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November 20, 2024

Amy Yeldell
DRMS Room 215,
1001 E 62nd Ave,
Denver, CO 80216

Re: Technical Revision, Water Treatment Facility, & Reclamation Cost Estimate Update, Whirlwind Mine, Permit No. M-2007-044

Dear Ms. Yeldell:

In accordance with Mineral Rules and Regulations of the Colorado Mine Land Reclamation Board for Hard Rock metal, and designated Operations, Energy Fuels Resources Inc. ("**EFRI**") is herein submitting a Technical Revision pursuant to Rule 1.9 for the addition of a "bolt-on" system to the existing water treatment plant at the Whirlwind Mine (the "**Mine**").

The Mine permit was approved by the Colorado Division of Reclamation, Mining and Safety ("**DRMS**") per letter dated September 10, 2008. Approval was granted as EFRI satisfied applicable requirements of C.R.S. 34-32-101. As part of the permitting process, EFRI obtained an industrial discharge permit in 2007 through the Colorado Department of Public Health and Environment ("**CDPHE**"), Permit CO0047562. That permit is described in Exhibit D and a copy of the permit is included in Appendix F. By letter dated January 22, 2015, CDPHE renewed the discharge permit which was later modified by letter dated February 12, 2015. The renewed permit contained new lower effluent limits that would need to be met for discharge to be allowed.

As the Mine had been in temporary cessation until 2022, there was no discharge occurring. In 2022, EFRI began rehabilitating the Mine decline and is now ready to start dewatering the Mine to continue rehabilitation of the mine adit and eventually produce ore. However, EFRI recognizes the need to upgrade the water treatment plant to meet the new effluent limits before discharge can commence.

EFRI contracted Linkan Engineering ("**Linkan**") to design a system that could be added in series to the existing system that was designed by Lyntek Incorporated ("**Lyntek**") and installed in 2008. The Lyntek design report is included in the mine application as Appendix H. Linkan has designed a "bolt-on" treatment system using media filtration followed by ion exchange to reduce various constituents to below the effluent limits. A copy of the Linkan design report is enclosed for review as Appendix H.2 in the proposed Technical Revision.

This system is containerized in two 20-foot portable truck mounted containers. After water has been treated through the Lyntek system, it will go into the Polishing Tank. From there, Linkan's system will pump water from the Polishing Tank into the Linkan system. The influent water flows into a 300-gallon agitated feed tank, which is then fed into a series of fiberglass reinforced vessels containing sand filtration media, a strong base anion exchange resin, arsenic/selenium selective ion exchange resin and activated carbon, in that order.

The addition of the Linkan system will not increase the estimated amount of sludge produced as described in the approved permit. No new disturbance is required for the system as the trailers will be placed in an area already disturbed. No additional tanks, beyond the existing Untreated Water, Polishing and Settling Tanks, are needed. The fence line will have to be moved out to encompass the new trailers for security and safety purposes. The discharge flow rate and quantity remain the same as specified in the CDPHE discharge permit. The discharge point (outfall 1) remains the same. The Linkan system requires the use of two chemicals which have not previously been evaluated at the Mine. These chemicals include hydrochloric acid and sodium hydroxide.

With the addition of the Linkan system to the water treatment facility, various sections of the permit application have been revised to include a discussion of the Linkan system's role in water treatment, similar to the Lyntek system. These sections include:

- Exhibit C – Pre-Mining and Mining Plan Maps of Affected Lands
- Exhibit D – Mine Plan
- Exhibit T – Environmental Protection Plan
- Appendix F – Materials Containment and SPCC Plans
- Appendix L – Discharge Permit (2015)

To facilitate review of Technical Revision to include the Linkan system, text changes have been provided as redline changes and an Index of Change has been included as a guide specifying Exhibits, sections and pages which have been revised.

The fee of $1,006.00 as per the DRMS cover sheet for Technical Revisions will be paid online.

Additionally, by letter dated June 7, 2022, DRMS required that prior to any work, beyond safety and rehabilitation, the reclamation cost estimate needed updated. To satisfy that requirement, EFRI is providing additional information for the reclamation cost estimate as follows.

Task	**Form Used**	**Description**
BH1	N/A	Iron Woman Quote = $575,00.00, Thirsty Bird Quote =$202,183.00, RAM Quote = $619,730
01P	Demo	No Changes
02P	Mineseal	No Changes

03P	Dozer	No Changes
04P	Excavate	No Changes
05P	Excavate	No Changes
06P	Dozer	No Changes
07P	Reveg	No Changes
08P	Loader	No Changes
01W	Demo	Water Treatment Liner Disposal Cost Estimate: $45,500.00. Includes disposal and disposal fees.
02W	Loader	No Changes
03W	Loader	No Changes
04W	Mineseal	No Changes
05W	Dozer	No Changes
06W	Ripper	No Changes
07W	Dozer	No Changes
08W	Reveg	No Changes
09W	Dozer	No Changes
1WP	Mineseal	No Changes
2WP	Borehole	No Changes
3WP	Demo	6-40 ft. power poles installed $400/pole = $2400 4 runs of wire @1310' each = 5240' wire. $2/ft. X 5240'= $10,500. Includes removal/disposal.
4WP	Ripper	No Changes
5WP	Dozer	No Changes
6WP	Reveg	No Changes
MB1	Mob	No Changes
MB2	Mob	No Changes
Indirect		No Changes (see 3 bulkhead quotes)

It is worth noting that for Task 3WP, the power poles were installed by San Miguel to get power to Whirlwind. The power poles were installed within the permit boundary but were installed in places previously disturbed. So there has been no additional surface disturbance required.

For changes in Tasks BH1, 01W, and 3WP quotes have been enclosed.

If you have any questions please contact Dawn Kolkman at (307)351-9165 or dkolkman@energyfuels.com, or myself at (303)389-4132 or sbakken@energyfuels.com.

Sincerely,

ENERGY FUELS RESOURCES (USA) INC.
Scott A. Bakken
Vice President, Regulatory Affairs

SB/dk

Encl. Request for Technical Revision Cover Sheet
Index of Change
Revisions to 112d Permit Application
Appendix H.2 Linkan Engineering Water Treatment Design Report
Fee Payment
Reclamation Cost Quotes

cc: M. Munson (DOGM), J. Whittington (BLM),
K. Weinel, J. App, N. Martin, D. Kolkman (EFRI)

COLORADO DIVISION OF RECLAMATION, MINING AND SAFETY
1313 Sherman Street, Room 215, Denver, Colorado 80203 ph(303) 866-3567

REQUEST FOR TECHNICAL REVISION (TR) COVER SHEET

File No.: M- 2007-044 Site Name: Whirlwind Mine

County Mesa TR# *(DRMS Use only)*

Permittee: Energy Fuels Resources Corporation

Operator (If Other than Permittee):

Permittee Representative: Scott Bakken

Please provide a brief description of the proposed revision:

Improve water treatment facility with addition of new containerized system to meet water discharge limits required by CDHPE's discharge permit CO0047562

As defined by the Minerals Rules, a Technical Revision (TR) is: "a change in the permit or application which does not have more than a minor effect upon the approved or proposed Reclamation or Environmental Protection Plan." The Division is charged with determining if the revision as submitted meets this definition. If the Division determines that the proposed revision is beyond the scope of a TR, the Division may require the submittal of a permit amendment to make the required or desired changes to the permit.

The request for a TR is not considered "filed for review" until the appropriate fee is received by the Division (as listed below by permit type). Please submit the appropriate fee with your request to expedite the review process. After the TR is submitted with the appropriate fee, the Division will determine if it is approvable within 30 days. If the Division requires additional information to approve a TR, you will be notified of specific deficiencies that will need to be addressed. If at the end of the 30 day review period there are still outstanding deficiencies, the Division must deny the TR unless the permittee requests additional time, in writing, to provide the required information.

There is no pre-defined format for the submittal of a TR; however, it is up to the permittee to provide sufficient information to the Division to approve the TR request, including updated mining and reclamation plan maps that accurately depict the changes proposed in the requested TR.

Required Fees for Technical Revision by Permit Type - Please mark the correct fee and submit it with your request for a Technical Revision.

Permit Type	**Required TR Fee**	**Submitted** (mark only one)
110c, 111, 112 construction materials, and 112 quarries	$216	☐
112 hard rock (not DMO)	$175	☐
110d, 112d(1, 2 or 3)	$1006	☑

Index of Change

Energy Fuels Resources (USA) Inc.

Whirlwind Mine Water Treatment Technical Revision

Volume	Exhibit	Page, Map or other Permit Entry to be Removed	Page, Map or other Permit Entry to be Added	Description of Change
Volume I	Table of Contents	Cover and Appendices page	Cover and Appendices page	Updated the cover page with revision date. Added the Linkan water treatment design report to Appendix H as Appendix H.2. This new report needs to follow behind the existing Lyntek water treatment design report which will now be Appendix H.1.
Volume I	Exhibit C	Map C-2	Map C-2	Updated to include Linkan water treatment trailers and to show where the fence was moved to.
Volume I	Exhibit D	All Pages	All Pages	Revision date was updated to September 2024 at the bottom of the page.
Volume I	Exhibit D	Section 7. Water Treatment Area, pgs D-16, D-17	Section 7. Water Treatment Area, pgs D-16, D-17	Revised description of the Lyntek System to account for the Addition of the Linak system. Revised description of Settling and Polishing Tanks to account for flow changes with the addition of the Linkan system. Added description of new Linkan designed water treatment system.
Volume I	Exhibit D	Section 18.4 Water Treatment Plant and Tanks, pg. D-36	Section 18.4 Water Treatment Plant and Tanks, pg. D-36	Revised section to include description of the Linkan treatment system.
Volume I	Exhibit T	All Pages	All Pages	Revision date was updated to September 2024 at the bottom of the page.
Volume I	Exhibit T	Section 1. General Plan, pgs T-3, T-4	Section 1. General Plan, pgs T-3, T-4	Revised section to include description of the Linkan treatment system.
Volume I	Exhibit T	Section 2. Maps, pg T-4	Section 2. Maps, pg T-4	Typographical change to make "Plant" and "Layout" plural with addition of s at end of word.
Volume I	Exhibit T	Section 3. Other Agency Environmental Protection Measures, pg. T-7	Section 3. Other Agency Environmental Protection Measures, pg. T-7	Add text to account for updated CDHPE Permit in 2015.
Volume I	Exhibit T	Section 5. Designated Chemical Evaluation, pg T-9, T-10, T-11	Section 5. Designated Chemical Evaluation, pg T-9, T-10, T-11	Revised section to include the two new chemicals as described in the Linkan treatment system. Also, provide additional description about the use of the chemical within the Linkan treatment system.
Volume I	Exhibit T	Section 6. Designated Chemicals and Materials Handling, pg. T-11, T-12	Section 6. Designated Chemicals and Materials Handling, pg. T-11, T-12	Revised section to include description of the Linkan treatment system.
Volume I	Exhibit T	Section 7.2 Treatment System Safety Features, pg. T-18	Section 7.2 Treatment System Safety Features, pg. T-18	Removed the Nucla office as that no longer exists and replaced with text that records will be mainted onsite during operations. Added text about spills in the Linkan trailers.
Volume I	Exhibit T	Table T-2, pg. T-25	Table T-2, pg. T-25	Updated and corrected table to reflect 2015 CDPS permit conditions.
Volume II	Appendix F	Materials Containment & SPCC Plan	Materials Containment & SPCC Plan	Updated the Materials Containment Plan with corrected positions, roles, responsibilities, phone numbers, in addition to the two new chemicals. Replaced SPCC Plan with new EPA Tier I form.
Volume II	Appendix H	nothing to be removed only added	Appendix H.1 Linkan Water Treatment Design Report	The Linkan Report will follow right behind the Lyntek Report.
Volume II	Appendix L	CDPS Permit 2007	CDPS Permit 2015	Replacing the 2007 permit for the 2015 permit.

Cover, Table of Contents and Appendices Pages

Energy Fuels Resources Corporation

Whirlwind Mine

112d PERMIT APPLICATION COLORADO DIVISION OF RECLAMATION, MINING AND SAFETY

PREPARED BY:
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REVISED September 2024

WHIRLWIND MINE

HARDROCK/METAL 112d OPERATION

TABLE OF CONTENTS

APPENDICES

Exhibit C – Maps

Map C-2 submitted separately online

Exhibit D
Mine Plan

MINING PLAN EXHIBIT D

1. Background Information

The ore deposit is located in the Salt Wash Member of the Morrison Formation, which consists of interbedded fine-grained sandstone (about 60 percent) and mudstone (40 percent). The ore is located within the upper (i.e., Top Rim) red sandstone of the Salt Wash and occurs in areas of reduced gray sandstone and where the sandstone is in contact with gray or green mudstone bands. The uranium and vanadium mineralization occurs in bands that range in thickness from a few inches to in excess of eight feet. The average ore thickness is 2.7 to 3.0 feet. The ore body is located below approximately 500 to 750 feet of cover and can be accessed through adits located on the side of canyon walls and declines and shafts. For a full discussion of area geology, see Exhibit G – Water Information.

1.1 Urantah Decline

The Urantah Mine was started by Pioneer Uravan in September 1979. It consists of a 3,200-foot-long, single-entry decline that accesses the ore body at a six percent grade plus approximately 700 feet of drift in the Salt Wash member. The decline is supported by steel sets through the Brushy Basin member of the Morrison Formation, which is predominantly shales and mudstones. Both the decline and drifts are about nine feet high by twelve feet wide. Approximately 2,800 tons of ore had been mined when the mine was closed in September 1981. The mine was later acquired by Cotter Corporation, but remained idle until it was reclaimed in the fall of 2002.

Little Maverick Mining Company reopened the mine under a prospect permit (P-2005-008) in 2005. Energy Fuels is currently conducting exploration activities under this permit through a lease agreement with Little Maverick. Surface disturbance associated with exploration activities have included opening up an access road, uncovering a buried concrete pad, and building a working pad on top of the reclaimed waste pile (see Map C-1A). The mine portal was reclaimed with a bat gate; therefore, no excavation was required to access the old workings.

Underground exploration activities have included rehabilitating the existing workings to gain safe access to the ore body plus geological and environmental sampling. Energy Fuels plans to collect a bulk ore sample by driving a drift between the Urantah Decline and the Packrat Mine (see Map C-1B).

1.2 Packrat Mine

The Packrat Mine is an older mine that probably was first developed in the 1950's and consists of several miles of drifts with numerous stopes or rooms mined off of each drift. The three Packrat Mine portals are located approximately one-half mile north of the Whirlwind portal and almost 300 feet lower in elevation. The Packrat portals access the Salt Wash directly from the side of Lumsden Canyon (see Maps C-1A and C-2).

The mine workings extend in a southwesterly direction though the Salt Wash unit (see Map C-1B), which is relatively flat lying (the formations dips to the northeast at one to three degrees). Early miners used track methods to mine most drifts. The drifts in the south part of the mine are still relatively small with a width of about six feet. The northern drifts were later widened and extended using rubber tired equipment and are typically nine feet high by twelve feet wide. The Packrat Mine had two ventilation shafts; a sixty-inch diameter shaft near the end of the northern workings and a thirty-six-inch shaft called Ten Straight near the end of the southern workings. The larger ventilation shaft was backfilled as part of reclamation, but the Ten Straight is still open and protected by a metal grate.

The Packrat Mine operated until 1990 when depressed uranium prices caused it to go on standby. Umetco later reclaimed the mine surface area in 2002. Energy Fuels reopened the mine in early 2007 under prospect permit P-2007-003. Under this permit, the road to the Packrat and the main portal were reopened. A small pad area (less than 0.6 acre) was established in front of the portal. This work was completed in May 2007 and is not shown on Map C-1A. Energy Fuels is currently establishing ventilation and rehabilitating portions of the Packrat Mine so that exploration activities can be safely conducted.

This permit application outlines further modifications to the site for the full mine operation. Surface disturbances associated with exploration activities are included in this application so that the 112d Permit will incorporate and supersede existing exploration permits.

2. Underground Mine Operations

Energy Fuels plans to reopen the Urantah Decline and Packrat Mine as a single combined underground uranium-vanadium mine operation called the Whirlwind Mine. The mine will operate one to three shifts per day five days per week. Initially, ten to twelve employees will mine approximately 100 tons of ore per day. As the mine expands and more headings are opened up, up to twenty-four employees may work at the mine and production will increase to an average of 200 tons of ore per day. The mine has a projected life of ten years based on known and inferred resources.

2.1 Mine Design

Based on existing exploration data, the mine will be initially expanded to the west and south in the direction of the proposed vent shafts shown on Map C-1B. The thin and irregular nature of the ore body makes it difficult to define the exact location and extent of future mining. Exploration drilling from the surface and long-hole drilling from existing underground workings will ultimately determine the optimum location of future drifts and production stopes. The maximum limit of underground mining is shown on Map C-1B.

Future underground mining operations may connect with adjacent mines in the area such as the Lumsden No. 2 and Rajah 49. This would be done primarily for mine ventilation purposes although some older stopes could also be mined. No additional surface disturbance is anticipated at this time because ventilation fans would be installed underground and ore and waste would all be hauled out through the Whirlwind Decline. Before connecting with older mine workings in the area, Energy Fuels will consult with the BLM and DRMS regarding potential environmental impacts to bats (see Exhibit H), ground water (see Exhibit G), and other resources. Appropriate mitigation measures would be developed at that time to minimize identified environmental impacts.

2.2 Mine Plan

Nine-foot high by twelve-foot wide drifts will be driven through known ore-bearing zones to provide access for production mining. The drifts also provide access for geologic mapping, long-hole drilling, rib scanning, and collecting samples. This geologic data will be used to develop detailed mine planning and stope development for each drift.

The ore will be mined using a modified room-and-pillar system. This mining method is a common method for mining in uranium-bearing sandstone and is designed to follow the irregular configuration of the individual ore bodies. The ore seams vary in height with an average seam thickness of approximately three feet. The waste to ore ratio also varies depending on the thickness of the ore and splits within the ore seams. The mines in this area have typically averaged 2 to 3.5 tons of waste per 1 ton of ore.

The existing workings in both the Urantah Decline and Packrat Mine will require rehabilitation prior to the start of full-scale mining. This will include cleaning up rock falls, bolting of the back where needed, establishing ventilation, and installing sumps and pumping stations for the lower portions of the mine where ground water collects. Once the mine meets Mine Safety and Health Administration (MSHA) safety requirements, the existing drifts will be extended into known ore zones. These drifts will have nominal dimensions of nine feet high by twelve feet wide. The 600 to 700-foot proposed drift between the Whirlwind Tunnel and the Packrat Mine will be started first and may be completed under the bulk sampling provisions of the prospect permit. A portion of the existing southern drift of the Packrat Mine will also be enlarged to accommodate modern rubber-tired mine equipment.

As the mine expands, seven ventilation shafts will be added as shown on Map C-1B. The location of these vent shafts may change by several hundred feet depending on the ultimate location of the drift and ventilation needs. The ventilation shafts will typically be 72 inches in diameter and cased; however, shaft diameters may vary depending on the drill contractor's equipment. The steel casing will be grouted where it passes through aquifers to prevent intermixing of waters between formations.

The ore zone does not naturally contain ground water at this location; however, ground water is seeping into the Whirlwind mine from aquifers located above the mine workings. This water is entering the mine where the Whirlwind decline intersects sandstone lenses near the base of the Brushy Basin member. Ground water is also entering around the casing of the Ten Straight vent shaft into the Packrat Mine and through open drill holes and fractures in the formation. Initially, Energy Fuels will need to pump water out of the mine because water has collected in low areas of the mine during the past fifteen to twenty-five years. This water will be treated prior to being discharged to a nearby

ephemeral drainage. Once the mine is operating, the water flowing into the mine will be used in mining operations for drilling and dust suppression. Energy Fuels has obtained a water right to use this water. As discussed in Exhibits G and T, mine water discharge will not be required or will only be needed intermittently during active mining operations.

Energy Fuels plans to implement a program for minimizing ground water inflows into the mine workings. This will include evaluating the seepage around the casing of the Ten Straight vent shaft and grouting the casing to plug off or reduce water inflows. Historic drill holes encountered during mining that are open and producing water will also be plugged or grouted. It is believed that this will reduce the amount of water entering the ore bearing zone from above thus preserving some of this water in the upper aquifers while lessening the amount of water that will be treated at the Whirlwind surface area. Additional details regarding ground water control are presented in Exhibit T.

2.3 Mine Operations

A typical equipment list for the underground operation is presented in Section 4 of this exhibit. Jacklegs operating on compressed air will be utilized to drill the blast holes and rock-bolt holes in the drifts and production areas. A larger jumbo drill may also be used in the development areas if conditions warrant. The ore averages about three feet in thickness but the drifts are approximately nine feet in height while the stopes or rooms are a minimum of six to seven feet in height. In order to avoid excessive dilution of the ore, much of the waste will need to be drilled and shot separately from the ore using what is referred to as “split shooting.”

Blasting operations will be conducted in accordance with MSHA regulations (30 CFR Parts 56 and 57). Blast holes will be loaded with a blasting cap, chemical booster, and a mixture of ammonium nitrate and fuel oil (ANFO) prills. The blasts will be initiated using a non-electric system (nonels) with the hole pattern, firing sequence, and delays designed to allow for optimum breakage and minimum ore dilution. Explosives and detonators will be initially stored in powder magazines located on the surface near the portal. These magazines will be relocated underground once the mine expands in size. Explosives will be transported from the magazines to the working face in accordance with MSHA regulations (30 CFR Part 56 and 27 CFR Part 55).

The ore and waste rock will be mucked out using small diesel loaders. Ore will be hauled to the surface using low-profile, diesel-powered haul trucks (commonly called buggies). Some of the waste produced during later development and production may be disposed of underground.

Back support will consist of installing five-foot to eight-foot-long mechanical split-set roof bolts. Bolting will be performed as necessary with the spacing varying according to back conditions and the size of the opening. Mine openings will be twelve feet wide in the drifts but may be wider in the stopes. Metal mats and mine-grade wire will be installed in the back and diagonally on the ribs when additional ground support is required.

Material storage areas and stationary equipment will also be located underground. Roof bolts, mats, vent tubing, hoses, lubricants, and the smaller and more commonly used equipment parts will be stored underground near the working faces. These locations will change as the mine workings are advanced. Stationary underground equipment will include air compressors, transformers, and ventilation fans.

3. Surface Facilities

The proposed surface facilities are shown on Maps C-2 and C-3 for the main Whirlwind Mine area and Maps C-4 and C-5 for the Packrat Mine area. Minor changes may be made to the proposed layouts during construction; however, construction activities will be confined to the permit area and outside of surface drainages. The majority of the ore and waste rock (i.e., over 90 percent) will be brought to the surface from the Whirlwind portal. Any ore or waste brought through the Packrat portal will be transferred to bins where the material can be loaded into highway haul trucks for transfer to the Whirlwind or, in the case of ore, hauled directly to the mill.

A surface equipment list is presented in the lower portion of Section 4 of this exhibit. There will be no processing activities on site as all the ore will be transported to the White Mesa Mill or another existing uranium mill in the region. Should a new mill be built by Energy Fuels, the ore would be transported to that process facility.

The surface facilities at the Whirlwind Project include the following.

- waste rock embankment
- ore stockpile area
- topsoil stockpile areas
- water treatment plant and tanks
- fuel and oil storage areas
- maintenance shops and warehouse
- mine offices and shower locker 0room (dry)
- designated parking and storage areas
- mine access roads and pads
- utilities
- solid waste storage (trash, scrap metal, batteries)
- ventilation shafts (existing and proposed)
- power drops and associated pad areas
- ore and waste bins at the Packrat portal
- retaining walls at Packrat portal
- drainage collection and diversion ditches with culverts
- mine sediment pond at Whirlwind portal
- powder magazine at Whirlwind portal
- magnesium chloride tank at Whirlwind portal
- ventilation fan at Whirlwind portal
- cyclone fences and gates at Whirlwind portal
- portable watchman's trailer
- portable generators

Approximately one third of the proposed surface disturbance at the Whirlwind Project will be on land that was previously disturbed and reclaimed by previous mine operations. The remaining areas to be disturbed have also been impacted, but to a lesser extent, by historic exploration activities consisting primarily of road and pad construction. Surface disturbance on previously undisturbed ground is largely confined to the waste pile expansion on the east end of the Whirlwind portal site.

The proposed Packrat portal area disturbance is on land that has been completely disturbed in the past, as seen on Map C-1A. The former waste embankment was previously reclaimed by regrading, placing imported topsoil, and creating depressions on the land surface to provide pockets where seed could more readily germinate. The majority of the reclaimed waste embankment will not be re-disturbed. Only the upper portion of the waste embankment will be disturbed to allow for a portal bench with some minor facilities.

Table D-1 below shows a breakdown of proposed surface disturbance between previously impacted areas and areas that were not impacted extensively by historic operations.

As mentioned in Section 1, some of these surface facilities, such as the reopening of mine access roads, pads, and portals, were approved under previously submitted prospect applications. This mine permit application encompasses these disturbances and is intended to supersede and replace those exploration permits.

Table D-1 Proposed Surface Disturbance

Area	Previously Disturbed Acreage	Total Disturbed Acreage
Whirlwind Portal Area		
Portal Bench	2.10	2.35
Access and Facilities	1.00	1.33
Portal Bench Slope	0.70	1.00
Fill Stockpile	0.00	0.27
Expanded Waste Embankment	0.00	9.98
Topsoil Stockpile #1	0.00	1.70
Water Treatment Area	0.50	1.54
Existing 5/10 Road & Shoulder	0.73	0.73
Misc Ditches, etc.	0.00	0.34
Narrow strip north of 5/10 Road	0.04	0.19
Topsoil Stockpile #2	0.00	0.32
Subtotals	**5.07**	**19.75**
Packrat Portal Area		
New Upper Bench	0.62	0.62
New Lower Bench	0.37	0.37
Packrat Road	0.76	0.76
Subtotals	**1.75**	**1.75**
Vent Shafts (Colorado)	0.23	0.46
Power Drop Areas	0.64	0.64
Total Disturbed Area (Coloado)	**7.69**	**22.60**
Additional Shafts in Utah	**0.00**	**1.38**
Total Disturbance (CO and UT)	**7.69**	**23.98**

Note: The acreages in Table D-1 are approximate.

4. Surface and Underground Mine Equipment

The following equipment may be used at the mine operation.

TABLE D-2
PRELIMINARY MINE EQUIPMENT LIST

Underground Equipment	Number
Diesel Skid-Steer Loaders, 2 cy capacity	2 – 3
Diesel Trucks (Buggies), 5 and 10 ton capacity	8 – 10
Development Drill, Jumbo	1
Production Drills, Jacklegs	8 – 10
Exploration Drills, Longhole	1 – 2
Diesel Boss Buggies and Utility Vehicles	2 – 4
Surface Equipment [(c)]	**Number**
Snow Plow	1
Front End Loader, 2 – 3 cy capacity	1
Backhoe/Skid Loader or Excavator, 80-hp[(a)]	1
Highway Haul Trucks, 22 to 24-ton capacity [(b)]	2 – 8
Bulldozer, 200-hp	1
Motor Grader, 140-hp	1
Flat-Bed Truck, 1-ton	1
Pick-up Truck, ¾-ton (4wd)	2

Notes:

(a) A backhoe and/or hydraulic excavator will be brought on site as needed to perform maintenance activities.

(b) Highway haul trucks will be provided by a contractor. Trucks used for transportation will consist of 14-ton, end-dump trucks with 10-ton pups pulled behind or 23-ton end or side dump haul trucks. The number of trucks listed is based on two trips per day.

(c) Miscellaneous rental and contract equipment will be brought to the mine site as needed. These could include fuel trucks, propane trucks, boom trucks, maintenance vehicles including welders, pipe equipment, electrical man lifts for working on power lines, contract vent hole drilling equipment, exploration drilling equipment, material delivery trucks, and concrete and gravel trucks.

5. Waste Rock Embankment

The existing bench at the Whirlwind portal was made from waste rock excavated from the driving of the decline and the two short developmental drifts at the base of the decline. The slope of this bench was reclaimed previously but will be re-disturbed since the bench will be expanded using waste rock produced from underground mining operations. See Map C-1A for the configuration of the current bench. See Map C-2 for the plan view of the expanded waste rock embankment.

The waste rock pile will be expanded to the east and gradually raised in height. Map C-3 shows the cross sections of the existing and the expanded waste rock embankment. The waste rock will be hauled to the pile by low-profile trucks or "buggies" and dumped near the edge of the pile. A dozer will then level and push the material over the edge of the pile. The pile will have two levels; the lower level at the portal and an upper level to the east that will gradually increase in height and move further to the east as more waste is placed. Travel over the pile by the loaded rubber-tired buggies will compact the material creating a low-permeable surface. The waste rock pile will have a capacity of 900,000 tons, which will contain most of the waste rock generated during the projected ten-year mine life. The remaining waste rock will be disposed of underground in mined out areas.

The area east of the existing waste rock pile consists of pinyon and sagebrush crisscrossed by historic drill roads and pads (see Map C-1A). Prior to expansion of the waste rock embankment to the east, the vegetation will be stripped and approximately 12 to 18 inches of topsoil will be removed and stockpiled in Stockpile #1 shown on Map C-2 on the north side of County Road 5/10. Another small stockpile area exists on the expanded bench (Temporary Topsoil Stockpile). Downed trees and all other woody material will be placed in separate piles that will be placed on top of the topsoil during reclamation, either as mulch or in whole pieces. The area around the Whirlwind and Packrat portals has been checked for springs and seeps. None exist within the area of the waste rock embankment expansion.

The waste material will be generated from above and below the ore-bearing material by blasting (i.e., split-shooting). The material will be primarily sandstone that loses a large portion of its cementation upon exposure to air and water. The blasted rock ranges in size from fine-grained sand particles to a

maximum of 2 feet in diameter. As the waste rock is brought outside in the buggies, it will be dumped into the expansion area and graded to a maximum final slope of 3 horizontal to 1 vertical (3H:1V). Any waste rock hauled out of the Packrat Portal will be dumped into bins at the Packrat Portal and then hauled to the Whirlwind waste embankment using larger highway haul trucks.

As shown on Map C-2, two ten feet wide benches will be placed on the final slope of the waste embankment as it is constructed, to prevent vertical drops of more than thirty feet. In addition, a haul road with a six percent positive slope will be constructed as the embankment expands. This road will be treated with magnesium chloride to minimize the generation of fugitive dust. Water will be channeled away from the slope using a ditch on the inside of this road. The road and top of the embankment will have a 3-foot high berm as required by MSHA for safety of the vehicle traffic on the road. This berm will be made of waste rock.

Expansion of the waste rock pile will occur in increments of approximately three to four acres so that a large portion of the area will not be disturbed at once. As permanent waste rock slopes are created, topsoil from new disturbance areas will be placed on the regraded slopes and seeded to allow for contemporaneous reclamation of a portion of the pile. The work will be completed during the fall seeding window (August to October 15). All reclaimed slopes will be covered with a minimum of twelve inches of topsoil prior to reseeding and mulching. Based on soil samples taken in April of 2007, the average replacement thickness is 14 inches, which is used for all earthwork and reclamation calculations.

Permanent diversions will keep undisturbed runoff from entering the waste rock embankment from the uphill areas to the south. Drainage of the waste rock embankment is discussed in Section 18.

Recent samples of the ore and waste from newly exposed underground faces were taken by Energy Fuels. These samples were analyzed for chemical content and then tested using the Synthetic Precipitation Leaching Procedure (SPLP), which is the Division's recommended procedure for determining whether mine waste has the potential to environmentally impact ground or surface water.

The sampling procedures, locations and results of these tests are presented in Appendix A. The results show that the ore has the potential to generate leachate and surface water runoff containing elevated levels of uranium, radium, and trace metals (see Section 6 below). The waste rock, however, did not produce leachate that exceeded state water quality standards. The following Best Management Practices (BMPs) for disposal and reclamation of waste rock will also minimize the potential for impacting surface or ground water resources.

