported to the disposal area.

2.6.1.1 Control

- Filter Press
  - Sludge is delivered to the filter press using an air operated diaphragm pump. The speed of the air operated diaphragm pump is regulated by an air control valve. The filter press and air operated diaphragm pump are manually started and stopped by the operator.

- Centrifuge
  - Sludge is delivered to the centrifuges using Moyno progressive cavity pumps. The speed of the progressive cavity pumps are regulated by the speed of the centrifuge back drive. The centrifuges and progressive cavity pumps are manually started and stopped by the operator.

2.6.1.2 Major Components

The major components of the sludge dewatering system include:

- Filter Press
  - One Filter Press – Pacific Press Company, Model #P12M232A-50CR
  - Filter Press Feed Pump – Air operated diaphragm – TBD
  - Sludge Steady Head Tank – TBD
  - Centrate Surge Tank.

- Centrifuge
  - Two Centrifuges
  - Centrifuge Feed Pumps (2)
  - Discharge Conveyor (1)
  - Centrate Surge Tank – Steel Tank (1)

See Appendix C for more detailed information on pumps, equipment, piping, instrumentation, and power.

2.6.1.3 Laboratory or Onsite Testing Controls

Paint Filter Liquids Test

Purpose	This test is used to determine the free water content in the plant sludge.
Sampling Site	Centrifuge sludge discharge conveyor #2 or cake from filter press plate
Expected Range of Results	Results are not quantified with this test. The sludge material is placed on a paint filter and if any liquid passes through and drops from the filter within the 5 minute test period, the material is deemed to contain free liquids.
Method Reference	40 CFR 264.314
Consequences of Test Results	If the test confirms the presence of free liquids, the sludge will be further processed to remove residual water.

2.6.1.4 Start-Up

Filter Press - For more details of the filter press startup and operation, please refer to the Pacific Press Company operating manual. The filter press operating manual is stored in the WTP control room. The following sequence shall be followed when starting the filter press sludge dewatering system:

1. Inspect filter press building for obstructions around and below filter press. Verify that sludge haul truck bed is down. Put truck power take off into neutral.
2. Make sure that the sludge steady head tank scraper is running.
3. Back sludge haul truck under filter press.
4. Check that filter press plates and seals are clean.
5. Close filter press – Method TBD.
6. Shut bombay doors – Method TBD
7. Start air operated diaphragm pump – Method TBD
8. After centrate surge tank has filled, start centrate pump.
9. Shut off pump – Pressure and method TBD.
10. Core blow down – Time and method TBD.
11. Open filter press just enough to release pressure – TBD

12. Allow any water to drip onto the bombay doors. When water finishes dripping, open bombay doors.

13. Use the plate shifter to move each plate and use the scraper to clean the filter cake off each plate.

14. After emptying the filter press, clean cloth and seals as required. If washing down the cloth and seals, pull out sludge truck to prevent water from getting into the sludge haul truck trailer.

Centrifuge - For more details of the centrifuge startup and operation, please refer to the Sharples operating manual. The Sharples operating manual is stored in the WTP control room. The following sequence shall be followed when starting the sludge dewatering system:

1. Inspect truck shed for obstructions around conveyor. Verify that sludge haul truck bed is down. Put truck power take off into neutral.

2. Back sludge haul truck under conveyor.

3. Check oil level in pumps.

4. Push start button for centrifuge.

5. Push start button for backdrive.

6. Push start button for conveyor.

7. After centrate surge tank has filled, start centrate pump.

2.6.1.5 Normal Operation

Filter Press – TBD

Centrifuge – During normal operations, once the system is stable, the plant will run 24 hours per day and centrifuges will operate continuously for 15 hours daily. After shutdown of the centrifuges, rinse the centrifuges with water. After the sludge truck has been loaded, pull the truck out and hose down the truck bay. The daily sludge output is approximately 12 tons per day and is transported and disposed as described in the Residual Management Plan (Miller Geotechnical Consultants, 2009).

2.6.1.6 Alternate Operation

The alternative operation for the filter press is to run the centrifuge.

2.6.1.7 Emergency Operations and Failsafe Features

Filter Press – Emergency stop cables and a light curtain are present on the filter press. Activation of either of these will stop the filter press.

Centrifuge - There are no emergency operations associated with this sludge dewatering system. Emergency stop cables run along the sludge conveyor. The centrifuges are equipped with vibration sensors that will shut off the centrifuges if excessive vibration is occurring.

The following information is supplemental to Attachment 1, Section 3.11:

3.11 Common Operating Problems for the Sludge Dewatering System

1. **Description of Problem:** Filter press or centrifuge does not start or operate.

   Probable Causes and Control Techniques:

   A. Filter Press – Failure of the filter press controls. Remedy: verify that the breaker switch and power switch are both ON. Electricians should verify proper power input.

   B. Centrifuge - Failure of the drive motor. Remedy: verify that the breaker switch and power switch are both ON. Electricians should verify proper power input and motor operation. Replace motor if necessary.

2. **Description of Problem:** No solids or low solids produced.

   Probable Causes and Control Techniques:

   A. Sludge steady head tank is empty. Remedy: open feed from clarifier #1 to sludge steady head tank or clean piping.

   B. Piping from sludge steady head tank to pump is plugged. Remedy: Check for flow from sludge stead head tank to pump intake using pressurized water. If there is no flow, clean piping.

   C. Scraper for filter press sludge steady head tank is not functioning. Remedy: Verify that the breaker switch and power switch are both ON. Electricians should verify proper power input and motor operation. Replace motor if necessary.

   D. Flocculant feed to filter press or centrifuge is shut off, at the incorrect flow, or at the incorrect concentration. Remedy: check that flocculant is pumping to centrifuge, if flocculant is pumping refer to Section 3.1.9 for trouble shooting of the flocculant feed rate and concentration.

   E. Filter press or centrifuge feed pump motor has failed. Remedy:

      i. Filter Press - Verify that air compressor is on and supplying air to the pump. Verify that pump is operating. Check for leaks in the air pipeline or receiver tank. Check that air compressor is supplying the proper air pressure and volume. Check that air valve for pump is opening. Repair air compressor of pump if necessary.

      ii. Centrifuge - Verify that the breaker switch and power switch are both ON. Electricians should verify proper power input and motor operation. Replace motor if necessary.

   F. Centrifuge feed pump stator or rotor has worn out. Remedy: check that pump is running and sludge flow is available to pump. If discharge from pump is low, replace stator and/or rotor.

3. **Description of Problem:** General troubleshooting

   Probable Causes and Control Techniques:

   A. See manufacturer's operation and maintenance manual for additional information.

The following information is supplemental to Appendix C, Section 5.

5.0 SLUDGE HANDLING

- Filter Press
  - One Filter Press – Pacific Press Company, Model #P12M232A-50CR
  - Filter Press Feed Pump – Air operated diaphragm – TBD
  - Sludge Steady Head Tank – TBD
  - Centrate Surge Tank

    Tank:

    Capacity – 52.6 gal
    Diameter – 30 inches
    Height - 42 inches
    Material - Steel
    Mixing – No

MANUFACTURER OPERATIONS AND MAINTENANCE MANUALS FOR THE FILTER PRESS

Attachment 7
Manufacturer Operations and Maintenance Manuals
Index

1. 1200 mm Filter Press Operation & Instruction Manual.
2. 1200 mm Filter Press Drawing
3. 140015C- Automatic Plate Shifter Operations & Maintenance Supplement
4. 140017B- E-stop Operation Rapid Stop Switch Push-Pull Cable
5. 140018B-Bombay doors Manual
6. 140040B- Light Curtain System Manual
7. 140122B-Electric Hydraulic Manual

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Attachment P-8

Routine Inspection and Maintenance for Water Treatment Plant Influent and Effluent Pipelines (Future Construction)

Midnite Mine Superfund Site
100 Percent Design

Attachment P-8 - WTP Influent and Effluent Pipelines – Operation, Maintenance, and Monitoring Plan

Revised October 2015

Prepared for:

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Figure 2 Overall Effluent Pipeline Plan – End of Construction

LIST OF ACRONYMS

BODR	Basis of Design Report
BPA	Backfilled Pit Area
CD	Consent Decree
EPA	U.S. Environmental Protection Agency
HDPE	high density polyethylene
NPDES	National Pollutant Discharge Elimination System
OM&M	Operation, Maintenance and Monitoring
ODA	Other Disturbed Areas
RA	remedial action
SDR	standard diameter ratio
Site	Midnite Mine Superfund Site
WCA	Waste Containment Area
WTP	Water Treatment Plant

1.0 INTRODUCTION

Influent pipelines will be used to convey impacted water from backfilled Pit 3, Pit 4, existing extraction well GW-54 location in the Backfilled Pit Area (BPA), and the two Pit 3 toe seep collectors to the new Water Treatment Plant (WTP) and a single effluent pipeline will convey treated water from the WTP to the Spokane River Arm of Lake Roosevelt. Because these influent and effluent pipelines will have similar monitoring and maintenance activities following their construction, they both are included in this plan. This plan then presents the operation, maintenance, and monitoring (OM&M) activities for the WTP influent and effluent pipelines that will be constructed during the remedial action (RA) at the Midnite Mine Superfund Site (Site).

As currently planned, implementation of the Selected Remedy will be conducted in three distinct phases with individual components of the overall remedy completed during each phase. As a result, the WTP influent pipeline OM&M activities will be necessary from the time the Waste Containment Area (WCA) cover is installed on Pit 4 during Phase 1, through final installation of the Pit 3 cover system at the end of Phase 3, and into the post-remedy monitoring period. OM&M activities associated with the effluent pipeline will be necessary only after construction of the new WTP is completed and treated water is being discharged to Lake Roosevelt. OM&M activities for other remedial elements that are under construction will be conducted in accordance with the *Remedial Action Site Wide Monitoring Plan* in *Appendix Q of the Basis of Design Report* (BODR; MWH, 2015).

This WTP Influent and Effluent Pipelines OM&M Plan is an attachment to the *Midnite Mine Superfund Site Operation, Maintenance, and Monitoring Plan*, which describes the OM&M for all of the components of the Selected Remedy, which will require monitoring and maintenance.

1.1 PURPOSE, SCOPE, AND OBJECTIVES

The purpose of this WTP Influent and Effluent Pipelines OM&M Plan is to describe the inspection, maintenance and monitoring activities, and to establish frequencies for this work. The primary objectives of this plan are to:

- Monitor and maintain influent and effluent pipelines relative to manhole damage
- Monitor and maintain influent and effluent pipelines relative to pipeline leaks.

To meet these objectives, this WTP Influent and Effluent Pipelines OM&M Plan includes the following:

- Identification of the pipeline runs that require routine inspection, monitoring, and maintenance,
- Documentation of procedures for inspection and maintenance of these pipeline segments, and
- Listing of reporting requirements.

2.0 DESCRIPTION OF WTP INFLUENT AND EFFLUENT PIPELINES

This section of the WTP Influent and Effluent OM&M Plan provides a description of the pipelines to be installed during RA construction. The configuration of the permanent influent and effluent pipelines as shown in the Midnite pipeline design (Appendix J and Section 10 drawings of the BODR) and discussed in this section are shown on Figures 1 and 2.

2.1 WTP INFLUENT PIPELINES

The influent pipelines mostly will traverse land that will be remediated (i.e., disturbed through mine waste removal) and reclaimed at the end of remediation. As such, the influent pipes during construction will be temporary and will be relocated constantly throughout the remedial action RA process. Due to the highly variable nature the temporary pipeline locations and their alignments, most of the construction and positioning of the temporary pipelines will be left to the selected Contractor's discretion and take place in the field as the land surface changes. Permanent influent pipeline construction will be concurrent with the final cover installation or ground surface remediation/revegetation in areas where covers are not required. The influent pipelines regardless if they are temporary or permanent will be constructed of dual containment high density polyethylene (HDPE) of various sizes and standard diameter ratio (SDR) values. HDPE manholes will be installed at regular intervals to allow maintenance of the pipeline.

2.1.1 Temporary Influent Pipelines

The selected Contractor will be required, through the Drawings and Technical Specifications, to use specific pipeline materials for construction of the temporary piping. They will be required to meet the project performance standards for containment of contaminated water which means continually monitoring the temporary pipelines during the construction process. This process will be straightforward in that most of the temporary lines are above ground. For those that are

subsurface, if a leak is detected it will be repaired and because the temporary pipeline in most cases would be on or buried in contaminated material, it will be cleanup up by excavation and transported to one of the pits for containment.

Currently and at the beginning of construction, mine-effected water will be piped directly from Pit 4, Pit 3, and the BPA to the existing WTP for treatment. The existing WTP will be operated until the new WTP is constructed which will be after the NPDES permit for discharge to Lake Roosevelt is approved.

2.1.2 Permanent Influent Pipelines

There will be four primary influent water sources that must be treated during construction and following the RA. These sources are: Pit 3, Pit 4, BPA well GW-54, and the Pit 3 toe seep collectors as depicted on Figure 1. The first permanent pipelines will be installed concurrently with the Pit 4 cover installation. This will be followed by other permanent influent pipeline installation when the subsequent covers are initiated and completed on Pit 3 and the BPA. Permanent influent pipelines from the seep collectors will be installed as mine wastes are removed, the areas are remediated, and the path to the WTP is revegetated.

2.2 WTP EFFLUENT PIPELINE

The selected effluent pipeline alignment is depicted on Figure 2 and leads from the new WTP to Lake Roosevelt. The effluent pipeline is approximately 5.5 miles long and will be constructed of HDPE of various sizes and SDR values as shown on Figure 2. Manholes with H20 traffic rated covers will be installed at regular intervals to allow observation and maintenance of the pipeline.

The pipeline progresses from the new WTP south down what will be the alignment of the proposed future Midnite Mine Access Road until it encounters the Ford-Wellpinit (aka the West End) Road. After passing under the Ford-Wellpinit Road, the pipeline continues downhill in a southerly direction along an unnamed, unpaved 4x4 road until intersecting the Blue Creek Road (BIA Hwy 55). The pipeline then is installed in the Blue Creek Road Bed to the confluence of Blue Creek with the Spokane Arm of Lake Roosevelt (as depicted in more detail in Section 10 of the 100% BODR drawings). The effluent pipe enters the lake and the conveyed water is discharged via a subsurface diffuser positioned in the middle of the submerged Spokane River channel.

It should be noted that the design of the effluent pipeline has been held at the 60% design level until the NPDES permitting process has concluded.

3.0 WTP INFLUENT AND EFFLUENT PIPELINE - OPERATION, MAINTENANCE AND MONITORING

WTP Influent OM&M will be performed from the time the final covers are installed in each of the WCAs (i.e., completion of the Pit 4 cover in Phase 1, the Pit 3/BPA cover in Phase 3 of the RA, and remediation/revegetation of the area between the seep collectors and the WTP) and into post-remedy monitoring. As stated previously, Effluent OM&M activities associated with the effluent pipeline will commence once the new WTP is constructed, operational and discharging treated water. Observation and documentation through inspection reports will enable prompt repair scheduling and execution of pipeline repair or maintenance. The monitoring will include visual inspection of the WTP Influent and Effluent pipelines to ensure system integrity is maintained. The monitoring plan, including the individual monitoring tasks, schedule, monitoring criteria, and maintenance, is discussed below.

3.1 WTP INFLUENT PIPELINE

The monitoring requirements for the WTP Influent Pipeline (temporary and permanent) are summarized in Table 1. The inspections will be performed to be protective of the pipeline system. Vehicular access along the dewatering well maintenance roads located on the capped WCA surface will allow the observations from multiple locations along the pipeline alignment as well as access to manholes that will be installed at regular intervals along the pipeline alignments. The WTP influent pipeline will be subjected to the following inspections and monitoring requirements:

1) Routine Inspection:

    a. Manhole Damage – manholes will be observed for signs of structural damage and missing components.

    b. Signs of pipeline leaks – the ground surface along the pipeline alignment will be observed for signs of soil saturation or settlement.

    c. Leak detection – manholes will be monitored for the presence of water or visible flow of water from the containment piping.

The monitoring frequency and unacceptable conditions (action triggers) for each of these monitoring metrics are summarized in Table 1 along with the associated (maintenance) response action.

3.2 WTP EFFLUENT PIPELINE

The monitoring frequency and action trigger requirements for WTP Effluent Pipeline are summarized in Table 2. The inspections will be performed to be protective of the pipeline system. Vehicular access along the Site Access and Blue Creek roads will allow the observations from multiple locations along the pipeline alignment as well as access to manholes that will be installed at regular intervals along the pipeline alignments. The WTP effluent pipeline will be subjected to the following inspections and monitoring requirements:

1) Routine Inspection:
    a. Manhole Damage – manholes will be observed for signs of structural damage and missing components.
    b. Signs of pipeline leaks – the ground surface along the pipeline alignment will be observed for signs of soil saturation or settlement.

The unacceptable conditions (action triggers) for each of these monitoring metrics are summarized in Table 2 along with the associated (maintenance) response action.

It should be noted that the monitoring requirements for the Effluent Pipeline may be modified as the design is advance once the NPDES permitting process is finalized.

3.3 MAINTENANCE OF WTP INFLUENT AND EFFLUENT PIPELINES

The purpose of the maintenance procedures for the WTP Influent and Effluent Pipelines is to ensure that these pipelines perform as designed and that maintenance activities ensure their long-term integrity and viability. This is accomplished by ensuring the materials and maintenance practices are consistent with the final design and specifications. Below the maintenance activities for the influent and effluent pipelines are presented.

It should be noted that the maintenance requirements for the Effluent Pipeline may be modified as the design is advance once the NPDES permitting process is finalized.

3.3.1 Manhole Damage

Manholes located along or within Site access roads are susceptible to damage. If damage is noted during routine inspections (as defined in Tables 1 and 2), repair procedures may include

replacement of manhole covers and repair or replacement of concrete pads. Corrective action repairs and maintenance will be prioritized following inspections indicating there are problems in accordance with Tables 1 and 2.

3.3.2 Pipeline Leaks

Leaks in HDPE pipelines are extremely rare and may develop due to defects during fusion welding of individual pipe sections together or damage during backfill placement. Visual observations of saturated soil or settlement of the ground surface along the pipeline alignment are all indicative of pipeline leaks.

Influent Pipeline – Faulty materials and/or construction, or damage to the influent pipeline which results in leakage of pipelines on the influent side during construction are of relatively minor concern because they overlie contaminated materials. However, long term the permanent influent pipelines will be installed within clean cap materials and any leakage of contaminated water then is of major concern. If leaks in the influent lines are detected or suspected, pumping operations shall cease until the source of the leak can be identified and repaired.

Effluent Pipeline – Faulty materials and/or construction, or damage to the effluent pipeline which results in leakage from effluent pipeline is problematic for a variety of reasons, but is not a major environmental concern because the water has been treated and only a few contaminants remain in the water which are mixed in Lake Roosevelt waters to acceptable standards. As a result, the effluent pipeline maintenance schedule is less stringent than the influent pipeline monitoring and maintenance schedule.

Repairing influent and effluent pipeline leaks may involve excavation to expose damaged pipe, cutting and removing damaged piping, and fusion welding of replacement pipe sections. Corrective action repairs and maintenance will be prioritized following inspections indicating there are problems in accordance with Tables 1 and 2.

3.3.3 Pipeline Maintenance

The influent pipeline will be observed to determine if there is water flowing from the containment pipe into the manholes. Observable flow in the manhole would indicate a pipeline leak. Corrective action repairs and maintenance will be prioritized following inspections indicating there are problems in accordance with Table 1.

The effluent pipeline will be observed to determine if there is water flowing from manhole to manhole down the entire alignment to the Lake Roosevelt. Lack of observable flow could mean

a pipeline leak or plugged piping. Once it has been verified that a pipeline leak is not occurring, the individual manhole overflow piping will be inspected to determine which overflow is active to identify the section of pipe that has become blocked. Once the section of blocked piping has been identified, maintenance of the pipeline to remove obstructions may be required. This typically involves the use of a water jet or pig to dislodge materials that have formed a plug in the pipe. Corrective action repairs and maintenance will be prioritized following inspections indicating there are problems in accordance with Table 2.

4.0 RECORD KEEPING AND REPORTING

4.1 GENERAL

Documentation of WTP Influent and Effluent Pipelines OM&M activities will be completed and retained pursuant to the requirements of the Consent Decree (CD; EPA, 2011). The final *OM&M Plan* will include a Monitoring and Maintenance Activity form.

4.2 REPORTING

In accordance with the *Midnite Mine Superfund Site Operation, Maintenance, and Monitoring Plan,* to which this plan is attached, an annual summary report of the monitoring and maintenance activities will be prepared pursuant to all Site OM&M activities related to:

- Cover System and Other Disturbed Areas (ODAs) Inspection and Maintenance
- Midnite Mine WTP
- Fence Inspection and Maintenance
- Site Access Roads and Culverts
- Surface Water Diversions
- Alluvial Groundwater Controls
- Ponds and Tanks
- WTP Influent and Effluent Pipelines
- Pit Area Dewatering and Underdrain Wells

This yearly summary report will be transmitted to the EPA by March 31 annually, summarizing the prior year's activities.

5.0 REFERENCES

MWH Americas, Inc. (MWH), 2015. Midnite Mine Superfund Site 100 Percent Basis of Design Report. Prepared on behalf of Newmont USA Limited and Dawn Mining Company for submittal to U.S. Environmental Protection Agency, Region 10. June.

U.S. Environmental Protection Agency (EPA), 2011. Consent Decree Statement of Work for the Remedial Action for the Midnite Mine Superfund Site, Spokane Indian Reservation, Washington. Civil Action No. CV-05-020-JLQ. United States of America, Plaintiff v. Dawn Mining Company, LLC and Newmont USA Limited, Defendants. August.

TABLE 1

WTP INFLUENT PIPELINE - MIDNITE MINE

OPERATION, MAINTENANCE, AND MONITORING SUMMARY

Post-Remedial Monitoring Element	Measurement/Inspection	Activity Frequency	Action Trigger/Unacceptable Condition	Response Action
Routine Inspections	Manhole Damage (During Construction)	Weekly	Signs of damage to manhole. Missing manhole covers.	Corrective action repairs and maintenance will be prioritized following inspections indicating there are problems and scheduled within 3 working days. Manhole repairs then will be completed within 4 working days except if missing manholes are discovered which will be replaced immediately.
	Signs of Pipeline Leaks (During Construction)	Weekly	Signs of saturated soils or settlement of ground surface will be observed based on a visual inspection. [1]	Pumping operations will be discontinued immediately. Corrective action repairs and maintenance will be prioritized following inspections indicating there are problems and scheduled within 3 working days. The repairs then will be completed within 2 working days.
	Leak Detection (During Construction)	Weekly	Presence of water in manhole or visible flow of water out of the containment pipe. Inspection to be performed during pump operations.	See response for pipeline leaks
	Manhole Damage (Post RA Construction)	Semiannually	Signs of excessive erosion around or other damage to manhole. Erosion damage greater than 6 inches in depth along the perimeter. Missing manhole covers.	Corrective action repairs and maintenance will be prioritized following inspections indicating there are problems and scheduled within 30 days. The repairs then will be completed within the field season except if missing manhole covers are discovered which will be replaced immediately.
	Signs of Pipeline Leaks (Post RA Construction)	Semiannually	Signs of saturated soils or settlement of ground surface will be observed based on a visual inspection.	Pumping operations will be discontinued immediately. Corrective action repairs and maintenance will be prioritized following inspections indicating there are problems and scheduled within 30 days. The repairs then will be completed within the field season.
	Leak Detection (Post RA Construction)	Semiannually	Presence of water in manhole or visible flow of water out of the containment pipe. Inspection to be performed during pump operations.	As above in response action for pipeline leaks (Post RA Construction)
Routine Measurements	NONE	NONE	NONE	NONE

Notes:

1. During RA construction when temporary pipelines are uncovered and relocated, the fusion-welded joints along the pipeline length will be visually inspected for cracks or leaks in the outer wall of the containment pipe. This inspection must occur before the pipe is anchored in the new location.

TABLE 2

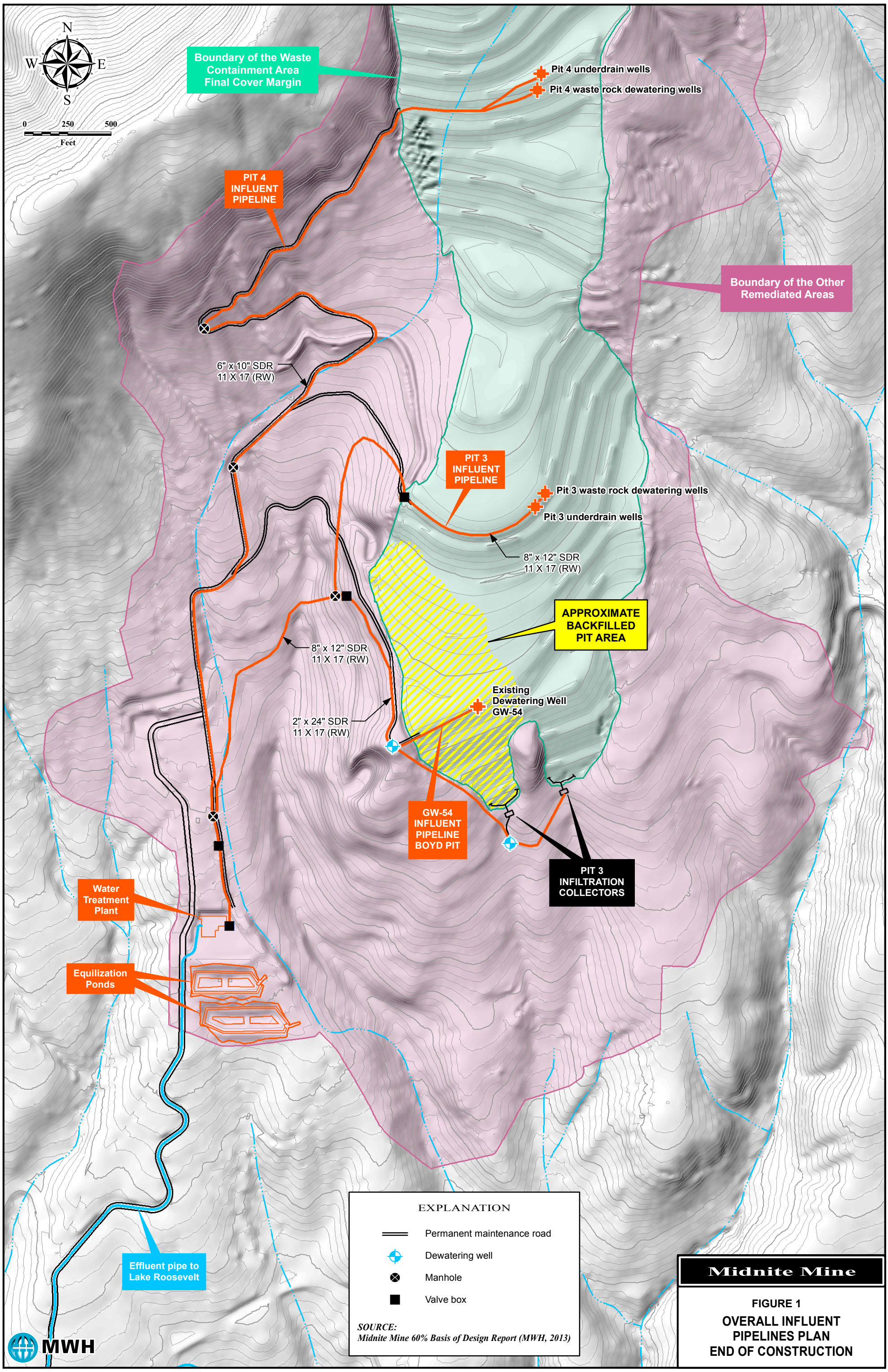
WTP EFFLUENT PIPELINE - MIDNITE MINE

OPERATION, MAINTENANCE, AND MONITORING SUMMARY

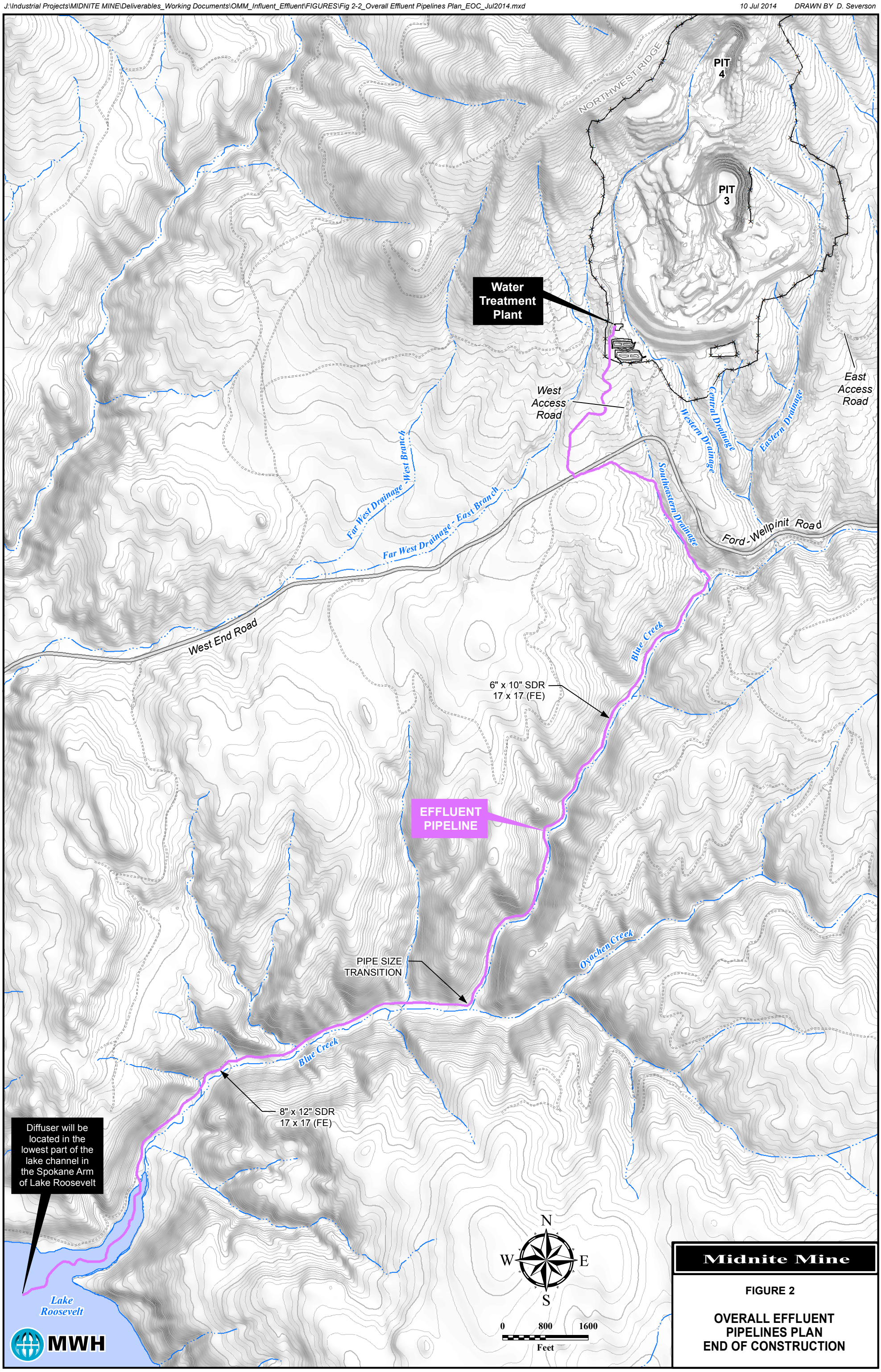
Post-Remedial Monitoring Element	Measurement/Inspection	Activity Frequency	Action Trigger/Unacceptable Condition	Response Action
Routine Inspections	Manhole Damage	Semiannually	Signs of excessive erosion around or other damage to concrete pad. Erosion damage greater than 1 inch in depth along more than 50% of pad perimeter. Missing manhole covers.	Corrective action repairs and maintenance will be prioritized following inspections indicating there are problems and scheduled within 30 days. The repairs then will be completed within the field season.
	Signs of Pipeline Leaks	Semiannually	Signs of saturated soils or settlement of ground surface will be observed based on a visual inspection.	As above in first response
	Observation of Flow	Semiannually	No flow into manhole from upstream pipeline segment.	Corrective action repairs and maintenance will be prioritized following inspections indicating there are problems and scheduled within 10 working days. The repairs then will be completed within 30 working days of discovery.
Routine Measurements	NONE	NONE	NONE	NONE

Notes:

1. During RA construction when temporary pipelines are uncovered and relocated, the fusion-welded joints along the pipeline length will be visually inspected for cracks or leaks in the outer wall of the containment pipe. This inspection must occur before the pipe is anchored in the new location.