Waste Embankment BMP's

1) In the SPLP test, the ore is ground to a minute size (i.e., smaller than 9.5 millimeters) prior to leaching with a pH 5 solution, while the actual waste rock embankment site will have larger sized rocks from one inch to twenty-four inches in diameter, that will not leach as readily. The permeability of the waste rock (and susceptibility to leaching) will also be reduced by the compaction that occurs as loaded haulage buggies and other equipment travel over the top of the waste pile.

2) Undisturbed runoff from the south hillside will be permanently diverted away from the waste rock embankment, utilizing diversion ditches designed for the 100-year, 24-hour storm event.

3) The waste rock embankment will be covered with a minimum of twelve inches of topsoil and planted with a stable mix of grasses and forbs well suited to this location. The vegetation will utilize most of the direct precipitation and surface water runoff that occurs on the reclaimed embankment. This will minimize the amount of water that can percolate into the reclaimed waste material.

4) The gradual slopes and revegetated surface of the waste rock embankment will minimize erosion of topsoil and prevent exposure of the underlying waste rock.

Based on the apparent stability of the existing reclaimed and older, unreclaimed waste rock pile slopes in the area, a detailed slope stability analysis was not performed. Many of these older mines have slopes as steep as 1.4H:1V compared to the 3H:1V proposed minimum slope of the Whirlwind waste rock embankment. The spring and seep survey of the site conducted by Greg Lewicki, P.E. in April of 2007 revealed no springs or seeps; therefore, there is no water that could enter the waste from below

and potentially compromise the stability of the embankment. Exhibit U presents a slope stability analysis using commonly accepted basic equations and material parameters. The analysis indicates that the waste embankment has a calculated safety factor above 2, which is well above the minimum safety requirements for permanent slopes.

Runoff from the waste rock pile and other disturbed areas will be collected in the sediment pond shown on Map C-2. The sediment pond will allow suspended solids to settle out of solution before the water enters the natural drainage. As an added precaution, the sediment pond water will be tested quarterly for radium-226 and uranium, as well as other parameters (see Exhibit T for monitoring details). The sediment pond is designed to fully contain the ten-year, twenty-four-hour precipitation event for the site. It is also designed to safely pass the 100-year, 24-hour storm event through the principal spillway pipe (see Section 18 below).

6. Ore Stockpile Area

Ore will be end dumped directly onto the ore stockpile pad located north of the Whirlwind portal by the buggies. The stockpile pad has been sized to contain up to 15,000 tons of ore, which represents three to four months of full production. As shown on Map C-2, the ore pad covers approximately 0.5 acre and drains to a collection sump. The ore pad will consist of a geosynthetic clay liner (GCL) covered by a 2.5-foot thick cushion layer of finer-grained material and 1 foot of compacted run-of-mine (ROM) waste rock. The lined pad will drain to a concrete sump. The ore stockpile area will be able to store the entire first year of ore production, which is estimated to be approximately 10,000 tons. The sump will be equipped with an overflow that drains directly to the lined tank that feeds into the water treatment plant. This overflow will utilize a six-inch diameter HDPE pipe that will be buried at least eighteen inches below the surface from the sump to the Untreated Water Tank. The entrance to the pipe will be screened to prevent large pieces of rock or debris from entering and clogging the pipe. The ore pad design is presented in detail in Appendix J

The ore pad will be sloped toward the concrete sump described above. As shown on Map C-2, the ore pad area will be surrounded by a gradual sloping berm that will direct all runoff from the ore pad area to the sump. These provisions are designed to capture and allow for treatment of surface water runoff

that may have contacted the uranium ore. As shown in Appendix A, leaching of the ore has the potential to generate elevated levels of uranium, radium, and trace metals. The ore will be stored only temporarily on site and all ore will be removed prior to site reclamation as discussed in Exhibit E. In addition, the 3.5 feet of total liner cover material and the liner will be removed and placed in a dry portion of the mine prior to reclamation of the pad.

A front-end loader will load the ore into haul trucks. Fugitive dust will be minimal because the ore will have a high moisture content and the loading area will be treated with magnesium chloride to seal the pad surface. The truck beds will be covered with tarps prior to leaving the mine site to prevent the generation of fugitive dust during haulage. Initially, approximately twenty trucks per week will be loaded and sent to the mill. As production increases to 200 tons per day, truck traffic will increase to an average of about forty roundtrips per week. Weather conditions, haul truck availability, mill demands, and other factors may result in periods of increased haulage of up to eighty roundtrips per week (i.e., sixteen trips per workday). The primary haulage route will be via Mesa County roads to Colorado Highway 141 just south of Gateway. Three secondary routes via Grand County, Utah roads to Utah highways may also be used, especially in the summer when weather conditions are more favorable.

Ore haulage will be performed by contractors who will be required to: obtain all necessary permits and clearances, follow Department of Transportation regulations including establishment of spill control plans, and obey Colorado and Utah traffic laws.

7. Water Treatment Area

A portable water treatment plant and associated tanks were installed on site as part of DRMS and BLM-approved prospecting activities. Energy Fuels proposes to use these existing facilities during mining operations to treat mine water and ore pad runoff. Water treatment and discharge is expected to be intermittent, as most of the mine water will be used for drilling, dust suppression, and other mining activities. The water treatment facilities are located north of 5/10 Road as shown on Map C-2. Topsoil was removed from this area and the subsoil was graded and compacted prior to installing the water

treatment system. Environmental protection measures for the treatment facilities are described in detail in Exhibit T and Appendix H. A description of the treatment components follow.

Untreated Water Tank

Three-inch diameter high density polyethylene (HDPE) pipe extends from the mine sump to the Untreated Water Tank. A 2-inch return line extends from the tank back to the mine. These water lines are buried from the portal to the tank to prevent freezing. A third, 6-inch diameter HDPE buried pipe will be installed from the ore pad sump to the Untreated Water Tank when the ore pad is constructed.

The Untreated Water Tank has dimensions of 68 feet by 68 feet by 4.75 feet high and is constructed of interlocking metal wall panels. The tank is lined with two 30-mil, reinforced synthetic liners. Leak detection is provided by an 8-oz. geotextile fabric that is located between the two liners and connected to a dip tube leak detector. Tertiary containment is provided by a GCL liner that is installed at the base of the tank between the wall panels. The tank has approximately 22,000 cubic feet of storage capacity (equivalent to 164,000 gallons of untreated water). Freeboard requirements are described in Section 18 below.

Water Treatment Plant - Lyntek System

The treatment plant consists of two treatment systems. The first system was developed by Lyntek (2008) and the second system by Linkan Engineering (2024). Each system is located in portable containers. The Lyntek system is located in ~~a~~ the 47-foot-long truck trailer. There are three mix tanks of 370, 300, and 230 gallons containing dilute solutions of barium chloride, ferric sulfate, and other chemicals as needed (See Exhibit T and Appendix H). These chemicals are fed into the untreated waterline via metering pumps. After chemical dosing, the water flows through in-line static mixers to two 335-gallon reaction tanks. These reaction tanks are equipped with mixers that provide additional contact time between the treatment chemicals and the natural contaminants in the water (i.e., radionuclides, selenium and other trace metals). The water then flows by gravity into the Settling Tank located outside the trailer.

Settling and Polishing Tanks

The Settling Tank and Polishing Tank are of the same size with dimensions of 8 feet by 26.75 feet by 4.75 feet high with total capacities of 1,000 cubic feet or 7,500 gallons each. The tanks are constructed in the same manner as the Untreated Water Tank and are equipped with double liners and leak detection. The treated water flows initially into the Settling Tank where the insoluble precipitate formed by the addition of barium chloride and ferric sulfate settles into the bottom of the tank. To ~~insure~~ensure complete separation of the solids from the treated water, the settled water from the Settling Tank gravity flows into the Polishing Tank before further treatment in the Linkan system. ~~before being discharged~~.

Water Treatment Plant - Linkan System

Thereafter, the water from the Polishing Tank is pumped into the Linkan system. The Linkan system is containerized in two 20 ft. shipping containers. The water is treated with hydrochloric acid to adjust the pH as it is prepared for ion exchange to further reduce any remaining natural contaminants. The water is sent into a 300-gllon tank and then pumped through a series of fiberglass reinforced vessels containing sand filtration media, strong base anion exchange resin, arsenic/selenium selective ion exchange resin and activated carbon. The media filters remove residual solids that may carry over from the Polishing Tank while the two ion exchange steps remove residual uranium, arsenic and selenium. Sodium hydroxide may be added before the finish water tanks to ensure the pH meets discharge limits.

8. Topsoil Stockpile Areas and Sediment Pond Excavation

Topsoil Stripping

Topsoil will be stripped from all areas prior to conducting mining or construction activities. This includes both previously reclaimed areas and previously undisturbed areas. Pinyon pine, juniper, scrub oak, and any other small trees will be removed from previously undisturbed areas prior to stripping the topsoil. These trees and other woody material will be placed in separate piles. During reclamation, these materials will be placed on top of topsoiled areas, either as mulch or in whole pieces.

The Packrat Mine was reclaimed by importing alluvial soil from the Gateway area. The material was used to cover the backfilled portal, regraded waste embankment area, and the access road. This material will be stripped to the extent possible, but it is expected that only 4 to 6 inches of material will be salvaged over an area of approximately 1.0 acres. This is a volume of 672 cubic yards, assuming an average soil depth of 5 inches. Since there is no room at the Packrat portal area for storing this material, the material will be used for the creation of the MSHA berm along the Packrat pad area and access road. These berms will be seeded with the mix described in the reclamation plan to minimize erosion.

The following areas of topsoil stripping correspond to the areas shown on map C-1A.

Area 1: Most of the Whirlwind portal area was previously reclaimed without placing topsoil; accordingly, there is only a limited amount of topsoil that can be salvaged from the previously reclaimed area. Almost all of the salvageable topsoil in this area occurs on the slope of the reclaimed waste pile, which covers about 1.6 acres. This material will be stripped to a depth of 6 inches and will be placed in the Whirlwind stockpile on the north side of 5/10 Road (Stockpile #1). This represents about 1,300 cubic yards of topsoil. The existing growth media on top of the waste pile pad will also be salvaged and placed into the Temporary Topsoil Stockpile on top of the waste pile.

Area 2: The waste embankment will expand east over Area 2, which is relatively flat with gentle slopes. Most of the soil borings were completed in this area, where topsoil ranges from 1.2 feet to 2.3 feet in thickness. There are a number of rock outcrops in the area where no topsoil is available. Based on the collected soil samples, the average topsoil thickness in this area is 1.78 feet. When the rock outcrops are subtracted, the average thickness is estimated to be 1.6 feet. Since the area is 8.42 acres in size, the volume available for stripping is 21,700 cubic yards. Initially, only about 5,900 cubic yards will be stripped and placed in Stockpile #1, located north of 5/10 Road, for use in final reclamation. The stockpile will have 3H:1V sideslopes. A smaller stockpile will exist on the portal bench as shown on Map C-2 (Temporary Topsoil Stockpile, a.k.a., Stockpile #3). This area will have the same 3H:1V sideslopes and will contain approximately 3,900 cubic yards of topsoil stripped prior to future

advances of the waste embankment. Subsequent topsoil stripping will be used to contemporaneously reclaim previously regraded areas of the waste embankment.

Area 3: Area 3 comprises the steeper slopes along the south edge of the waste embankment expansion. Soil boring 5 with a topsoil thickness of 1.2 feet was completed at the base of this slope. No borings were completed higher up on the slope, but based on a visual inspection, it is apparent that this area has a thinner soil cover than Area 2. For estimating purposes, a soil thickness of 0.8 feet is assumed, which results in an estimated topsoil volume of 3,000 cubic yards over the 2.36 acre area.

Area 4: This area is north of 5/10 Road and will contain the treatment plant and various tanks, and the Sediment Pond. No soil borings were completed in this area, but the area is similar in grade and land form to Area 2. An average topsoil thickness of 1.6 feet is assumed for Area 4. Since the area is 1.71 acres, the topsoil volume available for stripping is estimated to be 4,400 cubic yards. The majority of this topsoil (4,200 cy) will be placed in a stockpiles east of the water treatment area (Topsoil Stockpiles #2 and #2A) and the subsoil stockpile (see Sediment Pond Excavation below). Some of the topsoil (200 cy) will be placed as a 6-inch cover over the sideslopes of the sediment pond and the fill stockpile that will be excavated from the pond area. The placed topsoil will seeded to produce a stable, vegetated cover during active mining operations. During reclamation, the topsoil will be stripped from the subsoil stockpile and the sedimentation pond prior to regrading the area. After the area has been regraded to the approximate original contours, the topsoil will be placed on top.

The total estimated volume of topsoil available from the four areas is approximately 30,400 cubic yards. It is believed that this estimated volume is accurate to plus or minus 20 percent. The reclamation design and cost estimate are based salvaging and placing 30,400 cubic yards of topsoil.

A summary of the topsoil stockpile areas is given below:

1. Stockpile #1: Main Stockpile located north of County Road containing 5,900 cy from the initial stripping of Area 2 plus 1,300 cy from Area 1 for a total estimated volume of 7,200 cy. The stockpile area shown on Map C-2 is larger than necessary to store 7,200 cy, so there is extra storage space available in case the average stripping depth is greater.

2. Stockpiles #2 and #2A: Located at Water Treatment Area with an estimated volume of 4,200 cy.
3. Stockpile #3: Temporary stockpile located at Whirlwind portal bench with an estimated volume of 3,900 cy.

Total estimated topsoil storage required: 15,300 cy

Temporary topsoil stockpiles will be created in front (i.e., east) of the waste rock pile as it expands. This material will be used to concurrently reclaim the north facing waste rock pile slopes next to County Road 5/10 after they are regraded to a 3H:1V configuration.
Each topsoil stockpile will have a small, one-foot high berm along the perimeter to isolate it from the surrounding area runoff and to trap runoff from the stockpile itself within the ditch created by the berm. All stockpiles that will be in place for more than one year will be seeded using the prescribed mix shown in the Reclamation Plan.

Sediment Pond Excavation

After topsoil is removed to an average depth of 16 inches over the sediment pond area, the pond will be excavated. The subsoil will be placed in a fill stockpile located east of the water treatment area leach field as shown on Map C-2. An estimated volume of 4,608 cy of subsoil will be stockpiled.

9. Fuel and Oil Storage Areas

Diesel fuel and various oils for use in mobile equipment and generators will be stored and used on site. Secondary containment will be provided for all petroleum products. In most cases, secondary tank containment will consist of an oversized livestock water tank within which the fuel or oil tank will be placed. All tanks containing fuel, oils or other petroleum products will be inspected daily during normal operations. Leaks will be promptly repaired and any spilled product or contaminated soils will be placed in containers or designated storage areas for later sampling and disposal.

The utility company will supply electrical power to the site; however, small generators may be used initially to supply power to the main facilities, remote ventilation fans, and to the water treatment trailer. These generators will be located within their respective trailers for secondary containment and security purposes. Fuel tanks will be located in the base of the generator or as separate tanks contained within larger livestock tanks for spill containment purposes. Once electrical power is available on site, the generators will be removed and/or used for emergency backup.

A Spill Control, Containment, and Contingency (SPCC) Plan for storing and using petroleum products will be prepared and implemented for the site in accordance with federal and state regulations, as the total aboveground storage of fuel and oil in containers of 55 gallons or more will exceed 1,320 gallons. A current plan has been included in Appendix F. A summary of fuel and oil storage at the site follows.

1. A skid-mounted oil storage shed with nominal dimensions of eight feet by ten feet will be located adjacent to the maintenance shop. Up to 500 gallons total of the listed products will be stored in the skid-mounted shed. Container size will range from 5 gallons to 55 gallons. This shed will drain to the Sediment Pond. The listed products are: *Antifreeze, motor oil, gear oil, hydraulic oil, ATF, rock drill oil, and gasoline.* Secondary containment will consist of the walls of the shed and shop.

2. *Used Oil* drums will be placed on a concrete pad equipped with secondary containment walls and a roof (to prevent contamination of rainwater). Used oil will be transferred to the drums using manual methods.

3. Up to four 500-gallon *diesel fuel tanks* will be installed on the Whirlwind Pad area (referred to as the fuel station on Map C-2) immediately west of the ore pad. These tanks will be installed within larger livestock tanks (approx. 700-gallons each). The fueling station area will be isolated with low rolling berms of six to nine inches in height that will fully contain the contents of the largest fuel tank plus direct precipitation from the 100-year storm event (i.e., 2.9 inches of precipitation).

4. There will be 100 to 500-gallon *diesel fuel tanks* outside the generator trailers at the Whirlwind and Packrat Portals, water treatment plant, and possibly one of the remote ventilation shafts. Secondary containment will be provided by livestock tanks large enough to hold a minimum of 110 percent of the diesel tank volume.

5. Small containers of oil and lubricants (less than 100 gallons total) will be stored and used in the two maintenance shops (i.e., Whirlwind and Packrat shops). Secondary containment will be provided by the shop walls and floor.

10. Warehouse and Maintenance Shops

A mobile trailer and prefabricated Sprung structure will be used initially as the warehouse and maintenance area, respectively, at the Whirlwind portal area. As the mine develops, these structures will be replaced by a one bay service area and warehouse constructed on top of the existing 43-foot by 60-foot concrete pad of 6" thickness. This structure will be a prefabricated metal building that is painted a BLM-approved color to better blend in with the surrounding natural features. Maintenance activities will be limited to routine service and minor repairs.

A second maintenance shop is located in a short drift just north of the main Packrat portal. This underground shop will be blocked in and equipped with a garage door.

11. Mine Offices and Shower Facilities

A four-inch thick concrete pad with nominal dimensions of twenty feet by fifty feet will be constructed immediately north of the warehouse and maintenance shop. A prefabricated metal building consisting of mine offices and change/shower facilities (i.e., dry) will be constructed on this concrete pad. This building will be contiguous with the shop and warehouse and will be painted the same color. This area will have a chain link fence and gate to prevent unauthorized access when the mine is idle. Signs will be posted stating that visitors must check in at the mine office.

A portable watchman's trailer will also be located on site as shown on Map C-2. This trailer will be approximately 10 feet x 30 feet and may be used as sleeping quarters for a security person at night or when the mine is not operating. A septic system will be installed for the shower and bathroom facilities as described under utilities below.

12. Designated Parking and Storage Areas

A gravel parking area will be provided for employees and visitors just north and adjacent to the mine offices.

One or more material storage areas will be established on top of the Whirlwind waste rock pad. A small storage area will also be available at the north end of the Packrat waste rock pad next to the maintenance shop. These storage areas will contain supplies used underground such as roof bolts, mats, pipe, power cable, ventilation tubing, hoses, timbers, and parts for large equipment.

A 1,000 gallon tank containing a dilute solution of magnesium chloride will be installed on top of the pad near the Whirlwind portal as shown on Map C-2. This tank will be surrounded with a soil berm to contain any releases or spills. The magnesium chloride will be sprayed on the mine haulage roads to create a sealed surface that minimizes the generation of fugitive dust.

13. Mine Access Roads and Pads

Primary Access Roads

The Whirlwind Mine portal is located in the north central part of the claim block. It is accessed by driving 0.8 mile on Colorado Highway 141 south of the Gateway Post Office to Mesa County Road 4 $^{4}/_{10}$ (a.k.a., John Brown Road); then 7.4 miles southwest to the intersection with Mesa County Road $^{5}/_{10}$; and, then proceeding west and north on Road $^{5}/_{10}$ for 3.2 miles to the mine site. Energy Fuels has Surface Alteration Permits with Mesa County that allow the company to assist the County in road maintenance activities. Permitted maintenance activities include snow removal, minor repairs, and application of magnesium chloride on both roads. Installation of culverts and additional road improvements (i.e., construction of ditches, placement of road base, and periodic road grading) are also allowed on 5/10 Road.

Maintenance activities on John Brown Road and 5/10 Road are expected to result in year-round access to the mine. However, there will be time periods when the steeper sections of the road are not safe for ore haulage. The Whirlwind Mine Superintendent and the ore haulage contractor will make the decision whether to temporarily suspend ore haulage operations on a case-by-case basis. Normally this would occur after a heavy precipitation event. The County Conditional Use Permit also places restrictions on the times and days when ore haulage may occur to minimize impacts to other users of

the road. At the present time, these restrictions include hauling only during three posted time periods on weekdays and no weekend haulage from April 15 to December 15.

Secondary Access Roads

The two short access roads to the Whirlwind off of 5/10 Road will remain in their current configuration as shown on Map C-1A. The Packrat portal will be accessed by reopening a previously reclaimed mine access road off of 5/10 Road (see Map C-2). Reopening of this road was completed in May 2007 during the exploration phase of the project. The 10-Straight vent shaft will be accessed by an existing secondary road and two-track road off of 5/10 Road. The proposed vent shafts are located next to existing roads and the access roads are included within the proposed 100-foot by 100-foot pad area (see Map C-1B).

The access roads to the portal areas within the mine permit will be dirt and/or gravel and bermed in accordance with MSHA regulations. The roads into the Whirlwind and Packrat will have swinging metal gates. Gates will be locked during weekends, holidays, and other down times. The short access roads to ventilation shafts and power drops will typically be two-track overland roads that will only be used for periodic inspections and maintenance. No fencing or gates will be required at these sites.

Mine Pad Areas

The Whirlwind pad, as previously discussed, will have two levels. The lower level will be at approximately the same elevation as the portal while the upper level will gradually move up the side of the hill to the east. This upper level will be built from waste rock hauled from the mine.

The Packrat pad will be relatively small (approximately 1.0 acre in disturbed area) and terraced to provide two levels as shown on Maps C-4 and C-5. The cut and fill for the portal area is an approximate balance of 3,200 cubic yards. Two 30-ton metal bins for storage of waste rock and ore will be installed so that the buggies can dump into the bins at the top level and haul trucks can pull under the bins on the lower level and be loaded. An additional pair of bins may also be installed at a later date if needed. See Map C-4 for a plan view of the mine layout. The upper pad will have a ramp

that allows the mine buggies to reach the top of the bins to dump. Map C-5 shows the cross sections of the Pack Rat Mine. These cross sections show the existing terrain, the mining configuration and the reclaimed terrain. The existing reclaimed Packrat waste pile is located on steep terrain and is not suitable for disposal of waste rock. Accordingly, all waste rock and ore hauled out of the Packrat Portal will be dumped into the bins. The waste will be hauled from the waste bin to the Whirlwind waste rock pile while the ore will be hauled to either the Whirlwind ore stockpile or directly to the mill.

14. Utilities

The local power company will supply electricity to the site using the existing power poles and lines for the most part. Some additional poles and transformers will be needed and temporary generators may used in some areas until the power is completely established. Installation of the new power poles and lines and acquisition of the required right of ways will be the responsibility of San Miguel Power Company.

Power drops to the Whirlwind and Packrat portal areas, Whirlwind Mine, Packrat Mine, and vent shafts will be installed. The approximate locations of the two pad areas for the power drops to the Whirlwind and Packrat underground workings are shown on Figure C-1B. The power drops for the Whirlwind portal, Packrat portal and vent shafts will probably be from a power pole transformer to a breaker box at the ground surface within the proposed surface disturbance for these areas, although some vent shafts could be powered from an underground feed. For more detail on the power drop locations, see Section 17 of this Exhibit.

As shown on map C-1, several existing telephone poles are located within the proposed waste embankment expansion. A solar-powered radio is located on one of these -poles, which provides telephone service to the mine. The poles are not owned by a utility company. Energy Fuels will remove the pole and relocate the radio receiver prior to the waste pile expansion into this area. This will not occur for at least two years after mine startup.

Water for bathrooms, showers, and other general uses will be hauled to the site from nearby, privately owned springs or wells. An above-ground water supply tank may be installed near the dry to store this

water. The mine will supply bottled water for drinking purposes. A septic system will be installed in accordance with state and county requirements near the mine offices and dry change facilities.

The main building, which includes the maintenance shop, warehouse, mine offices, and dry change facilities will be heated using propane; the propane tank will be located near the building. The water treatment trailer will be equipped with an electrical heater for use during the colder months. A portable propane heating system may also be used at the Packrat maintenance shop during the winter.

15. Solid Waste Storage

A roll off container for disposal of trash will be located next to the maintenance shop and warehouse. A second roll off may be located on top of the Whirlwind pad near the storage area and smaller trash barrels will be located in the shop areas. Any trash receptacles used to contain lunch-room wastes will be stored in fenced areas to preclude access by bears and other wildlife. The trash will be picked up on a routine basis by a service company and disposed of at an approved landfill. No landfills will be constructed on site. Scrap metal will be stored in a bin and/or on pallets near the shop until it can be picked up for recycling. Used batteries and tires will be stored in the same area and will be picked up and recycled by vendors.

16. Ventilation Shafts

The existing 10-Straight Vent Shaft that accesses the southern portion of the Packrat Mine will be rehabilitated and used for ventilation purposes. As the mine expands, one additional ventilation shaft in Colorado and six ventilation shafts in Utah will be added as shown on Map C-1B for a total of eight ventilation shafts. The location of these vent shafts may change by several hundred feet depending on the ultimate location of the drift and ventilation needs. The ventilation shafts will typically be 72 inches in diameter and cased. The steel casing will be grouted where it passes through aquifers to prevent intermixing of waters between formations.

A concrete pad up to 200 square feet in size and a thickness of 6” will be constructed at each new vent shaft to provide a level platform for drilling equipment during installation. Prior to installation of the

pad, topsoil will be stripped to a minimum depth of 12 inches and the material will be stockpiled at the perimeter of the pad for later use in reclamation. These perimeter topsoil berms will also isolate the vent shaft areas from the surrounding drainages. All drainage from the ventilation shaft areas will be kept on site by the topsoil berms, which will be seeded since they will be present for a number of years.

Once the shafts are completed and cased, a single-vane axial fan with a diffuser will be mounted on top of each hole. These units are typically about three to five feet high and have metal grates on top. Taller diffusers may be installed if additional noise reduction is required. The diffusers will be painted a BLM-approved color to blend in with the surroundings.

The fans will be powered by electricity from nearby power poles and each unit will have locked breaker boxes at the power drop. Some additional poles and transformers will be needed to access some locations and temporary generators may used in some areas until the power is completely established. The vent shafts have been located adjacent to existing access roads. Surface disturbance at each vent shaft is estimated to be 0.23 acres consisting of a small pad area (typically 100 feet by 100 feet) that includes a 15-foot-wide, two-track access road. Fencing and locked gates may be added at each vent shaft location for security purposes if required by the BLM. The vent shafts will be inspected periodically during operation (i.e., average of once per day) by Energy Fuels personnel.

17. Power Drop Locations

Map C-1A shows a permit area of 0.41 acres located approximately 1,100 feet southwest of the Packrat portal area. This area has been previously disturbed by past mining operations. The current site is relatively flat and contains two abandoned power poles surrounded by a chain link fence and an abandoned steel air receiver tank a short distance away. An existing borehole was drilled in the past to allow power to enter the mine. Energy Fuels plans to use the same boring or install a new cased 6-inch diameter hole to allow power to enter the mine. San Miguel Power will re-connect the power to the site from poles in the surrounding area. As seen on Map C-1A, the site currently has existing access roads that enter the pad area from the south and the north. These roads will not be part of the DRMS permit area.

Over time, weed vegetation has built up on the pad area. These weeds will be sprayed and then the topsoil will be stripped to a depth of 6 inches and stockpiled in a perimeter berm around the entire area. This berm will be a minimum of 2 feet high with sideslopes of 2H:1V. This berm will isolate the site from all outside area runoff. The topsoil will be seeded with the mix described in the Reclamation Plan within 3 months after construction. The runoff from the site itself will be collected in a sediment sump which is large enough to contain the 100 year – 24 hour event from the 0.41 acre site. In addition to the power drop, the site may also be used to store portable equipment, a water tank, and an air compressor.

The power drop to the Whirlwind Mine will be run through an existing 12-inch diameter drill hole from the top of the mesa to a transformer located in the mine, approximately 540 feet below. This hole, which is cased and grouted, was completed by Little Maverick Mining Company under approved NOI M-2005-016. It is located southwest of the mine portal and is shown on Map C-1B. This permit area will be 100 feet x 100 feet in size, which is identical to the ventilation shaft areas. The area will be stripped of topsoil and bermed similar to the Packrat portal drop area described above.

Reclamation of the two cased holes and associated pad areas has been included in the reclamation cost estimate (see Exhibit E).

18. Water Management

Surface drainage control is divided into the following three main categories:

1.Surface drainage from undisturbed areas uphill from both portal areas will be permanently diverted around the mine area via constructed ditches and culverts. This water will be diverted directly to nearby natural drainages. All such diversion ditches and culverts are designed for the NOAA year round 100-year, 24-hour storm event of 2.9 inches. This is more conservative than the lower rainfall presented in TR-55, which is more widely used in Colorado for determining peak flows. All ditches have a maximum sideslope of 2H:1V and 0.3 feet freeboard. Any ditch with a design flow greater than 5.0 feet per second is designated for a rip-rap lining, which is also designed to withstand the peak flow from the 100-year 24-hour event.

2.Surface drainage from the Whirlwind waste rock pile and all other surface facilities will be diverted through ditches and culverts to the mine sediment pond that, in turn, discharges to an ephemeral drainage in Lumsden Canyon. These collection ditches, which will be reclaimed at the conclusion of mining, have been designed for the 10-year, 24-hour storm event. They have maximum sideslopes of 2H:1V and freeboard levels of 0.3 feet except next to topsoil stockpiles where the freeboard depth is 1.0 feet. The sediment pond will fully contain the 10-year, 24-hour event and will safely pass the 100-year 24-hour event. A principal spillway pipe is used to drain the pond for storm events up to the 100-year event. Larger flows will be handled though a trapezoidal emergency spillway that also leads to the ephemeral drainage. The sediment pond is completely incised in the flat area at the low point of the Whirlwind disturbed area and will have excavated slopes of 2H:1V that will be topsoiled and revegetated. It has a surface area of 0.46 acres and a volume of 4,608 cubic yards.

3.Surface drainage from the ore stockpile pad will be directed to a sump that will overflow into a synthetically lined tank (Untreated Water Tank) that feeds the water treatment system. Water pumped from underground will also enter this system. The Untreated Water Tank is designed to utilize 40,000 gallons of capacity for daily operation of the mine dewatering and treatment system. The tank will also have 75,000 gallons of emergency capacity -for continued mine pumping during planned or unplanned plant maintenance activities, and 49,000 gallons for inflow from the ore pad and the tank surface for a 100-year storm event. Therefore, the total design volume of the tank is 164,000 gallons. The tank will have a minimum freeboard of 1.5 feet. This tank is also described as part of the Water Treatment System designed by Lyntek in Appendix H.

18.1 Whirlwind Surface Drainage

Surface drainage in the Whirlwind portal area will include installation of long-term drainage controls in the facility areas (i.e., buildings and water treatment system) and phased drainage controls at the ore pad and waste pile areas. The proposed drainage ditches and culverts are illustrated on Map C-6. Collection ditches within the site are shown in light blue and diversion ditches around the site are shown in purple. All collection ditches drain to the sediment pond while diversion ditches divert surface water runoff from undisturbed areas around the site. The sediment pond is sized to safely pass

the 100-year storm event with a discharge rate of less than 3 cfs. The 10 year 24 hour runoff is fully contained in the pond. The pond will remain throughout the life of mine and during the initial period after reclamation until vegetation has been adequately reestablished over the mine area.

Surface Facilities

As shown in Phase 1 of Map C-6, drainage from the buildings (i.e., shop, dry, and administrative offices), mine access road, and parking area will be collected in a ditch along County Road 5/10 and diverted to the sediment pond via two 24-inch culverts installed under the road. The water treatment area will be gradually sloped at a grade of about 2 percent toward the sediment pond. Therefore, stormwater runoff and any spills from the treatment area will be captured in the sediment pond. Surface drainage in the facilities areas will remain the same through phase 2 and 3 of the project as shown on Map C-6.