N
W
E
S
0
250
500
Feet
Boundary of the Waste Containment Area Final Cover Margin
Pit 4 underdrain wells
Pit 4 waste rock dewatering wells
PIT 4 INFLUENT PIPELINE
Boundary of the Other Remediated Areas
6" x 10" SDR
11 X 17 (RW)
PIT 3 INFLUENT PIPELINE
Pit 3 waste rock dewatering wells
Pit 3 underdrain wells
8" x 12" SDR
11 X 17 (RW)
APPROXIMATE BACKFILLED PIT AREA
8" x 12" SDR
11 X 17 (RW)
Existing Dewatering Well GW-54
2" x 24" SDR
11 X 17 (RW)
GW-54 INFLUENT PIPELINE BOYD PIT
PIT 3 INFILTRATION COLLECTORS
Water Treatment Plant
Equilization Ponds
Effluent pipe to Lake Roosevelt
EXPLANATION
Permanent maintenance road
Dewatering well
Manhole
Valve box
SOURCE:
Midnite Mine 60% Basis of Design Report (MWH, 2013)
MWH
Midnite Mine
FIGURE 1
OVERALL INFLUENT PIPELINES PLAN
END OF CONSTRUCTION

J:\Industrial Projects\MIDNITE MINE\Deliverables_Working Documents\OMM_Influent_Effluent\FIGURES\Fig 2-2_Overall Effluent Pipelines Plan_EOC_Jul2014.mxd 10 Jul 2014 DRAWN BY D. Severson



Midnite Mine

FIGURE 2

OVERALL EFFLUENT PIPELINES PLAN
END OF CONSTRUCTION

Attachment P-9

Routine Inspection and Maintenance for Dewatering, Underdrain, and Alluvial Groundwater Control Systems (Future Construction)

Midnite Mine Superfund Site

100 Percent Design

Attachment P-9 - Underdrain, Waste Rock and BPA Dewatering Systems and Alluvial Groundwater Control Systems – Operation, Maintenance, and Monitoring Plan

Revised October 2015

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LIST OF ACRONYMS

BODR	Basis of Design Report
BPA	backfilled pit area
CD	Consent Decree
DMC	Dawn Mining Company, LLC
DOPM	DMC Operating Procedures Manual
EPA	U.S. Environmental Protection Agency
HDPE	high density polyethylene
ODA	Other Disturbed Area
OM&M	Operation, Maintenance and Monitoring
PCP	Pollution Control Pond
PVC	Polyvinyl chloride
RA	remedial action
ROD	Record of Decision
Site	Midnite Mine Superfund Site
SLCB	slag-cement bentonite
SMP	Site-Wide Monitoring Plan
Tribe	Spokane Tribe of Indians
WTP	water treatment plant

1.0 INTRODUCTION

A variety of groundwater pump back systems will be required to comply with the Consent Decree (CD; EPA, 2011) requirements to contain and treat contaminated water on Midnite Mine Superfund Site (Site) prior to offsite discharge. Three systems will be used to capture groundwater prior to treatment. These systems are:

- Underdrain and Waste rock dewatering pump back systems will be needed for the collection and conveyance of mine-affected water from Pit 3/Pit 4 to the Water Treatment Plant (WTP) during the remedial action (RA) at the Site. During the RA construction, one underdrain pump back system consisting of two side-by-side wells and one waste rock dewatering pump back system consisting of two side-by side wells will be constructed and operated in both Pit 3 and Pit 4.
- One existing extraction well installed within the Boyd Pit waste rock (GW-54) will be used to dewater the Backfilled Pit Area (BPA) and a redundant well will be installed as a backup in case of maintenance issues with GW-54.
- In addition, an alluvial groundwater controls system consisting of a collection trench and a downgradient low permeability barrier wall will be installed in each of the drainages at the Site (i.e., the Western, Central, and Eastern Drainages). This alluvial groundwater collection system is intended to intercept impacted groundwater in the alluvial and shallow extremely-weathered bedrock and convey it for treatment to the WTP.

These systems will be operated during both the RA construction period and into the long-term operations and monitoring period following completion of the RA construction. This plan presents the operation, maintenance, and monitoring (OM&M) activities for the waste rock dewatering and underdrain pump back systems, as well as the alluvial groundwater control systems in each of the drainages that will be constructed during the RA. The locations of these systems are shown in Figure 1.

As currently planned, implementation of the Selected Remedy will be conducted in three distinct phases with individual components of the overall remedy completed during each phase. As a result, Waste Rock Dewatering and Underdrain System OM&M activities will be necessary from the time waste placement in Pit 4 is initiated during Phase 1, through the start of Pit 3 dewatering in Phase 2 as the backfilling of waste begins, and into the post-remedy monitoring

period. Alluvial groundwater control system OM&M activities will begin in Phase 1 and continue into the post-construction monitoring period.

This Waste Rock Dewatering, Underdrain, and Alluvial Groundwater Control Systems OM&M Plan is an attachment to the *Midnite Mine Superfund Site Operation, Maintenance, and Monitoring Plan*, which describes the OM&M for all of the components of the Selected Remedy, which will require monitoring and maintenance.

1.1 PURPOSE, SCOPE, AND OBJECTIVES

This Waste Rock and BPA Dewatering, Underdrain, and Alluvial Groundwater Controls System OM&M Plan describes the inspection, maintenance and monitoring activities, and to establish frequencies for this work. The primary objectives of this plan are to:

- Monitor and maintain the waste rock dewatering and underdrain systems relative to specific design criteria (i.e., upper and lower water elevations) using water-level monitoring equipment.
- Monitor and maintain the Boyd Pit extraction well (GW-54) relative to specific design criteria (i.e., upper and lower water elevations) using water-level monitoring equipment.
- Monitor and maintain the alluvial groundwater control systems relative to specific design criteria (i.e., upper and lower water elevations) using water-level monitoring equipment.
- Monitor and maintain submersible pumps installed in all of these systems.

To meet these objectives, this Waste Rock Dewatering, Underdrain, and Alluvial Groundwater Controls OM&M Plan includes the following:

- Identification of the system components that require routine inspection, monitoring, and maintenance
- Documentation of procedures for inspection and maintenance of these components
- Listing of reporting requirements

Performance monitoring requirements for monitoring wells associated with these systems is presented in the Site-wide Monitoring Plan (SMP) which is attached to the Midnite Mine 100 Percent Basis of Design Report (MWH, 2015).

2.0 DESIGN AND OPERATION OF THE PIT UNDERDRAIN, WASTE ROCK AND BPA DEWATERING SYSTEM AND THE ALLUVIAL GROUNDWATER CONTROLS SYSTEM

This section of the Waste Rock Dewatering, Underdrain, and Alluvial Groundwater Controls OM&M Plan provides a description of the individual dewatering systems to be constructed during the RA.

2.1 WASTE ROCK DEWATERING AND UNDERDRAIN SYSTEMS

Currently, impacted water is stored in Pit 3 and Pit 4 prior to treatment at the existing WTP. Over the course of the RA, these pits will be backfilled, and groundwater that enters the underdrain and meteoric water that falls on the backfilled waste before it is capped will be collected and conveyed to the WTP. The design and materials of construction for the Pit 3 and Pit 4 waste rock dewatering and underdrain systems are identical and details are present below.

Pit 3 and Pit 4 will have two similar systems for capture and pump back of mine affected water. The lower system is referred to as the underdrain dewatering system and the upper system is referred to as the sub-waste rock dewatering system. To the extent practicable, water will be kept from accumulating in Pit 3 and Pit 4 during and after consolidation of waste within the pit.

2.1.1 Lower Underdrain Dewatering System

Following removal of the sediment from each of the pits during the RA, bedrock will be excavated using heavy equipment, blasting, or other mean necessary, to create a discrete approximately 20 foot by 20 foot (square) by 20 foot (deep) sump. Sumps in both pits contain two vertical risers that will be installed for the removal of groundwater. This lower underdrain dewatering system's purpose is to collect groundwater before it contacts the overlying reactive mine waste backfill in the pits.

Groundwater accumulating in the underdrain sump will be isolated between high and low water levels which effectively confines the water removal to the excavated sump itself and keeps the overlying drain gravel drained. Water collecting in these sumps will be conveyed by pumping through the vertical risers which penetrate the cover system and is piped the WTP for treatment. The underdrain sump risers will be constructed from stainless-steel well casing, which during construction will be incrementally extended and remain above the backfill surface as waste is being placed in both Pit 4 and Pit 3. Stainless steel well casing will be used for the dewatering risers because of its superior strength, which will allow it to withstand anticipated loadings from

the waste backfill (relative to other corrosion resistant pipe materials such as PVC and HDPE piping). In addition, the stainless steel specified will be much less susceptible to corrosion relative to other high-strength pipe materials.

Because this lower dewatering zone has to convey groundwater inflows effectively, it will be constructed from coarse, non-reactive, highly conductive rock in the excavated sump and similarly permeable gravel overlying the sump drain rock. These materials will be crushed and screened to the specified size from the Hillside Waste Rock Pile. The drain gravel will be placed in the bottom of each pit to depth which varies depending on the pit geometries. The underdrain sump dewatering system design is shown on Drawings 4-12/4-81 (Pit 4) and Drawings 4-37/4-39 (Pit 3).

2.1.2 Upper Waste Rock Dewatering System

A geomembrane liner (i.e., a sub-waste liner) will be placed on the surface of the underdrain drain rock/gravel to isolate this lower underdrain system from seepage and sediment transport through the overlying waste rock. Any meteoric water collecting on the geomembrane will be conveyed by pumping from a sump in the sub-waste liner through a vertical riser (a waste rock dewatering well) to piping that delivers the water to the WTP for treatment. The waste rock dewatering risers will be constructed from materials and maintained during construction similar to the vertical risers used for the underdrain dewatering system discussed above. The configuration of the Pit 3 and 4 underdrain and sub-waste liner dewatering systems are shown Drawings 4-13 thru 4-15 (Pit 4) and 4-40 thru 4-41 (Pit 3).

The underdrain and waste rock liner sumps will be dewatered using submersible pumps installed within the backfilled sump. The well-discharge pipes for both the underdrain and sub-waste liner systems will be extended in coordination with the extension of well casings so as to remain above the backfill surface as waste is being placed in Pit 4 and Pit 3. Duplicate dewatering risers, including pumps and piping, will be installed to avoid shutdowns in the dewatering system due to maintenance or mechanical failure during the RA and long-term operations and monitoring period. Therefore, in each of the backfilled pits there will be two wells installed in the underdrain position (the sumps) and two wells installed above the sub-waste liner.

2.1.3 Underdrain Down Time

Concern has been raised about the time period that the underdrain system can be off-line before water entering the backfilled pits fills the drain rock and encounters the overlaying waste

rock. Several considerations are important when discussing the length of time that is necessary to correct a problem encountered in the lower underdrain dewatering system, including complete failure of the pumping system (the maintenance response time). The lower dewatering systems in both Pit 3 and 4 maintain the groundwater level in the excavated sump at a minimum of 20 feet beneath the subwaste liner and overlying waste rock.

First, there is a redundant pump and vertical dewatering well in the underdrain dewatering sumps in both pits. So it is highly unlikely that both pumps and their sumps would fail at the same time. Secondly, if both wells fail in one of the underdrain systems, then the overlying drain gravel will have to be saturated before the backfilled waste rock would be encountered. The existing pits effectively create a bathtub to contain the rising groundwater. The Table 1 shows the storage capacity (gallons) in each pit and the assumed porosity, the groundwater inflow rate, and the length of time that would be necessary to fill this space.

Table 1 – Estimated Time Period to Flood Drain Rock

Pit Name	Porosity	Storage Capacity (gallons) approximate	Groundwater Inflow Rate (Gallons/min)	Time to Flood Waste Rock (days) approximate
Pit 4	30%	1,100,000	13.1	58
Pit 3	30%	370,000	17.5	15

2.2 BPA DEWATERING SYSTEM

Initially, two existing dewatering wells located in the BPA will be used to remove water from the BPA. Water levels maintained by the BPA dewatering system will be maintained at a level that minimizes hydraulic head in the BPA while also minimizing the potential for scaling and fouling of the dewatering system. The locations of these existing wells are shown on Drawing 4-9. These existing wells are located in the two main pits in the BPA complex: 1) GW-54 is located in the Boyd Pit and 2) GW-58 is located in Pit 2 West.

A BPA dewatering test program was completed to determine effectiveness of these two wells and to provide design information for a system of dewatering wells intended for long-term dewatering. This test program was conducted in accordance with the approved *Backfilled Pits Area Pumping Plan* (WME, 2013). The objectives of the testing program were to evaluate:

- The operating condition of existing wells and equipment in Pit 2 and the Boyd Pit for use in initial dewatering of the BPA.
- The effects of varying water levels and pumping schemes on groundwater water levels within the waste rock backfill and surrounding bedrock to provide optimal water levels and dewatering well configurations for long-term dewatering of the BPA.

As indicated in the Work Plan, now that BPA dewatering has commenced, it will be continued throughout the design process, the RA construction, and after construction.

Based on preliminary results from the dewatering test program, BPA well GW-54 located in the Boyd Pit appears to provide the necessary hydraulic performance to dewater the entire BPA. Therefore, the BPA dewatering system will consist of a single groundwater extraction well, GW-54, located in the waste rock contained in the backfilled Boyd Pit. Over time, additional wells may be installed to provide redundancy to the dewatering system and allow for continued operation in the event of a well failure, similar to what is proposed for the Pit 3 and Pit 4 dewatering system. However, it is possible that when the cover is installed over the BPA, the groundwater influx to the BPA may be reduced to insignificant amounts because the source of water to the BPA has been cut off, and pumping could be discontinued or greatly reduced. In any case, water removed from the BPA by this well will be conveyed to the storage ponds (Pit 3, South Pond, West Pond, or WTP Pond) depending on the phase of RA construction at the time of removal followed by treatment at the WTP.

2.3 ALLUVIAL GROUNDWATER CONTROLS

Groundwater in the alluvium in the Western, Central, and Eastern Drainages has been identified as exceeding concentrations listed in Table 8-2 of the Record of Decision (ROD) (EPA, 2006). Alluvial pump back systems have been installed and currently are operating in these drainages as part of interim improvements to the water management system. The alluvial groundwater controls described in this OM&M Plan will replace those systems and will be located farther downstream in the Western, Central, and Far East Drainages as shown on Drawings 7-1 and 7-9.

The alluvial groundwater control system in each of these drainages will consist of an extraction trench installed immediately upslope of a low-permeability barrier wall. The extraction trench will be excavated through the alluvium, residual soils and extremely-weathered bedrock to the point of hydraulic excavator refusal in competent bedrock downgradient of the Mine Area. The low-permeability barrier wall will be installed, also to depths corresponding to excavator refusal

in competent bedrock immediately downgradient of the extraction trench to increase capture efficiency.

The extraction trenches will be backfilled from the trench bottoms to the elevation of a level working platform with drain sand. Groundwater in the trench will be collected in slotted drain pipe installed near the bottom of the trench as shown on Drawings 7-5, 7-8, and 7-11. A vertical riser will be connected to the drain pipe near the low-point of the extraction trench. Groundwater will be extracted from the trenches by pumping intermittently via submersible pumps and discharge pipes installed in each of the pump risers. Initially, groundwater from the extraction trenches will be conveyed to the Pollution Control Pond (PCP), and from there it will be conveyed to the storage ponds and WTP. Once the PCP is decommissioned (in Phase 3), groundwater will be conveyed directly to the WTP Equalization Pond.