Ore Pad

Initially, the ore pad at the site will be located within a fully bermed area that will contain all direct precipitation. As the lower pad area is expanded to its full size, a new ore pad will be constructed using a GCL liner and 2.5 feet of cover material consisting of compacted fine-grained and run-of-mine waste rock covered with an additional 1.0 feet of compacted run-of-mine waste rock (See Appendix J). This pad will be contained within a berm and all drainage will be routed to a concrete sump. The containment berm will be approximately a foot high and will have gradually-sloped sides that will allow for haulage buggies, trucks, and loaders to access the ore stockpile. The sump will be equipped with an overflow that will drain excess water through a 6-inch HDPE pipe into the Untreated Water Tank. As shown on Map C-6, these drainage controls will remain in place through Phase 2 and 3.

Waste Pile

Surface drainage controls for the waste pile will be implemented in three phases during mine operations; initial (phase 1), interim (phase 2), and final (phase 3). These three phases are illustrated on Map C-6.

During the initial phase, the existing lower pad will be expanded northward to its final design stage. An initial collection ditch **G1a** will be constructed along the east toe of the waste pile that will carry runoff from the pile to the sediment pond. This temporary collection ditch will be utilized until such time the interim phase 2 starts. An existing East Diversion Ditch (**Tc-1**) along the south perimeter of the waste pile will divert surface water runoff around the pile to a small natural channel located east of the waste pile. A second Diversion Ditch (**Tde-1**) located along County Road 5/10 will capture runoff from the areas further east of the waste pile. This phase is expected to last two years.

The interim phase 2 includes the expansion of the waste pile into Temporary Basins Tc and Tde at a flat grade up to the level of the interim East Diversion Ditch. The interim diversion will be constructed along the hillside contour above the expanding waste pile and will discharge into a culvert that runs under County Road 5/10 just east of the primary topsoil stockpile. The diversion ditch on the south edge of the lower pad area will be reconstructed so that it drains to the ephemeral drainage located west of the site. A culvert will be installed at the portal so that this water will not be impacted by mobile equipment passing through the portal. A collection ditch, **Tn-1**, will be installed between the expanding waste pile and the county road. Temporary collection ditches will also be installed around the east edge of the expanding waste pile as topsoil is stripped. These temporary ditches will be at the edge of the stripped area and will flow into collection ditch **Tn-1**. This phase of the operation is expected to last 3 to 4 years.

The final phase 3 of the project will consist of gradually raising the east portion of the waste pile. As the pile is raised, the west diversion channel will be extended further to the east and will become permanent. A permanent diversion channel will also be constructed around the east side of the pile. Internal collection ditches will remain at the waste pile downslope perimeter and new ditches will be installed along the haul road to the upper waste pile pad area. Phase 3 is expected to extend through the life of the mine.

The maximum projected flow through culverts during any phase determined the ultimate size of each culvert. A minimum culvert size of 24 inches was used for all installations to minimize the potential for plugging and to facilitate cleaning. Culverts will be installed at the initial phase of the project or as needed for the next phase to continue.

18.2 Packrat Surface Drainage

As the Packrat portal area is very small (i.e., about an acre), installation of an unlined collection sump is considered sufficient to control runoff and sediment from the disturbed area. This sump will handle the runoff from the 100-year, 24-hour storm event. As shown on Map C-6, the sump will be located at the bottom of the bin area. Surface water runoff will flow directly into the sump from the lower pad. Water runoff from the upper bench will be transferred to the bin level sump by a 6-inch diameter HDPE vertical pipe, which is shown on Map C-4.

Surface water runoff from above the Packrat will be diverted around the site by diversion channels located along the west perimeter of the pad. The channels will be directed into culverts where they pass under portal areas. All diversions, collection ditches, and culverts were designed using the 100-year peak flows.

18.3 Design Method

The hydrology designs, including ditches, culverts, drainage basins, peak flows, sediment pond, etc. are shown on Map C-6 Mine Surface Hydrology Designs. All calculations for the designs are shown in Appendix B.

For both the Whirlwind and Packrat sites, the 100-full-year type 2 storm event was chosen for designs. Information for the 2.90 inch event was obtained from the NOAA Atlas 2, Volume III for Colorado.

The hydrologic soils group for the Sili , Sedgran, and Bodot soils is “C”, although for conservative design purposes, a “D” hydrologic soil group was used.

The Curve Number Method was developed to allow calculation of the overall time of concentration (Tc) under a wide range of conditions. The method is designed for areas of 2,000 acres or less. The calculations require a proper understanding of the input requirements:

The HYDROCAD computer modeling program was used which uses the SCS Unit Hydrograph Method for watershed runoff modeling.

SCS Unit Hydrograph Method

The SCS unit hydrograph procedure (also known as the TR-20 runoff method) generates a runoff hydrograph by the following basic steps: (For brevity, this is a simplified description.)

1) A rainfall distribution is selected which indicates how the storm depth will be distributed over time. This is usually a standardized distribution, such as the SCS Type II storm, and often has a standardized duration of 24 hours.

2) The design storm depth is determined from rainfall maps, based on the return period being modeled. Combined with the rainfall distribution, this specifies the cumulative rainfall depth at all times during the storm.

3) Based on the Time-of-Concentration, the storm is divided into “bursts" of equal duration. For each burst, the SCS runoff equation and the average Curve Number are used to determine the portion of that burst that will appear as runoff.

4) A Unit Hydro-graph, in conjunction with the Time-of-Concentration, is used to determine how the runoff from a single burst is distributed over time. The result is a complete runoff hydrograph for a single burst.

5) Individual hydrographs are added together for all bursts in the storm, yielding the complete runoff hydrograph for the storm.

For a Tc of 7.5 minutes, the burst duration is 1 minute, so a 24-hour storm will consist of 1440 bursts. If each burst involves a unit hydrograph of 100 coordinates, then 140,000 coordinates must be summed to produce the composite hydrograph.

Because of the computational requirements of the unit hydrograph procedure, the SCS derived a simplified tabular method as published in Technical Release 55 JR-55).

Storage-Indication + Translation Method

The basic storage-indication method accounts for only the storage effects of a reach. Other techniques must be used to account for the kinematic effects of long reaches. HydroCAD provides the option of adding a time lag or translation to the normal storage-indication routing.

Time Translation

The "Stor-lnd+Trans' routing method first performs a storage-indication routing, and then translates the resulting hydrograph by the travel time. A close examination of the resulting hydrograph will reveal that the peak discharge no longer corresponds to a point on the inflow curve, but is translated (delayed) by the prescribed amount.

$$T_c = \frac{L}{0.6}$$

where $$L = \frac{I^{0.8} \times (S+1)^{0.7}}{1900 \times Y^{0.5}}$$

and $$S = \frac{1000}{CN} - 10$$

where:
Tc=Time of Concentration [hours]
L=Lag time [hours]
I=Hydraulic length of the watershed [feet]
Y=Average land slope [percent]
S=Potential maximum retention [inches]
CN=Weighted Curve Number

Note the use of the average land slope, and not the slope of the hydraulic path. Although some care is required to determine this value, the Curve Number method has the advantage of using a small number of fairly objective parameters. This provides more consistent results than some other approaches.

18.4. Water Treatment Plant and Tanks

Excess water from the underground workings will be pumped into a lined untreated water tank via a buried six-inch diameter HDPE pipe. The lined tank will be located just north of 5/10 Road and south of the sediment pond. Surface drainage overflow from the ore pad area will also be directed to this tank. ~~A~~ ~~P~~portable, trailer/container-mounted water treatment plants will be installed immediately west and south of the collection tank. See Map C-2. The plant will pump water from the synthetically lined collection tank and first treat the water with barium chloride and ferric sulfate to precipitate out radium and uranium.

The treated water will be discharged into one of two synthetically lined tanks located immediately north of the treatment plant. Precipitated metals and radionuclides will settle out in the first tank and then the water will then be pumped into a second and third treatment containers for pH adjustment, sand media filtration, and ion exchange to remove residual contaminants. Finish water tanks located inside the containers will collect the treated water prior to permitted discharge into the ephemeral drainage located immediately west of the tank. The treatment plant and tanks will be fenced and equipped with a locked gate to prevent unauthorized access.

Sampling and analysis of treated water will be conducted in accordance with Colorado Discharge Permit System (CDPS) Permit Number CO-0047562 with the Colorado Division of Water Quality Control. See Appendix L)

Details of the water treatment process are discussed in Exhibit T and Appendix H.

18.5 Construction QA/QC

The BLM and DRMS will be notified in writing at least 10 working days prior to the beginning of construction of stormwater control features, the ore pad, and any additional structures. This will allow the agencies the opportunity to conduct inspections prior to and during construction activities. A

detailed preconstruction report will be prepared by a licensed professional engineer and submitted within 30 days of completion of the work or prior to commencing use, whichever date is less.

19. Temporary Closure

In the event that market conditions or other circumstances require a temporary shutdown of mine operations, Energy Fuels will provide notice to the BLM in accordance with the requirements of Part 3802.4.7, Title 43 of the Code of Federal Regulations (CFR) and to DRMS in accordance with Section 1.13.5 of the Colorado Hard Rock/Metal Mining Rules and Regulations. During non-operating periods, Energy Fuels will maintain the buildings, drainage structures, ponds, roads, and other surface facilities in a safe and environmentally acceptable condition. Underground openings, gates, and buildings will be locked to discourage unauthorized access when mine personnel are not present.

Water treatment will likely continue during any short-term closure period of six months or less. It is likely that water treatment will be discontinued if the mine has to be idled for an extended period of time.

20. Mining Schedule

Mine life is estimated at approximately 10 years. **Table D-3** shows the approximate schedule of mining operations at Whirlwind. Details of each task are covered in Section 2 – Underground Mine Operations.

Table D-3

Task #	Description	Time Needed (Months)
1	Rehabilition of existing workings in both the Urantah Decline and Packrat Mine. Construction of surface facilities.	6
2	Development of several nine-foot by twelve-foot drifts through known ore-bearing zones to provide access for production mining.	12
3	Mine uranium. Addition of seven ventilation shafts (72 inch dia.)	102
4	Post-mining reclamation of operation. (Details in **Table E-1: Reclamation Timetable**)	24
	Total months	**144**
	Total years	**12**

21. General Area Road Use and Maintenance

Road use and road maintenance has been addressed with Mesa County and the BLM.

Exhibit T
Environmental Protection Plan

DESIGNATED MINING OPERATION ENVIRONMENTAL PROTECTION PLAN EXHIBIT T

1. General Plan

An Environmental Protection Plan and Monitoring Plan is being submitted because the project is classified as a Designated Mining Operation by the Division of Reclamation, Mining and Safety (DRMS). This classification results from the current DRMS definition of Designated Mining Operations that includes a "mining operation at which toxic or acid-forming materials will be exposed or disturbed as a result of mining operations." The Whirlwind Project falls into this category because mine water will be pumped to the surface intermittently where it will be treated and discharged. The mine water contains elevated levels of radionuclides, uranium, and trace metals that could be considered chronically toxic if ingested over an extended period of time. Additionally, some of the water treatment chemicals are strongly acidic and, in their undiluted form, could present a potential threat to human health or the environment.

In preparing this Environmental Protection and Monitoring Plan, the proposed mine plan was evaluated to determine what portions of the project could potentially generate "toxic" materials that would require implementation of additional environmental controls. The following three aspects of the mine plan were identified as having the greatest potential to impact the surrounding environment, especially ground and surface water.

1) Mine Waste Disposal: Surface water runoff from the waste pile and infiltration of precipitation through the waste material could potentially liberate radium, uranium, and other metals resulting in impacts to ground water and/or surface water. Synthetic Precipitation Leaching Procedure (SPLP) tests were conducted on representative waste rock samples to determine the waste's potential for leaching radionuclides and metals. The test results, which are presented in Appendix A, indicate that the waste rock has low leaching potential. The activity and concentration levels of all the constituents in the leachate generated from the tests were below maximum state water quality limits. Based on these results, the waste pile was designed in accordance with standard mine

methods in which surface runoff is diverted around the waste pile while surface runoff within the pile is directed to a sediment pond. Discharges from the sediment pond will be sampled and analyzed periodically to verify that any water being discharged meets state water quality standards. The waste rock embankment is discussed in detail in Section 5 of Exhibit D.

2) Ore Storage: SPLP testing of representative ore samples generated a leachate containing elevated levels of radium, uranium, arsenic, and selenium (see Appendix A). To ensure that the temporary stockpiles of uranium ore will not impact ground or surface water, the ore pad will be limited to 0.5 acre and a berm will be maintained around the pad that directs all runoff to a small concrete sump. The overflow from the sump will connect to a waterline that will deliver the water to the Untreated Water Tank (see Exhibit D Section 6). From there, the water will be pumped to the treatment plant for removal of radionuclides and trace metals prior to discharge. The ore pad will be underlain by a geosynthetic clay liner (GCL) on a prepared subgrade. The liner will be protected by 2.5 feet of compacted cushion material and 1 foot of run of mine (ROM) waste rock. Details regarding the construction of the ore pad are presented in the Golder Associates design report, which has been included as Appendix J. The liner is designed to prevent downward migration of leachate that could potentially impact ground water. At the end of mining, the liner and cover material will be excavated and placed in the Whirlwind Mine in an appropriate (i.e., dry) area prior to sealing. This is discussed in more detail in Exhibit E – Reclamation Plan.

3) Mine Water Treatment and Discharge: Excess water will need to be removed from the mine on an intermittent basis. As discussed in Exhibit G, ground water inflow into the mine is attributed primarily to seepage from water-bearing zones above the mine workings. This ground water is of poor quality and degrades further when in contact with the ore zone resulting in mine drainage that requires treatment prior to discharge into the local ephemeral drainage.

Mine water management and treatment are the focus of this Environmental Protection and Monitoring Plan because it is these activities that place the mine project into the Designated Mining Operation permit category and, the environmental controls for waste rock disposal and ore storage are already described in detail in Exhibits D and E.

The mine water will be pumped on an intermittent, or as necessary, basis from a sump inside the Whirlwind Mine to the surface for treatment. A 3-inch diameter high density polyethylene (HDPE) pipe will be buried from the portal through the bench area, down the bench slope, under County Road 5/10 and to the Lined Untreated Water Tank shown on Map C-2. The pipe will be buried below the frost line to prevent freezing. A 2-inch diameter HDPE pipe will be buried along side the 3-inch pipe to allow pumping of water from the tank back to the mine's head tank, which is located in the decline.

Direct precipitation runoff from the ore stockpile pad will be directed to a sump that will overflow into a 6-inch diameter HDPE pipe, or equivalent, that will also drain to the Lined Untreated Water Tank. This pipe will be buried alongside the water pipe from the mine. As can be seen from Map C-2, the ore pad area and surrounding loading area is approximately 0.5 acre.

The Untreated Water Tank has a capacity of 164,000 gallons. It is designed to contain up to 50,000 gallons of water during normal treatment operations. The tank has 65,000 gallons of additional capacity for scheduled and unscheduled periods of treatment plant downtime and 49,000 gallons of additional reserve storage capacity for the surface water runoff from the ore pad and direct precipitation on the tank surface from a 100-year storm event. The Untreated Water Tank is lined with two 30-mil, reinforced synthetic liners. Leak detection is provided by an 8-oz. geotextile fabric that is located between the two liners and that is connected to a dip tube leak detector. The entire tank area is also underlain by a GCL on a prepared subbase. This liner provides a third level of containment in the event of a leak.

Water from the Untreated Water Tank will be pumped to the Lyntek system water treatment trailer, where barium chloride and ferric sulfate will be added to remove radium, uranium, and trace metals. The treated water will flow by gravity into the Settling Tank which allows for particle growth and settling of contaminants before it flows by gravity to the Polishing Tank for additional solids removal. Settled, clarified water from the Polishing Tank will be pumped to the Linkan treatment trailers. The Linkan system will treat the incoming water with hydrochloric acid for pH adjustment prior to it entering a series of sand filters, ion exchange and activated carbon columns (in that order) to remove residual contaminants. A contingent sodium hydroxide dose may be used before the finish water tanks if the pH should fall below the anticipated discharge limits. The treated water will then be pumped to

two finish water tanks prior to discharge. Both the Settling and Polishing tanks have a nominal capacity of 7,500 gallons and were constructed with multiple liners in the same manner as the Untreated Water Tank. ~~Radionuclides and metals will coprecipitate out of solution as chemical compounds formed by adding water treatment reagents in the Settling Tank. A minor amount of additional settling may also occur in the Polish Tank; however, the main purpose of this tank is to allow sampling of the treated water prior to discharge.~~ The treated water will discharge from the finish water tanks by gravity flow to the ephemeral tributary of Lumsden Creek located immediately west of the treatment area, as shown on Map C-2.

Lyntek Incorporated, which specializes in designing treatment plants of this type, has prepared a detailed design of the treatment plant and water tank system. The plant design is included as Appendix H. Linkan's newly designed system is an added treatment to ensure compliance with lower discharge limits per the discharge permit with CDHPE.

2. Maps

In Appendix H, the following maps are enclosed:

Flow Sheet, Water Treatment Plants
General Trailer Layouts

In addition, Map C-2 - Mine Plan, which is included in Appendix I, shows the layout of all surface facilities for the Whirlwind and Packrat sites.

3. Other Agency Environmental Protection Measures

Local Agencies

A Conditional Use Permit for the mine was approved by Mesa County. The Conditional Use Permit included many of the same environmental protection measures described in this permit application. The County permit also included more detailed analyses of road maintenance on County Road 5/10, traffic volume, and noise generation. Road maintenance included installing road warning signs,

additional culverts for storm water control, and graveling sections of the road to allow safe access to the mine during inclement weather. The anticipated traffic volume at the intersection of John Brown Canyon Road and Highway 141 is less than 4 trips per day during peak traffic hours; therefore, auxiliary turn lanes will not be required at this intersection. Noise reduction measures will include mufflers or silencers on the generators and fans used at the site.

Energy Fuels has obtained an individual sewage disposal system permit from Mesa County for construction and operation of a septic system at the site. The proposed location of the leach field is north of 5/10 Road next to the treatment plant as shown on Map C-2. Energy Fuels will also apply for building permits from the County prior to building more permanent structures on site. Currently, temporary structures and self-contained porta-bathrooms are present on site during exploration activities. The required permits will be obtained prior to replacing the temporary structures with more permanent facilities. The septic system will be installed in accordance with applicable state and county regulations. Bottled water will be supplied for drinking purposes and water needed for other uses such as showering will be transported to the site from a potable source. A permit is not required for this type of system because the number of employees will be less than 25, which is the current permitting threshold for these types of water systems.

At the present time, no Grand County, Utah permits have been identified as being necessary for proposed mining activities.

Federal Agencies

The project is located entirely on public land managed by the U.S. Bureau of Land Management (BLM). A Plan of Operations has been submitted to the BLM. The Plan of Operations is identical to the 112d Permit Application except for formatting and additional analysis of environmental impacts associated with cultural resources, socioeconomics, radioactivity, site occupancy, site management during temporary mine closure, cave resources, threatened and endangered species, and air quality. The identification of appropriate environmental protection (i.e., mitigation) measures will be determined by the BLM as part of the National Environmental Policy Act (NEPA) analysis that will be conducted for this project. A summary of anticipated environmental protection measures follow.

1) Cultural resources identified as being eligible for the National Register of Historic Places will be avoided.
2) Socioeconomic impacts to local communities will be positive but relatively minor in extent due to the limited number of employees at the mine.
3) Regrading and placement of the clay-rich topsoil cover will result in the reclaimed site having higher background radiation levels than the immediate surroundings but well within risk-based standards for remote sites.
4) For security reasons, one to two people may reside on site in a small trailer. The trailer will be either equipped with self-contained water and wastewater systems or plumbed into the mine utilities.
5) Additional environmental protection measures will be stipulated during periods when the mine is temporarily closed. These measures will focus on general site cleanup, maintenance, and security.
6) Bats currently may be found in some of the mines in Lumsden Canyon including the Packrat Mine. No bats have been identified in the Whirlwind Tunnel. Bat mitigation measures, such as maintaining one or more of the surrounding historic mines open as alternate roosting sites, may be required by the BLM.
7) A biological survey of the mine areas did not identify any threatened or endangered species of wildlife and vegetation. The Townsend's big-eared Bat, which is a sensitive species, may be present in some portions of the Packrat Mine.
8) Fugitive dust will be controlled in accordance with the requirements of Energy Fuels' Fugitive Particulate Emission Permit (see Other State Agencies below). This will include treatment of haulage roads with magnesium chloride and/or water sprays. The ore stockpile will also be sprayed with water if the ore dries out. Treatment of County Road 5/10 will be done in accordance with Mesa County's requirements, which include application of magnesium chloride to the county roads two to three times per year. Use of mine water for dust suppression will be limited to the mine roads and pads.

A Spill Prevention, Control and Countermeasure (SPCC) Plan will be prepared and maintained in conformance with the U.S. Environmental Protection Agency's (EPA's) regulations for aboveground storage of more than 1,320 gallons of petroleum products. This plan will provide measures for properly storing and handling petroleum products and responding to, and reporting, spills. A copy of the most recent SPCC Plan for the site is included in Appendix F.

A 404 dredge and fill permit is not required from the U.S. Army Corp of Engineers because no drainages or wetlands will be impacted by surface disturbing activities. If this should change in the future, Energy Fuels would request a jurisdictional determination from the Corp for the drainage that would be impacted. If the affected drainage was determined to be a water of the United States, Energy Fuels would obtain a permit from the Corp and approval from the BLM prior to construction. For example, installation of a culvert to access a remote ventilation shaft could trigger the need for a Nationwide Permit Application to the Corp if the drainage is considered jurisdictional.

Ore transportation will be conducted by independent trucking contractors. These contractors will be required to follow all U.S. Department of Transportation rules for hauling uranium ore.

Other State Agencies

The Colorado Discharge Permit System (CDPS) permit issued by the Water Quality Control Division (WQCD) established the limits for all chemical constituents that must be controlled in the discharge of treated water. The permit was originally ~~A copy of this permit, which was~~ issued in July 2007. It was ~~and~~ later ~~amended in December 2007~~renewed in 2015. A copy of the 2015 permit~~,~~ is included as Appendix L. The treated mine water will be discharged into an ephemeral tributary to Lumsden Creek, which when flowing, discharges into the Dolores River. The permit requires sampling and analysis for selected radionuclides and metals on a weekly and monthly basis at the discharge point. The permit standards are based on the water quality criteria established by the state for Stream Segment 3a of the Dolores River. A Material Containment Plan will also be developed that provides guidance for the storage, use, cleanup, training, and reporting associated with the use of water treatment chemicals on site. The most current Material Containment Plan for the site is presented in Appendix F.

A Stormwater Management Plan (SWMP) is currently in place and implemented for exploration activities on site. The plan was recently expanded to include the proposed mine and reclamation activities described in this Plan of Operations. This plan, which is required by WQCD, addresses both permanent and temporary best management practices as well as stormwater monitoring. A copy of the plan has been provided to both the BLM and DRMS.

Energy Fuels submitted and received approval from the Colorado Air Pollution Control Division (APCD) for three Air Pollution Emission Notices (APENs). These APENs quantify potential air pollutants from fugitive dust, generator emissions, and mine ventilation emissions. All three sources are considered to be minor sources by the APCD. Fugitive dust controls include applying magnesium chloride and water to mine haul roads and county access roads, maintaining a high moisture content in the ore stockpile, and prompt revegetation of topsoil stockpiles and reclaimed areas. The generators used on site will be modern units with relatively low emissions and noise levels. Ventilation emissions will be recorded continuously and the results will be modeled annually using an EPA approved method to determine radiation levels at the nearest receptor.

A solvent-cleaning station may be installed in one or both of the maintenance shops. These stations generally consist of a cleaning sink mounted on a small drum of solvent. The solvent is pumped into and used in the sink and then recycled back to the drum via a gravity drain. The drums of solvent are periodically replaced by a vendor that recycles the solvent. If these stations are installed, Energy Fuels will acquire the necessary permit(s) from the Colorado Hazardous Materials and Waste Management Division (HMWMD). The electrical transformers to be used on site will not contain Polychlorinated Biphenyls (PCBs). As addressed in Section 4.5 of Appendix H and Section 6 of this exhibit, sludge produced from the water treatment system will be disposed of in accordance with HMWMD's Radiation Management Program's regulations for Technologically-Enhanced Naturally Occurring Radioactive Materials (TENORM).

Utah State Agencies

A small mine permit has been approved by the Utah Division of Oil, Gas and Mining (DOGM) for the installation and eventual reclamation of the vent shafts proposed in Utah. This application had similar content to Sections 14 and 16 of Exhibit D and Section 5 of Exhibit E. DOGM, with BLM input, will be responsible for determining the reclamation bond amount for proposed surface disturbances in Utah.

4. Other Agency Permits

Other permits and plans required for this operation that will include environmental protection measures are listed below. All of these permits and plans, with the exception of the Mesa County building permit, are in place.

1 – CDPHE Colorado Discharge Permit System Permit with the Water Quality Control Division
2 – BLM Plan of Operations (includes a third party environmental assessment of the plan)
3 – Mesa County Conditional Use Permit
4 – CDPHE Fugitive Particulate Emission Permit with the Air Pollution Control Division
5 – CDPHE Stormwater Management Plan with the Water Quality Control Division
6 – EPA Spill Prevention Control and Countermeasures Plan (SPCC)
7 – Mine Safety Health Administration, Mine Permit
8 – CDNR Water Right and Well Permit with the Division of Water Resources
9 – Mesa County Building Permit
10 – Mesa County Health Department Individual Sewage Disposal System Permit
11 – Utah DOGM Small Mine Permit

CDPHE = Colorado Department of Public Health and Environment
CDNR = Colorado Department of Natural Resources

5. Designated Chemical Evaluation

The water treatment chemicals commonly used on site include barium chloride, ~~and~~ ferric sulfate, hydrochloric acid, and sodium hydroxide.. Sulfuric acid, hydrochloric acid, and sodium metabisulfite have also been used in the system to reduce pH and oxygen levels, respectively. The ferric sulfate, sulfuric acid, and sodium metabisulfite are low pH chemicals in their undiluted state and, in that form, meet the definition of a "designated chemical." After mixing, the chemicals will be added to the untreated water in dilute concentrations that present minimal risk to human health or the environment. Sodium hydroxide may be used to increase the pH should it fall below the discharge limits. The chemical mixing will be performed within the treatment plant using appropriate personal protection

equipment (PPE), with adequate ventilation, and under the supervision of a certified wastewater treatment operator.

The water treatment chemicals are designed to help remove potentially harmful constituents from the mine discharge water during the water treatment process. In the Lyntek system ~~B~~barium chloride and ferric sulfate will be added to the untreated water to precipitate radionuclides and metals. These chemicals will be premixed in reagent tanks of about 300 gallons each. A spare reagent tank has also been included in the plant design as a contingency measure should an additional water treatment chemical be added to the treatment process. During the initial shakedown period for the treatment plant, both sulfuric acid and sodium metabisulfite have been added in this spare tank to treat selenium. The sulfuric acid lowers the water pH, which helps precipitate selenium. Metabisulfite reduces the oxygen levels in the water, which changes selenium from its selenate form to selenite, which is more easily adsorbed in the chemical precipitant. It is unknown at this time whether sulfuric acid and metabisulfate will continue to be used; it is unlikely that both would be necessary. Addition of a flocculant could also be beneficial to the treatment process. Flocculants are typically non-toxic chemicals that cause the fine particles in solution to agglomerate into flocs, which settle much more rapidly than would the individual dispersed particles.

The chemical precipitate produced from the treatment will settle out in the Settling Tank as a sludge. This sludge will contain low levels of radionuclides and metals. Based on testing performed at a similar facility, the metal concentrations and radioactivity levels are expected to be well below the regulatory thresholds that would require disposal of the sludge as a hazardous waste (see Section 4.5 of Appendix H).

After an average residence time of about 10 hours in the Settling and Polishing Tanks, the water will be pumped from the Polishing Tank to the Linkan treatment trailers where it will be dosed with hydrochloric acid to obtain a pH which is optimal for ion exchange performance. The water will flow into a 300-gallon agitated feed tank before being pumped to a series of fiberglass reinforced vessels containing sand filtration media, strong base anion exchange resin, arsenic/selenium selective ion exchange resin, and activated carbon, in series and in that order. The media filters polish residual solids that carry over from the Polishing T~~t~~ank while the two ion exchange systems~~s~~ remove residual

uranium, arsenic and selenium. The activated carbon is included to polish residual organics from the treated water to prevent aquatic toxicity. A contingent sodium hydroxide dose will be available just before the finish water tanks should the pH ever be below the anticipated discharge limits.

Magnesium chloride or a similar non-hazardous chemical will be used to treat haul roads within the mine and waste pile area. The chemical will be added in a dilute solution to the road surface where it will bind with the road material. The hard surface created by this treatment will minimize the amount of fugitive dust generated by mine haulage activities. The road treatment solution will be stored in a tank near the mine portal entrance. The tank will be bermed to contain any spills or other releases to the environment.

Diesel fuel, oils, and antifreeze will be used in the mine equipment. Storage and use of these products is discussed in Exhibit D, the SPCC Plan, and the Material Containment Plan. The current SPCC and Material Containment Plans for the site are provided in Appendix F.

6. Designated Chemicals and Materials Handling

Pallets of dry chemicals, up to 1000 lbs. each, and 55-gallon drums of chemical solution will be stored in the treatment plant trailer. Drums containing chemical solutions will be stored on spill-containment pallets or in secondary containment basins. As discussed below, the trailers ~~is~~ are also equipped with a secondary containment tank that is connected to the floor drain. The water treatment chemicals will be stored in quantities that are less than their reportable quantities. Petroleum products and antifreeze will be stored in above-ground storage tanks, drums, and smaller containers. All storage areas will have secondary containment that will capture the products in the event of a spill or leak.

The complete description of how the water treatment chemicals will be used and stored is explained in Appendix H in the Lyntek and Linkan systems reports. The Environmental and Operator Safety Plan is presented in Section 4.0 of the same appendix and the ~~M~~SDS sheets for the primary chemicals are also attached to the same. The expected use rate of barium chloride is 1.3 tons per year and the expected rate of ferric sulfate use is 0.2 tons per year. Hydrochloric acid will be dosed ~~-~~from a 275-gallon IBC tote in the new containerized system and the sodium hydroxide will be dosed from a 55-gallon barrel.

The acid ande base will be separated completely and contained on their own individual secondary containment vessels. MSDS sheets for all chemicals are maintained in a binder at the mine site.

With the addition of barium chloride and ferric sulfate to the mine water, a sludge precipitate will form that contains radium, uranium, arsenic and other metals. The Settling Tank has been designed to contain the full amount of sludge produced for the currently projected mine life of 10 years. As described in the reclamation plan, the sludge will be shipped to a mill for uranium recovery, disposed of in an appropriate off-site landfill, or mixed with concrete and disposed of in a dry location within the upper portion of the Whirlwind decline.

If the rate of sludge production is more than anticipated due to an increased solids load from the mining operation or the mine life exceeds 10 years, than a one time sludge removal would be needed in the latter part of the mine life. This material would be removed from the Settling Tank and either 1) dried and disposed of at a off-site facility approved to handle such material, according to the TENORM regulations of the CDPHE or 2) mixed with ore and transported to a uranium mill for recovery.

Spills and leaks from the treatment system will be contained as described in Section 4.5 and 5.0 of Appendix H, and will not result in a release to the environment. Liquid spills will be contained in the treatment trailers or be directed to the floor drains that discharges into a 400275-gallon secondary-containment tank located immediately outside the each trailers. This solution will be evaluated for content and then either recycled for plant use, pumped to the Untreated Water Tank, or disposed of off-site at an approved facility. If a significant spill should occur from one of the 300-gallon reagent tanks, the plant will be automatically shut down to prevent a situation where water could flow through the system without proper chemical dosing.

Sections 4.0, 5.0 and 6.0 of Appendix H provide chemical information, a material handling plan, and a monitoring plan respectively. Appendix F presents the current SPCC and Material Containment plans for the mine. These plans will be updated whenever the storage or use of chemicals and petroleum products changes. The procedures and controls discussed in appendices F and H are designed to

minimize the potential that an upset condition within the plant could adversely impact the surrounding environment.

If it is necessary to temporarily shut down the mine, dewatering operations will continue on an intermittent basis. If the plant is not needed because mine operations are consuming all of the ground water inflow, the plant will be shut down until needed. Temporary shutdown will include minimizing the volume of water contained in the water tanks, draining liquid reagents from the tanks, and locking the trailer and gates to prevent unauthorized access.

7. Facilities Evaluation

Maps and drawings describing the facility layout are included in Appendix H. Map C-2 in Appendix I shows the relative location of the treatment facility, tanks, and point of discharge. The proposed portable treatment plant with its secondary containment features is a proven design that has been used successfully at other locations. The plan takes into account site conditions by locating the treatment plant and water tanks in a relatively flat area that provides sufficient space to allow for the extra tank storage capacity that may be needed in the event of a plant outage or large storm event. The plant area is located downslope and separate from the main mine area with its own separate access off County Road 5/10. It is surrounded by a chain link fence so that access is controlled and limited to authorized personnel. The use of fabricated tanks and a portable trailer to house the treatment plant will facilitate future closure and reclamation of the site.

7.1 Water Balance

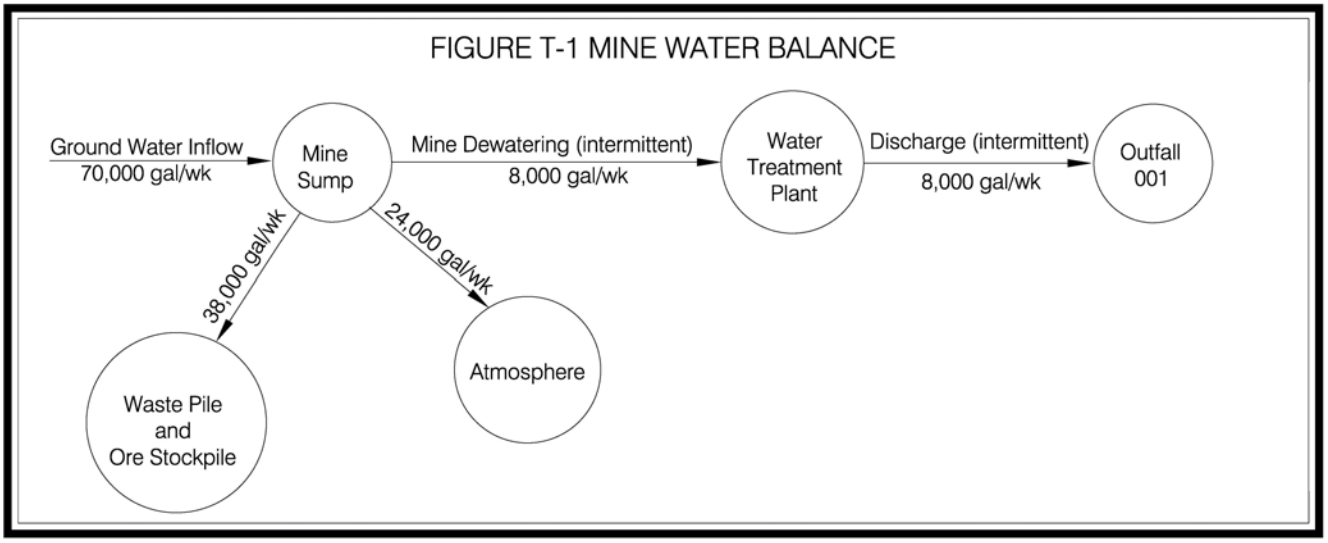
As discussed in Exhibit G, the upper Salt Wash ore zone is relatively dry. The majority of the ground water found in this unit originates from the Burro Canyon and Brushy Basin aquifers above. This water enters the mine workings through the Whirlwind decline, the existing Ten-Straight Shaft, historic exploration drill holes, and natural fractures and faulting. Based on records kept by Pioneer Uravan and Umetco, Energy Fuels believes that the water inflow into the Whirlwind and Packrat mine workings averages about 7 gpm. Historically, the ground water entering the mine workings collected in sumps and was used in mining operations for drilling and dust suppression purposes. Because the

ground water inflow rate was relatively low, mine operations consumed most of this water when the mines were active.

After the mines shut down, ground water accumulated in the low areas of the mine workings until equilibrium was established between the water source and the ore formation. This accumulated ground water will need to be pumped out, treated, and discharged prior to starting full-scale mining operations. The water treatment system is designed to treat 20 gpm. During initial dewatering, the system will operate 24 hours per day to remove the water collected in the lower portions of the mine plus the additional ground water inflow during this period. Once the mine is dewatered, the plant operation can be reduced to one shift per day.

Most, if not all, of the ground water inflow into the Whirlwind Mine will be consumed by mining activities when the mine is put into production. A water right to consume this water has been approved by the district water court. During mining operations, the ground water inflow will be directed to mine sumps where it will be used for drilling and dust suppression. Most of the water used during drilling flows back out of the drill holes and into the nearest mine sump, where it is then circulated back to the drilling equipment. However, some of the water remains in the rock, which is blasted and mucked out with small loaders. Some water is also lost to evaporation as dry air from the surface is circulated through the mine for ventilation purposes. The anticipated water balance during production is shown on Figure T-1 and described in the narrative below.

FIGURE T-1 MINE WATER BALANCE



The mining plan calls for an initial mining rate of 100 tons of ore with an average of 275 tons of waste rock generated per workday. Assuming that the broken material averages eight to nine percent moisture content, an average of about 7,700 gallons of water will be removed in the mined material per workday. As the mine develops, production is expected to increase along with water use and consumption. As shown in the calculation below, this means that most of the projected ground water inflow will be consumed by mining.

Ground Water Inflow = 7 gpm x 60 minutes x 24 hours x 7 days/week = 70,560 gals/week
Water Consumed = (7,680 gal/day x 5 days/wk) = 38,400 gals/week

The added moisture in the ore and waste is beneficial in reducing fugitive dust emissions from the ore stockpile and waste rock pile. The moisture also promotes higher densities in the waste rock material, which is compacted by the loaded buggies and other mobile equipment used on top of the waste rock pile.

Water will also be evaporated by the mine's ventilation circuit. Approximately 100,000 cubic feet per minute of air will be circulated through the mine during the initial stages of development and production. The water saturation level in the air will likely increase by an average of 30% or more while the air is circulated through 1 to 2 miles of drift. At an approximate elevation of 7,000 feet, a 30 percent increase in saturation is equivalent to 0.0002 pounds per cubic foot (pcf) of air. As shown below, a significant volume of water is expected to be lost in the mine ventilation circuit.

Water Evaporated = 100,000 cfm x 0.0002 pcf x 1gal/8.3 lb = 2.4 gpm or about 24,000 gals/wk

As the mine expands, Energy Fuels expects that pumping, treatment, and discharge of water will be needed only intermittently. This may include pumping in the spring when ground water inflows may increase due to snowmelt, after weekends and holidays, and in the event that open exploration holes are mined into (which is not uncommon in historic mine areas). As discussed in Section 10, Energy Fuels will plug point sources of ground water inflow as they are encountered during the normal course of mining. This is expected to further reduce the need for future water treatment at the site.

7.2 Treatment System Safety Features

The safety features of the treatment system components consisting of the Untreated Water Tank, Settling and Polish Tanks, and the Treatment Plant are described in more detail below.

Untreated Water Tank Safety Features

The Untreated Water Tank was installed in the fall of 2007 and consists of interlocking fabricated panels that support a multiple liner containment system. Prior to tank construction, topsoil was removed from the treatment area and the area was graded and compacted. Fine-grained squeegee material was then placed and compacted to create a smooth and level surface for tank installation. The interlocking panels were installed first and were anchored with blocks to prevent movement. Next, a geosynthetic clay liner (GCL) was installed on the prepared subbase between the panels as an extra precaution against seepage. The tank installation was completed by installing two 30-mil synthetic liners within the panel support system. A geotextile was also installed between the two liners and then connected to a monitoring dip stick to provide leak detection. This system provides both multiple containment and leak detection in the event that the upper liner is punctured.

The Untreated Water Tank has a total capacity of 164,000 gallons. To provide adequate settling of suspended particles in the mine water, the tank will be maintained at a nominal operating level of 50,000 gallons. The tank is designed with an additional 65,000 gallons of storage capacity for 6.5 days of mine pumping at an inflow rate of 7 gpm. The 7 gpm inflow is the expected rate of mine dewatering that would be required to keep the Whirlwind/Packrat mine workings dry when the mine is idle. When the mine is operating, most of this water will be consumed by drilling and other mining activities and the volume of water requiring treatment will decrease proportionately.

The Untreated Water Tank is also designed to contain the calculated 49,000-gallon direct precipitation and runoff volume generated during a 100-year, 24-hour storm event on the ore pad area and tank surface. Runoff from the ore pad will flow to a sump in the corner of the pad and then overflow through a pipe to the Untreated Water Tank.

The expected volume of runoff from the ore pad area was calculated using the SURVCADD program and shown below:

Runoff Curve Number and Runoff

Project: Whirlwind Mine By: GL
Location: Ore Pad Storm Volume Checked: GL
Developed Watershed

1. Runoff curve number (Cn)

Cover description	*CN*	*Soil Type*	*Area*
Pad compacted	*92*	*disturbed*	*0.810 Acres (This is the total area draining to the sump)*

CN (weighted): 92

2. Runoff
Frequency ..... : 100 yr
Rainfall, P (24-hour) .. : 2.90 in
Runoff, Q ..... : 2.0668 in
Runoff Volume ..... : 0.1395 Acre-Ft = = 40,600
Volume of Direct Precipitation on Tank = (2.9 in./12) x 68 ft x 68 ft/(7.48 gal/ft^3) = 8,400 gal.
Total Extra Volume Required for 100-yr storm event = 40,600 gal. + 8,400 gal. = 49,000 gal.

Treated Water Settling Tank Safety Features

The two Treated Water Tanks (a.k.a., Settling Tank and Polishing Tank) were installed in identical fashion to the Untreated Water Tank. The Settling Tank is designed to handle the full amount of precipitated sludge produced from the water treatment process over the life of the mine (see Section 3.3 of Appendix H). The level of sludge will be monitored on an ongoing basis during operation. The treated water from the Settling Tank could be directly discharged; however, a Polishing Tank has been

included in the design to provide additional holding capacity and the opportunity to sample the water prior to discharge.

Treatment Plant Safety Features

Safety procedures for daily plant operation, with redundancies and backups are summarized below:

1) All plant personnel will be fully trained and supervised in the operation of the plant by a state certified industrial wastewater operator. Annual refresher training and additional training for any facility alterations will be provided. Training records will be maintained ~~at Energy Fuels' Nucla office~~onsite during operations.

2) Once the ore pad is constructed, the Untreated Water Tank will have a float valve installed at the 115,000-gallon level, which corresponds to a freeboard level of 1.5 feet. If the water reaches this level, the float valve will trigger the mine pump to shut down and/or sound an alarm. The 1.5 feet of freeboard will provide 52,000 gallons of additional storage capacity, which is sufficient to contain the 100-year, 24 hour storm event runoff from the ore pad area plus direct precipitation on the tank.

3) Plant personnel will be required to inspect the plant at the start and periodically during each shift.

4) Any liquid chemical spills in the Lyntek trailer will be collected in a floor drain and diverted to a 400-gallon, secondary-containment tank located immediately outside the trailer. Any liquid chemical spills in the Linkan trailers will be collected in a floor drain and diverted to a 275-gallon sump which is fed to the ~~f~~Untreated Water Tank.

5) Any shutdown of the generator will shut down the entire plant, including the reagent feed equipment and the pump from the Untreated Water Tank to the plant.

6) Level controls in the reagent feed tanks will shut down the entire plant if any tank reaches a volume of less than or equal to 5% of its capacity.

7) The ongoing monitoring and sampling procedures are outlined in Appendix H – Section 6.0.

8) An Emergency Response Plan has been prepared and is included with the Material Containment and SPCC Plans in Appendix F. The Emergency Response Plan provides direction on how to respond to an upset condition at the plant that presents a threat to worker safety and/or the environment.

8. Ground and Surface Water Information

Map G-1 shows the regional hydrology of the Beaver Mesa area and all the nearby springs, streams, ditches, wells and other water features from the mesa to the confluence of Lumsden Creek with the Dolores River. The River is 5.1 miles downstream from the mine discharge point. The strata and aquifers within 2 miles of the site are comprised of the following in the order of their occurrence:

- Sandstones of the Burro Canyon Formation, (known discharge at DP Spring at Lumsden Fault)
- Sandstones of the Brushy Basin member of the Morrison Formation (closest known discharge is Willow Creek located southeast of Beaver Mesa)
- Sandstones of the Salt Wash member of the Morrison Formation (known discharge at PR Spring)
- Sandy shale and mudstone of the Summerville Formation (aquitard with no aquifers)
- Slick Rock member of the Entrada Sandstone (possible aquifer but no known springs)
- Dewey Bridge member of Entrada Sandstone (no known aquifer on Beaver Mesa))
- Sandstones of the Navajo Sandstone (possible aquifer but no known springs)
- Sandstones of the Kayenta Formation (possible aquifer but no known springs)
- Wingate Sandstone ((possible aquifer but no known springs)
- Sandstones of the Chinle Formation (possible spring in Lumsden Canyon)

Figure G2 shows a stratigraphic section of the geologic formations for the area. Map G-2 shows the formation outcrop areas, old mine workings, wells, springs, mine portals, mine shafts, and other features in relationship to the planned Whirlwind Mine. Surface topography is also shown on this map.

Exhibit G provides detailed information on the formations, springs, ground water and surface water found on Beaver Mesa and downstream in Lumsden Canyon.

Overall, there is very little groundwater in the area. Although numerous perforations exist from the Burro Canyon and Brushy Basin aquifers into the old mine workings, the discharges from the portals were minimal in the past and have since ceased. The only exception was the Rajah 30 portal, which was sealed. This is discussed in detail in Exhibit G.

There are no known wells or other uses in Lumsden Creek within 2 miles downstream of the planned discharge location. The treatment plant will discharge in the middle fork of Lumsden Creek, which is an ephemeral stream. It flows only in response to spring thaw and large runoff events. Over the distance of approximately 5.15 miles from the planned discharge point to the Dolores River, Lumsden Creek drops 2,515 feet from an initial elevation of 7,050 feet to an elevation of 4,535 feet. This is an average grade of 9.2%. The approximate distances from the mine discharge point to key locations are presented in Table T-1 below.

Table T-1 Lumsden Canyon Drainage from Whirlwind Mine to Dolores River

Segment #	From	To	Length Ft	Cumulative Length Ft	Comments
1	Mine Discharge	Packrat Mine	2,040	2,040	Steep Canyon
2	Packrat Mine	Junction of North fork from Dutchman Mine and DP Spring	3,791	5,831	Steep Canyon
3	Junction N Fork	Junction with East Fork From Raja 49	1,330	7,161	Steep Canyon
4	Junction from East Fork	Lumsden Spring	8,300	15,461	Steep Canyon
5	Lumsden Spring	Mouth of Canyon	3,327	18,788	Steep Canyon
6	Mouth of Canyon	Dolores River	8,410	27,198	Mild Slopes

The nearest recorded occurrence of any usable water downstream in the Lumsden Creek drainage is PR Spring, located 2,040 feet downstream of the discharge point. This spring flows at approximately 4-10 gallons per minute and feeds a stock tank, which then overflows into a minor drainage. The water

flows from the base of the Top Rim sandstone in the Salt Wash and reportedly infiltrates into the soils prior to reaching Lumsden Creek. The spring water is of poor quality, as it contains elevated levels of radium, uranium, arsenic and selenium.

The next closest downstream water occurrence is Lumsden Spring. There is an upper and lower contact for the spring, as recorded by the BLM in 1993. This spring is 2.93 miles downstream of the discharge point of the treated water. When the spring was sampled by Energy Fuels in April 2007, it was flowing at 7 gpm. The water contained elevated concentrations of uranium and selenium, but was of better quality than PR Spring. The 1993 samples of this water collected by the BLM exhibited elevated levels of radium 226 and uranium. See Appendix E for a summary of the water data collected for the general area.

The only major fracture system in the area is the Lumsden Fault (see Map G-2), which has a vertical displacement of slightly less than 100 feet. It is located north of the Packrat portal and trends SW – NE. DP Spring, which is located upstream in the west tributary of Lumsden Creek, occurs at or near the fault. It appears that Burro Canyon ground water flowing to the northeast along the known dip of 1.75 degrees encounters the fault and is forced to the surface at this point. The water quality of this spring is relatively good but it degrades significantly as it flows through the toe of the old Dutchman mine dump, which is located in the northwest drainage channel of Lumsden Canyon.

The Whirlwind Mine waste pile, treatment tanks and other facilities are located in the Brushy Basin member of the Morrison Formation, as shown on Map G-2. There are no known fractures in the immediate vicinity. Although the Brushy Basin member is known to have some minor aquifers, it primarily contains shales and mudstones which prevent downward migration of water. There are no known springs in the area of the waste rock pile or the other surface facilities of both portals.

9. Ground Water Quality Data

Ground water quality data is available for all the major geologic formations in the Whirlwind Project area. Representative samples have been collected from the Burro Canyon Formation at the BLM Well and DP Spring. Upper Brushy Basin sample data has been collected from the two shallow wells known

as the Cherokee Wells and Willow Spring, which are located east of the mine site. Middle and Lower Brushy Basin samples have been collected from drill holes completed as part of past uranium exploration and environmental investigation projects. Two water samples were also recently collected from the Lower Brushy Basin the unit intersects the Whirlwind Decline. The Salt Wash has a discharge at PR Spring that has been sampled extensively. Ground water data is also available from past mine discharges in the area (Packrat Mine, Lumsden #2, and Rajah 49) and from the current water pools in the Whirlwind decline and Packrat drifts. Water quality data for the springs, groundwater, surface water and mine water are presented in Appendix E.

The water quality data and other information collected from the Beaver Mesa aquifers indicate that:

1) the aquifers located immediately above and below the mine workings are limited in extent, thickness, and potential recharge;
2) the water quality deteriorates with depth on the mesa. The Burro Canyon and the Upper and Middle Brushy Basin aquifers are of relatively good quality while the Lower Brushy Basin and Salt Wash aquifers contain high levels of salts, metals, and radionuclides;
3) the mine workings, which are located at the very top of the Top Rim Salt Wash unit is a tight formation containing very little in-situ ground water;
4) most of the water in the mine workings is entering the mine from above through natural fractures and pre-existing exploration holes, vent shafts, and declines; and,
5) the water quality of the ground water flowing into the Salt Wash deteriorates further because of contact with the uranium-bearing sandstone that contains elevated levels of salts, metals, and radionuclides.

The conclusions presented above are based on the water information presented in Exhibit G.

10. Ground Water Control and Monitoring

Reduction of ground water inflows into the mine during mining operations and after mine closure will minimize the potential impacts to ground and surface water in the area. It will also provide cost savings for Energy Fuels by limiting the volume of water that will need to be pumped and treated. Monitoring and ground water characterization will be conducted during and after mine operations, both within the

mine and in the two closest aquifers, to create a model of the local ground water system and identify any impacts to ground water that may occur as a result of mining activities.

10.1 Ground Water Control Measures

Reduction of ground water flows will be accomplished by: (1) implementing an inflow source control program at the start of and during mining operations, and (2) constructing hydraulic seals during closure and reclamation to further reduce ground water inflow from point sources and non-point sources. Details of the proposed ground water control program follow.

Point Source Control

During mining operations, Energy Fuels will identify those locations where ground water is entering the mine. This will include both point sources and area where seepage occurs over a broader area. Potential point sources consist primarily of historic mining features such as open exploration holes and un-grouted vent shafts and declines. Non-point sources include seepage from fracture systems and more permeable sandstone lenses. The locations and estimated flow rates where ground water is entering the mine workings will be identified and plotted on a map, where possible.

Each of the ground water inflow locations will be evaluated to determine whether the inflow can be prevented or reduced in volume as part of active operations or at time of mine closure. Point sources can be plugged or partially plugged by installing packers in the opening and then grouting the opening above the packer through the packer mandrel or by drilling from the side and injecting a concrete grout. Packers are inflatable and/or mechanical devices that can be wedged tightly in an opening. Larger openings, such as around the outside of a vent shaft, may require the installation of forms that can then be filled hydraulically with a cement grout. Sprayed structural (e.g., polyurethane) foam can also be used at times to create temporary support for the subsequent installation of permanent seals.

It may also be possible to grout or otherwise plug some point sources from the surface. In most cases, this will be limited to larger features such as vent shafts that can be readily located on the surface. Surface plugging of cased vent shafts would, in most cases, consist of drilling around the opening and

sealing the opening off from shallow aquifers by injecting grout. Surface exploration drill holes drilled by Energy Fuels Resources are plugged in accordance with existing regulatory and specific exploration permit requirements. Most historic surface exploration drill holes cannot be located and plugged on the surface because the collar area of the holes has typically caved and been filled in over time.

After identifying those areas where immediate action can be taken, Energy Fuels will conduct sealing operations. This may require the assistance of a grouting contractor with specialized equipment. The sealing operations and observed reductions in ground water inflow rates will be documented. Those seepage areas that cannot be sealed during mining operations will be evaluated for sealing at the time of mine closure as discussed below under Closure Source Control.

As the mine is developed, point source control will continue to be implemented. New vent shafts will be grouted where they pass through aquifers so that there is no conduit available for ground water inflow. Historic exploration holes and other points of ground water inflow encountered during mine development will be evaluated and, where practicable, sealed using packers and injected grout.

Closure Source Control

Point Source Control is expected to reduce the ground water inflow rate into the mine and the volume of water that will need to be pumped and treated during active operations. However, there will be other areas where ground water inflow cannot be controlled during mining. The Whirlwind decline is a good example of this type of situation. The decline passes through the lower Brushy Basin aquifer over a distance of about 200 feet. The seepage along this contact is barely detectable but the overall inflow is significant (i.e., as high as 2 gpm). There does not appear to be a reliable method for sealing off this inflow during active mining operations and some, if not all, of this water will still be needed to support drilling and dust suppression activities in the mine.

Energy Fuels proposes to seal off the portion of the decline that is making water during final reclamation by installing a hydraulic seal downgradient of the seeping sandstone lenses The aquifer is perched and present only at the base of the channel sandstone unit; therefore, the water level behind the bulkhead seal is expected to stabilize at or near the ground water inflow point within the decline.

Energy Fuels will monitor the water elevation above the lower seal until it reaches equilibrium plus an additional 5 quarters (i.e., 1.25 years). This will be done by manual measurement since an upper seal will not be installed.

The pool is not expected to migrate significantly because it will be contained within low-permeable Brushy Basin mudstones and shales. A schedule for taking water level measurements and water quality samples will be proposed to DRMS and the BLM prior to sealing based on the inflow rates measured at that time. Once the pool reaches and maintains equilibrium for 5 quarters, the portal will be backfilled and reclamation of the site can be completed.

Exhibit E – Reclamation Plan provides additional details for the bulkhead seal in the decline. Other areas of low, generalized seepage will also be evaluated as part of closure activities for possible implementation of inflow reduction measures. Energy Fuels has also agreed to include a contingency bulkhead seal in the reclamation bond for the site (see Exhibit E).

10.2 Ground Water Monitoring and Characterization

Ground water will be monitored (1) within the mine, (2) in a monitoring well completed in the lower Brushy Basin, and (3) at PR Springs. This information will be used to establish baseline conditions, verify compliance with regulations, and construct a model of ground water flow and quality for the site. Proposed water quality parameters and test methods are presented in Table T-2 below.

Table T-2 Water Monitoring Parameters at Whirlwind Mine

Parameter	Method	Det. Limit	Unit	Moni-toring Well W-1	Mine Water	PR Springs	Storm Water	Treated Water
Major Ions (See Note 1)								
Alkalinity, Total as CaCO3	E310.1/A2320 B	1	mg/L	X	X	X	X	
Bicarbonate as HCO3	E310.1/A2320 B	1	mg/L	X	X	X	X	
Calcium	E200.7/E200.8/ E215.1	1	mg/L	X	X	X	X	
Chloride	E300.0/A4500-Cl B	1	mg/L	X	X	X	X	
Fluoride	A4500-F C/Technicon 380-7WE	0.1	mg/L	X	X	X	X	
Magnesium	E200.7/E200.8/ E242.1	1	mg/L	X	X	X	X	

Parameter	Method	Det. Limit	Unit	Moni-toring Well W-1	Mine Water	PR Springs	Storm Water	Treated Water
Phosphorus	E200.7/E365.1	0.1	mg/L	X	X	X	X	
Potassium	E200.7/E200.8/ E258.1	1	mg/L	X	X	X	X	
Sodium	E200.7/E200.8/ E273.1	1	mg/L	X	X	X	X	
Sulfate	A4500-SO4 E/E300.0	1	mg/L	X	X	X	X	
Nitrate as N	E353.2	0.05	mg/L	X	X	X	X	
Physical Properties (See Note 2)								
Chemical Oxygen Demand (COD)	HACH 8000 /E410.1/ E410.4	1	mg/L					X
pH	A4500-H B/E150.1	0.1	s.u.	X	X	X	X	X
Total Dissolved Solids (TDS)	A2540 C/E160.1	10	mg/L	X	X	X	X	X
Total Suspended Solids (TSS)	A2540 D/E160.2	10	mg/L	X	X	X	X	X
Metals (See Note 3)								
Arsenic	E200.8/E200.9	0.005	mg/L	X	X	X	X	X
Aluminum			µg/L					X
Barium	E200.7/E200.8	0.1	mg/L	X	X	X	X	
Beryllium	E200.7/E200.8/ E200.9	0.001	mg/L	X	X	X	X	~~X~~
Boron	E200.7/E200.8	0.1	mg/L	X	X	X	X	~~X~~
Cadmium	E200.7/E200.8/ E200.9	0.001	mg/L	X	X	X	X	X
Chromium	E200.7/E200.8/ E200.9	0.01	mg/L	X	X	X	X	X
Copper			µg/L					X
Iron	E200.7/E200.8/ E200.9/ E236.1/E200.2	0.03	mg/L					X
Lead	E200.7/E200.8/ E200.9	0.01	mg/L	X	X	X	X	X
Manganese	E200.7/E200.8/ E200.9	0.01	mg/L	X	X	X	X	X
Mercury			µg/L					X
Molybdenum	E200.7/E200.8/ E246.2	0.005	mg/L	X	X	X	X	X
Nickel	E200.7/E200.8/ E200.9	0.01	mg/L	X	X	X	X	X
Selenium	E200.8/E200.9/ A3114B	0.005	mg/L	X	X	X	X	X
Silver			µg/L					X
Uranium	E200.8/E908.0	0.01	mg/L	X	X	X	X	X
Vanadium	E200.7/E200.8/ E286.2	0.1	mg/L	X	X	X	X	X
Zinc	E200.7/E200.8/ E200.9	0.01	mg/L	X	X	X	X	X
Non-Metals								
Cyanide, Weak Acid Dissociable	ASTM D2036	0.005	mg/L					X
Radionuclides – Total								
Radium 226	E903.0	0.2	pCi/L	X	X	X	X	X
Radium 228	E904.0/RA-05	1.0	pCi/L	X	X	X	X	X
Radionuclides – Dissolved								
Radium 226	E903.0/E200.2	1.0	pCi/L					X

Parameter	Method	Det. Limit	Unit	Moni-toring Well W-1	Mine Water	PR Springs	Storm Water	Treated Water

Notes:
1 SAR (sodium adsorption ratio) and ionic balance calculations will be provided for all samples except treated water.
2 Physical parameters including dissolved oxygen, specific conductivity, pH, and temperature will be measured at the time of sample collection of all samples.
3 All metals will be analyzed for total metals with two exceptions (or as stated in individual permit):
- treated water samples will be analyzed for dissolved iron; and
- groundwater samples collected from monitoring well W-1 will be analyzed for dissolved metals only.

Mine Water Monitoring and Reporting

Energy Fuels will document existing water conditions within the Whirlwind Mine complex (i.e., Packrat workings and the Whirlwind Decline) as safe access is gained to the various areas. This information will be collected and reported quarterly to DRMS and the BLM. The quarterly hydrological report will include:

1) Mapped inflow locations and flow rates (quarterly measurement)
2) Description of each inflow and possible source reduction measures (initial report)
3) Proposed point source and closure source control measures (initial report)
4) Results of any source control measures implemented during mine rehabilitation (as completed)
5) Water sampling and analytical results for each inflow greater than 1 gpm (minimum of two sampling events per inflow taken over the first two quarters)
6) Documentation of any new inflow locations, flow rates, and water quality
7) Mapped locations and depth of standing water and any associated flow rates within the mine drifts (quarterly measurement).
8) Sampling and analytical results of representative pools of standing water (minimum of two sampling events at up to three locations)
9) Records of mine water volumes pumped, treated, and discharged as well as the volume of water that is used during mining (i.e., hauled out of the mine in the produced ore and waste and exhausted to the atmosphere by the mine ventilation system).

PR Spring Monitoring and Reporting

The monitoring program will also include recording of the flow rate and sampling and analysis of PR Spring on a quarterly basis for the first 5 quarters of the project. After 5 quarters of baseline monitoring, the spring will be checked quarterly for flow rate and sampled and analyzed on an annual basis. PR Spring flows from the base of the Top Rim sandstone and represents the closest downgradient sampling point (from the mining zone) for ground water. The spring seeps from an area that supports tree and shrub growth, as opposed to the relatively sparse vegetation in surrounding areas. The point for sample collection and flow measurements will be an existing PVC pipe from which water flows into a stock tank before overflowing into the drainage below. Quarterly flow rates and water quality analyses will be reported in the quarterly hydrological report to DRMS and the BLM. Any changes in flow rate and/or water quality will be discussed and evaluated.

In conjunction with monitoring activities at PR Spring, monitoring personnel will also perform a pedestrian survey of the Top Rim sandstone within Lumsden Canyon. This survey will be performed over a distance of about 1,000 feet to the south of PR Spring and 1,500 feet to the northwest of PR Spring. Any seeps or wet spots encountered in this area will be plotted on a map, measured for approximate flow rate, and sampled and analyzed if the flow rate is sufficient to collect a sample. This seep survey will be performed in late spring of each year after the snow has melted. In addition, the flow rate at upgradient DP Spring will be measured and reported quarterly.

Lower Brushy Basin Monitoring and Reporting

Energy Fuels will install a monitoring well (Well W-1) just north of County Road 5/10 as shown on Map C-2. This monitoring well is located downgradient of the Whirlwind surface facilities and the bulkhead seal in the decline. The monitoring well will consist of threaded 2-inch polyvinylchloride (PVC) pipe screened in the lower water-bearing zone of the Brushy Basin (approximately 150 feet below ground surface). If the well produces water, it will be sampled 8 times in the first 15 months after completion (i.e., immediately after completion and every two months thereafter) to establish baseline conditions. If the well does not produce sufficient water for sampling or is dry, water levels will be recorded during the 8 baseline sampling events. After baseline conditions have been established, a monitoring schedule will be developed in consultation with DRMS.

A boring log, well completion details, water levels, and an initial water quality analysis will be submitted to DRMS within 90 days after well completion as part of the quarterly hydrologic report. Subsequent monitoring data will be included in later quarterly reports for the facility. Energy Fuels will notify DRMS and the BLM within 30 days of receiving sample results if the analyses indicate deterioration in water quality compared to the established baseline data. If this were to happen, Energy Fuels would evaluate ground water conditions and propose suitable mitigation measures if the compiled information indicates an impact from mining activities.

Energy Fuels will also monitor water inflows into the Whirlwind Decline from the lower Brushy Basin. Flow rates will be reported quarterly and any changes in flow rates will be described.

Ground Water Characterization

An environmental consulting company experienced in hydrogeologic investigations will review the existing geology and hydrology database plus the information collected from the underground mine, springs, and Monitoring Well W-1 over the first 5 quarters of mine operation. Staff from this company will then inspect the mine workings and prepare a preliminary ground water characterization of the site. The preliminary ground water characterization will identify any data gaps that may exist and propose measures for collecting additional data to complete the characterization. This report will be submitted to DRMS for review and comment prior to implementing additional field work.

Additional field and laboratory information needed to address data gaps may include one or more of the following.