Low-permeability barrier walls will be constructed immediately downgradient of the extraction trenches, as shown on Drawings 7-3, 7-6, and 7-10, in order to increase the capture efficiency of the these trenches. The barrier wall will be excavated from a working platform through the underlying alluvium and weathered bedrock materials to a depth where practical excavator refusal is reached. The excavations will be continued into either valley wall as shown on the Drawings 7-4, 7-7, and 7-11 to the point where the working platform contact with the valley wall is reached. Although it is anticipated that the barrier walls will be constructed as slag-cement bentonite (SLCB) slurry walls, it is possible that other methods (such as soil mixing) may be used. Upon completion of the barrier wall, the wall will be allowed to harden to the point where it will not be damaged by backfilling and then covered with a minimum of 2 feet of soil to prevent damage due to desiccation or erosion. The ground surface in the work area then will be restored to its original contours, and areas of disturbance revegetated with native seed mix in accordance with project requirements.

3.0 UNDERDRAIN, WASTE ROCK, AND BPA DEWATERING SYSTEMS, AND ALLUVIAL GROUNDWATER CONTROL SYSTEM - OPERATION, MAINTENANCE AND MONITORING

Underdrain and Waste Rock Dewatering Systems and Alluvial Groundwater Control System OM&M will be performed from the time of Pit 4 backfilling is commenced (in Phase 1) and into long-term operation and monitoring. Observation and documentation through inspection reports will enable prompt repair scheduling and execution of pond repair or maintenance. The

monitoring plan, including the individual monitoring tasks, schedule, monitoring criteria, and maintenance, is discussed below.

Access to the general vicinity of these facilities will be via the existing site roads and later by the permanent access roads. In those cases where the facilities are not immediately adjacent to the existing site or permanent access roads, final access will be via foot.

3.1 UNDERDRAIN, WASTE ROCK, AND BPA DEWATERING SYSTEM OPERATION

Groundwater from the Pit 3/Pit 4 underdrain and waste rock dewatering systems as well as groundwater from the BPA dewatering system will be transferred to storage ponds or the WTP via pumps and conveyed initially by temporary influent pipelines. At the conclusion of RA construction, the water will be conveyed via permanent influent pipelines to the new WTP. Details regarding the OM&M of these pipelines are presented in the *WTP Influent and Effluent Pipelines OM&M Plan* (MWH, 2015) which is included as an attachment to the *Midnite Mine Superfund Site Operation, Maintenance, and Monitoring Plan*.

Operation of the underdrain, waste rock, and BPA dewatering systems will be performed in accordance with a new DMC Operating Procedures Manual (DOPM) that will be prepared prior to the initiation of Phase 1 of the RA.

3.2 ALLUVIAL GROUNDWATER CONTROL SYSTEM OPERATION

Water from the alluvial groundwater control pump back systems will initially be conveyed to the PCP, and from there it will be conveyed to the storage ponds and WTP. Once the PCP is decommissioned (in Phase 3), groundwater will be conveyed directly to the WTP Equalization Pond.

Operation of the alluvial groundwater control pump back systems will be performed in accordance with a new DOPM that will be prepared prior to the initiation of Phase 1 of the RA.

3.3 UNDERDRAIN, WASTE ROCK, AND BPA DEWATERING SYSTEMS - INSPECTION AND MONITORING

The monitoring requirements for the Pit 3/Pit 4 waste rock dewatering, underdrain pump back, and BPA dewatering pump back systems are summarized in Table 2. Vehicular access along existing site roads and later along permanent access roads will allow observation of these

systems. The Pit 3/Pit 4 underdrain and waste rock dewatering systems and BPA dewatering system will be subjected to the following inspections and monitoring requirements:

1) Routine Inspection:

    a. Waste Rock Underdrain / Dewatering Vaults – the surface completions will be inspected for damage.

    b. BPA Dewatering Wells – the surface completion will be inspected for damage.

    c. Pumps – the submersible pumps will be periodically inspected for signs of wear

    d. Water Level Monitoring Equipment – Equipment used for monitoring of water levels in the waste rock dewatering and underdrain extraction risers will be checked for proper operation. Operations checks will include manual water level measurements to confirm proper operation of installed water level transducers.

2) Routine Measurements:

    a. Survey elevation of Waste Rock Underdrain / Dewatering Vaults

    a. Water Level Monitoring

    b. Flow Rates to individual extraction pumps.

The monitoring frequency and unacceptable conditions (action triggers) for each of these monitoring metrics are summarized in Table 2 along with the associated (maintenance) response action. Please note that because there are redundant vertical risers in both the underdrain and the waste rock sumps the urgency of repairs is not as stringent as some of the other designed elements which require monitoring and maintenance or repairs. Also refer to Table 1 that summarizes the worst case scenario in the Pits 3 and 4 underdrain system when it is assumed that both the primary dewatering well and its backup are down for repair.

3.4 ALLUVIAL GROUNDWATER CONTROL SYSTEM - INSPECTION AND MONITORING

The monitoring requirements for the alluvial groundwater control pump back systems are summarized in Table 3. The alluvial groundwater control pump back systems will be subjected to the following inspections and monitoring requirements:

3) Routine Inspection:

    c. Pump Vaults – the surface completions will be inspected for damage.

d. Pumps – the submersible pumps will be periodically inspected for signs of wear

e. Water Level Monitoring Equipment – Equipment used for monitoring of water levels in the alluvial groundwater control extraction risers will be checked for proper operation. Operations checks will include manual water level measurements to confirm proper operation of installed water level transducers.

f. Surface vegetation. This inspection is to observe and document the establishment of vegetation on the disturbed areas that will require revegetation. This inspection to include noxious weed surveys.

4) Routine Measurements:

a. Vegetation Survey

b. Water Level Monitoring

c. Flow Rates to individual extraction pumps.

The monitoring frequency and unacceptable conditions (action triggers) for each of these monitoring metrics are summarized in Table 3 along with the associated (maintenance) response action.

3.5 MAINTENANCE OF UNDERDRAIN,WASTE ROCK, AND BPA DEWATERING SYSTEM

The purpose of the maintenance procedures for the underdrain and waste rock dewatering systems (including the BPA dewatering system) is to ensure that these systems perform as designed and that maintenance activities ensure their long-term integrity and viability. This is accomplished by ensuring the materials and maintenance practices are consistent with the final design and specifications. Below the maintenance activities for the underdrain and waste rock dewatering systems are presented.

3.5.1 Pumps

Depending on water chemistry, submersible pumps can be susceptible to fouling. In addition, pump components are susceptible to normal wear and tear during operation. Maintenance of the submersible pumps will be conducted in accordance with manufacturer's recommendations.

3.5.2 Water Level Monitoring Equipment

Pressure transducers in the waste rock dewatering risers will be checked periodically for proper operation in accordance with manufacturer's recommendations.

3.6 MAINTENANCE OF ALLUVIAL GROUNDWATER CONTROL SYSTEMS

The purpose of the maintenance procedures for the alluvial groundwater control systems is to ensure that these facilities perform as designed and that maintenance activities ensure their long-term integrity and viability. This is accomplished by ensuring the materials and maintenance practices are consistent with the final design and specifications. Below the maintenance activities for the alluvial groundwater control systems are presented.

3.6.1 Pumps

Depending on water chemistry, submersible pumps can be susceptible to fouling. In addition, pump components are susceptible to normal wear and tear during operation. Maintenance of the submersible pumps will be conducted in accordance with manufacturer's recommendations.

3.6.2 Water Level Monitoring Equipment

Pressure transducers in the alluvial groundwater extraction risers will be checked periodically for proper operation in accordance with manufacturer's recommendations.

3.6.3 Vegetation Maintenance

Revegetated areas may require maintenance to ensure success criteria are met and maintained for percent cover and plant density as identified on Table 3. Initial revegetation of the disturbed areas surrounding the individual alluvial groundwater control systems is described in the *Revegetation Plan* attached to Appendix D of the Basis of Design Report (BODR; MWH, 2015). In the event that noxious weeds become established in revegetated areas, control practices will be implemented.

Chronically poor plant growth may signal a need for fertilization or amendments to improve soil conditions. In the event of vegetative die-off or stress, the soils will be evaluated and treated to revitalize vegetation. If necessary, a plan for the application of such nutrients or soil amendments will be submitted for approval to EPA and the Tribe.

4.0 RECORD KEEPING AND REPORTING

4.1 GENERAL

Documentation of Waste Rock Dewatering, Underdrain, and Alluvial Groundwater Control System OM&M activities will be completed and retained pursuant to the requirements of the CD (EPA, 2011).

4.2 REPORTING

In accordance with the *Midnite Mine Superfund Site Operation, Maintenance, and Monitoring Plan,* to which this plan is attached, an annual summary report of the monitoring and maintenance activities will be prepared pursuant to all Site OM&M activities related to:

- Cover System and other disturbed areas (ODAs) Inspection and Maintenance
- Midnite Water Treatment Plant
- Fence Inspection and Maintenance
- Site Access Roads and Culverts
- Surface Water Diversions
- Alluvial Groundwater Controls
- Ponds and Tanks
- WTP Influent and Effluent Pipelines
- Pit Area Dewatering and Underdrain Wells

This yearly summary report will be transmitted to the EPA by March 31 annually, summarizing the prior year's activities.

5.0 REFERENCES

MWH Americas, Inc. (MWH), 2015. Midnite Mine Superfund Site 100 Percent Basis of Design Report. Prepared on behalf of Newmont USA Limited and Dawn Mining Company for submittal to U.S. Environmental Protection Agency, Region 10. June.

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U.S. Environmental Protection Agency (EPA), 2011. Consent Decree Statement of Work for the Remedial Action for the Midnite Mine Superfund Site, Spokane Indian Reservation, Washington. Civil Action No. CV-05-020-JLQ. United States of America, Plaintiff v. Dawn Mining Company, LLC and Newmont USA Limited, Defendants. August.

Worthington Miller Environmental (WME), 2013. Technical Memorandum – Backfilled Pits Area Pumping Plan Midnite Mine, Revision 3. Prepared for U.S. EPA Region 10. May 17.

TABLES

TABLE 2
PIT 3/PIT 4 UNDERDRAIN, WASTE ROCK DEWATERING AND BPA DEWATERING SYSTEMS - MIDNITE MINE
OPERATION, MAINTENANCE, AND MONITORING SUMMARY

Post-Remedial Monitoring Element[1]	Measurement/Inspection	Activity Frequency	Action Trigger/Unacceptable Condition	Response Action
Routine Inspections	Water Level Monitoring Equipment. Manual measurement of water level.	Monthly	Transducers fail to record data or transducer is out of calibration based on manual water level measurement.	Repairs / maintenance will be prioritize, scheduled and completed within 30 days. Maintenance and repair activities will be in accordance with manufacturer's recommendations.
	Pumps	Quarterly	Change in discharge flowrates, increase in pump discharge pressures, changes in electrical draws outside of manufacturer listed ranges.	Repairs / maintenance will be prioritize and scheduled within 30 days then completed within 30 days. Maintenance and repair activities will be in accordance with manufacturer's recommendations. Evaluations may include video logging of individual risers to determine if well screen has become plugged.
	Surface Completions (Vaults for Pit3/Pit 4 system; Aboveground Wellhead Completions for BPA)	Quarterly	Damage to surface completions or components	Repairs / maintenance will be prioritize and scheduled within 30 days then completed within the field season.
RoutineMeasurements	Flow Rate from Individual Underdrain or Waste Rock Dewatering Pumps	Monthly	Significant decrease in flow rate from previous monitoring period.	Engineering evaluation and determine corrective action on case-by-case basis based on results of engineering evaluation.
	Survey of Surface Completions	Quarterly for first 5 years, annually thereafter.	The deformation analyses indicate that long-term settlements of 0.01(1.5%) of the mine waste fill height can be expected. Based on this estimate, the Action Trigger/Unacceptable condition for settlement at each settlement monitoring location will vary. Upon completion of construction, the acceptable settlement will be calculated based on the as-built waste thickness at the settlement point location for a maximum vertical strain of 1.5%.	Engineering evaluation and determine corrective action on case-by-case basis based on results of engineering evaluation.
	Water Level Monitoring	Monthly	Water level outside acceptable operating range	Engineering evaluation and determine corrective action on case-by-case basis based on results of engineering evaluation.

Notes:
[1] This list of monitoring and maintenance elements apply to Pit 3 and Pit 4 underdrain and waste rock dewatering risers and BPA dewatering well GW-54.

TABLE 3
ALLUVIAL GROUNDWATER CONTROL SYSTEMS - MIDNITE MINE
OPERATION, MAINTENANCE, AND MONITORING SUMMARY

Post-Remedial Monitoring Element[1]	Measurement/Inspection	Activity Frequency	Action Trigger/Unacceptable Condition	Response Action
Routine Inspections	Water Level Monitoring Equipment. Manual measurement of water level.	Monthly	Transducers fail to record data or transducer is out of calibration based on manual water level measurement.	Repairs / maintenance will be prioritize, scheduled and completed within 30 days. Maintenance and repair activities will be in accordance with manufacturer's recommendations.
	Pumps	Quarterly	Change in discharge flowrates, increase in pump discharge pressures, changes in electrical draws outside of manufacturer listed ranges.	Repairs / maintenance will be prioritize, scheduled and completed within 30 days. Maintenance and repair activities will be in accordance with manufacturer's recommendations. Evaluations may include video logging of individual risers to determine if well screen has become plugged.
	Surface Completions (Vault)	Quarterly	Damage to surface completions or components	Repairs / maintenance will be prioritize and scheduled within 30 days then completed within the field season.
	Vegetation	Surface vegetation monitoring will be performed during each growing season (annually) until revegetation success criteria are met at this point monitoring will be discontinued. [2]	Signs of vegetation success and failure will be observed based on a visual inspection.	Review below under routine measurements - vegetation survey
RoutineMeasurements	Flow Rate from Individual Alluvial GW Control Risers	Monthly	Significant decrease in flow rate from previous monitoring period.	Engineering evaluation and determine corrective action on case-by-case basis based on results of engineering evaluation.
	Water Level Monitoring	Monthly	Water levels in downgradient monitoring wells not indicating inward gradient or decreasing water levels.	Engineering evaluation and determine corrective action (i.e. permeation grouting) on case-by-case basis based on results of engineering evaluation.
	Vegetation Survey	Surface vegetation monitoring will be performed during each growing season (annually) until revegetation success criteria are met at this point monitoring will be discontinued. [2]	Revegetation success criteria will be established following the 2014 HEP survey of the Rhoads Property and will include criteria for percent cover and woody plant density.	Areas of non-compliance will be assessed then as necessary retreat and/or reseed in the fall.