1) Hydraulic conductivity test results for rock samples from representative mine strata.
2) Placement of tracer or dye packs in mine pools coupled with monitoring of springs and seeps.
3) Installation, sampling, and testing of additional temporary or permanent water wells.
4) Geologic and structural mapping of the mine workings.
5) Inventory and sampling of outlying springs or seeps in similar geologic terrain and hydrogeologic conditions.

Once the additional data is collected, the final ground water characterization report will be prepared and submitted to DRMS for review and comment. The report will characterize the upgradient and downgradient aquifers, the ground water flowing into the mine, the water flowing out of the mine, the eventual fate of the water flowing from the mine, and any ground water impacts from mining operations. Potential environmental impacts that are found as a result of the investigation will be evaluated in the report and, if necessary, mitigation measures will be proposed.

11. Surface Water Quality Data

Surface water quality data is discussed in Exhibit G and enclosed in Appendix E. Surface water in Lumsden Creek occurs only intermittently after precipitation events and during spring snow melt. Several small ponds have been placed in the three tributaries upstream from the mine for use as stock watering ponds. These ponds further reduce downstream flows. The creek water does not have any known domestic or agricultural uses downstream of the mine site. With the exception of wildlife use, it is unlikely that there will be any future downstream uses of the water due to the prevailing dry conditions and intermittent nature of the surface flows. As shown in Table T-1, Lumsden Creek is in a steep canyon for the first 3.55 miles downstream from the treatment plant discharge location. The steep terrain and remote location on public land make it even more unlikely that the water could be used beneficially for domestic or agricultural purposes in the future.

The surface water quality data indicate that natural erosional processes and historic mining activity has resulted in the accumulation of uranium-bearing sands within the Lumsden Creek streambed. Limited downstream sampling of the creek by the BLM in 1996 and 1997 indicate that the environmental effect of this material is low during storm events when flow rates are significant. However, lower surface water flows from springs, snow melt, and small precipitation events can become more concentrated in radionuclides and metals when exposed to these uranium-bearing materials. This is most apparent in the west tributary of Lumsden Creek where DP Spring flows through the toe of the historic Dutchman waste dump. The spring water degrades in quality with increases in radium, uranium, and arsenic levels as it flows through the toe area and gradually infiltrates into the streambed. The middle tributary to Lumsden Creek, where Energy Fuels proposes to discharge treated water, is less impacted by historic mining activities.

12. Surface Water Control and Monitoring

Potential contaminants in surface water will be controlled by diverting surface waters away from material storage areas, containing and treating surface water runoff originating in ore storage areas, and by both preventing exposure to surface water and providing for secondary containment of the various chemicals used on site.

Containment and use of chemicals on site for water treatment, dust suppression, and equipment fueling and maintenance is addressed earlier in Section 6 of this Exhibit and in more detail in Appendices F and H. There will be no acid mine drainage or acid-forming material on site. The uranium ore, as previously discussed, has the potential to contribute radionuclides and metals to surface water runoff. Accordingly, runoff from the ore pad will be contained and treated prior to discharge. All ore stockpiles will be removed prior to performing reclamation.

Detailed designs have been developed to divert all undisturbed runoff away from the site for the 100-year, 24-hour storm event. The diversions around the waste embankment will be permanent. Detailed designs have also been developed for the collection of all surface runoff from the disturbed area. This is done through a series of collection ditches, culverts and a sediment pond at the Whirlwind site. The Packrat portal area is relatively small and contains a sump that will contain the runoff from the 100-year event with no discharge.

These drainage designs are discussed in Exhibit D – Mine Plan – Section 18. The actual design calculations are presented in Appendix B and on Map C-6.

As described in Section 18 of Exhibit D, the sediment pond that will receive surface water runoff from the disturbed area around the Whirlwind portal was designed to contain all the runoff from the 10-year, 24-hour storm event. Storm events larger than this size will be discharged through the pond's emergency overflow. The water collected in and discharged from the sediment pond will be sampled and analyzed on a quarterly basis for a full suite of DRMS water quality parameters including radium-226 and uranium (see stormwater column in Table T-2)..

In the event that a sediment pond sample fails to meet surface water quality discharge parameters, Energy Fuels will investigate the system of collection ditches to determine the likely source or sources of the elevated constituents. If this should occur, the most likely cause would be the placement of low-grade proto-ore in or next to a collection ditch. Identification of the potential source would include visual reconnaissance, sampling of soil materials, and follow-up sampling and analysis of subsequent surface water runoff events. A full report of any exceedances and corrective action taken will be provided in the quarterly report to the DRMS with copies to the BLM. Should surface water discharge from the sediment pond continue to exceed state standards, additional mitigation measures would be adopted in consultation with DRMS and the BLM. This could include diverting the pond water to the water treatment system for treatment prior to discharge.

Energy Fuels has obtained a discharge permit from the Water Quality Control Division of CDPHE for treating and discharging excess mine water. The permit requires that the treated water be sampled and analyzed on a weekly and monthly basis during active discharge operations. The monitoring parameters and frequency are summarized on Table T-2. The permit limits for each constituent are based on the state water quality standards for the Dolores River at Gateway (i.e., Segment 3a of the river). The permit limits are provided in the CDPS Permit that is included as Appendix L.

13. Climate Data

The available climate data for the location has been included in Exhibit K. Evaporation data is included. Interpolation between weather stations was required, since no one station was representative of the actual mine site. Site-specific wind data is not available but the prevailing winds are generally from west to east. Site-specific precipitation data from nearby Cave Canyon has also been included in Exhibit K. This data, which was provided by the BLM, corresponds closely with the precipitation data that was generated through interpolation methods.

14. Geochemical Data and Analysis

Recent samples of the ore and waste from newly exposed underground faces were taken by Energy Fuels. These samples were analyzed for chemical content and then tested using the Synthetic Precipitation Leaching Procedure (SPLP), which is the Division's recommended procedure for determining whether mine waste and ore has the potential to environmentally impact ground or surface water.

The sampling procedures, locations and results of these tests are presented in Appendix A. The results show that the ore has the potential to generate leachate or surface water runoff containing elevated levels of uranium, radium, and trace metals. Accordingly, runoff from the ore stockpile area will be contained and treated prior to discharge.

The waste rock, however, did not produce leachate that exceeded state water quality standards. The following Best Management Practices (BMPs) will also help insure that the waste material does not impact surface or ground water resources.

Waste Rock Pile BMPs

1) In the SPLP test, the ore is ground to a minute size (i.e., smaller than 9.5 millimeters) prior to leaching with a pH 5 solution, while the actual waste rock pile will consist primarily of larger sized rocks from one inch to twenty-four inches in diameter, that will not leach as readily. The permeability of the waste rock (and susceptibility to leaching) will also be reduced by the compaction that occurs as loaded haulage buggies and other equipment travel over the top of the waste pile.

2) Blending of low grade ore with high grade ore will be standard practice at the mine, thereby minimizing the amount of sub-ore-grade material that would otherwise be disposed of as waste.

3) Undisturbed runoff from the hillside south of the waste rock pile will be permanently diverted away from the waste rock embankment, utilizing diversion ditches designed for the 100-year, 24-hour storm event.

4) The waste rock embankment will be covered with a minimum of twelve inches of topsoil cover material and planted with a stable mix of grasses and forbs well suited to this location. The vegetation will utilize most of the direct precipitation and surface water runoff that occurs on the reclaimed embankment. This will prevent most of this water from ever entering the waste material.

5) The gradual slopes and revegetated surface of the waste rock embankment will minimize erosion of the topsoil and make any subsequent exposure of waste rock unlikely.

15. Construction Schedule Information

The water treatment plant and tanks were installed as part of prospecting activities. Required construction and estimated completion times for the remaining environmental protection facilities are listed below. The goal is to have all of these facilities in place by early fall 2008.

1) Construct diversion ditches, collection ditches, and sediment pond (3 months)
2) Enlarge top of waste pile and construct lined ore pad, sump, and overflow pipe to the Untreated Water Tank (6 months)
3) Install septic system (1 month)
4) Move and reinstall the fueling station, oil storage enclosure, and generator stations, as needed, with appropriate secondary containment for all petroleum products (6 months).

16. Quality Assurance and Quality Control Program and Measures

Energy Fuels will notify the BLM and DRMS at least 10 working days in advance of any major construction activities on site. This will allow the agencies the opportunity to conduct inspections prior to, during, and after construction. A licensed professional engineer experienced in construction of ponds, embankments, liners, etc. will be on site during the construction of the ore pad and sediment pond to verify that these facilities are properly constructed. The engineer will prepare a detailed post-construction report that will be submitted to the agencies within 30 days of completion of the work.

Operation and monitoring of the treatment system will be directly supervised by a state certified wastewater operator. This person will be responsible for making adjustments in the plant equipment to meet discharge standards and for implementing a water discharge monitoring program that meets all the requirements of the site's CDPS Permit. A copy of this permit is included as Appendix L.

17. Plant Growth Medium (Soils)

The soil types and boundaries for the area are shown on Map C-1A. All soil information for these types is presented in Exhibit I. All of these soils support vegetation and no unsuitable or problematic soils have been identified.

All topsoil from previously reclaimed areas and newly disturbed areas will be salvaged and used for reclamation. The plans for this stockpiling are explained in Exhibit D. The Packrat power drop pad area currently has an infestation of Russian knapweed and field bindweed. This power drop area may need to be pretreated for the weeds prior to doing any topsoil stripping at this location.

All stockpiles will be seeded with the mix described in the Reclamation Plan once the piles are established. The process of spreading, grading, and harrowing the topsoil prior to reseeding has been described in the Exhibit E – Reclamation Plan. The topsoil will be tested to determine if any amendments are needed should the stockpiles exhibit poor revegetation.

It is expected that approximately 12 inches to 18 inches of topsoil will be salvaged from the previously undisturbed areas at the Whirlwind portal area. Based on recent test holes explained in Exhibit I, the estimated average thickness of topsoil replacement at the Whirwlind portal area and waste embankment is 14 inches. All calculations and reclamation costs have been based on this amount of topsoil fill over the Whirlwind area. Approximately 12 inches of topsoil will be salvaged from vent shaft and power drop areas and another 4-6 inches of imported topsoil will be salvaged from the outer slope of the existing Whirlwind pad and from the Packrat portal area. This material will all be stockpiled and used for reclamation.

18. Wildlife Protection

The Untreated Water Tank and all other tanks in the water treatment facility will be fully enclosed by a chain link fence (see Map C-2) to preclude domestic livestock and most wildlife. The Untreated Water Tank is only 0.1 acre in size.. The small pond footprint, mining activity in the immediate area, and the presence of other water sources nearby is expected to deter waterfowl from using the untreated water pond on a frequent basis. Bird and bat escape structures will be installed on the water tanks during the warm weather months when wildlife may use the tanks more frequently as a water source.

As described in the reclamation plan, the site will be fully reclaimed to wildlife habitat once the mine is closed. One portal at the Packrat bench will be left open for bat habitat.

19. Disposal of Ore Pad Material and Sludge in Mine Workings

Over the life of the mine, percolation of rainwater through the ore may result in radionuclides leaching into the compacted ore pad. A geosynthetic clay liner (GCL) will be installed beneath the pad area to confine this potential contamination to the upper 3.5 feet of compacted pad area. During reclamation,

the compacted soil cover and the liner will be excavated and placed in a dry area within the upper portion of the Whirlwind decline.

The accumulated sludge from the Settling Tank will be disposed of in either one of three ways: 1) mixed into concrete on site and disposed of in the upper decline in a designated (i.e., dry) area above the water table, 2) transported to a uranium mill with ore to be processed, or 3) transported to a suitable off-site landfill for disposal. For reclamation costing purposes, the former alternative is assumed. The sludge volume is estimated to be approximately 19 cubic yards (see Appendix H). The concrete grout produced is expected to be about 40 cubic yards. The grout would be pumped into the mine and placed over or next to the ore pad material.

Appendix F
Materials Containment Plan
& SPCC

MATERIALS CONTAINMENT PLAN

for the

WHIRLWIND MINE
30100 5/10 ROAD
GATEWAY, COLORADO 81522

Prepared by:

ENERGY FUELS RESOURCES CORPORATION

February 2012
Revised September 2024

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Attachments

Appendices

1.0 INTRODUCTION

~~Energy Fuels Resources Corporation (Energy Fuels) is reopening and rehabilitating two underground uranium mines, the Urantah Decline and the Packrat Mine, as a combined operation called the Whirlwind Mine.~~ The Whirlwind Mine is located approximately 5 miles southwest of Gateway, Colorado in Mesa County. Refer to Figure 1 for the layout of the Whirlwind Mine Site.

Mine dewatering is required as part of the mine rehabilitation process. The mine water is required to be treated prior to surface discharge into the middle fork of Lumsden Creek, located adjacent to the surface facilities at the Whirlwind Portal. Lumsden Creek is an ephemeral drainage that ultimately drains to the Dolores River, approximately 4.3 miles northeast of the mine site. Use of the treatment system located on-site is permitted under the Colorado Discharge Permit System (CDPS), Permit Number CO-0047562. This discharge permit requires preparation of a Materials Containment Plan for the as-built configuration of the treatment plant and mine site.

The Materials Containment Plan has been prepared to provide employees at the Whirlwind Mine site the necessary information to store, handle, and provide expedient and complete response to spills of materials that may cause harm to employees, the public, or the environment. For the purpose of this plan a spill is defined as *"The unintentional release of a material in use, process, or storage at the Whirlwind Mine that may result in a significant adverse impact on the environment."*

2.0 MATERIALS USED ON-SITE

The materials used, processed, or stored at the mine site that may have an adverse impact to the environment are identified in Table 1. Information sheets for each of these materials is provided in the attachments as identified in the table.

Table 1
On-Site Materials List

Attachment	Material	Location
1	Barium Chloride – Granular	Treatment Trailer
2	Barium Chloride – 10% to 15% Solution	Treatment Trailer
3	Ferric Sulfate – Granular	Treatment Trailer
4	Ferric Sulfate – 50% Solution	Treatment Trailer
5	Ferric Sulfate – 2% to 8% Solution	Treatment Trailer
6	Sulfuric Acid – 93% Solution	Treatment Trailer
7	Sulfuric Acid – 10% to 15% Solution	Treatment Trailer
8	Untreated/Partially Treated Mine Water	Treatment System Tanks
9	Treatment Precipitate	Settling Tank
10	Diesel Fuel, Low Sulfur	Fueling Station/Generators
11	New/Used Motor Oil	Shop/Waste Dump
12	New/Used Anti-freeze	Shop
13	Sodium Metabisulfite – Granular	Treatment Trailer
14	Sodium Metabisulfite – 1% to 10% Solution	Treatment Trailer
15	Hydrochloric Acid – 31% Solution	Treatment Trailer
16	Sodium Hydroxide – 25% Solution	Treatment Trailer

The information sheets for each material summarize the following material specific information:

- Maximum Quantity Stored On-Site
- Description of Material
- Potential Health Hazards
- Potential Environmental Hazards
- Handling Instructions
- First Aid Measures
- Containment Provided
- Maintenance Requirements
- Spill Response Instructions

- Spill Notification Requirements

3.0 SPILLS

Prevention of spills of materials potentially harmful to people, property, and the environment is a top priority when storing, handling, and using any of these materials. Should a spill occur, it is of utmost importance that information regarding the containment and clean-up of the spilled material be readily available to employees. This Materials Containment plan serves as a guide to timely and appropriate actions to be taken for spills of potentially harmful materials stored and used at the Whirlwind Mine. Please refer to Appendix A for a History of Spills that have occurred at the Whirlwind Mine. This form should be updated following any spill incidents.

3.1 Spill Response Procedures

General notification procedures for spills of any materials include immediate notification of the following persons:

Title	Name	Primary	Secondary
Mine Superintendent	Todd Eldredge	Verbal	~~(435) 686-2244~~

If Mine Superintendent cannot be reached, contact:

Safety and Compliance Officer Tyler Martin

The information that should be relayed in the initial notification is:

1) The location and nature of the incident
2) The type of material
3) Quantity, actual or estimated, of material released
4) Any potential or realized harm to employees or the public

The Mine Superintendent will notify the required internal personnel including the Director of Mining and the Director of Compliance. The Director of Compliance will evaluate this information and make a determination as to whether or not a spill has occurred or is about to occur, and if required, will make the required oral notifications to regulatory agencies. The agencies to be notified will vary based on the type of materials, nature of the spill, and quantity of material spilled and may include the National Response Center, the Colorado Department of Public Health and Environment (CDPHE), the Mesa County Local Emergency Planning Commission, Emergency Services, and the Bureau of Land

Management. At this time, there are no downstream water users of Lumsden Creek and the creek extends approximately 5 miles before reaching the Dolores River. Spill response procedures and contact information for these agencies are outlined in the attached material information sheets, the Emergency Response Plan, and the Spill Prevention, Control, and Countermeasure (SPCC) Plan. These plans are located on-site. Information to be provided during the initial oral notification of these agencies is included on the Spill Notification Form located in Appendix B.

In the event of a spill, the Mine Superintendent will seek assistance from other mine personnel, as needed, and will immediately initiate spill response procedures. Spill response will consist of evaluating potentially dangerous conditions, containing the spill, and cleaning the spill area. Containment of the spill will focus first on preventing materials from entering from waters of the State, then from entering other environmentally sensitive areas, then to the smallest area possible. Spill response materials located on-site include:

- Two 20-gallon spill response kits that include absorbents and a disposal bag. One kit will be located at the Water Treatment Plant and a second kit will be at or near fueling station;
- Oil dry and absorbent material located in the Mine Shop;
- Shovels, rakes, and other hand tools located in the tool trailer; and
- Heavy equipment on-site for berming and other earthmoving activities.

Spilled materials and contaminated soils recovered during the spill response effort will typically be placed in clean, empty drums for later disposal. Soils contaminated by petroleum products may be placed in the designated storage area on-site.

Sampling of the spill material may be necessary if the polluting constituents are not known. In addition, potentially affected and unaffected surface water or soil samples may be taken, if necessary. Determination of the necessity for collecting samples will be made by the Mine Superintendent or Safety and Compliance Officer in coordination with the Director of Compliance on a case-by-case basis.

3.2 Follow-Up Actions

Upon completion of the initial spill response and clean-up, measures that can be taken to

prevent a recurrence of the spill will be discussed and evaluated. Appropriate measures will be implemented to remedy the circumstances that led to the spill.

Written notification to the appropriate regulatory agencies is required and will be completed by Regulatory Affairs at Corporate Headquarters. Instructions for written notification will be provided by the agencies at the time of or following oral notification.

All records resulting from a spill will be retained for a minimum of five years, or longer, if requested by the Regional Administrator of the U.S. Environmental Protection Agency (U.S. EPA) or the Colorado Water Quality Control Division.

4.0 Plan Updates

The Materials Containment Plan will be updated whenever additional chemicals are stored on-site that may pose a threat to people, property, or the environment. In addition, the plan will be reviewed annually to ensure that all potentially harmful materials are included in the plan.

MATERIAL INFORMATION SHEETS

BARIUM CHLORIDE – GRANULAR

Maximum Quantity On-site: 1,000 pounds

Description: White granular powder, odorless

Potential Health Hazards

- Skin Contact: May cause irritation
- Eye: May cause irritation
- Inhalation: Harmful if inhaled
- Ingestion: Harmful if ingested
- Sensitization: May cause allergic skin reaction
- Not a carcinogen, teratogen, mutagen, or reproductive toxin

Potential Environmental Hazards

- This material does not contain any hazardous air pollutants
- This material is not listed as a hazardous or toxic substance under TSCA, the Clean Water Act, or CERCLA
- Dust clouds generated during handling or storage can form an explosive mixture with air

Handling

- Wear proper PPE including safety glasses, impervious gloves, and standard site PPE
- Use of a NIOSH approved dust respirator is recommended

First Aid

- Eyes: Flush eyes with large amount of water for 15 minutes while holding eyelids open. Seek medical attention.
- Skin: Wash skin with water and soap. Seek medical attention if irritation occurs or persists.
- Ingestion: Do not give liquids if person is unconscious or drowsy. Otherwise give one tablespoon of Epsom salts and seek immediate medical attention. Induce vomiting.
- Inhalation: Remove person to fresh air immediately. If breathing has stopped, apply artificial respiration and administer oxygen if necessary. Seek medical attention.

Containment

- Primary: Paper bags stacked on pallet
- Secondary: Stored inside treatment trailer, protected from weather
  Treatment trailer sump drains to external 400-gallon plastic tank

BARIUM CHLORIDE – GRANULAR (continued)

Maintenance Requirements

- Bags should be kept inside treatment trailer, protected from weather
- Bags should be kept off floor on pallet
- Care should be taken not to puncture bags
- Punctured bags should be placed in a closed container

Spill Response

- Control source of spill or leak, if possible.
- Small Spills: Sweep or scoop up and place in a closed container
- Large Spills: Contact Maintenance Supervisor for additional assistance

Spill Notification Requirements

- Immediately contact the Mine Superintendent (verbally)
- If not available contact Safety and Compliance Officer

- This material has no reportable quantity
- No agency notifications required unless spill enters waters of the State

- Report spills of any quantity which enter waters of the State to:
  - Colorado Department of Public Health and Environment
    Toll-Free 24-hour Environmental Spill Reporting Line
    (877) 518-5608
  - Bureau of Land Management, Grand Junction Field Office
    Alan Kraus
    (970) 244-3078

- Refer to the Spill Report in Appendix A for information to be provided to the above agencies during oral notification
- Follow-up written notification will be required by the above agencies and are required to be copied to the BLM. Instructions for submittal of the written notification will be provided by the agencies during or following oral notification.

BARIUM CHLORIDE – 10% to 15% SOLUTION

Maximum Quantity On-site: 370 gallons (barium chloride mix tank)

Description: Clear liquid, odorless

Potential Health Hazards

- Skin Contact: May cause irritation
- Eye: May cause irritation
- Inhalation: May cause irritation
- Ingestion: May cause irritation

Potential Environmental Hazards

- No fire or explosion hazards
- This material does not contain any hazardous air pollutants
- This material is not listed as a hazardous or toxic substance under TSCA, the Clean Water Act, or CERCLA

Handling

- Wear proper PPE including safety glasses, impervious gloves, and standard site PPE

First Aid

- Eyes: Flush eyes with large amount of water for 15 minutes while holding eyelids open.
- Skin: Wash skin with water and soap.
- Ingestion: Drink large volumes of water or milk. Do not give liquids if person is unconscious or drowsy. Do not induce vomiting. Seek medical attention.
- Inhalation: Remove person to fresh air.

Containment

- Primary: 370-gallon plastic tank
- Secondary: Treatment trailer sump drains to external 400-gallon plastic tank

Maintenance Requirements

- Inspect tanks and lines for cracks or punctures, repair or remove defective tanks and lines
- Do not overfill tanks

Spill Response

- Control source of spill or leak, if possible.
- Small Spills: Wash area with large volumes of water
- Large Spills: Contact Mine Superintendent for additional assistance

BARIUM CHLORIDE – 10% to 15% SOLUTION (continued)

Spill Notification Requirements

• Immediately contact the Mine Superintendent (verbally) • If not available contact Safety and Compliance Officer
• This material has no reportable quantity • No agency notifications required unless spill enters waters of the State
• Report spills of any quantity which enter waters of the State to: o Colorado Department of Public Health and Environment Toll-Free 24-hour Environmental Spill Reporting Line (877) 518-5608 o Bureau of Land Management, Grand Junction Field Office Alan Kraus (970) 244-3078
• Refer to the Spill Report in Appendix A for information to be provided to the above agencies during oral notification • Follow-up written notification will be required by the above agencies and are required to be copied to the BLM. Instructions for submittal of the written notification will be provided by the agencies during or following oral notification.

FERRIC SULFATE – GRANULAR

Synonyms: Iron sulfate

Maximum Quantity On-site: 1,000 pounds

Description: Yellowish crystals or grayish-white powder, slight odor

Potential Health Hazards

- Skin Contact: May cause irritation
- Eye: May cause irritation
- Inhalation: May cause irritation with coughing, sneezing, or difficulty breathing
- Ingestion: Low ingestion hazard
- Not a carcinogen

Potential Environmental Hazards

- No fire or explosion hazards
- None reported

Handling

- Wear proper PPE including safety glasses, impervious gloves, and standard site PPE

First Aid

- Eyes: Flush eyes with large volumes of water for 15 minutes while holding eyelids open. Seek medical attention immediately.
- Skin: Remove contaminated clothing immediately. Wash skin with water and soap until no evidence of chemical remains (at least 15-20 minutes).
- Ingestion: Induce vomiting. Follow with gastric lavage using deferoxamine solution (2 grams in 1 liter of water containing sodium bicarbonate). Maintain airway, blood pressure and respiratory function. Seek medical attention immediately.
- Inhalation: Remove person to fresh air immediately. Perform artificial respiration if necessary. Keep person warm and at rest. Treat symptomatically and supportively. Seek medical attention.

Containment

- Primary: Paper bags stacked on pallet
- Secondary: Stored inside treatment trailer, protected from weather
  Treatment trailer sump drains to external 400-gallon plastic tank

FERRIC SULFATE – GRANULAR (continued)

Maintenance Requirements

- Bags should be kept inside treatment trailer, protected from weather
- Bags should be kept off floor on pallet
- Care should be taken not to puncture bags
- Punctured bags should be placed in a closed container

Spill Response

- Control source of spill or leak, if possible.
- Small Spills: Sweep with minimum generation of dust and place in closed container
- Large Spills: Contact Mine Superintendent- for additional assistance

Spill Notification Requirements

- Immediately contact the Mine Superintendent (verbally)
- If not available contact Safety and Compliance Officer

- Reportable quantity: 1,000 pounds
- Report spills of 1,000 pounds or more to:
  - National Response Center
    (800) 424-8802
  - Colorado Department of Public Health and Environment
    Toll-Free 24-hour Environmental Spill Reporting Line
    (877) 518-5608
  - Mesa County Local Emergency Planning Commission
    ~~Kathleen Neault~~
    (970) 242-6707
  - Bureau of Land Management, Grand Junction Field Office
    ~~Alan Kraus~~
    (970) 244-3078

- Report spills of any quantity which enter waters of the State to:
  - National Response Center
    (800) 424-8802
  - Colorado Department of Public Health and Environment
    Toll-Free 24-hour Environmental Spill Reporting Line
    (877) 518-5608

- Refer to the Spill Report in Appendix A for information to be provided to the above agencies during oral notification
- Follow-up written notification will be required by the above agencies and are required to be copied to the BLM. Instructions for submittal of the written notification will be provided by the agencies during or following oral notification.

FERRIC SULFATE – 50% SOLUTION

Synonyms: Iron sulfate

Maximum Quantity On-site: 110 gallons

Description: Reddish-brown solution, slight odor

Potential Health Hazards

- Skin Contact: May cause burns
- Eye: May cause burns
- Inhalation: May cause irritation of mucous membranes
- Ingestion: Severe gastritis with abdominal pain and vomiting beginning 10-60 min. after ingestion. Diarrhea and dehydration. Shock, pallor, cyanosis, and coldness. Rapid, weak pulse, low blood pressure, drowsiness, hyporeflexia, dilated pupils, and coma.
- Not a carcinogen

Potential Environmental Hazards

- No fire or explosion hazards
- Designated as a hazardous material
- Highly corrosive

Handling

- Wear proper PPE including safety glasses, impervious gloves, protective work clothing, and standard site PPE
- Use with care

First Aid

- Eyes: Flush eyes with large volumes of water for at least 20 minutes while holding eyelids open. If irritation persists, seek medical attention.
- Skin: Remove contaminated clothing immediately. Wash skin with water and soap until no evidence of chemical remains (at least 15-20 minutes). If irritation persists, seek medical attention.
- Ingestion: Contact local poison control center or physician immediately. Give large quantities of water or milk, unless unconscious. If vomiting occurs, keep head lower than hips. Loosen tight clothing. Seek medical attention immediately.
- Inhalation: Remove person to fresh air immediately. Perform artificial respiration if necessary. Seek medical attention.

FERRIC SULFATE – 50% SOLUTION (continued)

Containment

- Primary: Steel, closed top, 55-gallon drums
- Secondary: 2-drum containment basin
  Stored inside treatment trailer, protected from weather
  Treatment trailer sump drains to external 400-gallon plastic tank

Maintenance Requirements

- Drums should be kept inside treatment trailer, protected from weather
- Inspect drums regularly for leaks or corrosion

Spill Response

- Control source of spill or leak, if possible.
- Small Spills: Absorb spill with sand or non-combustible dry material and collect in appropriate container for disposal. Flush area with water.
- Large Spills: Prevent entry into waters of the state. Isolate area and deny entry to unnecessary personnel. Absorb spill with sand or non-combustible dry material and collect in appropriate container for disposal. Flush area with water.

Spill Notification Requirements

- Immediately contact the Mine Superintendent
- If not available contact Safety and Compliance Officer

- Reportable quantity: 1,000 pounds
- Reportable quantity exceeds maximum site quantity (110 gallons of 50% solution is equivalent to approximately 800 lbs. of ferric sulfate)
- No agency notifications required unless spill enters waters of the State

- Report spills of any quantity which enter waters of the State to:
  - National Response Center
    (800) 424-8802
  - Colorado Department of Public Health and Environment
    Toll-Free 24-hour Environmental Spill Reporting Line
    (877) 518-5608
  - Bureau of Land Management, Grand Junction Field Office
    (970) 244-3078

- Refer to the Spill Report in Appendix A for information to be provided to the above agencies during oral notification
- Follow-up written notification will be required by the above agencies and are required to be copied to the BLM. Instructions for submittal of the written notification will be provided by the agencies during or following oral notification.

FERRIC SULFATE – 2% to 8% SOLUTION

Synonyms: Iron sulfate

Maximum Quantity On-site: 230 gallons (ferric sulfate mix tank)

Description: Clear, no odor

Potential Health Hazards

- Skin Contact: May cause burns
- Eye: May cause burns
- Inhalation: May cause irritation of mucous membranes
- Ingestion: Severe gastritis with abdominal pain and vomiting beginning 10-60 min. after ingestion. Diarrhea and dehydration. Shock, pallor, cyanosis, and coldness. Rapid, weak pulse, low blood pressure, drowsiness, hyporeflexia, dilated pupils, and coma.
- Not a carcinogen

Potential Environmental Hazards

- No fire or explosion hazards
- Corrosive

Handling

- Wear proper PPE including safety glasses, impervious gloves, protective work clothing, and standard site PPE
- Use with care

First Aid

- Eyes: Flush eyes with large volumes of water for at least 20 minutes while holding eyelids open. If irritation persists, seek medical attention.
- Skin: Remove contaminated clothing immediately. Wash skin with water and soap until no evidence of chemical remains (at least 15-20 minutes). If irritation persists, seek medical attention.
- Ingestion: Contact local poison control center or physician immediately. Give large quantities of water or milk, unless unconscious. If vomiting occurs, keep head lower than hips. Loosen tight clothing. Seek medical attention immediately.
- Inhalation: Remove person to fresh air immediately. Perform artificial respiration if necessary. Seek medical attention.

Containment

- Primary: 230-gallon plastic tank
- Secondary: Treatment trailer sump drains to external 400-gallon plastic tank

FERRIC SULFATE – 2% to 8% SOLUTION (continued)

Maintenance Requirements

- Inspect tank and lines for cracks or punctures, repair or remove defective tank and lines
- Do not overfill tanks

Spill Response

- Control source of spill or leak, if possible.
- Small Spills: Absorb spill with sand or non-combustible dry material and collect in appropriate container for disposal. Flush area with water.
- Large Spills: Prevent entry into waters of the state. Isolate area and deny entry to unnecessary personnel. Absorb spill with sand or non-combustible dry material and collect in appropriate container for disposal. Flush area with water.