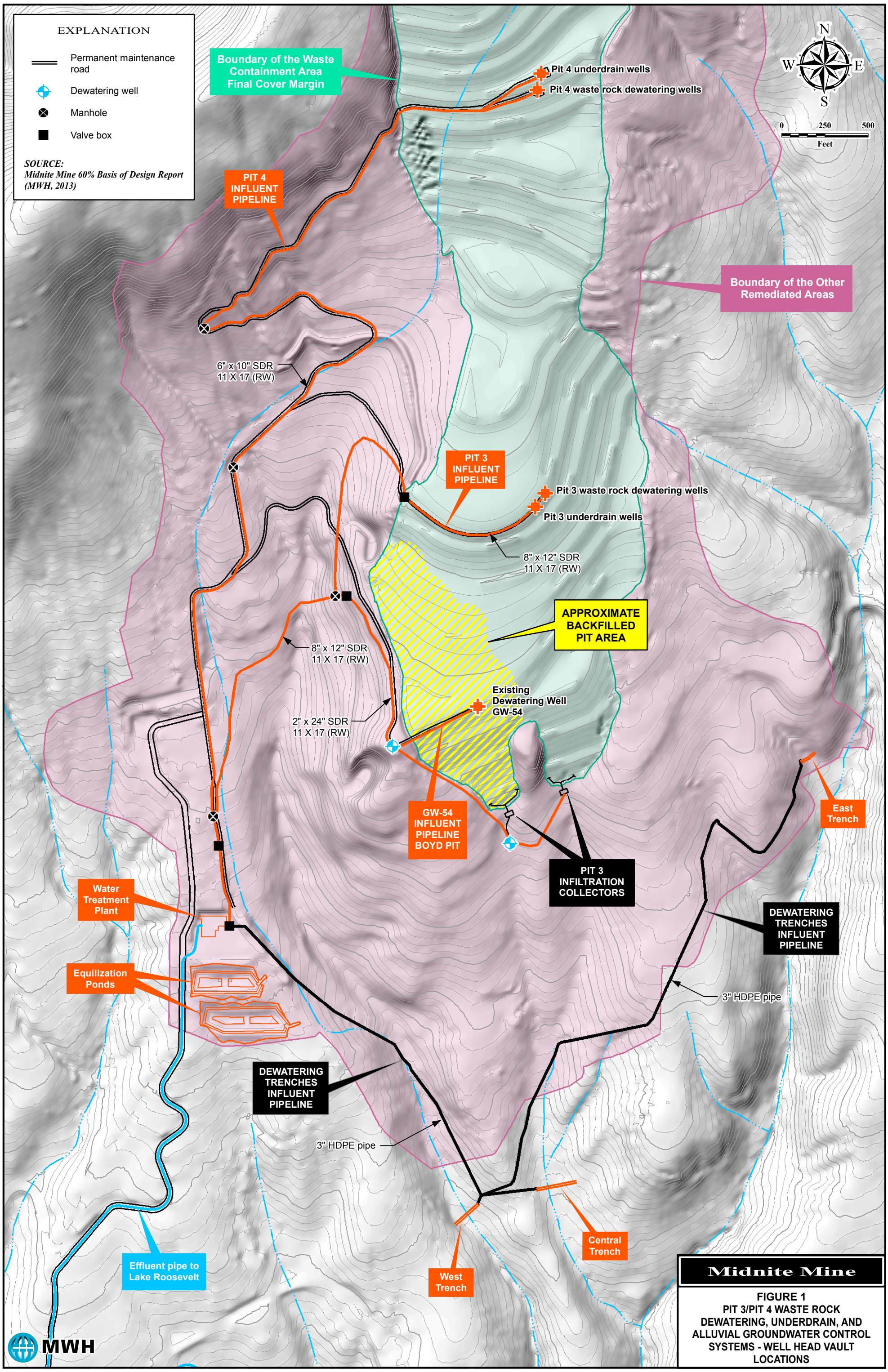
Notes:

[1] This list of monitoring and maintenance elements apply to the alluvial dewatering trenches (groundwater controls) in the East, Central and West drainages.

[2] The surveys will include identification of bare ground areas, which will be defined as areas greater than 250 ft2 containing less than 20% live cover and areas containing signs of uncontrolled erosion (e.g., rills and gullies, accumulations of sediment or debris).

Bare ground areas exhibiting less than 20% live vegetative cover for two successive seasons will be re-assessed for nutrients and other conditions that could cause vegetation failure. Pending the assessment results, the affected areas will be retreated and reseeded.

FIGURES


EXPLANATION
Permanent maintenance road
Dewatering well
Manhole
Valve box
SOURCE:
Midnite Mine 60% Basis of Design Report (MWH, 2013)
Boundary of the Waste Containment Area Final Cover Margin
Pit 4 underdrain wells
Pit 4 waste rock dewatering wells
N
W
E
S
0
250
500
Feet
PIT 4 INFLUENT PIPELINE
Boundary of the Other Remediated Areas
6" x 10" SDR
11 X 17 (RW)
PIT 3 INFLUENT PIPELINE
Pit 3 waste rock dewatering wells
Pit 3 underdrain wells
8" x 12" SDR
11 X 17 (RW)
APPROXIMATE BACKFILLED PIT AREA
8" x 12" SDR
11 X 17 (RW)
Existing Dewatering Well GW-54
2" x 24" SDR
11 X 17 (RW)
GW-54 INFLUENT PIPELINE BOYD PIT
PIT 3 INFILTRATION COLLECTORS
East Trench
Water Treatment Plant
DEWATERING TRENCHES INFLUENT PIPELINE
Equilization Ponds
3" HDPE pipe
DEWATERING TRENCHES INFLUENT PIPELINE
3" HDPE pipe
Central Trench
West Trench
Effluent pipe to Lake Roosevelt
MWH
Midnite Mine
FIGURE 1
PIT 3/PIT 4 WASTE ROCK DEWATERING, UNDERDRAIN, AND ALLUVIAL GROUNDWATER CONTROL SYSTEMS - WELL HEAD VAULT LOCATIONS

Attachment P-10

Routine Inspection and Maintenance of Cover Systems (Future Construction)

Midnite Mine Superfund Site
100 Percent Design

Attachment P10 – Cover System and Other Disturbed Areas – Operation, Maintenance, and Monitoring Plan

Revised October 2015

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FIGURE

Figure 1 WCA Settlement Monitoring Point Locations

LIST OF ACRONYMS/ABBREVIATIONS

BODR	Basis of Design Report
BPA	backfilled pit area
EPA	U.S. Environmental Protection Agency
GDL	geocomposite drainage layer
LLDPE	linear low-density polyethylene
ODA	other disturbed area
OM&M	Operation, Maintenance and Monitoring
RA	remedial action
Site	Midnite Mine Superfund Site
Tribe	Spokane Tribe of Indians
WCA	waste containment area
WTP	water treatment plant

P1.0 INTRODUCTION

The Waste Containment Area (WCA) will be backfilled and capped as described in the Remedial Design for the Midnite Mine Superfund Site (Site). The areas adjacent to the WCA, known as other disturbed areas (ODAs), contain the mine wastes or contaminated soils that will be removed as part of the Selected Remedy and backfilled into the WCA. The ODAs will be reclaimed concurrently with final cover system construction in the WCA. Because these areas will have similar monitoring and maintenance activities following their construction, they both have been included in this plan. This plan then presents the operation, maintenance and monitoring (OM&M) activities for the WCA cover system that will be constructed and the associated ODAs that will be remediated and revegetated during the remedial action at the Site.

As currently planned, implementation of the Selected Remedy will be conducted in three distinct phases with individual components of the overall remedy completed during each phase. As a result, the Cover System and OM&M activities will be necessary from the time the WCA cover is installed on Pit 4 during Phase 1, through final installation of the Pit 3 cover system at the end of Phase 3, and into the post-remedy monitoring period. OM&M activities for other remedial elements that are under construction will be conducted in accordance with the *Remedial Action Site Wide Monitoring Plan* in *Appendix Q of the Basis of Design Report* (BODR; MWH, 2015).

This Cover System and ODAs OM&M Plan is an attachment to the *Midnite Mine Superfund Site Operation, Maintenance, and Monitoring Plan*, which describes the OM&M for all of the components of the Selected Remedy, which will require monitoring and maintenance.

P1.1 PURPOSE, SCOPE, AND OBJECTIVES

The purpose of this Cover System and ODAs OM&M Plan is to describe the inspection, maintenance and monitoring activities, and to establish frequencies for this work. The primary objectives of this plan are to:

- Monitor and maintain cover system relative to erosion
- Monitor and maintain cover system relative to veneer stability
- Monitor and maintain cover system to ensure vegetation success
- Monitor and maintain the cover system area stormwater diversion and runoff structures
- Monitor and maintain the cover system engineering controls

To meet these objectives, this Cover System OM&M Plan includes the following:

- Identification of the WCA Cover System and other disturbed areas that require inspection, monitoring, and maintenance
- Documentation of procedures for inspection and maintenance of these areas
- Listing of reporting requirements

P2.0 DESCRIPTION OF WCA COVER AND DISTURBED AREAS RECLAMATION

This section of the Cover System OM&M Plan provides a description of the various Site areas that will be disturbed during remedial action (RA) construction and require cover systems and/or revegetation. The various disturbance area locations discussed in this section are shown on Figure 1.

P2.1 WASTE CONTAINMENT AREA COVER SYSTEM

The WCA includes the areas where Site mine wastes will be or have been placed in Pits 3 and 4, the Backfilled Pit Area (BPA), and Area 5 as described in the BODR (MWH, 2015). A continuous surface cover will be constructed over the WCA as depicted on Figure 1. The cover will be revegetated to physically stabilize the surface cover. The proposed cover system in the WCA will consist of the following components:

1) Soil cover, with a total design soil-cover thickness of 3 feet comprising 2.5 feet of cover soil and 0.5 feet of topsoil or growth media.
2) Geomembrane layer consisting of a 40-mil (1.0 millimeter) thickness linear low-density polyethylene (LLDPE) with a textured top surface to be placed over mine waste surface and under the soil cover.
3) Geocomposite drainage layer (GDL) in areas where mine waste are sloped steeper than a 15 percent grade. The GDL will be installed between the soil and geomembrane layers to reduce potential pore water build up in the slope to enhance slope stability.

P2.2 OTHER DISTURBED AREAS

The ODAs at the Site are those areas adjacent to the WCA that either require revegetation where mine wastes (including contaminated soils) are excavated for WCA consolidation or areas where construction activities will result in removal of surface vegetation. The ODAs are

shown on Figure 1. These ODAs will be revegetated as described in the following paragraphs in an effort to return the Site to a condition that supports historic land uses. The Site ODAs have been categorized based upon topography and include: flat-lying areas (sloped at 3:1 horizontal to vertical [h:v] or flatter) and steeper areas (steeper than 3h:1v). Other ODAs requiring revegetation include the existing East and West haul roads and other existing Site roads that will be removed as part of the RA.

Mine waste in these ODAs will be excavated and transported to the WCA. Contaminated soil will be removed to a depth where either soil cleanup criteria are met or bedrock is encountered in the excavation, at which point excavation will be terminated. In order to support revegetation, a one-foot thick soil layer will be placed over ODAs where slopes are flatter than 2h:1v or where ODA waste cleanup results in excavations that expose bedrock on slope areas flatter than 2h:1v.

P2.2.1 Flat-Lying Areas

Relatively flat-lying areas will be revegetated in a similar manner regardless of whether cleanup excavations are terminated in native soil or bedrock, except for site preparation prior to seeding and planting. Areas excavated to bedrock will be ripped to a depth of 18 inches prior to placement of the one-foot surface soil layer. The soil layer will be scarified to a 12-inch depth to reduce equipment compaction and disked to a six inch depth as a final seedbed treatment prior to seeding and planting.

Areas where native soil remains after waste cleanup will be scarified to a 12- to 18-inch depth and then disked to a 6-inch depth as a final seedbed treatment prior to seeding and planting. Seeding of grasses and forbs in flat-lying areas will be by hydroseeding and hydromulching. Shrubs and trees will be planted as seedlings one year after seeding of grasses and forbs.

P2.2.2 Steeper Disturbed Areas

There are two types of steep ODAs that will require revegetation and long-term monitoring. The first are steep areas (steeper than 3h:1v, but flatter than 2h:1v) where either native soil or exposed bedrock may remain upon completion of waste and contaminated soil excavations. The second type of steep ODAs are steeper than 2h:1v slope, and are generally in areas of shallow bedrock. It is anticipated that waste excavations in this second type of steep area will expose bedrock during removal of waste material, but that the resulting slopes will be too steep for soil placement.

The ODAs steeper than 3h:1v, but flatter than 2h:1v will be ripped to an 18-inch depth prior to placement of the one-foot-thick surficial soil layer using the procedures described above for flat-lying areas. These areas will be scarified, disked, treated with soil amendments and hydroseeded and hydromulched as described above for flat-lying areas.

Exposed bedrock areas that are steeper than 2h:1v will be too steep to receive a soil cover and will not be seeded or planted. It is believed that these areas will become colonized with trees and shrubs over time as seed volunteers onto these areas from surrounding vegetation. This process of natural revegetation has already occurred on the Site since mining activities ceased.

P2.2.3 Existing Site Roads

Following removal of any contaminated material, the existing East and West Haul Roads and other Site roads that will not be maintained for future use will be ripped at least 18 inches in depth to eliminate roadway compaction and regraded to blend in with the surrounding topography. Contoured surfaces will be scarified to a depth of 12 inches and revegetated using the procedures discussed previously for flat lying areas.

P3.0 WASTE CONTAINMENT AREA COVER SYSTEM - OPERATION, MAINTENANCE AND MONITORING

Cover system OM&M will be performed from the time the final covers are installed in each of the WCAs (i.e., completion of the Pit 4 cover in Phase 1 and the Pit 3 cover in Phase 3 of the RA) and into post-remedy monitoring. Observation and documentation through inspection reports will enable prompt repair scheduling and execution of cover system repair or maintenance. The monitoring will include both visual inspection and surveying of the soil cover system and ODAs, the stormwater runoff management system, and any associated engineering controls to ensure system integrity is maintained. The monitoring plan, including the individual monitoring tasks, schedule, monitoring criteria, and maintenance, is discussed below.

Pit 3, Pit 4, the BPA, and Area 5 will be backfilled, covered with a composite cover system, and graded to form sloped soil cover surfaces where stormwater will flow to drainage bench channels oriented perpendicular to the slope that then will route clean stormwater off the cover and into newly constructed downdrain channels that report to site channels in the restored valley bottoms. These reconstructed site channels flow into natural drainages south of the Site. The Master Stormwater Management Plan in Appendix O of the BODR discusses the management, monitoring, and maintenance of the engineering controls that will be in place to

handle stormwater and sediment originating on these covered surfaces both during and after RA construction completion.

P3.1 COVER SYSTEM OVER WASTE CONTAINMENT AREA

The monitoring requirements for the WCA Cover System are summarized in Table 1. WCA cover system inspections will be performed to be protective of the cover system. Vehicular access along the dewatering well maintenance roads located on the capped WCA surface will allow the observations from multiple locations on the cap surface. Detailed inspection of any observed deficiencies observed from the roads (as shown on Figure 1) will be conducted on foot so as not to compromise the cover system. In addition, aerial photography and LIDAR surveys (with false color infrared) will be performed annually during RA construction and every 5 years after the remedy is complete. Aerial photography will provide a record of the construction and phased implementation. Post RA aerial photography will supplement the visual inspections. The LIDAR will provide supplemental information for the settlement plate measurements and document surface contours across the cover. The false color infrared images will provide information regarding vegetation density and growth that can be ground-truthed with the visual on foot surveys and provide a better estimate of the vegetation coverage and areas that may require maintenance.

The WCA Cover System will be subjected to the following inspections and monitoring requirements:

1) Routine Inspection:

   a. Settlement monitoring - monuments installed throughout the WCA will be visually observed to determine if they are in working condition. Settlement will be monitored at 62 discrete locations on the WCA cover system as shown on Figure 1. A schematic for a typical settlement plate is illustrated in Figure 1.

   b. Signs of stormwater erosion/damage – the WCA surface will be observed to see if there is evidence of erosion/damage.

   c. Veneer stability - Soil surface conditions will be observed to determine if there has been mass movement of the soil surface.

   d. Cap surface vegetation - This inspection is to observe and document the establishment of vegetation on the WCA soil surface. The inspection also will

include noxious weed surveys in accordance with the Revegetation Plan attached to Appendix D of the BODR.

e. Wildlife damage – The cover surface will be visually inspected to determine if there is evidence of wildlife damage.

f. Stormwater diversion controls (i.e., bench channels and downdrains) – The drainage benches and downdrains on the WCA cover will be observed to determine if they are operational.

2) 25 Year-24 hour Storm (2.2 inches of rain in a 24-hour period) or Seismic Event:

a. Non-routine inspections for signs of stormwater erosion/damage to the cap and stormwater diversion controls will commence within one day and completed within seven days after a:

1) 25-year, 24-hour storm event or

2) Seismic event greater than a magnitude 5.0 (Richter Scale) with an epicenter within 15 miles of the Site.

3) Routine Measurements:

a. Vegetation Survey

b. Settlement Survey

The monitoring frequency and unacceptable conditions (action triggers) for each of these monitoring metrics are summarized in Table 1 along with the associated (maintenance) response action.