Spill Notification Requirements

- Immediately contact the Mine Superintendent
- If not available contact Safety and Compliance Officer

- Reportable quantity: 1,000 pounds
- Reportable quantity exceeds maximum site quantity (230 gallons of 4% solution is equivalent to approximately 135 lbs. of ferric sulfate)
- No agency notifications required unless spill enters waters of the State

- Report spills of any quantity which enter waters of the State to:
  - National Response Center
    (800) 424-8802
  - Colorado Department of Public Health and Environment
    Toll-Free 24-hour Environmental Spill Reporting Line
    (877) 518-5608
  - Bureau of Land Management, Grand Junction Field Office
    (970) 244-3078

- Refer to the Spill Report in Appendix A for information to be provided to the above agencies during oral notification
- Follow-up written notification will be required by the above agencies and are required to be copied to the BLM. Instructions for submittal of the written notification will be provided by the agencies during or following oral notification.

SULFURIC ACID – 93% SOLUTION

Synonyms: Hydrogen sulfate, oil of vitriol, mattling acid, battery acid, electrolyte acid, dihydrogen sulfate, chamber acid.

Maximum Quantity On-site: 110 gallons

Description: Clear colorless to yellow liquid

Potential Health Hazards

- Skin Contact: Causes skin burns.
- Eye: Causes severe eye burns. May cause irreversible eye injury, blindness, and/or corneal opacification.
- Inhalation: May cause irritation of the respiratory tract with burning pain in nose and throat, coughing, wheezing, shortness of breath, and pulmonary edema. Causes chemical burns to the respiratory tract. Inhalation may be fatal as a result of spasm, inflammation, edema of the larynx and bronchi, chemical pneumonitis, and pulmonary edema.
- Ingestion: May cause severe and permanent damage to the digestive tract. Causes gastrointestinal tract burns.
- Known carcinogen

Potential Environmental Hazards

- Not a fire hazard
- May react vigorously, violently, or explosively with many organic and inorganic chemicals and with water
- Highly corrosive

Handling

- Wear proper PPE including safety glasses, face shield, neoprene gloves, apron, and/or clothing, protective work clothing, and standard site PPE
- Use with care and with adequate ventilation
- Wash thoroughly after handling

First Aid

- Eyes: Flush eyes with large volumes of water for at least 15 minutes. Seek medical attention immediately.
- Skin: Wash skin with water for at least 15 minutes while removing contaminated clothing and shoes. Seek medical attention immediately.
- Ingestion: Do not induce vomiting. If fully conscious, ingest cupful of water. Seek medical attention immediately.
- Inhalation: Remove person to fresh air immediately. Perform artificial respiration if necessary. Seek medical attention immediately.

SULFURIC ACID – 93% SOLUTION (continued)

Containment

- Primary: Steel, closed top, 55-gallon drums
- Secondary: 2-drum containment basin
  Stored inside treatment trailer, protected from weather
  Treatment trailer sump drains to external 400-gallon plastic tank

Maintenance Requirements

- Drums should be kept inside treatment trailer, protected from weather
- Inspect drums regularly for leaks or corrosion

Spill Response

- Control source of spill or leak, if possible.
- Small Spills: Absorb spill with sand or non-combustible dry material and cover with plastic to minimize contact with water. Carefully scoop up and place in appropriate disposal container. Provide ventilation. Do not flush with water.
- Large Spills: Prevent entry into waters of the state. Isolate area and deny entry to unnecessary personnel. Absorb spill with sand or non-combustible dry material and cover with plastic to minimize contact with water. Carefully scoop up and place in appropriate disposal container. Provide ventilation. Do not flush with water.

SULFURIC ACID – 93% SOLUTION (continued)

Spill Notification Requirements

• Immediately contact the Mine Superintendent • If not available contact Safety and Compliance Officer
• Reportable quantity: 1,000 pounds • Report spills of 1,000 pounds (70 gallons) or more to: o National Response Center (800) 424-8802 o Colorado Department of Public Health and Environment Toll-Free 24-hour Environmental Spill Reporting Line (877) 518-5608 o Mesa County Local Emergency Planning Commission (970) ~~985-8613~~242-6707 o Bureau of Land Management, Grand Junction Field Office (970) 244-3078
• Report spills of any quantity which enter waters of the State to: o National Response Center (800) 424-8802 o Colorado Department of Public Health and Environment Toll-Free 24-hour Environmental Spill Reporting Line (877) 518-5608 o Bureau of Land Management, Grand Junction Field Office (970) 244-3078
• Refer to the Spill Report in Appendix A for information to be provided to the above agencies during oral notification • Follow-up written notification will be required by the above agencies and are required to be copied to the BLM. Instructions for submittal of the written notification will be provided by the agencies during or following oral notification.

SULFURIC ACID – 10% to 15% SOLUTION

Synonyms: Hydrogen sulfate, oil of vitriol, mattling acid, battery acid, electrolyte acid, dihydrogen sulfate, chamber acid.

Maximum Quantity On-site: 300 gallons (sulfuric acid mix tank)

Description: Clear colorless liquid

Potential Health Hazards

- Skin Contact: May cause skin burns.
- Eye: May cause severe eye burns. May cause irreversible eye injury, blindness, and/or corneal opacification.
- Inhalation: May cause irritation of the respiratory tract with burning pain in nose and throat, coughing, wheezing, shortness of breath, and pulmonary edema.
- Ingestion: May cause severe and permanent damage to the digestive tract.
- Known carcinogen

Potential Environmental Hazards

- Not a fire hazard
- Highly corrosive

Handling

- Wear proper PPE including safety glasses, face shield, protective work clothing, and standard site PPE
- Use with care

First Aid

- Eyes: Flush eyes with large volumes of water for at least 15 minutes. Seek medical attention immediately.
- Skin: Wash skin with water for at least 15 minutes while removing contaminated clothing and shoes. Seek medical attention immediately.
- Ingestion: Do not induce vomiting. If fully conscious, ingest cupful of water. Seek medical attention immediately.
- Inhalation: Remove person to fresh air immediately. Perform artificial respiration if necessary. Seek medical attention immediately.

SULFURIC ACID – 10% to 15% SOLUTION (continued)

Containment

- Primary: 230-gallon plastic tank
- Secondary: Treatment trailer sump drains to external 400-gallon plastic tank

Maintenance Requirements

- Inspect tank and lines for cracks or punctures, repair or remove defective tank and lines
- Do not overfill tanks

Spill Response

- Control source of spill or leak, if possible.
- Small Spills: Absorb spill with sand or non-combustible dry material. Carefully scoop up and place in appropriate disposal container. Flush area with water.
- Large Spills: Prevent entry into waters of the state. Isolate area and deny entry to unnecessary personnel. Absorb spill with sand or non-combustible dry material. Carefully scoop up and place in appropriate disposal container. Flush area with water.

Spill Notification Requirements

- Immediately contact the Mine Superintendent
- If not available contact Safety and Compliance Officer

- Reportable quantity: 1,000 pounds
- Reportable quantity exceeds maximum site quantity (300 gallons of 15% solution is equivalent to approximately 325 lbs. of sulfuric acid)
- No agency notifications required unless spill enters waters of the State

- Report spills of any quantity which enter waters of the State to:
  - National Response Center
    (800) 424-8802
  - Colorado Department of Public Health and Environment
    Toll-Free 24-hour Environmental Spill Reporting Line
    (877) 518-5608
  - Bureau of Land Management, Grand Junction Field Office
    (970) 244-3078

- Refer to the Spill Report in Appendix A for information to be provided to the above agencies during oral notification
- Follow-up written notification will be required by the above agencies and are required to be copied to the BLM. Instructions for submittal of the written notification will be provided by the agencies during or following oral notification.

UNTREATED/PARTIALLY TREATED MINE WATER

Synonyms: Raw water, treatment water

Maximum Quantity On-site: 164,000 gallons (untreated water tank)
770 gallons (2 reaction tanks, 335 gallon each)
7,500 gallons (settling tank)
7,500 gallons (polishing tank)
~180,000 gallons total

Description: Clear, no odor
May contain elevated levels of radium-226, uranium, or other metals above effluent limitations set forth in NPDES Permit No. CO-0047562

Potential Health Hazards

- Skin Contact: Not a hazard
- Eye: Not a hazard
- Inhalation: Not a hazard
- Ingestion: Not a hazard

Potential Environmental Hazards

- No fire or explosion hazards
- May exceed effluent limitations for radium-226, uranium, or other metals

Handling

- Wear proper PPE including standard site PPE

First Aid

- Eyes: None required
- Skin: None required
- Ingestion: None required
- Inhalation: None required

Containment

Untreated Water Tank, Settling Tank, and Polishing Tank

- Primary: Geomembrane liner
- Secondary: Secondary geomembrane liner, leak detection between geomembrane liners, claymax underliner, and downgradient sediment pond.

Reaction Tanks

- Primary: Plastic Tanks
- Secondary: Treatment trailer sump drains to external 400-gallon plastic tank

UNTREATED/PARTIALLY TREATED MINE WATER (continued)

Maintenance Requirements

- Inspect tanks and lines for cracks or punctures, repair or remove defective tanks and lines
- Do not overfill tanks

Spill Response

- Control source of spill or leak, if possible.
- Small Spills: Within Trailer, direct spilled water into external 400-gallon tank via trailer sump drain.
  Outside of Trailer, stop source of the spill and contact Maintenance Supervisor. Source control of spill may require pumping of water into another tank or back into the mine.
- Large Spills: Contact Maintenance Supervisor for additional assistance.

Spill Notification Requirements

- Immediately contact the Mine Superintendent
- If not available contact Safety and Compliance Officer

- Reportable quantities: Selenium = 100 pounds
  Arsenic = 1 pound
  Radium-226 = 52,000,000 ρCi
  Uranium = 53,000,000 ρCi
- Reportable quantity exceeds maximum site quantities
  - 180,000 gallons of untreated mine water is equivalent to:
    - 0.05 pounds of Selenium (calculated based on 35 µg/L)
    - 0.04 pounds of Arsenic (calculated based on 27 µg/L)
    - 190 ρCi of Radium-226 (calculated based on 9.7 ρCi/L)
    - 15 ρCi of Uranium (calculated based on 126.6 ρCi/L)
  - Based on maximum detected levels of these constituents in untreated mine water
  - No EPA spill notification is required

- Spills of any quantity which enter waters of the state must be reported to:
  - Colorado Department of Public Health and Environment
    Toll-Free 24-hour Environmental Spill Reporting Line
    (877) 518-5608
  - Bureau of Land Management, Grand Junction Field Office
    (970) 244-3078

- Refer to the Spill Report in Appendix A for information to be provided to the above agencies during oral notification
- Follow-up written notification will be required by the above agencies and are required to be copied to the BLM. Instructions for submittal of the written notification will be provided by the agencies during or following oral notification.

TREATMENT PRECIPITATE

Synonyms: Settling tank sludge

Maximum Quantity On-site: 22,343 pounds (estimated at end of mine life)

Constituents: Low levels of Radium-226, Uranium, and other metals

Potential Health Hazards

- Skin Contact: Not a hazard
- Eye: Not a hazard
- Inhalation: Not a hazard
- Ingestion: Not a hazard

Potential Environmental Hazards

- No fire or explosion hazards
- None Reported

Handling

- Wear proper PPE including standard site PPE

First Aid

- Eyes: None required
- Skin: None required
- Ingestion: None required
- Inhalation: None required

Containment

- Primary: Geomembrane liner
- Secondary: Secondary geomembrane liner, leak detection between geomembrane liners, claymax underliner, and downgradient sediment pond.

Maintenance Requirements

- Inspect tanks for cracks or punctures, repair or remove defective tanks
- Measure precipitate levels

Spill Response

- Control source of spill or leak, if possible.
- Small Spills: Collect and place in container or return to settling tank
- Large Spills: Contact Maintenance Supervisor for additional assistance

TREATMENT PRECIPITATE (continued)

Spill Notification Requirements

- Immediately contact the Maintenance Supervisor (verbally)
- If not available contact Environmental Manager at (303) 864-7775

- Reportable quantities: Radium-226 = 0.052 Ci
  Uranium = 0.053 Ci
  - 600 pounds of precipitate may be equivalent to the reportable quantity of uranium
  - Reportable quantity exceeds the maximum quantity for radium-226 on-site
  - Concentrations based on sludge sample from settling pond of a similar treatment system in Utah
- Report spills of 600 pounds (0.5 cubic yards) or more of precipitate to:
  - National Response Center
    (800) 424-8802
  - Colorado Department of Public Health and Environment
    Toll-Free 24-hour Environmental Spill Reporting Line
    (877) 518-5608
  - Mesa County Local Emergency Planning Commission
    (970) 242-6707
  - Bureau of Land Management, Grand Junction Field Office
    (970) 244-3078

- Spills of any quantity which enter waters of the state must be reported to:
  - Colorado Department of Public Health and Environment
    Toll-Free 24-hour Environmental Spill Reporting Line
    (877) 518-5608
  - Bureau of Land Management, Grand Junction Field Office
    (970) 244-3078

- Refer to the Spill Report in Appendix A for information to be provided to the above agencies during oral notification
- Follow-up written notification will be required by the above agencies and are required to be copied to the BLM. Instructions for submittal of the written notification will be provided by the agencies during or following oral notification.

DIESEL FUEL, LOW SULFUR

Synonyms: Diesel Fuel #2, NA 1993, Petroleum Distillate, Diesel, #2 Fuel Oil, On-Road Diesel, Ultra Low Sulfur Diesel, Off-Road Diesel

Maximum Quantity On-site: 1,800 gallons

Potential Health Hazards

• Skin Contact:	Prolonged exposure may cause moderate irritation, cracking, redness, itching, inflammation, dermatitis, and possible secondary infection
• Eye:	May cause sever irritation, redness, tearing, blurred vision, and conjunctivitis
• Inhalation:	Nasal and respiratory tract infection, central nervous system effects including excitation, euphoria, contracted eye pupils, dizziness, drowsiness, blurred vision, fatigue, nausea, headache, loss of reflexes, tremors, convulsions, seizures, loss of consciousness, coma, respiratory arrest, and sudden death could occur as a result of long term and/or high concentration exposure to vapors.
• Ingestion:	Toxic if swallowed. May cause burns to mouth or stomach. May cause nausea, vomiting, diarrhea, and restlessness. May cause nervous system effects similar to those listed for inhalation.

Potential Environmental Hazards

- Combustible, flammable in presence of open flames
- None Reported

Handling

- Wear proper PPE including standard site PPE

First Aid

• Eyes:	Flush eyes with large volumes of water for at least 15 minutes while holding eyelids open. If pain or redness persists, seek medical attention.
• Skin:	Immediately flush skin with water. Remove contaminated clothing and shoes. Wash clothing and clean shoes thoroughly before reuse. Wash exposed area with water and soap. If irritation persists, seek medical attention.
• Ingestion:	Do not induce vomiting. Seek medical attention immediately.
• Inhalation:	Remove person to fresh air immediately. Perform artificial respiration if necessary. Give oxygen if breathing is difficult. Seek medical attention.

DIESEL FUEL, LOW SULFUR (continued)

Containment

- Primary: Above-ground steel storage tanks
- Secondary: Fuel Stop: Metal basin and downgradient sediment pond
  Generators: Bermed area around generator and tank

Maintenance Requirements

- Inspect tanks, hoses, and dispensers for corrosion or leakage; repair or remove defective tanks, hoses, or dispensers

Spill Response

- Control source of spill or leak, if possible.
- Small Spills: Absorb spilled material with absorbent, sand, or soil. Collect contaminated soil. Place absorbent and soil in designated contaminated soil storage area.
- Large Spills: Contact Maintenance Supervisor for additional assistance

Spill Notification Requirements

- Immediately contact the Mine Superintendent
- If not available contact Safety and Compliance Officer

- Reportable quantity: 25 Gallons
- Report spills of 25 gallons or more to:
  - Division of Oil & Public Safety - Dept of Labor and Employment (during business hours)
    303-318-8547
  - Colorado Department of Public Health and Environment (after business hours)
    Toll-Free 24-hour Environmental Spill Reporting Line
    (877) 518-5608
  - Bureau of Land Management, Grand Junction Field Office
    (970) 244-3078

- Report spills of any quantity which enter waters of the State to the above agencies as well as:
  - National Response Center
    (800) 424-8802

- Refer to the Spill Report in Appendix A for information to be provided to the above agencies during oral notification
- Follow-up written notification will be required by the above agencies and are required to be copied to the BLM. Instructions for submittal of the written notification will be provided by the agencies during or following oral notification.

NEW AND USED LUBRICATING OIL

Synonyms: Lubricating oil, engine oil, crankcase oil, machinery oil, motor oil

Maximum Quantity On-site: 800 gallons

Description: Dark brown to black, viscous, oily liquid, pronounced hydrocarbon odor

Potential Health Hazards

- Eye: Contact may cause slight to moderate irritation, including burning, redness, and tearing. Contact with hot material may cause thermal burns.
- Skin: Prolonged and/or repeated exposure may cause mild skin irritation, including redness, burning, temporary drying/cracking, and acute dermatitis. Contact with hot material may cause thermal burns. Used motor oil and some cutting oils are possible skin cancer hazards based on animal testing.
- Inhalation: High concentrations of aerosol or mist may be generated at high temperatures and may be irritating to the respiratory tract, including nose and throat, and may cause difficulty breathing. This material is not expected to present an inhalation exposure hazard at ambient conditions.
- Ingestion: May cause mild irritation of the digestive tract, including cramping, diarrhea, nausea and vomiting. Aspiration into the lungs – by initial ingestion or vomiting – may cause mild to severe pulmonary injury.

Potential Environmental Hazards

- May become combustible or flammable in presence of open flames
- None Reported

Handling

- Keep away from heat, sparks and flames
- Avoid generating oil mists or aerosols
- Wear proper PPE including standard site PPE

NEW AND USED LUBRICATING OIL (continued)

First Aid

• Eyes:	Immediately flush eyes with large amounts of water for a minimum of 15 minutes. If redness or irritation persists, continue flushing until the irritation subsides. If the material is hot, seek medical attention immediately for thermal burns.
• Skin:	Wash contact area with water and soap. If clothing is contaminated, minimize contact time on skin by removing contaminated clothing (if applicable) and washing contact area thoroughly with water and soap. If material is hot, flush or submerge affected area in cold water, and seek medical attention immediately for thermal burns.
• Ingestion:	This material does not present an ingestion hazard if a very small quantity is accidentally swallowed. May act as a laxative. No treatment is necessary under ordinary circumstances. If cramping and/or diarrhea are present following ingestion, seek medical attention.
• Inhalation:	If symptoms are present, remove to fresh air immediately. If irritation persists, seek medical attention.

Containment

• Primary:	Steel 55-gallon drums
• Secondary:	Shop walls, metal basin, and downgradient sediment pond

Maintenance Requirements

- Inspect drums for corrosion or leakage, repair or remove damaged drums

Spill Response

- Control source of spill or leak, if possible.
- Small Spills: Absorb spilled material with absorbent, sand, or soil. Collect contaminated soil. Place absorbent and soil in designated contaminated soil storage area.
- Large Spills: Contact Mine Superintendent for additional assistance

NEW AND USED LUBRICATING OIL (continued)

Spill Notification Requirements

- Immediately contact the Mine Superintendent
- If not available contact Safety and Compliance Officer

- Reportable quantity: 25 Gallons
- Report spills of 25 gallons or more to:
  - Division of Oil & Public Safety - Dept of Labor and Employment (during business hours)
    303-318-8547
  - Colorado Department of Public Health and Environment (after business hours)
    Toll-Free 24-hour Environmental Spill Reporting Line
    (877) 518-5608
  - Bureau of Land Management, Grand Junction Field Office
    (970) 244-3078

- Report spills of any quantity which enter waters of the State to the above agencies as well as:
  - National Response Center
    (800) 424-8802

- Refer to the Spill Report in Appendix A for information to be provided to the above agencies during oral notification
- Follow-up written notification will be required by the above agencies and are required to be copied to the BLM. Instructions for submittal of the written notification will be provided by the agencies during or following oral notification.

NEW AND USED ANTI-FREEZE

Synonyms: Coolant, ethylene glycol

Maximum Quantity On-site: 275 gallons

Description: Yellow-green to dark green, slightly viscous liquid, oily to the touch, slight odor

Potential Health Hazards

- Eye: May cause slight to moderate irritation, including burning, redness, and tearing. Contact with hot material may cause thermal burns.
- Skin: Prolonged and/or repeated exposure may cause mild skin irritation to sensitive individuals, including redness, burning, temporary drying/cracking, and dermatitis. Contact with hot material may cause thermal burns.
- Inhalation: Under normal exposure conditions, may cause systemic irritation of the nose and throat with accompanying headache. In a highly concentrated vapor environment, exposure may additionally produce nausea, vomiting, dizziness, severe headaches, and possibly unconsciousness.
- Ingestion: May be fatal if swallowed. May cause abdominal pain, dizziness, malaise, lumbar pain, oliguria, uremia, and CNS depression. Severe kidney damage, and subsequent renal collapse and failure, follows the ingestion of large volumes of ethylene glycol.

Potential Environmental Hazards

- May become combustible or flammable in presence of open flames
- None Reported

Handling

- Always keep away from sources of heat or flame, incompatible materials (e.g., oxidizers and strong acids), foodstuffs and personal effects.
- Wear proper PPE including standard site PPE

First Aid

- Eyes: Immediately flush eyes with large amounts of water for a minimum of 15 minutes. If redness or irritation is persistent, continue flushing until the irritation subsides. If the material is hot, seek medical attention immediately for thermal burns.
- Skin: Wash contact area with soap and water. If clothing is contaminated, remove contaminated clothing and wash contact area thoroughly with soap and water. If material is hot, flush or submerge affected area in cold water, and seek medical attention immediately for thermal burns.

NEW AND USED ANTI-FREEZE (continued)

First Aid (continued)

- Ingestion: Call a physician immediately. Induce vomiting by administering ipecac. Ethanol may be administered *in very small quantities* as an antidote; if the victim becomes pale and weak, cease administration immediately. Seek medical attention immediately.
- Inhalation: Remove to fresh air immediately. If breathing is difficult, give oxygen until victim's respiration rate returns to normal and seek medical attention immediately.

Containment

- Primary: Steel 55-gallon drums
- Secondary: Shop floor and downgradient sediment pond

Maintenance Requirements

- Inspect drums for corrosion or leakage, repair or empty damaged drums

Spill Response

- Control source of spill or leak, if possible.
- Small Spills: Absorb spilled material with absorbent, sand, or soil. Collect contaminated soil. Place absorbent and soil in designated contaminated soil storage area.
- Large Spills: Contact Mine Superintendent for additional assistance

NEW AND USED ANTI-FREEZE (continued)

Spill Notification Requirements

• Immediately contact the Mine Superintendent • If not available contact Safety and Compliance Officer
• Reportable quantity: 5,000 pounds of ethylene glycol   o equivalent to 630 gallons of new, unmixed antifreeze or 900 gallons of used antifreeze • Reportable quantity exceeds maximum on-site quantity (275 gallons) • No agency notifications required unless spill enters waters of the State

• Report spills of any quantity which enter waters of the State to:
  o National Response Center
  (800) 424-8802
  o Colorado Department of Public Health and Environment (after business hours)
  Toll-Free 24-hour Environmental Spill Reporting Line
  (877) 518-5608
  o Bureau of Land Management, Grand Junction Field Office
  (970) 244-3078

• Refer to the Spill Report in Appendix A for information to be provided to the above agencies during oral notification • Follow-up written notification will be required by the above agencies and are required to be copied to the BLM. Instructions for submittal of the written notification will be provided by the agencies during or following oral notification.

SODIUM METABISULFITE – GRANULAR

Maximum Quantity On-site: 1,000 pounds

Description: Fine, white granular powder, pungent sulfur dioxide odor

Potential Health Hazards

- Skin Contact: Repeated or prolonged contact with dust may cause irritation
- Eye: Dust or mist may cause irritation or burning
- Inhalation: Dust or mist may cause irritation. May cause severe or deadly allergic reactions in asthmatics and sulfite sensitive individuals.
- Ingestion: May cause irritation. May cause severe or deadly allergic reactions in asthmatics and sulfite sensitive individuals.
- Sensitization: May cause allergic skin reaction
- Not a carcinogen, teratogen, mutagen, or reproductive toxin

Potential Environmental Hazards

- This material does not contain any hazardous pollutants
- This material is not listed as a hazardous or toxic substance under TSCA, the Clean Water Act, or CERCLA

Handling

- Wear proper PPE including safety glasses, impervious gloves, and standard site PPE
- Recommend use of air-purifying respirator when mixing or in close contact
- Avoid unintentional contact with water, ice, acids, heat, and oxidizing agents

First Aid

- Eyes: Flush eyes with large amount of water for 15 minutes. Remove contact lenses if present after 5 minutes. Seek medical attention if irritation persists.
- Skin: Wash skin with water and soap. Remove contaminated clothing. Seek medical attention if irritation persists.
- Ingestion: If conscious, rinse mouth with water and give 1 glass of water to drink. Do not induce vomiting. Seek immediate medical attention.
- Inhalation: Remove person to fresh air. Seek medical attention if signs of suffocation, irritation, or other symptoms develop.

Containment

- Primary: Plastic bags stacked on pallet
- Secondary: Stored inside treatment trailer, protected from weather
  Treatment trailer sump drains to external 400-gallon plastic tank

SODIUM METABISULFITE – GRANULAR (continued)

Maintenance Requirements

- Bags should be kept inside treatment trailer, protected from weather, water, ice, acids, and oxidizing agents
- Bags should be kept off floor on pallet
- Care should be taken not to puncture bags
- Punctured bags should be placed in a closed container

Spill Response

- Control source of spill or leak, if possible.
- Small Spills: Sweep or scoop up and place in a closed container
- Large Spills: Contact Mine Superintendent for additional assistance

Spill Notification Requirements

- Immediately contact the Mine Superintendent
- If not available contact Safety and Compliance Officer

- This material has no reportable quantity
- No agency notifications required unless spill enters waters of the State

- Report spills of any quantity which enter waters of the State to:
  - Colorado Department of Public Health and Environment
    Toll-Free 24-hour Environmental Spill Reporting Line
    (877) 518-5608
  - Bureau of Land Management, Grand Junction Field Office
    (970) 244-3078

- Refer to the Spill Report in Appendix A for information to be provided to the above agencies during oral notification
- Follow-up written notification will be required by the above agencies and are required to be copied to the BLM. Instructions for submittal of the written notification will be provided by the agencies during or following oral notification.

SODIUM METABISULFITE – 1% to 10% SOLUTION

Maximum Quantity On-site: 300 gallons (sodium metabisulfite mix tank)

Description: Clear liquid, sulfur dioxide odor

Potential Health Hazards

- Skin Contact: May cause irritation or chemical burns
- Eye: May cause irritation or chemical burns. Possible permanent eye injury.
- Inhalation: May cause irritation
- Ingestion: May cause irritation

Potential Environmental Hazards

- This material does not contain any hazardous pollutants
- This material is not listed as a hazardous or toxic substance under TSCA, the Clean Water Act, or CERCLA

Handling

- Wear proper PPE including safety glasses, impervious gloves, and standard site PPE
- Recommend use of air-purifying respirator when mixing or in close contact

First Aid

- Eyes: Flush eyes with large amount of water for 15 minutes. Remove contact lenses if present after 5 minutes. Seek medical attention if irritation persists.
- Skin: Wash skin with water and soap. Remove contaminated clothing. Seek medical attention if irritation persists.
- Ingestion: If conscious, rinse mouth with water and give 1 glass of water to drink. Do not induce vomiting. Seek immediate medical attention.
- Inhalation: Remove person to fresh air. Seek medical attention if signs of suffocation, irritation, or other symptoms develop.

Containment

- Primary: 300-gallon plastic tank
- Secondary: Treatment trailer sump drains to external 400-gallon plastic tank

Maintenance Requirements

- Inspect tanks and lines for cracks or punctures, repair or remove defective tanks and lines
- Do not overfill tanks

SODIUM METABISULFITE – 1% to 10% SOLUTION (continued)

Spill Response

- Control source of spill or leak, if possible.
- Small Spills: Wash area with water
- Large Spills: Contact Mine Superintendent for additional assistance

Spill Notification Requirements

- Immediately contact the Mine Superintendent
- If not available contact Safety and Compliance Officer

- This material has no reportable quantity
- No agency notifications required unless spill enters waters of the State

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- Report spills of any quantity which enter waters of the State to:
  - Colorado Department of Public Health and Environment
    Toll-Free 24-hour Environmental Spill Reporting Line
    (877) 518-5608
  - Bureau of Land Management, Grand Junction Field Office
    Alan Kraus
    (970) 244-3078

- Refer to the Spill Report in Appendix A for information to be provided to the above agencies during oral notification
- Follow-up written notification will be required by the above agencies and are required to be copied to the BLM. Instructions for submittal of the written notification will be provided by the agencies during or following oral notification.

HYDROCHLORIC ACID – 31% SOLUTION

Maximum Quantity On-site: 275 gallons (tote in Water Treatment Plan)

Description: Clear liquid, may produce acid vapors

Potential Health Hazards

- Skin Contact: Rapidly causes severe chemical burns
- Eye: Rapidly causes severe chemical burns, possibly with permanent impairment of vision.
- Inhalation: Can cause choking, coughing, headache dizziness, destroy mucous membranes.
- Ingestion: Severe burning of mouth, pharynx, abdomen, dental erosions, asphyxia, corrosion of upper gastro-intestinal tract with vomiting.

Potential Environmental Hazards

- Likely mobile in the environment due to its water solubility.
- Large amounts will affect pH and harm aquatic organisms

Handling

- Protect containers from mechanical damage
- If possible, provide sufficient mechanical ventilation
- Do not store or mix with cyanides, amines, sulfides, oxidizers or formaldehyde
- Keep in cool place
- Keep away from heat, sparks and flame
- Keep containers tightly closed
- Wear proper PPE including chemical splash goggles (face shield use is also advisable), Rubber or plastic apron/coat, shoes, hard hat with brim. glasses, acid impervious gloves, and standard site PPE
- Avoid breathing vapors
- Do not get in eyes, on skin or clothing
- Wash thoroughly with soap and water after handling
-

HYDROCHLORIC ACID – 31% SOLUTION
(Continued)

First Aid

- Eyes: Flush eyes with large amount of clean water, holding eyelids open for 15 minutes. Do not use chemical antidotes, speed is essential
- Skin: Immediately flush exposed area with water for 15 minutes. Remove all contaminated clothing and wash. Seek medical attention. Keep affected area cool.
- Ingestion: DO NOT INDUCE VOMITING! Give large quantities of water. See medical attention immediately. Keep warm. Never give anything by mouth if person is unconscious.
- Inhalation: Remove person to fresh air. Seek medical attention immediately. If breathing is difficult, give oxygen (6 liters per minute). If breathing has stopped, give artificial respiration.

Containment

- Primary: 275-gallon IBC tote
- Secondary: Individual containment vessel
- Tertiary: Treatment trailer sump drains to external 275-gallon plastic tank

Maintenance Requirements

- Inspect tanks and lines for cracks or punctures, repair or remove defective tanks and lines
- Do not overfill tanks

Spill Response

- Control source of spill or leak, if possible.
- Small Spills: Cover the contaminated surface with Sodium Bicarbonate, Soda Ash or Lime. Mix and add water if necessary to form a slurry. Scoop up slurry and wash site with Sodium Bicarbonate solution.
- Large Spills: Evacuate persons from area that are not equipped with proper PPE. Stay upwind of any spill. Stop leak at source if safe to do so. Dike to prevent spreading. Pump to non-metallic salvage truck/tank.

HYDROCHLORIC ACID – 31% SOLUTION
(Continued)

Spill Notification Requirements

- Immediately contact the Mine Superintendent (verbally)
- If not available contact Safety and Compliance Officer

- Reportable quantity is 5,000 lb approx.. 1,300 gallons
- No agency notifications required unless spill enters waters of the State

- Report spills of any quantity which enter waters of the State to:
  - Colorado Department of Public Health and Environment
    Toll-Free 24-hour Environmental Spill Reporting Line
    (877) 518-5608
  - Bureau of Land Management, Grand Junction Field Office
    (970) 244-3078

- Refer to the Spill Report in Appendix A for information to be provided to the above agencies during oral notification
- Follow-up written notification will be required by the above agencies and are required to be copied to the BLM. Instructions for submittal of the written notification will be provided by the agencies during or following oral notification.