P3.2 OTHER DISTURBED AREAS

The monitoring frequency and action trigger requirements for ODA surface grading and revegetation are summarized in Table 2. Because the ODAs are not underlain by a geosynthetic liner and are not covering contaminated materials, they are treated differently than the WCA as reflected in the type and frequency of monitoring in Tables 1 and 2. However, similar to the WCA, all inspections will be performed from nearby access roads that allow vehicular traffic (as shown on Figure 1) with detailed inspection of any observed deficiencies conducted on foot so as not to compromise the revegetated surface. In addition, aerial photography and LIDAR surveys will be performed as described above in Section P3.2. ODA

surface grading and revegetation will be subjected to the following inspections and monitoring requirements:

1) Routine Inspection:
   a. Cap surface vegetation. This inspection to include noxious weed surveys in accordance with the Revegetation Plan attached to Appendix D of the BODR.
   b. Erosion/damage from runoff
   c. Wildlife damage
   d. Damage to stormwater diversion controls (East, Central, and West Site Channels).
2) 25 Year-24 hour Storm (2.2 inches of rain in a 24-hour period):
   a. Non-routine inspections for stormwater erosion/damage to the cover and stormwater diversion controls will commence within one day and completed within seven days after a 25-year, 24-hour storm event.
3) Routine Measurements:
   a. Vegetation Survey

The unacceptable conditions (action triggers) for each of these monitoring metrics are summarized in Table 2 along with the associated (maintenance) response action.

P3.3 WCA - STORM WATER MANAGEMENT STRUCTURES MONITORING

The OM&M described below will be performed on the bench channels and downdrains on the WCA. Stormwater management on the WCA surface includes capture and conveyance systems that serve to: 1) minimize erosion and 2) divert stormwater from the cover areas so there is no infiltration using bench channels and downdrains to transfer stormwater into exhumed drainages so that it can drain freely from the Site.

The post-remedial monitoring and maintenance elements shown in Table 3 apply only to the stormwater runoff management infrastructure associated with the WCA cover system (i.e., bench channels, downdrains, and site channels immediately adjacent to the cover). These stormwater runoff controls will be subjected to the following inspections and monitoring requirements:

1) Routine inspection
   a. Erosion/damage

b. Performance of stormwater diversion controls

Non-routine inspections for erosion/damage to stormwater runoff management infrastructure will commence within one day and be completed within seven days following a 25-year storm, 24-hour storm event. The unacceptable condition (action trigger) for each of these monitoring metrics is verified damage as identified by the visual inspections.

P3.4 MAINTENANCE OF WCA COVER AND ODAs

The purpose of the maintenance procedures for the WCA Cover System and ODAs is to ensure that these areas perform as designed and that maintenance activities do not affect the long-term integrity of the cover and vegetation. This is accomplished by ensuring the materials and maintenance practices are consistent with the final design and specifications. All repairs and/or reconstruction shall be conducted in a manner that maintains the final cover system and ODAs surface grading integrity.

P3.4.1 Erosion Damage

Areas most susceptible to rill or gully formation are those steeper slopes around the perimeter of the WCA Cover System. In the event that rilling or gullying develops (as defined in Tables 1 through 3), repair procedures may include scarifying, regrading, cover soil placement, or placement of erosion matting, followed by re-establishment of vegetation. Corrective action repairs and maintenance will be prioritized following inspections indicating there are problems and scheduled within 30 days. The repairs then will be completed within the field season unless any of the observed damages could present an immediate threat to the WCA cover integrity. The Revegetation Plan attached to Appendix D of the BODR has procedures for establishment of vegetation on the soil covered surfaces including the applicable seed mixes and planting techniques.

P3.4.2 Veneer Slope Instability

Shallow translational (veneer) slope instability may develop especially in areas approaching 2h:1v where a one-foot thick surficial soil layer will be placed over bedrock to aide in vegetation establishment. On these steeper slopes, there is increased potential for slippage of the thin surficial soil layer down-slope. This type of slope movement (shallow translation failures) is often the result of the formation of a saturated soil layer at the bedrock interface during spring melt cycles and normally becomes less of a concern as vegetation is established on the reclaimed ground surface. Visual observations of cracks in soil surface typically at the slide

origin (headwall) or long the margins of the slide, a bulged toe area, or groundwater seeps at slide toe are all indicative of downslope soil movement.

Repairing slope stability may entail regrading to reduce infiltration, or in some cases a partial reconstruction of the slopes with subsurface drains or the use of biostabilization (stabilization of surficial soil layers through use of deeper-rooted plant species). Corrective action to address material slippage laterally down slopes shall be completed within thirty days following discovery during an inspection event. Design specifications for the reconstruction activities in areas exhibiting persistent veneer slope movement shall be submitted to the EPA for review and approval within 90 days upon discovery of persistent conditions.

P3.4.3 Vegetation Maintenance

Revegetated areas may require maintenance to ensure success criteria are met and maintained for percent cover and plant density as identified on Tables 1 through 3. Initial revegetation of the capped surfaces is described in the *Revegetation Plan* attached to Appendix D of the BODR. In the event that noxious weeds become established in revegetated areas, control practices will be implemented

Chronically poor plant growth may signal a need for fertilization or amendments to improve soil conditions. In the event of vegetative die-off or stress, the cover soils will be evaluated and treated to revitalize cover vegetation. If necessary, a plan for the application of such nutrients or soil amendments will be submitted for approval to EPA and the Tribe.

P3.4.4 Stormwater Management Structures

The permanent bench channels and downdrains on the WCA will be observed to determine if there is structural damage and maintained free of debris and large vegetation. If structural damage or debris /vegetation is found in these structures during inspections it may result in inadequate drainage and require corrective action. Corrective action repairs and maintenance will be prioritized following inspections indicating there are problems and scheduled within 30 days. The repairs then will be completed within the field season unless any of the observed damages could present an immediate threat to the WCA cover integrity (see Table 4).

P3.5 ENGINEERING CONTROLS – PERIMETER FENCING

The purpose of the current engineering controls at the Site is to ensure site access is controlled through fences, entrance gate controls, site entrance logs, and warning signs. For the purposes of this Cover System OM&M Plan, the existing eight-foot high chain-link perimeter fence will

remain intact until the vegetation has been reestablished enough to allow free ranging herbivores (primarily deer and elk) to access the revegetated surfaces. The acceptable vegetation coverage and conditions are detailed *Revegetation Plan* attached to Appendix D of the BODR. This could be three to five years following the implementation of the Selected Remedy completion of construction activities.

The removal of the perimeter fencing will only occur after agreements are reached with the Tribe approving removal of the perimeter fencing and how public access will be handled on the perimeter of the Site. Prior to removing the existing fence, a perimeter barrier consisting of a boulder barrier, jack-leg fence and gate system, or a combination of both will be established on the perimeter of the WCA to allow deer and elk access to the Site, but prevent vehicular access on this controlled area. The monitoring requirements for the perimeter fencing and associated gates, signs, locks, etc. are summarized in Table 4.

These site engineering controls will be inspected semi-annually to ensure they remain functional. Should damage be observed, maintenance shall be conducted as soon as practicable to maintain the integrity of these engineering controls.

P4.0 RECORD KEEPING AND REPORTING

P4.1 GENERAL

Documentation of Cover System OM&M activities will be completed and retained pursuant to the requirements of the Consent Decree (CD; EPA, 2011).

P4.2 REPORTING

In accordance with the *Midnite Mine Superfund Site Operation, Maintenance, and Monitoring Plan,* to which this plan is attached, an annual summary report of the monitoring and maintenance activities will be prepared pursuant to all Site OM&M activities related to:

- Cover System and ODAs Inspection and Maintenance
- Midnite Mine Water Treatment Plant (WTP)
- Fence Inspection and Maintenance
- Site Access Roads and Culverts
- Surface Water Diversions
- Alluvial Groundwater Controls

- Ponds and Tanks
- WTP Influent and Effluent Pipelines
- Pit Area Dewatering and Underdrain Wells

This yearly summary report will be transmitted to the EPA by March 31 annually, summarizing the prior year's activities.

P5.0 REFERENCES

MWH Americas, Inc. (MWH), 2015. Midnite Mine Superfund Site 100 Percent Basis of Design Report. Prepared on behalf of Newmont USA Limited and Dawn Mining Company for submittal to U.S. Environmental Protection Agency, Region 10. June.

U.S. EPA, 2011. Consent Decree Statement of Work for the Remedial Action for the Midnite Mine Superfund Site, Spokane Indian Reservation, Washington. Civil Action No. CV-05-020-JLQ. United States of America, Plaintiff v. Dawn Mining Company, LLC and Newmont USA Limited, Defendants. August.

TABLES

TABLE 1

WASTE CONTAINMENT AREA COVER SYSTEM - MIDNITE MINE

OPERATION, MAINTENANCE, AND MONITORING SUMMARY

Post-Remedial Monitoring Element[1]	Measurement/Inspection	Activity Frequency	Action Trigger/Unacceptable Condition	Response Action
Routine Inspections	Settlement Monument	Visual Observations - Quarterly	Damaged settlement monument based on visual inspection	Repairs / maintenance will be prioritize and scheduled within 30 days then completed within the field season unless any of the observed damages could present an immediate threat to the WCA cover integrity.
	Signs of Erosion/Damage from Runoff	Inspections will be performed quarterly until vegetation has been reestablished then inspection will be conducted annually. Aerial Photography will be performed annualy during RA construction and every 5 years following remedy completion.	Signs of excessive run-on/runoff erosion or other damage to the WCA cover, or sediment buildup. Erosion damage greater than 6 inches in depth and 20 feet in length or if vegetation has been destroyed due to erosion.	As Immediately Above
	Veneer Stability	As Immediately Above	Visual observations of cracks in soil surface, bulged toe area, or groundwater seeps at slide toe indicating soil movement downslope.	As Immediately Above
	Vegetation	Cover surface vegetation and cover soil depth monitoring will be performed during each growing season until revegetation success criteria are met, at this point monitoring will be discontinued.[2]	Signs of vegetation success and failure will be observed based on a visual inspection.	Review below under routine measurements - vegetation survey
	Wildlife Damage	Semiannually	Excessive wildlife activity causing damage to the cover.	As above in first response
	Stormwater Diversion Controls	Inspections will be performed quarterly until vegetation has been reestablished then inspection will be conducted annually.	Signs of structural damage to or sediment/debris buildup within bench channels and downdrains. Signs of ponding water to indicate damage or plugging of drainage bench subsurface collectors.	Stormwater diversion structures will be cleared of shrubs or other large vegetation. Structural damage (including potential plugging of drainage bench subsurface collectors) that is observed will be prioritize and scheduled within 30 days then completed within the field season unless any of the observed damages could present an immediate threat to the WCA cover integrity.
25-Year, 24-Hour Storm Event Inspections (2.2 inches of rain in 24 hours)	Signs of Stormwater Erosion	Commence within one day and completed with seven days of the triggering storm or seismic event except if not feasible due to inaccessibility to the site or snow cover (possible from November through May).	Signs of excessive cover erosion or other damage, or sediment buildup. Erosion damage greater than 6 inches in depth and 20 feet in length or if vegetation has been destroyed due to erosion.	As above in first response
	Stormwater Diversion Controls	As Immediately Above	Damage to or sediment / debris buildup within diversion control infrastructure.	As above in first response
Seismic Event Inspections (magnitude 5.0 earthquake within 15 miles)	Settlement Survey	As Immediately Above	Exceeds acceptable settlement amount based on evaluation by Engineer.	Engineering evaluation and repair of impacted cover areas.
Routine Measurements	Vegetation Survey	Cover surface vegetation and cover soil depth monitoring will be performed during each growing season until revegetation success criteria are met, at this point monitoring will be discontinued.[2] Aerial photography (visible spectrum and false color infrared) will be performed annualy during RA construction and every 5 years following remedy completion.	Revegetation success criteria will be established following the 2014 HEP survey of the Rhoads Property and will include criteria for percent cover and woody plant density.	Areas of non-compliance will be assessed, retreated and/or reseeded as appropriate in the fall.
	Settlement Survey	Settlement monument surveying will be performed semiannually for the first 5 years, then annually during the post-remedial period until the total cumulative movements are less than 0.03 foot vertically after which settlement monitoring will performed every 5 years. Aerial LIDAR survey will be performed annualy during RA construction and every 5 years following remedy completion.	The deformation analyses indicate that long-term settlements of 0.01(1.5%) of the mine waste fill height can be expected. Based on this estimate, the Action Trigger/Unacceptable condition for settlement at each settlement monitoring location will vary. Upon completion of construction, the acceptable settlement will be calculated based on the as-built waste thickness at the settlement point location for a maximum vertical strain of 1.5%. In addition, the results of the aerial LIDAR survey will be used to evaluate darinage bench settlement. If areas are identified where flat (less than 0.5%) bed slopes appear to be developing, bed slopes in these areas will be measured by ground survey methods to verify actual drainage bench bed slopes.	Engineering evaluation and repair of impacted cover areas.

Notes:

[1] This list of post-remedial monitoring and maintenance elements apply to earthen covers over backfilled Pits 3 & 4, Area 5, and the BPA.

[2] The surveys will include identification of bare ground areas, which will be defined as areas greater than 250 ft2 containing less than 20% live cover and areas containing signs of uncontrolled erosion (e.g., rills and gullies, accumulations of sediment or debris). Bare ground areas exhibiting less than 20% live vegetative cover for two successive seasons will be re-assessed for nutrients and other conditions that could cause vegetation failure. Pending the assessment results, the affected areas will be retreated and reseeded.

TABLE 2
OTHER DISTURBED AREAS - MIDNITE MINE
OPERATION, MAINTENANCE, AND MONITORING SUMMARY

Post-Remedial Monitoring Element[1]	Measurement/Inspection	Activity Frequency	Action Trigger/Unacceptable Condition	Response Action
Routine Inspections	Signs of Erosion/Damage from Runoff	Semiannually	Signs of excessive erosion or other damage, or sediment buildup. Erosion damage greater than 3 inches in depth and 20 feet in length or if vegetation has been destroyed due to erosion.	Corrective action repairs and maintenance will be prioritized following inspections indicating there are problems and scheduled within 30 days. The repairs then will be completed within the field season.
	Vegetation	Surface vegetation monitoring will be performed during each growing season (annually) until revegetation success criteria are met at this point monitoring will be discontinued. [2]	Signs of vegetation success and failure will be observed based on a visual inspection.	Review below under routine measurements - vegetation survey
	Stormwater Diversion Controls	Semiannually	Damage to or sediment / debris buildup within diversion control infrastructure. Downdrains shall be cleared of shrubs or other large vegetation.	As above in first response
	Wildlife Damage	Semiannually	Excessive wildlife or insect activity causing damage to revegetated areas.	As above in first response
25-Year, 24-Hour Storm Event Inspections (2.2 inches of rain in 24 hours)	Signs of Stormwater Erosion	The monitoring will be commence within one day and completed with seven days of the triggering storm event except if not feasible due to inaccessibility to the site or snow cover (possible from November through May).	Signs of excessive run-on/runoff cap erosion or other damage, or sediment buildup. Erosion damage greater than 3 inches in depth and 20 feet in length or if vegetation has been destroyed due to erosion.	As above in first response
	Stormwater Diversion Controls	As Immediately above	Damage to or sediment / debris buildup within diversion control infrastructure.	As above in first response
Routine Measurements	Vegetation Survey	Surface vegetation monitoring will be performed during each growing season (annually) until revegetation success criteria are met at this point monitoring will be discontinued. [2]	Revegetation success criteria will be established following the 2014 HEP survey of the Rhoads Property and will include criteria for percent cover and woody plant density.	Areas of non-compliance will be Assess, retreat and/or reseed as appropriate in the fall.

Notes:

[1] This list of post-remedial monitoring and maintenance elements apply to revegetated areas adjacent to the Waste Containment Area as well as the East and West haul roads.

[2] The surveys will include identification of bare ground areas, which will be defined as areas greater than 250 ft2 containing less than 20% live cover and areas containing signs of uncontrolled erosion (e.g., rills and gullies, accumulations of sediment or debris).

Bare ground areas exhibiting less than 20% live vegetative cover for two successive seasons will be re-assessed for nutrients and other conditions that could cause vegetation failure. Pending the assessment results, the affected areas will be retreated and reseeded.

TABLE 3

WASTE CONTAINMENT AREA - STORM WATER MANAGEMENT SYSTEM

OPERATION, MAINTENANCE, AND MONITORING SUMMARY

Post-Remedial Monitoring Element[1]	Measurement/Inspection	Activity Frequency	Action Trigger/Unacceptable Condition	Response Action
Routine Inspections	Signs of Erosion/Damage to Structures from Runon/runoff	Inspections will be performed quarterly until vegetation has been reestablished then inspection will be conducted annually.	Signs of excessive run-on/run-off which damages or sediment buildup on the bench channels, downdrains, and in downstream Site channels	Repairs / maintenance will be prioritized following inspections indicating there are problems and scheduled within 30 days. The repairs or other maintenance then will be completed within the field season unless any of the observed damages could present an immediate threat to the WCA cover integrity.
	Stormwater Diversion Controls	Inspections will be performed quarterly until vegetation has been reestablished then inspection will be conducted annually.	Structural damage to the bench channels, downdrains, or site channels.	Stormwater diversion structures will be repaired and cleared of shrubs or other large vegetation. Repairs / maintenance will be prioritized following inspections indicating there are problems and scheduled within 30 days then completed within the field season unless any of the observed damages could present an immediate threat to the WCA cover integrity.
25-Year, 24-Hour Storm Event Inspections (2.2 inches of rain in 24 hours)	Signs of Stormwater Erosion	Commence within one day and completed with seven days of the triggering storm except if not feasible due to inaccessibility to the site or snow cover (possible from November through May).	Signs of excessive run-on/run-off or other damage, or sediment buildup.	As above in first response
	Stormwater Diversion Controls	Commence within one day and completed with seven days of the triggering storm except if not feasible due to inaccessibility to the site or snow cover (possible from November through May).	Damage to or sediment / debris buildup within diversion control infrastructure. Stormwater diversion structures shall be cleared of shrubs or other large vegetation.	As above in first response

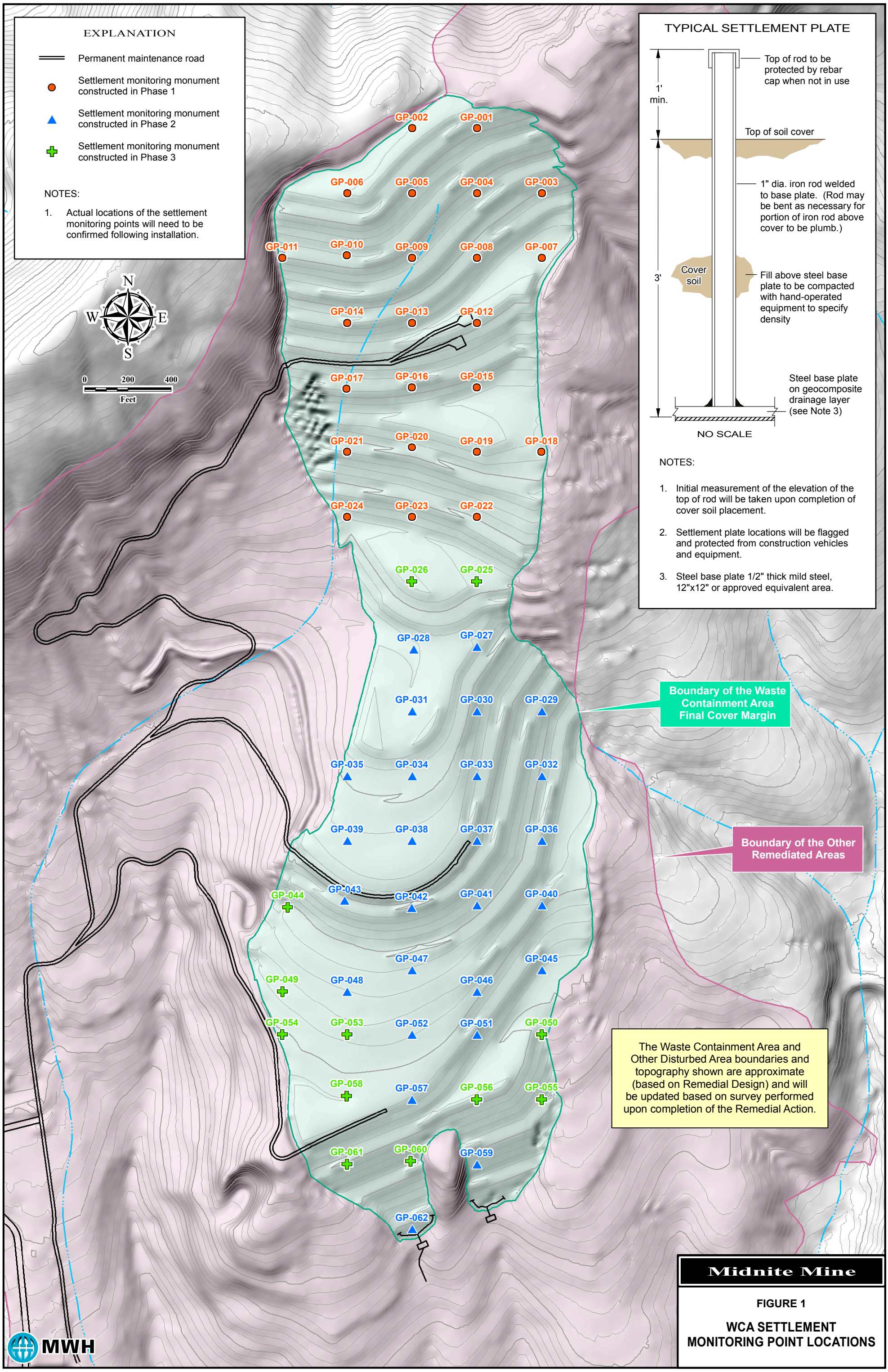
Notes:

[1] This list of post-remedial monitoring and maintenance elements apply to the bench channels, downdrains, and site channels.

TABLE 4
SITE-WIDE ENGINEERING CONTROLS - PERIMETER BARRIER
OPERATION, MAINTENANCE, AND MONITORING SUMMARY

Post-Remedial Monitoring Element	Measurement/Inspection	Activity Frequency	Action Trigger/Unacceptable Condition	Response Action
Routine Inspections	Security Systems	Semi-Annually	Damaged or non-functioning security infrastructure (e.g., fences, signs, gates, etc.)	Repairs / maintenance will be prioritize and scheduled within 30 days then completed within the field season unless these conditions present an immediate threat to the WCA cover system.

FIGURE


EXPLANATION
Permanent maintenance road
Settlement monitoring monument constructed in Phase 1
Settlement monitoring monument constructed in Phase 2
Settlement monitoring monument constructed in Phase 3
NOTES:
1. Actual locations of the settlement monitoring points will need to be confirmed following installation.
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S
E
W
0 200 400
Feet
GP-001
GP-002
GP-003
GP-004
GP-005
GP-006
GP-007
GP-008
GP-009
GP-010
GP-011
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GP-052
GP-053
GP-054
GP-055
GP-056
GP-057
GP-058
GP-059
GP-060
GP-061
GP-062
Boundary of the Waste Containment Area Final Cover Margin
Boundary of the Other Remediated Areas
The Waste Containment Area and Other Disturbed Area boundaries and topography shown are approximate (based on Remedial Design) and will be updated based on survey performed upon completion of the Remedial Action.
TYPICAL SETTLEMENT PLATE
1' min.
Top of rod to be protected by rebar cap when not in use
Top of soil cover
1" dia. iron rod welded to base plate. (Rod may be bent as necessary for portion of iron rod above cover to be plumb.)
3'
Cover soil
Fill above steel base plate to be compacted with hand-operated equipment to specify density
Steel base plate on geocomposite drainage layer (see Note 3)
NO SCALE
NOTES:
1. Initial measurement of the elevation of the top of rod will be taken upon completion of cover soil placement.
2. Settlement plate locations will be flagged and protected from construction vehicles and equipment.
3. Steel base plate 1/2" thick mild steel, 12"x12" or approved equivalent area.
Midnite Mine
FIGURE 1
WCA SETTLEMENT MONITORING POINT LOCATIONS
MWH

Attachment P-11

Routine Inspection and Maintenance of Temporary Water Management Ponds (Future Construction)

Midnite Mine Superfund Site
100 Percent Design

Attachment P-11 – Temporary Water Management Ponds – Operation, Maintenance, and Monitoring Plan

June 2015

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FIGURE

Figure 1 Temporary Water Management Ponds and Movement Monitoring Point Locations

LIST OF ACRONYMS/ABBREVIATIONS

CD	Consent Decree
DMOP	Dawn Mining Company LLC Operating Procedure
EPA	U.S. Environmental Protection Agency
HDPE	high density polyethylene
Mgal	million gallons
ODA	other disturbed areas
OM&M	Operation, Maintenance and Monitoring
PCP	Pollution Control Pond
RA	remedial action
Site	Midnite Mine Superfund Site
SWRP	South Waste Rock Pile
WCA	waste containment area
WTP	water treatment plant

1.0 INTRODUCTION

Temporary Water Management Ponds will be needed for the collection, storage, and conveyance of impacted water initially to the existing Water Treatment Plant (WTP) and later to the new WTP during the remedial action (RA) construction activities at the Midnite Mine Superfund Site (Site). During the execution of the RA, two temporary water management ponds referred to as the South and West Ponds will be built and operated as water storage sites, and necessary storage volumes, change over the course of construction. This plan presents the operation, maintenance, and monitoring (OM&M) activities for these temporary water management ponds.

As currently planned, implementation of the Selected Remedy will be conducted in three distinct phases where individual components of the overall remedy will be completed during each construction phase. The construction phases revolve around the Site water management and construction of these temporary water management ponds. Temporary water management ponds and OM&M activities for these ponds will be necessary from the time the Waste Containment Area (WCA) cover is installed on Pit 4 during Phase 1 and Pit 3 backfilling starts in Phase 2. At the end of Phase 1, the South Pond will be constructed to replace lost storage capacity in Pit 3 once is in no longer available for mine-affected water storage. The West Storage Pond will be constructed at the end of Phase 2 when the South Pond will be dismantled as the mine wastes on which it is constructed are backfilled into Pit 3. The West Pond will be smaller in size as more of the Site waters are shed clean and will be operated after construction activities cease. The West Pond will be dismantled only after flows stabilize possible 10 to 15 years after construction is completed.

This Water Management Ponds OM&M Plan is an attachment to the *Midnite Mine Superfund Site Operation, Maintenance, and Monitoring Plan*, which describes the OM&M for all of the components of the Selected Remedy requiring monitoring and maintenance.

1.1 PURPOSE, SCOPE, AND OBJECTIVES

The purpose of this Water Management Ponds OM&M Plan is to describe the inspection, maintenance and monitoring activities at the temporary South and West Ponds, and to establish frequencies for this work. The primary objectives of this plan are to:

- Monitor and maintain the temporary water management ponds relative to water level monitoring equipment

- Monitor and maintain the temporary water management ponds relative to liner leaks
- Monitor and maintain the temporary water management ponds relative to embankment settlement or lateral movement
- Monitor and maintain the West Pond stormwater diversion structures

To meet these objectives, this Water Management Ponds OM&M Plan includes the following:

- Identification of the pond components that require routine inspection, monitoring, and maintenance
- Documentation of procedures for inspection and maintenance of these pond components
- Listing of reporting requirements

2.0 DESCRIPTION OF TEMPORARY WATER MANAGEMENT PONDS

This section of the Temporary Water Management Ponds OM&M Plan describes the temporary water management ponds to be constructed during the RA and decommissioned based on the water storage requirements as construction progresses. Currently, impacted water is stored in Pit 3 ad Pit 4 prior to treatment at the existing WTP. During the course of the RA, these pits will sequentially be backfilled, and ultimately will no longer be available for water storage once backfilling commences. Two temporary storage ponds (the South Pond and the West Pond) will be used for temporary storage of impacted water during the various phases of RA construction as described above in Section 1.0.

The configuration of the temporary water management ponds as shown in the Midnite Water Management Ponds design (Appendix E and Section 10 Drawings of the Basis of Design Report) and discussed in this section are shown on Figure 1. The selected Contractor will be required, through the Drawings and Technical Specifications, to use specific liner materials for construction of the temporary water management ponds. They will be required to meet the project Performance Standards for containment of contaminated water which means continually monitoring the temporary ponds during the construction process. Once constructed, the ponds will be monitored as described in Section 3.0.

2.1 SOUTH POND

The South Pond will be constructed immediately upslope from the Pollution Control Pond (PCP) by excavating into the South Waste Rock Pile (SWRP) waste. Prior to excavation of the South

Pond, existing Ore and Protore Piles 5 and 8 will be removed from the SWRP surface in the South Pond area and placed in Pit 4 as part of Phase 1 construction. After removal of the Protore in this area, additional excavation of SWRP material to depths of up to 70 feet (ft) will occur to create the pond. The South Pond configuration includes an emergency overflow spillway on the east side of the pond as shown on Drawing 5-2. The emergency overflow spillway is an open-channel type spillway with an invert elevation at elevation 2,678 ft and a trapezoidal cross-section with a depth of 5 ft and a bottom width of 10 ft as shown on Drawing 5-15.

The South Pond will be a double-lined with leak detection between the primary and secondary geomembranes. The primary liner will consist of a 60-mil high density polyethylene (HDPE) geomembrane overlying a synthetic geonet leak detection layer. The leak detection layer will overlie a secondary liner constructed of a second HDPE geomembrane liner. The primary, geonet leak detection layer, and secondary liner will extend outside of the pond footprint and buried within a 4 ft wide by 3 ft deep anchor trench. The pond will include a divider berm in the pond bottom at elevation 2,635 ft that effectively forms two cells at low-water levels, allowing for maintenance of one side of the pond (cell) while still maintaining the ability to operate in the other cell. The pond bottom in each cell will be sloped toward sump areas, with sump bottoms located at elevation 2,619 ft. The South Pond will have an effective storage capacity of approximately 64 million gallons (Mgal) after accounting for the approximately 3.2 Mgal of dead storage (which corresponds to a pond elevation of 2,633 ft) that will be maintained in the pond bottom to provide ballast for the liner system and prevent wind uplift.

It is anticipated that the South Pond will contain very little water beyond the dead storage needed for liner ballast in each cell for most years when the WTP is operating normally. Under these low-water operating conditions, wind uplift and anchor trench capacity can become a concern. In order to address this concern, evaluations were conducted during the design process of the anchor trench capacity for the anchor trench configuration shown on Drawing 5-12, and of potential wind uplift for both construction and low-water (dead-storage pool) conditions. These analyses indicate the anchor trench design is more than adequate, and the proposed 60-mil HDPE primary (upper) geomembrane has adequate strength to withstand stresses induced by wind uplift for the maximum wind speeds recorded at the Site.

2.2 WEST POND

As stated earlier, the West Pond will replace the South Pond beginning in Phase 3 of the RA as the waste rock on which the South Pond is built is backfilled into Pit 3. The West Pond will remain operational until post-construction water management flows subside to the point where the equalization ponds adjacent to the new WTP provide sufficient storage volume for the overall water management system. The West Pond will be constructed by excavating soils from the impoundment area immediately upstream of the West Pond and using them for construction of the West Pond embankment across the Western Drainage. Use of material from the upstream impoundment area as a borrow source will increase the West Pond capacity and reduce the required embankment height and volume. A diversion channel will be constructed to route clean surface water flow from upstream areas in the Western Drainage around the east side of the West Pond and return it to the Western Drainage channel downstream of the embankment, as shown on Drawing 5-7. A second interceptor channel will be constructed to collect upland runoff from eastern slopes of the Western Drainage above the West Pond and route it to the diversion channel as shown on Drawing 5-7. These diversion and interceptor channels have been designed and sized to convey flows up to, and including those associated with the 500-year, 24-hour storm event.

The West Pond will be constructed using the same design and materials as the South Pond. The only exception is that the West Pond bottom will not include the divider berm and will consist of a single cell.

The West Pond as designed includes an emergency overflow spillway at the left abutment of the embankment as shown on Drawing 5-10. The emergency overflow spillway will be an open-channel type spillway with an invert elevation at elevation 2,555 feet and a trapezoidal cross-section with a depth of 5 feet and a bottom width of 10 feet as shown on Drawing 5-15. The pond bottom will be sloped toward a sumps area, with sump bottom located at elevation 2,605 ft. The West Pond will have an effective storage capacity of approximately 24 Mgal after accounting for approximately 1.4 Mgal of dead storage (which corresponds to a pond elevation of 2,619 ft) that will be maintained in the impoundment bottom to provide ballast for the liner system.