SODIUM HYDROXIDE – 25% SOLUTION

AKA Caustic Soda

Maximum Quantity On-site: 55-gallon drum

Description: Clear liquid, odorless

Potential Health Hazards

- Skin Contact: Severe chemical burns
- Eye: Severe chemical burns. Possible permanent eye injury.
- Inhalation: May cause irritation
- Ingestion: May cause irritation

Potential Environmental Hazards

- Prevent product from entering drains
- This material is listed on TSCA, however, no component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.

Handling

- Wear proper PPE including tight fitting safety glasses, face shield and protective suit. Use impervious gloves, and standard site PPE

First Aid

- Eyes: Flush eyes with large amount of water and seek medical advice. Remove contact lenses. Keey eye open while rinsing.
- Skin: Wash skin with water. Immediate medical treatment is necessary. Remove contaminated clothing
- Ingestion: Do not induce vomiting without medical advice. Do not give milk or alcoholic beverages. Take person to hospital immediately.
- Inhalation: Remove person to fresh air. If unconscious place in recovery position and seek medical advice. If symptoms persist, call doctor.

Containment

- Primary: 55-gallon drum
- Secondary: Individual containment vessel
- Tertiary: Treatment trailer sump drains to external 275-gallon plastic tank

SODIUM HYDROXIDE – 25% SOLUTION
(Continued)

Maintenance Requirements

- Inspect tanks and lines for cracks or punctures, repair or remove defective tanks and lines
- Do not overfill tanks

Spill Response

- Control source of spill or leak, if possible.
- Small Spills: Neutralize with acid. Soak up with inert absorbent material (e.g. sand, silica gel, acid binder, universal binder, sawdust).
- Large Spills: Contact Mine Superintendent or Safety and Compliance Officer for additional assistance

Spill Notification Requirements

- Immediately contact the Mine Superintendent (verbally)
- If not available contact Safety and Compliance Officer at (303) 864-7775

- This material has no reportable quantity
- No agency notifications required unless spill enters waters of the State

- Regulatory Affairs will report spills of any quantity which enter waters of the State to:
  - Colorado Department of Public Health and Environment
    Toll-Free 24-hour Environmental Spill Reporting Line
    (877) 518-5608
  - Bureau of Land Management, Grand Junction Field Office
    (970) 244-3078

- Refer to the Spill Report in Appendix A for information to be provided to the above agencies during oral notification
- Follow-up written notification will be required by the above agencies and are required to be copied to the BLM. Regulatory Affairs will prepare and submit written notifications to the appropriate agencies following oral notification.

APPENDIX A
HISTORY OF SPILLS

APPENDIX A
HISTORY OF SPILLS AT THE WHIRLWIND MINE

Spilled Material	Date/Time	Cause of Spill	Remedial Actions
Untreated Mine Water	11/28/07 4:00 pm – 11/29/07 6:30 am	Valve at untreated water tank froze overnight and cracked. Approximately 300 gallons of water leaked to adjacent soils and froze. Water did not reach waters of the State.	Spilled, frozen water was removed and placed into mine portal. Damaged valve was replaced with additional insulation and heat tape.

APPENDIX B
SPILL NOTIFICATION FORM

APPENDIX B
SPILL NOTIFICATION FORM

INITIAL INFORMATION:

Date:	Time Reported ( ) AM ( ) PM	Time Occurred ( ) AM ( ) PM
Individual Reporting: (Your Name)		
Phone #	Company Name:	
Location of Spill:	Address:	
Product Spilled	Estimated Amount	County, City, State, Zip
Source & Cause of Incident:		
Person Reported To:	Weather/Stream Conditions:	
Severity of Spill:	Meeting Federal Obligations to Report?	

CURRENT CONDITIONS

(Include Containment and/or Clean-up Efforts)

NOTIFICATIONS

Persons and/or Agencies Notified	Phone Number	Date and Time Notified	Written Follow-up Report Required (yes/no)

U.S. ENVIRONMENTAL PROTECTION AGENCY
TIER I QUALIFIED FACILITY SPCC PLAN TEMPLATE

Instructions to Complete this Template

This template is intended to help the owner or operator of a Tier I qualified facility develop a self-certified Spill Prevention, Control, and Countermeasure (SPCC) Plan. To use this template, your facility must meet all of the applicability criteria of a Tier I qualified facility listed under §112.3(g)(1) of the SPCC rule. This template provides every SPCC rule requirement necessary for a Tier I qualified facility, which you must address and implement.

You may use this template to comply with the SPCC regulation or use it as a model and modify it as necessary to meet your facility-specific needs. If you modify the template, your Plan must include a section cross-referencing the location of each applicable requirement of the SPCC rule and you must ensure that your Plan is an equivalent Plan that meets all applicable rule requirements of 40 CFR 112.6(a)(3).

You may complete this template either electronically or by hand on a printed copy. This document is a reformatted version of the template found in Appendix G of 40 CFR part 112.[a] No substantive changes have been made. Please note that a "Not Applicable" ("N/A") column has been added to both Table G-10 (General Rule Requirements for Onshore Facilities) and Table G-11 (General Rule Requirements for Onshore Oil Production Facilities). The "N/A" column should help you complete your self-certification when a required rule element does not apply to your facility. Use of the "N/A" column is optional and is not required by rule.

All Tier I qualified facility self-certifiers must complete Sections I, II, and III. Additionally, the owner or operator of an:

- Onshore facility (excluding production) must complete Section A.
- Onshore oil production facility (excluding drilling and workover facilities) must complete Section B.
- Onshore oil drilling and workover facility must complete Section C.

Complete and include with your Plan the appropriate attachments. You should consider printing copies of the attachments for use in implementing the SPCC Plan (e.g. Attachment 3.1 - Inspection Log & Schedule; Attachment 4 - Discharge Notification Form).

To complete the template, check the box next to the requirement to indicate that it has been adequately addressed. Either write “N/A” in the column or check the box under the “N/A” column to indicate those requirements that are not applicable to the facility. Where a section requires a description or listing, write in the spaces provided (or attach additional descriptions if more space is needed).

Below is a key for the colors used in the section headers:

Sections I, II, and III: Required for all Tier I qualified facilities
Section A: Onshore facilities (excluding production)
Section B: Onshore oil production facilities (excluding drilling and workover facilities)
Section C: Onshore oil drilling and workover facilities
Attachments: 1 - Five Year Review and Technical Amendment Logs 2 - Oil Spill Contingency Plan and Checklist 3 - Inspections, Dike Drainage and Personnel Training Logs 4 - Discharge Notification Form

After you have completed all appropriate sections, certify and date your Plan, and then implement it by the compliance date. If your facility was in operation before August 16, 2002, and you do not already have a Plan, then implement this template immediately. Conduct inspections and tests in accordance with the written procedures that you have developed for your facility. You must keep with the SPCC Plan a record of these inspections and tests, signed by the appropriate supervisor or inspector, for a period of three years.

Do not forget to periodically review your Plan (at least once every five years) or to update it when you make changes to your facility. You must prepare amendments within six months of the facility change, and implement them as soon as possible, but not later than six months following preparation of any amendment.

In the event that your facility releases oil to navigable waters or adjoining shorelines, immediately call the National Response Center (NRC) at 1-800-424-8802. The NRC is the federal government's centralized reporting center, which is staffed 24 hours per day by U.S. Coast Guard personnel.

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[a] Please note that the use of this template is not mandatory for a Tier I qualified facility. You may also meet the SPCC Plan requirement by preparing a satisfactory Tier II qualified facility Plan, preparing a satisfactory Plan that is certified by a Professional Engineer, or by developing an equivalent Plan for a Tier I qualified facility. Further information on the requirements of these methods can be found in 40 CFR part 112.6(a)(1). If you use any of these alternative methods you must include a cross reference in your Plan that shows how the equivalent Plan meets all applicable 40 CFR part 112 requirements.

Tier I Qualified Facility SPCC Plan

This template constitutes the SPCC Plan for the facility, when completed and signed by the owner or operator of a facility that meets the applicability criteria in §112.3(g)(1). This template addresses the requirements of 40 CFR part 112. Maintain a complete copy of the Plan at the facility if the facility is normally attended at least four hours per day, or for a facility attended fewer than four hours per day, at the nearest field office. When making operational changes at a facility that are necessary to comply with the rule requirements, the owner/operator should follow state and local requirements (such as for permitting, design and construction) and obtain professional assistance, as appropriate.

Facility Description

Facility Name: Whirlwind Mine

Facility Address: 30100 5/10 Road.

City: Gateway State: CO ZIP: 81522

County: Mesa Tel. Number: ( ) -

Owner or Operator Name: Energy Fuels Resources (USA) Inc.

Owner or Operator Address: 225 Union Blvd, Suite 600

City: Lakewood State: CO ZIP: 80228

County: Jefferson Tel. Number: (303) 974 – 2140

I. Self-Certification Statement (§112.6(a)(1))

The owner or operator of a facility certifies that each of the following is true in order to utilize this template to comply with the SPCC requirements:

I Todd Eldredge certify that the following is accurate:

1. I am familiar with the applicable requirements of 40 CFR part 112;
2. I have visited and examined the facility;
3. This Plan was prepared in accordance with accepted and sound industry practices and standards;
4. Procedures for required inspections and testing have been established in accordance with industry inspection and testing standards or recommended practices;
5. I will fully implement the Plan;
6. This facility meets the following qualification criteria (under §112.3(g)(1)):
    a. The aggregate aboveground oil storage capacity of the facility is 10,000 U.S. gallons or less; and
    b. The facility has had no single discharge as described in §112.1(b) exceeding 1,000 U.S. gallons and no two discharges as described in §112.1(b) each exceeding 42 U.S. gallons within any twelve month period in the three years prior to the SPCC Plan self-certification date, or since becoming subject to 40 CFR part 112 if the facility has been in operation for less than three years (not including oil discharges as described in §112.1(b) that are the result of natural disasters, acts of war, or terrorism); and
    c. There is no individual oil storage container at the facility with an aboveground capacity greater than 5,000 U.S. gallons.
7. This Plan does not deviate from any requirement of 40 CFR part 112 as allowed by §112.7(a)(2) (environmental equivalence) and §112.7(d) (impracticability of secondary containment) or include any measures pursuant to §112.9(c)(6) for produced water containers and any associated piping;
8. This Plan and individual(s) responsible for implementing this Plan have the full approval of management and I have committed the necessary resources to fully implement this Plan.

I also understand my other obligations relating to the storage of oil at this facility, including, among others:

1. To report any oil discharge to navigable waters or adjoining shorelines to the appropriate authorities. Notification information is included in this Plan.
2. To review and amend this Plan whenever there is a material change at the facility that affects the potential for an oil discharge, and at least once every five years. Reviews and amendments are recorded in an attached log [See Five Year Review Log and Technical Amendment Log in Attachments 1.1 and 1.2.]
3. Optional use of a contingency plan. A contingency plan:
    a. May be used in lieu of secondary containment for qualified oil-filled operational equipment, in accordance with the requirements under §112.7(k), and;
    b. Must be prepared for flowlines and/or intra-facility gathering lines which do not have secondary containment at an oil production facility, and;
    c. Must include an established and documented inspection or monitoring program; must follow the provisions of 40 CFR part 109; and must include a written commitment of manpower, equipment and materials to expeditiously remove any quantity of oil discharged that may be harmful. If applicable, a copy of the contingency plan and any additional documentation will be attached to this Plan as Attachment 2.

I certify that I have satisfied the requirement to prepare and implement a Plan under §112.3 and all of the requirements under §112.6(a). I certify that the information contained in this Plan is true.

Signature _____ Title: _____

Name _____ Date: ___/___/ 2021

II. Record of Plan Review and Amendments

Five Year Review (§112.5(b)):

Complete a review and evaluation of this SPCC Plan at least once every five years. As a result of the review, amend this Plan within six months to include more effective prevention and control measures for the facility**,** if applicable. Implement any SPCC Plan amendment as soon as possible**,** but no later than six months following Plan amendment. Document completion of the review and evaluation, and complete the Five Year Review Log in Attachment 1.1. If the facility no longer meets Tier I qualified facility eligibility, the owner or operator must revise the Plan to meet Tier II qualified facility requirements, or complete a full PE certified Plan.

Table G-1 Technical Amendments (§§112.5(a), (c) and 112.6(a)(2))	
This SPCC Plan will be amended when there is a change in the facility design, construction, operation, or maintenance that materially affects the potential for a discharge to navigable waters or adjoining shorelines. Examples include adding or removing containers, reconstruction, replacement, or installation of piping systems, changes to secondary containment systems, changes in product stored at this facility, or revisions to standard operating procedures.	☒
Any technical amendments to this Plan will be re-certified in accordance with Section I of this Plan template. *[§112.6(a)(2)]* **[See Technical Amendment Log in Attachment 1.2]**	☒

III. Plan Requirements

1. Oil Storage Containers (§112.7(a)(3)(i)):

Table G-2 Oil Storage Containers and Capacities	
This table includes a complete list of all oil storage containers (aboveground containers[a] and completely buried tanks[b]) with capacity of 55 U.S. gallons or more, unless otherwise exempt from the rule. For mobile/portable containers, an estimated number of containers, types of oil, and anticipated capacities are provided.	☒

Oil Storage Container *(indicate whether aboveground (A) or completely buried (B))*	**Type of Oil**	**Shell Capacity (gallons)**
A) AST-1 Tank	On-site Diesel	500
A) AST-2 Tank	On-site Diesel	500
A) AST-3 Generator	On-site Diesel	500
A) 55 gallon Drums	New oil	110
A) 55 gallon Drums	Used Oil	110
	I	

Total Aboveground Storage Capacity [c] 1,720 gallons
Total Completely Buried Storage Capacity 0 gallons
Facility Total Oil Storage Capacity 1,720 gallons

[a] Aboveground storage containers that must be included when calculating total facility oil storage capacity include: tanks and mobile or portable containers; oil-filled operational equipment (e.g. transformers); other oil-filled equipment, such as flow-through process equipment. Exempt containers that are not included in the capacity calculation include: any container with a storage capacity of less than 55 gallons of oil; containers used exclusively for wastewater treatment; permanently closed containers; motive power containers; hot-mix asphalt containers; heating oil containers used solely at a single-family residence; and pesticide application equipment or related mix containers.

[b] Although the criteria to determine eligibility for qualified facilities focuses on the aboveground oil storage containers at the facility, the completely buried tanks at a qualified facility are still subject to the rule requirements and must be addressed in the template; however, they are not counted toward the qualified facility applicability threshold.

[c] Counts toward qualified facility applicability threshold.

2. Secondary Containment and Oil Spill Control (§§112.6(a)(3)(i) and (ii), 112.7(c) and 112.9(c)(2)):

Table G-3 Secondary Containment and Oil Spill Control	
Appropriate secondary containment and/or diversionary structures or equipment[a] is provided for all oil handling containers, equipment, and transfer areas to prevent a discharge to navigable waters or adjoining shorelines. The entire secondary containment system, including walls and floor, is capable of containing oil and is constructed so that any discharge from a primary containment system, such as a tank or pipe, will not escape the containment system before cleanup occurs.	☒

[a] Use one of the following methods of secondary containment or its equivalent: (1) Dikes, berms, or retaining walls sufficiently impervious to contain oil; (2) Curbing; (3) Culverting, gutters, or other drainage systems; (4) Weirs, booms, or other barriers; (5) Spill diversion ponds; (6) Retention ponds; or (7) Sorbent materials.

Table G-4 below identifies the tanks and containers at the facility with the potential for an oil discharge; the mode of failure; the flow direction and potential quantity of the discharge; and the secondary containment method and containment capacity that is provided.

Table G-4 Containers with Potential for an Oil Discharge

Area	Type of failure (discharge scenario)	Potential discharge volume (gallons)	Direction of flow for uncontained discharge	Secondary containment method[a]	Secondary containment capacity (gallons)
Bulk Storage Containers and Mobile/Portable Containers[b]					
A) AST-1	Tank overfill, fitting leak, fire, crushing	1-500	within containment area	sized secondary containment metal trough	750
A) AST-2	Tank overfill, fitting leak, fire, crushing	1-500	within containment area	sized secondary containment metal trough	750
A) AST-3	Tank overfill, fitting leak, fire, crushing	1-500	within containment area	sized secondary containment metal trough	750
A) AST-5 55 gallon drums	Transfer/overfill, leaks, fire, crushing	1-110 ea	within containment	sized secondary containment metal pad	750
A) AST-5 55 gallon drums	Transfer/overfill, leaks, fire, crushing	1-110 ea	within containment	sized secondary containment metal pad	750
Oil-filled Operational Equipment (e.g., hydraulic equipment, transformers)[c]					
Piping, Valves, etc.					
Product Transfer Areas (location where oil is loaded to or from a container, pipe or other piece of equipment.)					
Other Oil-Handling Areas or Oil-Filled Equipment (e.g. flow-through process vessels at an oil production facility)					
N/A					

[a] Use one of the following methods of secondary containment or its equivalent: (1) Dikes, berms, or retaining walls sufficiently impervious to contain oil; (2) Curbing; (3) Culverting, gutters, or other drainage systems; (4) Weirs, booms, or other barriers; (5) Spill diversion ponds; (6) Retention ponds; or (7) Sorbent materials.

[b] For storage tanks and bulk storage containers, the secondary containment capacity must be at least the capacity of the largest container plus additional capacity to contain rainfall or other precipitation.

[c] For oil-filled operational equipment: Document in the table above if alternative measures to secondary containment (as described in §112.7(k)) are implemented at the facility.

3. Inspections, Testing, Recordkeeping and Personnel Training (§§112.7(e) and (f), 112.8(c)(6) and (d)(4), 112.9(c)(3), 112.12(c)(6) and (d)(4)):

Table G-5 Inspections, Testing, Recordkeeping and Personnel Training	
An inspection and/or testing program is implemented for all aboveground bulk storage containers and piping at this facility. *[§§112.8(c)(6) and (d)(4), 112.9(c)(3), 112.12(c)(6) and (d)(4)]*	☒
The following is a description of the inspection and/or testing program (e.g. reference to industry standard utilized, scope, frequency, method of inspection or test, and person conducting the inspection) for all aboveground bulk storage containers and piping at this facility: 1. An assigned knowledgeable employee does periodic visual inspections of aboveground oil storage containers, including all aboveground container piping. See Attachment 3.1 for inspection information. Visual inspections of oil storage containers follow the inspection schedule in Attachment 3.2 of this plan. 2. If an employee encounters a spill during an inspection of the oil storage or transfer equipment, the employee will, if safely able to do so, take the necessary action outlined in Table G-7.	
Inspections, tests, and records are conducted in accordance with written procedures developed for the facility. Records of inspections and tests kept under usual and customary business practices will suffice for purposes of this paragraph. *[§112.7(e)]*	☒
A record of the inspections and tests are kept at the facility or with the SPCC Plan for a period of three years. *[§112.7(e)]* **[See Inspection Log and Schedule in Attachment 3.1]**	☒
Inspections and tests are signed by the appropriate supervisor or inspector. *[§112.7(e)]*	☒
Personnel, training, and discharge prevention procedures [§112.7(f)]	
Oil-handling personnel are trained in the operation and maintenance of equipment to prevent discharges; discharge procedure protocols; applicable pollution control laws, rules, and regulations; general facility operations; and, the contents of the facility SPCC Plan. *[§112.7(f)]*	☒
A person who reports to facility management is designated and accountable for discharge prevention. *[§112.7(f)]* Name/Title: Todd Eldredge, Spill Coordinator	☒
Discharge prevention briefings are conducted for oil-handling personnel annually to assure adequate understanding of the SPCC Plan for that facility. Such briefings highlight and describe past reportable discharges or failures, malfunctioning components, and any recently developed precautionary measures. *[§112.7(f)]* **[See Oil-handling Personnel Training and Briefing Log in Attachment 3.4]**	☒

4. Security (excluding oil production facilities) §112.7(g):

Table G-6 Implementation and Description of Security Measures	
Security measures are implemented at this facility to prevent unauthorized access to oil handling, processing, and storage area.	☒

The following is a description of how you secure and control access to the oil handling, processing and storage areas; secure master flow and drain valves; prevent unauthorized access to starter controls on oil pumps; secure out-of-service and loading/unloading connections of oil pipelines; address the appropriateness of security lighting to both prevent acts of vandalism and assist in the discovery of oil discharges:

1. During periods of non-operation or inactivity, for an extended period of time, the master flow and drain valves have adequate measures to ensure they remain in the closed position, and pump starter controls are maintained in the off position inside a secure facility. The loading/unloading connections are securely capped or blank-flanged and marked at the terminal connection or transfer point.

2. During operations, fuel tanks are fitted with locks on the fill caps, when not in use.

3. During operations access is restricted to a singular point of entry and when the Mine is unmanned the fences are locked.

5. Emergency Procedures and Notifications (§112.7(a)(3)(iv) and 112.7(a)(5)):

Table G-7 Description of Emergency Procedures and Notifications

The following is a description of the immediate actions to be taken by facility personnel in the event of a discharge to navigable waters or adjoining shorelines *[§112.7(a)(3)(iv) and 112.7(a)(5)]*:

No countermeasures will be employed until conditions are safe.

1. Shutdown pumping in event of a spill during fuel transfer operations.
2. Eliminate all ignition sources in the immediate area
3. Identify and secure source of spill.
4. Attempt to contain the spill using sorbents, other spill kit materials, earthen berms etc.
5. Attempt to divert flow away from the temporary ditch with a spill barrier or spill kit items.
6. Contact the Mine Superintendent who will determine if notification is necessary.
7. Contact regulatory authorities and other response personnel and organizations (see subsection 6)
8. Notify emergency response contractor for assistance and cleanup, as applicable.

6. Contact List (§112.7(a)(3)(vi)):

Table G-8 Contact List	
Contact Organization / Person	**Telephone Number**
National Response Center (NRC)	1-800-424-8802
Cleanup Contractor(s) Fuel Tech (St. George Utah)	435-673-9421
Key Facility Personnel	
Designated Person Accountable for Discharge Prevention: Todd Eldredge Mine Superintendent & Spill Coordinator	Office: 435-686-2504 Emergency: 435-459-1075
Race Fisher Director of Mining	Office: 435-686-9949 Emergency: 970-259-2100
Scott Bakken Vice President,	Office: 303 389-4132 Emergency: 303-720-5330
Tyler Martin Safety and Compliance Officer	Office: 505-947-8011 Emergency:
Colorado Dept of Public Health and Environment Spill Reporting Line (24 hrs)	877-518-5608
Other State, Federal, and Local Agencies Local Emergency Planning Committee (call immediately) Division of Oil and Public Safety BLM	 303-318-8547 970-244-3078
Local Fire Department Grand Junction Fire Department	970-244-1400
Local Police Department Mesa County Non-Emergency Dispatch	911 or Dispatch Center (24 hr) 970-242-6707
Hospital San Juan Hospital, Monticello, UT	435-587-2116
Other Contact References (e.g., downstream water intakes or neighboring facilities)	

7. NRC Notification Procedure (§112.7(a)(4) and (a)(5)):

Table G-9 NRC Notification Procedure	
In the event of a discharge of oil to navigable waters or adjoining shorelines, the following information identified in Attachment 4 will be provided to the National Response Center immediately following identification of a discharge to navigable waters or adjoining shorelines **[See Discharge Notification Form in Attachment 4]**: *[§112.7(a)(4)]*	☒

- The exact address or location and phone number of the facility;
- Date and time of the discharge;
- Type of material discharged;
- Estimate of the total quantity discharged;
- Estimate of the quantity discharged to navigable waters;
- Source of the discharge;
- Description of all affected media;
- Cause of the discharge;
- Any damages or injuries caused by the discharge;
- Actions being used to stop, remove, and mitigate the effects of the discharge;
- Whether an evacuation may be needed; and
- Names of individuals and/or organizations who have also been contacted.

8. SPCC Spill Reporting Requirements (Report within 60 days) (§112.4):

Submit information to the EPA Regional Administrator (RA) and the appropriate agency or agencies in charge of oil pollution control activities in the State in which the facility is located within 60 days from one of the following discharge events:

A single discharge of more than 1,000 U.S. gallons of oil to navigable waters or adjoining shorelines or
Two discharges to navigable waters or adjoining shorelines each more than 42 U.S. gallons of oil occurring within any twelve month period

Other Reporting Requirements: Regulatory Affairs will assist in providing notification to agencies of reportable spills. Releases of 25 gallons to the ground or that has or may impact waters of the state, specifically Lumsden Creek, must be called into the CDHPE immediately. This is to be followed by a written report describing the release and associated response. The State Oil Inspector at the Division of Oil & Public Safety needs to be called within 24 hrs of the incident.

You must submit the following information to the Regulatory Affairs:

(1) Name of the facility;
(2) Your name;
(3) Location of the facility;
(4) Maximum storage or handling capacity of the facility and normal daily throughput;
(5) Corrective action and countermeasures you have taken, including a description of equipment repairs and replacements;
(6) An adequate description of the facility, including maps, flow diagrams, and topographical maps, as necessary;
(7) The cause of the reportable discharge, including a failure analysis of the system or subsystem in which the failure occurred; and
(8) Additional preventive measures you have taken or contemplated to minimize the possibility of recurrence
(9) Such other information as the Regional Administrator may reasonably require pertinent to the Plan or discharge

* * * * *

NOTE: Complete one of the following sections (A, B or C) as appropriate for the facility type.

A. Onshore Facilities (excluding production) (§§112.8(b) through (d), 112.12(b) through (d)):

The owner or operator must meet the general rule requirements as well as requirements under this section. Note that not all provisions may be applicable to all owners/operators. For example, a facility may not maintain completely buried metallic storage tanks installed after January 10, 1974, and thus would not have to abide by requirements in §§112.8(c)(4) and 112.12(c)(4), listed below. **In cases where a provision is not applicable, write "N/A".**

Table G-10 General Rule Requirements for Onshore Facilities		N/A
Drainage from diked storage areas is restrained by valves to prevent a discharge into the drainage system or facility effluent treatment system, except where facility systems are designed to control such discharge. Diked areas may be emptied by pumps or ejectors that must be manually activated after inspecting the condition of the accumulation to ensure no oil will be discharged. *[§§112.8(b)(1) and 112.12(b)(1)]*	☒	☐
Valves of manual, open-and-closed design are used for the drainage of diked areas. *[§§112.8(b)(2) and 112.12(b)(2)]*	☐	☒
The containers at the facility are compatible with materials stored and conditions of storage such as pressure and temperature. *[§§112.8(c)(1) and 112.12(c)(1)]*	☒	☐
Secondary containment for the bulk storage containers (including mobile/portable oil storage containers) holds the capacity of the largest container plus additional capacity to contain precipitation. Mobile or portable oil storage containers are positioned to prevent a discharge as described in §112.1(b). *[§112.6(a)(3)(ii)]*	☒	☐
If uncontaminated rainwater from diked areas drains into a storm drain or open watercourse the following procedures will be implemented at the facility: *[§§112.8(c)(3) and 112.12(c)(3)]*		
• Bypass valve is normally sealed closed	☐	☒
• Retained rainwater is inspected to ensure that its presence will not cause a discharge to navigable waters or adjoining shorelines	☒	☐
• Bypass valve is opened and resealed under responsible supervision	☐	☒
• Adequate records of drainage are kept **[See Dike Drainage Log in Attachment 3.3]**		☒
For completely buried metallic tanks installed on or after January 10, 1974 at this facility *[§§112.8(c)(4) and 112.12(c)(4)]*:		
• Tanks have corrosion protection with coatings or cathodic protection compatible with local soil conditions.	☐	☒
• Regular leak testing is conducted.	☐	☒
For partially buried or bunkered metallic tanks *[§112.8(c)(5) and §112.12(c)(5)]*:		
• Tanks have corrosion protection with coatings or cathodic protection compatible with local soil conditions.	☐	☒
Each aboveground bulk container is tested or inspected for integrity on a regular schedule and whenever material repairs are made. Scope and frequency of the inspections and inspector qualifications are in accordance with industry standards. Container supports and foundations are regularly inspected. **[See Inspection Log and Schedule and Bulk Storage Container Inspection Schedule in Attachments 3.1 and 3.2]** *[§112.8(c)(6) and §112.12(c)(6)(i)]*	☒	☐
Outsides of bulk storage containers are frequently inspected for signs of deterioration, discharges, or accumulation of oil inside diked areas. **[See Inspection Log and Schedule in Attachment 3.1]** *[§§112.8(c)(6) and 112.12(c)(6)]*	☒	☐
For bulk storage containers that are subject to 21 CFR part 110 which are shop-fabricated, constructed of austenitic stainless steel, elevated and have no external insulation, formal visual inspection is conducted on a regular schedule. Appropriate qualifications for personnel performing tests and inspections are documented. **[See Inspection Log and Schedule and Bulk Storage Container Inspection Schedule in Attachments 3.1 and 3.2]** *[§112.12(c)(6)(ii)]*	☒	☐

Table G-10 General Rule Requirements for Onshore Facilities		N/A
Each container is provided with a system or documented procedure to prevent overfills for the container. Describe: **Tank Truck Loading/Unloading** **1.** Vehicles are chocked 2. Fuel oil trucks are fitted with safety shut-off valves with dual valving 3. The lower most drain and outlets are inspected for discharges. 4. During loading gauges on truck are continuously monitored ensuring ullage isn't exceeded. 5. Spill equipment is maintained within a shelter/building near the tanks. 6. The facility representative and delivery driver remain with the vehicle at all times during unloading 7. The amount of fuel transferred to the tank is logged. 8.The fill hose is drained and then all drain valves are closed, if applicable, before being removed from the tank 9. Any fuel in drip pans, on tarp, or in spill container on the fill pipe is poured in the tank or disposed of accordingly. 10. The truck is inspected to ensure lines have been disconnected. 11. The blocks are removed from the truck wheels 12 A copy of the fuel-loading checklist is completed and filed.	☒	☐
Liquid level sensing devices are regularly tested to ensure proper operation **[See Inspection Log and Schedule in Attachment 3.1]**. *[§112.6(a)(3)(iii)]*	☐	☒
Visible discharges which result in a loss of oil from the container, including but not limited to seams, gaskets, piping, pumps, valves, rivets, and bolts are promptly corrected and oil in diked areas is promptly removed. *[§§112.8(c)(10) and 112.12(c)(10)]*	☒	☐
Aboveground valves, piping, and appurtenances such as flange joints, expansion joints, valve glands and bodies, catch pans, pipeline supports, locking of valves, and metal surfaces are inspected regularly. **[See Inspection Log and Schedule in Attachment 3.1]** *[§§112.8(d)(4) and 112.12(d)(4)]*	☒	☐
Integrity and leak testing are conducted on buried piping at the time of installation, modification, construction, relocation, or replacement. **[See Inspection Log and Schedule in Attachment 3.1]** *[§§112.8(d)(4) and 112.12(d)(4)]*	☒	☐

ATTACHMENT 1 – Five Year Review and Technical Amendment Logs

ATTACHMENT 1.1 – Five Year Review Log

I have completed a review and evaluation of the SPCC Plan for this facility, and will/will not amend this Plan as a result.

Table G-13 Review and Evaluation of SPCC Plan for Facility

Review Date	Plan Amendment		Name and signature of person authorized to review this Plan
	Will Amend	Will Not Amend	
	☐	☐	
	☐	☐	
	☐	☐	
	☐	☐	
	☐	☐	
	☐	☐	
	☐	☐	
	☐	☐	
	☐	☐	
	☐	☐	
	☐	☐	
	☐	☐	
	☐	☐	
	☐	☐	

ATTACHMENT 1.2 – Technical Amendment Log

Any technical amendments to this Plan will be re-certified in accordance with Section I of this Plan template.

Table G-15 Description and Certification of Technical Amendments

Review Date	Description of Technical Amendment	Name and signature of person certifying this technical amendment

ATTACHMENT 2 – Oil Spill Contingency Plan and Checklist

An oil spill contingency plan and written commitment of resources is required for:

- Flowlines and intra-facility gathering lines at oil production facilities and
- Qualified oil-filled operational equipment which has no secondary containment. **Not Applicable**

An oil spill contingency plan meeting the provisions of 40 CFR part 109, as described below, and a written commitment of manpower, equipment and materials required to expeditiously control and remove any quantity of oil discharged that may be harmful is attached to this Plan.	☐

Complete the checklist below to verify that the necessary operations outlined in 40 CFR part 109 - Criteria for State, Local and Regional Oil Removal Contingency Plans - have been included.