The West Pond will contain very little water, beyond the dead storage needed for liner ballast, when the WTP is operating normally. As with the South Pond, wind uplift and anchor trench capacity can become a concern under these low-water conditions. Similar to the South Pond,

evaluations of the anchor trench capacity were completed during design for the anchor trench configuration shown on Drawing 5-12, and of potential wind uplift for both construction and low-water (dead-storage pool) conditions. These analyses indicate the anchor trench design is more than adequate, and the proposed 60-mil HDPE primary (upper) geomembrane has adequate strength to withstand stresses induced by wind uplift for the maximum wind speeds recorded at the Site.

3.0 TEMPORARY WATER MANAGEMENT PONDS - OPERATION, MAINTENANCE AND MONITORING

Water management pond OM&M will be performed from the time of Pit 3 backfilling is commences at the beginning of Phase 2 and into post-construction monitoring. Observation and documentation through inspection reports will enable prompt repair scheduling and execution of pond repair or maintenance. The complete monitoring plan, including the individual monitoring tasks, schedule, monitoring criteria, and maintenance, is discussed below.

3.1 WATER MANAGEMENT POND OPERATION

The temporary water management ponds will be used for water storage prior to transfer to the WTP for treatment and discharge. Water from the ponds will be transferred to the WTP via pumps and conveyed by temporary influent pipelines. Details regarding the OM&M of these pipelines are presented in the *WTP Influent and Effluent Pipelines OM&M Plan* (MWH 2015).

Water management and operation of the South and West Ponds will be performed in accordance with a new Dawn Mining Company Operating procedure (DMOP) that will be prepared during Phase 1 of the RA prior to the initiation of construction of the South Pond.

3.2 WATER MANAGEMENT POND INSPECTION AND MONITORING

The monitoring requirements for the water management ponds are summarized in Table 1. The inspections will be performed to be protective of the liner system. Vehicular access along existing site roads will allow the observations from multiple locations along the ponds. The actual inspections will be conducted on foot to avoid damage to the liner or embankments. The Temporary Water Management Ponds will be subjected to the following inspections and monitoring requirements:

1) Routine Inspections:

a. Leak Detection/Submersible Pump Risers – the surface completions for the leak detection and submersible pump risers will be inspected for damage.

b. Pumps – the submersible pump and leak detection pump will be inspected for signs of wear

c. Leak detection – Leak detection sumps will be monitored for the presence of water.

d. Water Level Monitoring Equipment – Equipment used for monitoring of water levels in the ponds and leak detection sumps will be checked for proper operation.

e. Embankment movement monitoring - monuments installed along the embankment of the West Pond and perimeter of the South Pond will be visually observed to determine if they are in working condition. Locations of the movement monuments and a schematic for a typical movement monitoring point are presented in Figure 1.

f. Pond embankments – the embankments also will be visually inspected for signs of erosion, seepage, and instability.

g. Stormwater diversion controls (i.e., diversion) – The diversion channels around the West Pond will be observed to determine if they are operational.

h. Liner Positioning – the primary geomembrane liner will be inspected during wind events for movement. These inspections will occur when measured wind speed at the site is greater than 35 miles per hour.

2) Routine Measurements:

a. Movement Survey

b. Flow rates into individual leak detection sumps.

3) Non-Routine Rain Storm and Seismic Events

Non-routine inspections for signs of stormwater erosion/damage to the West Pond stormwater diversion controls will commence within one day and completed within seven days after a:

a. 25-year, 24-hour storm event or

b. Seismic event greater than a magnitude 5.0 (Richter Scale) with an epicenter within 15 miles of the Site.

The monitoring frequency and unacceptable conditions (action triggers) for each of these monitoring metrics are summarized in Table 1 along with the associated (maintenance) response actions. In the event that water is detected in the leak detection sumps, a four-level system for allowable leakage rates and appropriate response actions will be followed as presented in Table 2.

3.3 MAINTENANCE OF TEMPORARY WATER MANAGEMENT PONDS

The purpose of the maintenance procedures for the Temporary Water Management Ponds is to ensure that these facilities perform as designed and that maintenance activities ensure their long-term integrity and viability. This is accomplished by ensuring the materials and maintenance practices are consistent with the final design and specifications. Maintenance activities for the water management ponds are:

3.3.1 Geomembrane Liner System

Although damage to the pond liner is considered unlikely, the liner is susceptible to damage. If damage is noted during routine inspections (as defined in Table 1), repair procedures may include replacement or patching of damaged liner. Corrective action repairs and maintenance will be prioritized following inspections indicating there are problems in accordance with Table 1.

3.3.2 Pumps

Depending on water chemistry, submersible pumps can be susceptible to fouling. In addition, pump components are susceptible to normal wear and tear during operation. Maintenance of the submersible pumps will be in accordance with manufacturer's recommendations.

3.3.3 Water Level Monitoring Equipment

Pressure transducers or other equipment used for monitoring water levels in the temporary water management ponds and detecting the presence of water in the leak detection sumps will be checked periodically for proper operation in accordance with manufacturer's Stormwater Diversion Channels.

The stormwater diversion channels around the West Pond as described in Section 2.2 will be observed to determine if there is structural damage and maintained free of debris and large vegetation. If structural damage or significant debris /vegetation is found in these structures

during inspections it will require corrective action. Corrective action repairs and maintenance will be prioritized following inspections indicating there are problems and scheduled within 30 days.

4.0 RECORD KEEPING AND REPORTING

4.1 GENERAL

Documentation of Temporary Water Management Pond OM&M activities will be completed and retained pursuant to the requirements of the Consent Decree (CD; EPA, 2011). The existing Pond and Tank Inspection form will be used during the initial OM&M efforts and may be revised at a later date.

4.2 REPORTING

In accordance with the *Midnite Mine Superfund Site Operation, Maintenance, and Monitoring Plan,* to which this plan is attached, an annual summary report of the monitoring and maintenance activities will be prepared pursuant to all Site OM&M activities related to:

- Cover System and other disturbed areas (ODAs) Inspection and Maintenance
- Midnite Water Treatment Plant
- Fence Inspection and Maintenance
- Site Access Roads and Culverts
- Surface Water Diversions
- Alluvial Groundwater Controls
- Ponds and Tanks
- WTP Influent and Effluent Pipelines
- Pit Area Dewatering and Underdrain Wells

This yearly summary report will be transmitted to the EPA by March 31 annually, summarizing the prior year's activities.

5.0 REFERENCES

MWH Americas, Inc. (MWH), 2015. Midnite Mine Superfund Site 100 Percent Basis of Design Report. Prepared on behalf of Newmont USA Limited and Dawn Mining Company for submittal to U.S. Environmental Protection Agency, Region 10. June.

U.S. EPA, 2011. Consent Decree Statement of Work for the Remedial Action for the Midnite Mine Superfund Site, Spokane Indian Reservation, Washington. Civil Action No. CV-05-020-JLQ. United States of America, Plaintiff v. Dawn Mining Company, LLC and Newmont USA Limited, Defendants. August.

TABLES

TABLE 1
TEMPORARY WATER MANAGEMENT PONDS - MIDNITE MINE
OPERATION, MAINTENANCE, AND MONITORING SUMMARY

Post-Remedial Monitoring Element[1]	Measurement/Inspection	Activity Frequency	Action Trigger/Unacceptable Condition	Response Action
Routine Inspections				
	Movement Monument	Quarterly	Damaged settlement monument based on visual inspection	Repairs / maintenance will be prioritize and scheduled within 30 days then completed within the field season.
	Embankment Inspections	Quarterly	Visible seepage, erosion features, or bulging or other signs of instability	Engineering evaluation and repair of impacted areas will be completed within 14 days.
	Water Level Monitoring Equipment	Weekly	Transducers fail to record data	Repairs / maintenance will be completed within 30 days. Maintenance and repair activities will be in accordance with manufacturer's recommendations.
	Pumps	Quarterly	Decrease in discharge flowrates, increase in pump discharge pressures, changes in electrical draws outside of manufacturer listed ranges.	Repairs / maintenance will be prioritize and scheduled within 30 days then completed within the field season. A backup pump will be on hand in case of a pump failure. Maintenance and repair activities will be in accordance with manufacturer's recommendations.
	Leak Detection Risers	Quarterly	Damage to surface completions or components	Repairs / maintenance will be prioritize and scheduled within 30 days then completed within the field season.
	Submersible Pump Risers	Quarterly	Damage to surface completions or components	Repairs / maintenance will be prioritize and scheduled within 30 days then completed within the field season.
	Primary Geomembrane Liner Uplift (Wind Events ONLY)	Inspection to occur ONLY when wind speed exceeds 35 mph (as measured by the on-site weather station)	Flapping, tears to liner material, liner pull out at anchor trench or reversal of curvature at corner panels.	Engineering evaluation and repair of impacted areas will be completed within 14 days. Corrective action could include additional ballast.
	Stormwater Diversion Controls (West Pond ONLY)	Quarterly	Signs of structural damage to or sediment/debris buildup within bench channels and downdrains.	Stormwater diversion structures will be cleared of shrubs or other large vegetation. Structural damage that is observed will be prioritize and scheduled within 30 days then completed within the field season unless any of the observed damages could present an immediate threat to the WCA cover integrity.
RoutineMeasurements				
	Flow Rate into Leak Detection Sumps	Weekly	See Table 2	See Table 2
	Water Level Monitoring	Weekly	Water level below dead-storage pool elevation of 2,633 ft (South Pond) or 2,619 ft (West Pond)	Engineering evaluation and determine corrective action on case-by-case basis based on results of engineering evaluation.
	Movement Survey of Pond Embankments	Movement monitoring will be performed quarterly.	If the amount of movement over 4 quarters is greater than 0.1 ft	Engineering evaluation and repair of impacted areas within 14 days.
Non-Routine Events/Inspections				
Rain Storm Event: 25-Year, 24-Hour Storm Event Inspections (2.2 inches of rain in 24 hours)	Stormwater Diversion Controls (West Pond ONLY)	Commence within one day and completed with seven days of the triggering storm or seismic event except if not feasible due to inaccessibility to the Site or snow cover (possible from November through May).	Damage to or sediment / debris buildup within diversion control infrastructure.	As above in first response
Seismic Event: Inspections (magnitude 5.0 earthquake within 15 miles)	Settlement Survey of Pond Embankments	As Immediately Above	Exceeds acceptable settlement amount based on evaluation by Engineer.	Engineering evaluation and repair of impacted areas within 14 days.

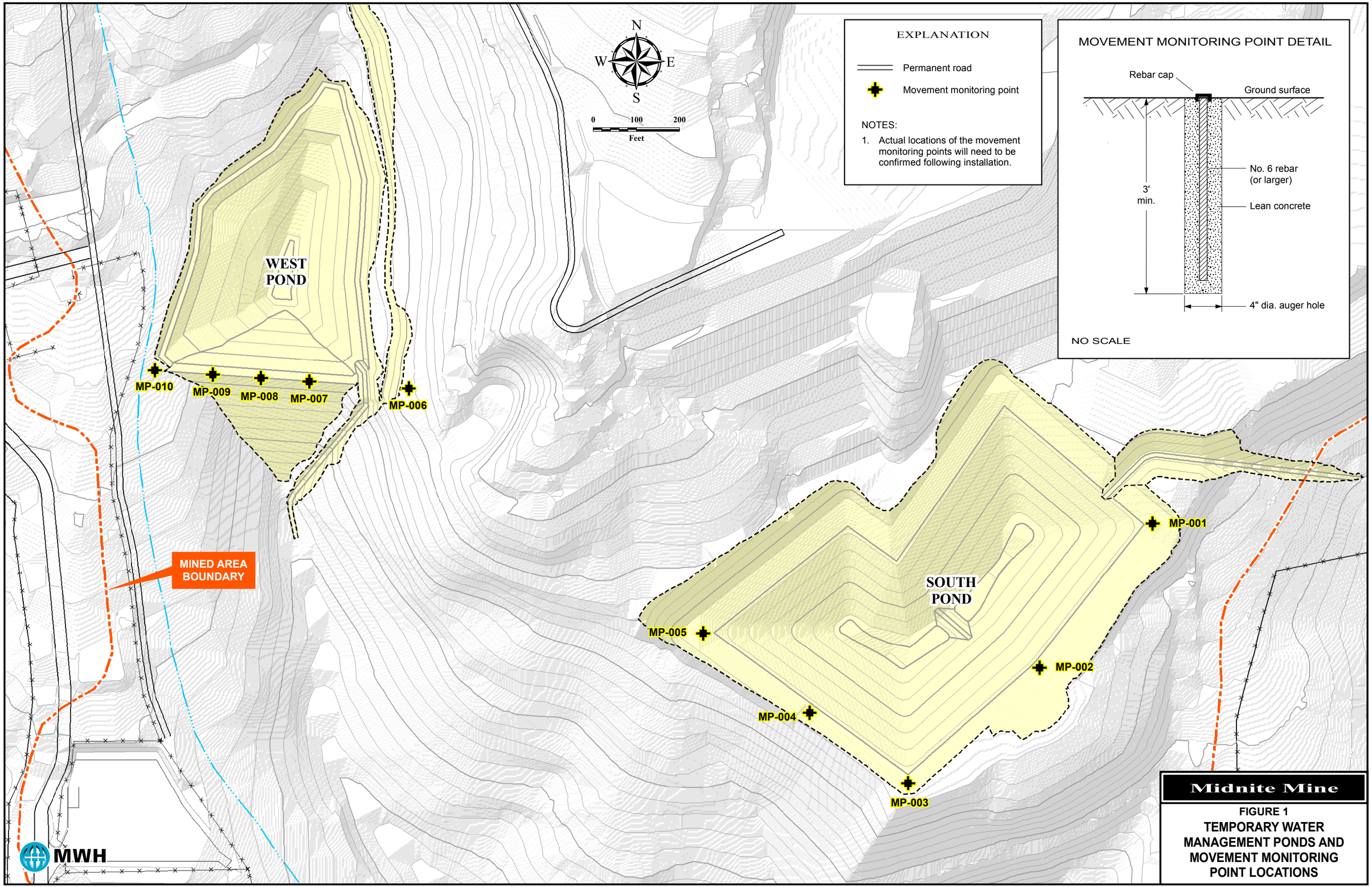
Notes:
[1] This list of monitoring and maintenance elements apply to temporary water management ponds (South Pond and West Pond).

TABLE 2
TEMPORARY WATER MANAGEMENT PONDS - MIDNITE MINE
ACTION LEAKAGE RATES

Action Leakage Level	Action Trigger/Unacceptable Condition	Response Action
Level 1 - Operating Leakage Level (OLR)	A Level 1 OLR exists if the leakage rate into individual leak detection sumps is less than 20 gallons per acre per day (gpad).	At a leakage rate of less than 20 gpad, the system is operating as designed and monitoring of leakage rates through the primary liner will be conducted on a weekly basis.
Level 2 - Increased Leakage Monitoring and Reporting (MR)	A Level 2 MR exists if the leakage rate into individual leak detection sumps exceeds 20 gpad but is less than 200 gpad.	If the leakage rate exceeds 20 gpad but is less than 200 gpad, the flow rate will be reported VERBALLY to the EPA within 24 hours of the determination and the frequency of monitoring of leak detection flow rates will be increased to daily during the routine work week.
Level 3 - Leak Investigation and Action Plan (LIAP)	A Level 3 LIAP exists if the leakage rate into individual leak detection sumps exceeds 200 gpad but are less than 500 gpad.	Monitoring and reporting at a frequency described for Level 2 (above) will be initiated. In addition, the source(s) of the leakage will be identified and a written action plan will be prepared and submitted to EPA. In addition to identification of the source of the leakage, additional actions that may be included at the LIAP level include continued monitoring, operating at a reduced water level, increased inspection of downstream embankments, or repair of the primary liner.
Level 4 - Immediate Response Level (IRL)	A level 4 IRL exists if the leakage rate into any leak detection sump exceeds 500 gpad.	Monitoring and reporting at a frequency described for Level 2 (above) will be initiated. The exposed liner surface in the pond will be inspected immediately and the water level in the pond will immediately be drawn down for subsequent liner inspection. The pond water level will be drawn down in incremental stages such that the liner and leak detection system can be inspected and the condition assessed. Once the source(s) of the leakage is identified, all necessary repairs will be made prior to refiling the cell(s) where leakage occurred.

Notes:

FIGURE



DRAWN BY D. Severson

12 June 2015

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