Table G-15 Checklist of Development and Implementation Criteria for State, Local and Regional Oil Removal Contingency Plans (§109.5)[a]	
(a) Definition of the authorities, responsibilities and duties of all persons, organizations or agencies which are to be involved in planning or directing oil removal operations.	☒
(b) Establishment of notification procedures for the purpose of early detection and timely notification of an oil discharge including:	
(1) The identification of critical water use areas to facilitate the reporting of and response to oil discharges.	☒
(2) A current list of names, telephone numbers and addresses of the responsible persons (with alternates) and organizations to be notified when an oil discharge is discovered.	☒
(3) Provisions for access to a reliable communications system for timely notification of an oil discharge, and the capability of interconnection with the communications systems established under related oil removal contingency plans, particularly State and National plans (e.g., NCP).	☒
(4) An established, prearranged procedure for requesting assistance during a major disaster or when the situation exceeds the response capability of the State, local or regional authority.	☒
(c) Provisions to assure that full resource capability is known and can be committed during an oil discharge situation including:	
(1) The identification and inventory of applicable equipment, materials and supplies which are available locally and regionally.	☒
(2) An estimate of the equipment, materials and supplies which would be required to remove the maximum oil discharge to be anticipated.	☒
(3) Development of agreements and arrangements in advance of an oil discharge for the acquisition of equipment, materials and supplies to be used in responding to such a discharge.	☒
(d) Provisions for well defined and specific actions to be taken after discovery and notification of an oil discharge including:	
(1) Specification of an oil discharge response operating team consisting of trained, prepared and available operating personnel.	☒
(2) Predesignation of a properly qualified oil discharge response coordinator who is charged with the responsibility and delegated commensurate authority for directing and coordinating response operations and who knows how to request assistance from Federal authorities operating under existing national and regional contingency plans.	☒
(3) A preplanned location for an oil discharge response operations center and a reliable communications system for directing the coordinated overall response operations.	☒
(4) Provisions for varying degrees of response effort depending on the severity of the oil discharge.	☒
(5) Specification of the order of priority in which the various water uses are to be protected where more than one water use may be adversely affected as a result of an oil discharge and where response operations may not be adequate to protect all uses.	☒
(6) Specific and well defined procedures to facilitate recovery of damages and enforcement measures as provided for by State and local statutes and ordinances.	☒

[a] The contingency plan must be consistent with all applicable state and local plans, Area Contingency Plans, and the National Contingency Plan (NCP)

ATTACHMENT 3 – Inspections, Dike Drainage and Personnel Training Logs

ATTACHMENT 3.1 – Inspection Log and Schedule

Table G-16 Inspection Log and Schedule
This log is intended to document compliance with §§112.6(a)(3)(iii), 112.8(c)(6), 112.8(d)(4), 112.9(b)(2), 112.9(c)(3), 112.9(d)(1), 112.9(d)(4), 112.12.(c)(6), and 112.12(d)(4), as applicable.

Date of Inspection	Container / Piping / Equipment	Describe Scope (or cite Industry Standard)	Observations	Name/ Signature of Inspector	Records maintained separately [a]
	Bulk storage tanks (seams, joints, and piping, oil outside the tank)	Visual Inspections STI SPOO1, Standard for the Inspection of Aboveground Storage Tanks)	Please refer to the attached inspection forms. Remember one of the monthly inspections can also count for the annual inspection. During Periods of temporary mining inactivity SPCC inspections (See Attached FORM III) will be performed quarterly in coordination with SWPPP inspections	See separate inspection sheets	☒
	Secondary Containment	Monthly visual inspections and after heavy rainfall	During periods of inactivity SPCC inspections will be performed quarterly. During inactivity at the site tanks are generally emptied to avoid incident when the site isn't occupied.	See separate inspection sheets	☒
					☐
					☐
					☐

[a] Indicate in the table above if records of facility inspections are maintained separately at this facility

TABLE 5 - MONTHLY INSPECTION CHECKLIST (Page 1 of 2)			
Date of Inspection:	Tank Name or No.:		
Date of Last Inspection:	Inspected by:		
	Signature:		
A. TANKS	**YES**	**NO**	**NOTES**
1. Are there any oil stains on the outside of the tank, including the underside?			
2. Is there any oil on the ground, concrete, or asphalt around the tank?			
3. Are there any visible cracks or indications of corrosion on the tank, at fittings, joints, or seals? (such as paint peeling or rust spots)			
4. Are there any raised spots, dents, or cracks on the tank?			
5. Does it appear that the foundation has shifted or settled?			
6. Is the fuel gauge working properly?			
7. Are all vents clear so they may properly operate?			
8. If rainwater is present in secondary containment area, does sufficient volume remain for spill control? (*if applicable)*			

TABLE 5 - MONTHLY INSPECTION CHECKLIST (Page 2 of 2)			
Date of Inspection:	Tank Name or No.:		
Date of Last Inspection:	Inspected by:		
	Signature:		
B. PIPING	**YES**	**NO**	**NOTES**
1. Is there any oil on the outside of or under any aboveground piping, hoses, fittings, or valves?			
2. Are aboveground piping, hoses, fittings, or valves in good working condition?			
C. SECURITY/SAFETY/SPILL COUNTERMEASURES			
1. Are lights working properly to detect a spill at night?			
2. Are all locks in the "lock" position?			
3. Are all warning signs properly posted and readable?			
4. Are vehicle guard posts in place and properly secured? (*If applicable)*			
5. Are spill kits easily accessible, protected from the weather, and complete?			
Corrective Actions Required:			

TABLE 6 - ANNUAL INSPECTION CHECKLIST (Page 1 of 1)			
Date of Inspection:	Tank Name or No.:		
Date of Last Inspection:	Inspected by:		
	Signature:		
	YES	**NO**	**NOTES**
A. MONTHLY CHECKLIST			
1. Has monthly inspection checklist been completed?			
B. TANKS			
1. Are all alarms and automatic shutoff devices working properly?			
C. OTHER			
1.			
2.			
Corrective Actions Required:			

ATTACHMENT 3.2 – Bulk Storage Container Inspection Schedule – onshore facilities (excluding production):

To comply with integrity inspection requirement for bulk storage containers, inspect/test each shop-built aboveground bulk storage container on a regular schedule in accordance with a recognized container inspection standard based on the minimum requirements in the following table.

Table G-17 Bulk Storage Container Inspection Schedule

Container Size and Design Specification	Inspection requirement
Portable containers (including drums, totes, and intermodal bulk containers (IBC)) N/A[a]	Visually inspect monthly for signs of deterioration, discharges or accumulation of oil inside diked areas
55 to 1,100 gallons with sized secondary containment In Mine Shop	Visually inspect monthly for signs of deterioration, discharges or accumulation of oil inside diked areas plus any annual inspection elements per industry inspection standards
1,101 to 5,000 gallons with sized secondary containment and a means of leak detection N/A[a]	
1,101 to 5,000 gallons with sized secondary containment and no method of leak detection N/A[a]	Visually inspect monthly for signs of deterioration, discharges or accumulation of oil inside diked areas, plus any annual inspection elements and other specific integrity tests that may be required per industry inspection standards

[a] Examples of leak detection include, but are not limited to, double-walled tanks and elevated containers where a leak can be visually identified.

ATTACHMENT 3.3 – Dike Drainage Log

Table G-18 Dike Drainage Log

Date	Bypass valve sealed closed	Rainwater inspected to be sure no oil (or sheen) is visible	Open bypass valve and reseal it following drainage	Drainage activity supervised	Observations	Signature of Inspector
	☐	☐	☐	☐		
	☐	☐	☐	☐		
	☐	☐	☐	☐		
	☐	☐	☐	☐		
	☐	☐	☐	☐		
	☐	☐	☐	☐		
	☐	☐	☐	☐		
	☐	☐	☐	☐		

ATTACHMENT 3.4 – Oil-handling Personnel Training and Briefing Log

Table G-19 Oil-Handling Personnel Training and Briefing Log		
Date	**Description / Scope**	**Attendees**
	Please refer to training documents for new hire and annual refresher training of employees. These documents are maintained separate from the SPCC document.	

ATTACHMENT 4 – Discharge Notification Form

In the event of a discharge of oil to navigable waters or adjoining shorelines, the following information will be provided to the National Response Center **[also see the notification information provided in Section 7 of the Plan]**: **Corporate will Notify Center**

Table G-20 Information provided to the National Response Center in the Event of a Discharge			
Discharge/Discovery Date		Time	
Facility Name			
Facility Location (Address/Lat-Long/Section Township Range)			
Name of reporting individual		Telephone #	
Type of material discharged		Estimated total quantity discharged	Gallons/Barrels
Source of the discharge		Media affected	☐ Soil ☐ Water (specify) ☐ Other (specify)
Actions taken			
Damage or injuries	☐ No ☐ Yes (specify)	Evacuation needed?	☐ No ☐ Yes (specify)
Organizations and individuals contacted	☐ National Response Center 800-424-8802 Time ☐ Cleanup contractor (Specify) Time ☐ Facility personnel (Specify) Time ☐ State Agency (Specify) Time ☐ Other (Specify) Time		

Appendix H.2

Linkan Engineering Water Treatment Design Report

MEMORANDUM

Date: August 27, 2024
To: Timo Groves
From: Drew Horseman, Ph.D.
Project: Whirlwind Mine Water Treatment Plant Design Build
Subject: Permitting Support Submittal
Doc. No.: 24US0131_Rev-1

The purpose of this memorandum is to detail the Whirlwind Mine water treatment plant upgrades in support of repermitting the site for treated water discharge.

INTRODUCTION

The Whirlwind Mine is a uranium-vanadium mine owned by Energy Fuels Inc. (Energy Fuels) in Mesa County, Colorado, roughly 4-5 miles southwest of Gateway, CO. Energy Fuels plans to reopen the underground mine workings, but they have flooded since mining operations ceased. To resume mining operations, approximately 2 Mgal of water in the underground workings must first be dewatered.

An existing water treatment plant used to dewater the underground working exists on site that was able to meet previous discharge limits permitted by Colorado Department of Public Health & Environment (CDPHE) in CO permit number CO0047562. The plant has not been in operation since 2008 and CO discharge limits have become more stringent, as such, Energy Fuels has hired Linkan Engineering (Linkan) to refurbish the existing water treatment plant and add additional unit operations such that the more stringent discharge limits can be met.

DESIGN BASIS

The following criteria served as the basis of design for the Whirlwind Mine water treatment system:

- The design treatment capacity is 30,000 gallons per day or 20.8 gpm.
- Any waste generated onsite, whether solid or liquid, must be removed and disposed of at appropriate offsite facilities according to regulated waste disposal protocol.
- The anticipated discharge limits are detailed in **Attachment 1**. These are the basis for treated effluent discharge limitations.
- The constituents of concern (COCs) requiring targeted treatment in the water treatment system are highlighted in red in **Attachment 1**.
    - Primary COCs, or those constituents that on average were above the anticipated discharge limits in the raw feed and in the effluent of the existing treatment system include selenium, uranium, and total suspended solids (TSS).
    - Secondary COCs, or those constituents that were on average below the discharge limits in the effluent of the existing system, but above the anticipated discharge limits in the raw feed include arsenic, iron, lead, manganese, zinc, pH, radium 226, and radium 226+228.

Linkan recommended media filtration followed by ion exchange (MMF-IX) as the most promising treatment technology to bolt-on to the existing treatment system. The existing system was intended to

remove the majority of COCs via chemical coprecipitation, while the downstream MMF-IX system is intended to polish residual COCs to achieve the more stringent discharge standards. This conceptual system served as the basis for bench and pilot testing and detailed design.

PROCESS DESCRIPTION

Water from the underground workings is first pumped to an existing, lined, 65' x 65' x 4' (*l x w x h*) untreated water storage pond. Dense solids settle before supernatant water is pumped to an existing trailerized (in a semi-truck trailer) water treatment system. In the trailer, ferric sulfate and barium chloride are dosed inline into static mixers to coprecipitate uranium and radium with barium sulfate and arsenic and selenium with hydrous ferric oxide (HFO) flocs. The dosed process water is then sent through a series of two 300-gallon mixed reaction tanks where 30-minutes of residence time is provided for the coprecipitation reaction and particle agglomeration processes.

Following the reaction tanks, water flows via gravity to two lined 8' x 27' x 4' (*l x w x h*) tanks (the Settling and Polishing Tanks), plumbed in series, where roughly 10 hours of residence time are allowed for particle growth and settling. The supernatant water from the Polishing Tank is then pumped into the newly designed containerized (in 20 ft shipping containers) water treatment system where hydrochloric acid is dosed to adjust the pH to 6-7 for optimal ion exchange performance.

Influent water flows into a 300-gallon agitated feed tank before being pumped to a series of fiberglass reinforced vessels containing sand filtration media, strong base anion exchange resin, arsenic/selenium selective ion exchange (IX) resin, and activated carbon (AC), in series and in that order. The media filters polish residual solids that carry over from the Polishing Tank while the two ion exchange steps remove residual uranium, arsenic, and selenium. The AC is included to polish residual organics from the water that were found to induce aquatic toxicity. A contingent sodium hydroxide dose will be available just before the finish water tanks should the pH ever be below the anticipated discharge limits.

Detailed design drawings of the water treatment process are in **Attachment 2**. The drawings include:

- G-100: the process flow diagram (PFD) and mass balance
- G-200 through G-502: the piping and instrumentation diagrams (P&IDs)
- C-100: the general site arrangement
- C-101: the general arrangement of the new containerized treatment systems
- P-100: the site piping details
- P-101: the new containerized treatment system piping details

PROCESS VALIDATION

Linkan was supplied sample water from the Whirlwind Mine underground workings for bench and pilot testing of the entire water treatment process. Note, arsenic and selenium concentrations in the received sample were lower than the average expected concentrations for the water treatment plant feed. To provide a more conservative evaluation of the system, arsenic and selenium were spiked into the sample water before testing began. Note that after treatment all primary and secondary constituents of concern (COCs) were below the anticipated discharge limits (**Table 1**). Third-party analytical lab reports where these data were derived can be found in **Attachment 3**.

Table 1 Pilot Testing Validation Results

Parameter	Fraction	Unit	Spiked Feedwater	Process Effluent	Anticipated Discharge Standards
Primary Constituents of Concern					
Selenium	Potentially Dissolved	mg/L	0.021	0.00004	0.0046
Uranium	Total Recoverable	mg/L	0.0335	0.00003	0.03
TSS	-	mg/L	3	< 10	20
Secondary Constituents of Concern					
Arsenic	Total Recoverable	mg/L	0.051	0.0002	0.01
Iron	Total Recoverable	mg/L	0.41	0.007	1.0
Lead	Potentially Dissolved	mg/L	< 0.001	< 0.001	0.0012
Manganese	Dissolved	mg/L	0.002	0.003	0.05
Zinc	Potentially Dissolved	mg/L	0.002	0.006	0.065
pH	-	s.u.	7.5	7.8	6.5 - 9.0
Radium 226	Dissolved	pCi/L	4.27 ± 0.932	2.63 ± 0.704	3
Radium 226 + 228	Total	pCi/L	5.69 ± 1.65	3.40 ± 2.15	5
Toxicity					
Static Renewal 7 Day Chronic *Pimephales promelas* (100% Effluent)				100%	Survival
				0%	Growth Inhibition
Static Renewal 7 Day Chronic *Ceriodaphnia dubia* (100% Effluent)				100%	Survival
				0%	Reproductive Effect

Effluent samples were also collected and submitted for whole effluent toxicity (WET) testing per the anticipated permit. Chronic WET tests were conducted on the *Pimephales promelas* and *Ceriodaphnia dubia* at 100% effluent concentration. Initial toxicity was observed, but the process was refined to include a final activated carbon (PAC in the attached report) polishing step. After simulation of the process with an AC polish, the effluent passed the WET test with no observed effect in survivability, growth, or reproduction at 100% effluent (**Table 1**). See **Attachment 4** for the third-party WET testing report.

CHEMICAL AND WASTE HANDLING PLANS

The following sections detail the chemical and waste handling plans for the Whirlwind Mine water treatment facility.

Chemical Handling

The primary chemicals that will be used in this water treatment process are barium chloride, ferric sulfate, hydrochloric acid, and sodium hydroxide. Representative safety data sheets (SDS) are provided in **Attachment 5**. Details of chemical dosing and consumption are provided below in **Table 2**.

Table 2 Chemical Dosing, Make Down, and Consumption Details

Chemical	Concentration	SG	Physical State	Maximum Anticipated Dose	Maximum Weekly Usage	Anticipated Inventory
Ferric Sulfate	45%	1.6	Liquid	52 mg/L	15.9 gal	55-gal drum
Barium Chloride	-	-	Solid	30 mg/L	56 lb	50-lb bag
Hydrochloric Acid	31%	1.16	Liquid	300 mg/L	185 gal	275-gal tote
Sodium Hydroxide	25%	1.28	Liquid	20 mg/L	13.9 gal	55-gal drum

Ferric sulfate and barium chloride will be batched in dilute solutions to minimize chemical hazards. Barium chloride will be supplied as dry powder while ferric sulfate may be supplied as dry powder or concentrated liquid. Existing 150-gallon mixed tanks in the trailerized treatment system will be utilized to batch these chemicals. Barium chloride and ferric sulfate will be stored in their own dedicated secondary containment vessels within the semi-trailer.

Hydrochloric acid will be dosed from a 275-gallon IBC tote in the new containerized water treatment system (Container 1) and sodium hydroxide will be dosed from a 55-gallon barrel in the new containerized water treatment system (Container 2). The acid and base will be separated completely and contained on their own individual secondary containment vessels.

In addition to the chemical secondary containment, each container will be watertight and equipped with floor drains. Each floor drain will be plumbed to a 275-gallon sump. If any liquid accumulates in that sump, it will be pumped to the untreated water storage pond. The addition of a common sump allows for control of spilled chemicals and/or process water.

Safety data sheets (SDS) and appropriate personal protective equipment (PPE) for all chemicals will be readily available onsite. Likewise, all trailers storing chemicals will be well ventilated. Storage and dosing strategies have been designed to minimize operator interaction with bulk chemicals. All chemical wastes will be disposed of offsite according to SDS protocol and relevant solid waste disposal protocol. It should also be noted that a house water system will be available to provide clean water for dilution, maintenance, or spill clean-up if required.

Waste Handling

The primary waste generated in the water treatment plant includes solids from the underground workings, sludge generated in the coprecipitation processes, ion exchange media, and activated carbon. Solids from the underground workings will settle in the lined untreated water storage pond. Similarly, sludge generated from the coprecipitation process will settle in the lined tanks (Settling and Polishing Tanks). All sludges will be removed and disposed of at the end of mine operations or sooner if retention time is compromised. Note, the new system will not affect sludge generation. Like sludge, Energy Fuels will also determine appropriate disposal measures for any exhausted water treatment media.

It should be noted that sludge characterization has been conducted on the sludge produced during prior water treatment plant operations at the Whirlwind Mine. The radium activity level and uranium content were found to be 2.1 pCi/g and 25.2 mg/kg, respectively. Additionally, TCLP results did not identify hazardous concentrations of the RCRA-8 metals. With these results, the sludge was considered exempt

from CDPHE regulation as its radium and uranium activities were less than 3 pCi/g and 30 pCi/g, respectively, and nonhazardous per the RCRA-8 classification.

OPERATION AND MAINTENANCE

The Whirlwind Mine water treatment facility is located at a relatively remote site. Thus, the entire treatment system will be housed in lockable trailers/containers and located behind a locked fence to prevent unauthorized entry. To simplify the system operability, key operational strategies have been implemented including:

- The effluent piping will be tied into the existing discharge piping to maintain the previously permitted discharge location.
- Both the new and existing containers/trailers will be insulated and equipped with active heating capabilities to enable operation during the cold months.
- A house water system, that utilizes the treated effluent, will be available for chemical make-down, filter backwashing, and general equipment maintenance.
- Drains have been included at several locations along the process to enable easy winterization and demobilization of equipment. Note, all drains will be plumbed to a secondary containment vessel.

Likewise, the system controls have been revamped to allow for remote monitoring and control capabilities. Alarms regarding treatment objectives and operating parameters in the water treatment plant will be set up to notify trained operators of any upset conditions. Any trained operator with remote monitoring access will also have the ability to stop the treatment system at any given time. Key control strategies include:

- High level alarms, quantified via level transmitters in all tanks, will result in automatic shutdown of feed pumps. This will prevent overflow and any potential unauthorized discharge of water. All tank overflows will drain through the container floor drain that will be plumbed back to a common sump. That common sump will discharge to the untreated water storage pond should an overflow occur.
- High pressure alarms will automatically shut off feed pumps to the media vessels to prevent over pressure. All media vessel pressure limitations exceed the maximum pressure capabilities of any feed pumps, but this precaution is still implemented. Likewise, necessary vents and pressure reliefs have also been integrated into the system design. Chemical dosing equipment is integrated with mechanical pressure relief systems should over pressure ever occur.
- High or low pH alarms will trigger an automatic bypass back to the untreated water storage pond should the effluent pH be outside of permitted limits.
- Continual pH, oxidation reduction potential (ORP), conductivity, and turbidity monitoring throughout the treatment system will have high and low alarm set points that will indicate changing water conditions and alert operators of a potential upset.
- A flow meter with instantaneous and daily totalized flows will be integrated into the effluent discharge to ensure maximum daily discharge capacities are not exceeded.
- Electrically actuated valving has been integrated into the system to enable a bypass back to the untreated water storage pond at several points along the treatment system to mitigate discharge of water expected to be outside of permitted discharge limits.

It should be noted that the treatment system is tied to reliable grid-power and Starlink internet service.

Due to the newly implemented ion exchange systems, Linkan anticipates that Energy Fuels will hire a Class A operator in responsible charge (ORC) to supervise the operation of the facility. During commissioning, Linkan will train Energy Fuels operators and develop an operations manual. Linkan will detail start-up and shut-down, safe chemical handling, waste disposal, daily operations and maintenance, and troubleshooting procedures in the manual. This manual, SDS, system drawings, and recommended daily check sheets will be provided to Energy Fuels before handing the system over for operations.

Attachments Enclosed:

Attachment 1 – Design Basis Water Quality and Discharge Limits
Attachment 2 – Design Drawings
Attachment 3 – Third-Party Pilot Testing Analytical Results
Attachment 4 – Third-Party Pilot Testing Whole Effluent Toxicity Report
Attachment 5 – Representative Chemical Safety Data Sheets

END

Attachment 1

Design Basis Water Quality and Discharge Limits

Table A1: Whirlwind Water Quality and Anticipated Discharge Limits

Parameter	Units	Fraction[1]	Raw Water Feed[2]	Qual.[3]	Existing Treatment System Effluent[2]		Anticipated Discharge Standards
					Max	Average	
Metals							
Aluminum	mg/L	Total	0.1	1	No Data	No Data	0.189
Antimony	mg/L	Total	< 0.05	1	No Data	No Data	
Arsenic	mg/L	Total	0.062	2	0.013	0.0062	0.01
Barium	mg/L	Total	0.10	2	No Data	No Data	
Beryllium	mg/L	Total	< 0.01	2	< 0.001	< 0.001	
Boron	mg/L	Total	0.20	2	0.2	-	
Cadmium	mg/L	PD	< 0.01	2	0.001	-	Report
Calcium	mg/L	Total	116	2	No Data	No Data	
Chromium III	mg/L	Total	0.08	2	< 0.01	-	Report
Copper	mg/L	PD	0.005	1	No Data	No Data	Report
Iron	mg/L	Dissolved	No Data		1.2	0.43	Report
	mg/L	Total	1.91	1	1.54	0.79	1
Lead	mg/L	PD	0.11	2	< 0.01	< 0.01	0.0012
Magnesium	mg/L	Total	22.9	2	No Data	No Data	
Manganese	mg/L	Dissolved	0.93	2	No Data	No Data	0.05
	mg/L	Total	0.069	1	0.072	0.041	
Mercury	mg/L	Total	< 0.001	1	No Data	No Data	Report
Molybdenum	mg/L	Total	< 0.1	2	No Data	No Data	Report
Nickel	mg/L	PD	< 0.05	2	< 0.01	< 0.01	Report
Potassium	mg/L	Total	21.9	2	No Data	No Data	
Selenium	mg/L	Dissolved	0.03	2	0.029	0.022	0.0046
Selenium IV	mg/L	Total	< 0.001	1	0.0020	0.0015	
Silver	mg/L	PD	< 0.01	1	No Data	No Data	Report
Sodium	mg/L	Total	150	2	No Data	No Data	
Thallium	mg/L	Total	< 0.1	1	No Data	No Data	
Uranium	mg/L	Total	0.46	2	0.294	0.124	0.03
Vanadium	mg/L	Total	0.60	2	0.04	0.02	Report
Zinc	mg/L	PD	< 0.05	1	No Data	No Data	0.065
	mg/L	Total	0.26	2	0.017	0.015	
Anions							
Chloride	mg/L	Total	53	2	No Data	No Data	
Fluoride	mg/L	Total	0.7	2	No Data	No Data	
Orthophosphate	mg/L as P	Total	2.85	2	No Data	No Data	
Sulfate	mg/L	Total	88	2	268	139	
Sulfide	mg/L	Total	< 1	1	No Data	No Data	0.002
Commons							
Alkalinity, Total	mg/L as $CaCO_3$	Total	296	2	No Data	No Data	
Alkalinity, Carbonate	mg/L as $CaCO_3$	Total	< 5	1	No Data	No Data	
Alkalinity, Bicarbonate	mg/L as $CaCO_3$	Total	361	2	No Data	No Data	
Carbon Dioxide	mg/L	Free	4	1	No Data	No Data	
	mg/L	Total	255	1	No Data	No Data	
COD	mg/L	Total	< 30	1	90	30.5	100
pH	s.u.	-	10	2	9.02	7.7	6.5 - 9.0
Hardness	mg/L as $CaCO_3$	-	384	2	No Data	No Data	

Parameter	Units	Fraction[1]	Raw Water Feed[2]	Qual.[3]	Existing Treatment System Effluent[2]		Anticipated Discharge Standards
					Max	Average	
TDS	mg/L		661	2	511	401	Report
TSS	mg/L		3540	2	64	30	20
Conductivity	uS/cm	-	649	2	No Data	No Data	
Oil & Grease	mg/L	-	No Data	-	No Data	No Data	10
Radionuclides							
Radium 226	pCi/L	Dissolved	40	2	10.4	2.8	3
	pCi/L	Total	40	3	10.4	2.8	
Radium 228	pCi/L	Dissolved	1.4	2	No Data	No Data	
	pCi/L	Total	1.4	2	3.1	1.4	
Radium 226+228	pCi/L	Dissolved	41.5	3	10.4	2.8	
	pCi/L	Total	41.5	2	13.5	4.1	5
Gross Alpha	pCi/L	Dissolved	101	1	No Data	No Data	
Gross Beta	pCi/L	Total	28.6	1	No Data	No Data	
Gross Alpha + Beta	pCi/L	Total	129.6	3	No Data	No Data	
Nitrogen Species							
Nitrogen, Inorganic	mg/L as N	Total	No Data	-	No Data	No Data	Report
Nitrate	mg/L as N	Total	< 0.01	1	4	3.2	
Nitrite	mg/L as N	Total	< 0.01	1	4	1.6	
Nitrate + Nitrite	mg/L as N	Total	4.3	2	4.5	3.6	

Notes:

[1] – PD = Potentially Dissolved

[2] – Values highlighted in red indicate constituents of concern requiring targeted treatment.

[3] – The qualifier for each raw feed parameter is numbered as:

(1) Maximum value of the mine pool data from 2007 and 2015,

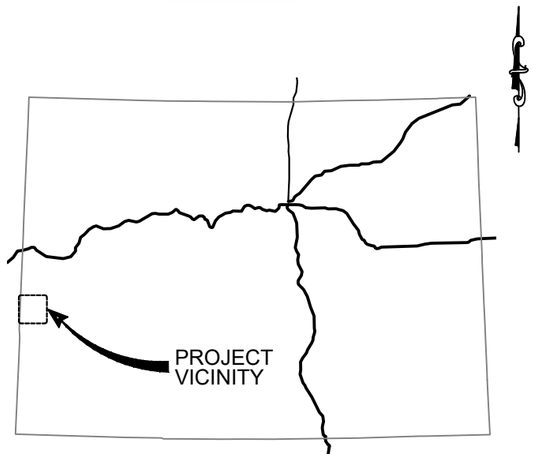
(2) Maximum value of the mine sump data from 2008,

(3) Calculated Value.

Attachment 2

Design Drawings

STATE MAP



COLORADO

ENERGY FUELS RESOURCES
WHIRLWIND DESIGN-BUILD

PREPARED BY:

2720 Ruby Vista Dr. Suite 101
Elko, NV 89801

REVISION:	B
ISSUE DATE:	AUG 27, 2024
ISSUED FOR:	ISSUED FOR REVIEW
CLIENT INFORMATION:	ENERGY FUELS INC. WHIRLWIND MINE
CLIENT ADDRESS:	223 UNION BLVD LAKEWOOD, CO 80228
PROJECT LOCATION:	4.25 MILES SOUTHWEST OF GATEWAY CO.
PROJECT NUMBER:	24US131

PROJECT VICINITY

Count	Count	Count
	General	
1	G-001	Cover Sheet
2	G-002	General Abbreviation, Legend
3	G-100	Process Flow Diagram
4	G-200	P&ID Legend and Symbols
	G-201	P&ID Exist Lyntek System
5	G-202	P&ID MMF Feed and Vessels
6	G-203	P&ID Two Stage IX & Gac Vessels
7	G-204	P&ID Finish Water Distribution
8	G-205	P&ID Overflow Recovery System
9	G-501	P&ID HCl & NaOH Dosing
10	G-502	P&ID Barium Cl2 & FeCl3
	Civil	
11	C-100	General Arrangement Overall Site Plan
12	C-101	General Arrangement WTP Site Plan
	Process Piping - P	
13	P-100	Piping WTP Site Plan
14	P-101	Piping WTP Plan

GENERAL ABBREVIATIONS

AFF	ABOVE FINISH FLOOR	FLG	FLANGE	PSF	POUNDS PER
ARCH	ARCHITECTURAL	FLR	FLOOR		SQUARE FOOT
B.O.	BOTTOM OF	FS	FAR SIDE	PT	POINT
B.O.B.P.	BOTTOM OF BASE PLATE	FT	FEET	R	RADIUS
		GA	GAGE	RD	ROOF DRAIN
BLDG	BUILDING	GB	GRADE BREAK	REINF	REINFORCING
BLK	BLOCKING	GALV	GALVANIZED	REQ'D	REQUIRED
BM	BEAM	GEN	GENERAL	RND	ROUND
BOT	BOTTOM	GR	GRADE	RTN	RETURN
BRG	BEARING	HORIZ	HORIZONTAL	SC	SLIP CRITICAL
BTWN	BETWEEN	HP	HIGH POINT	SCHED	SCHEDULE
CC	CENTER TO CENTER	IBC	INTERNATIONAL BUILDING CODE	SECT	SECTION
CIP	CAST IN PLACE			SHT	SHEET
CJ	CONTROL JOINT	ID	INSIDE DIAMETER	SIM	SIMILAR
℄	CENTERLINE	IE	INVERT ELEVATION	SP	SPACE
OC	ON CENTER	IF	INSIDE FACE	SPEC	SPECIFICATION
CMU	CONCRETE MASONRY UNIT	IN	INCH	SQ	SQUARE
		INT	INTERIOR	SS	STAINLESS STEEL
COL	COLUMN	JT	JOINT	SLBB	SHORT LEG BACK
CONC	CONCRETE	K	KIP (1,000 LBS.)		TO BACK
CONN	CONNECTION	KSF	KIPS PER SQUARE FOOT	STD	STANDARD
CONST	CONSTRUCTION			STIFF	STIFFENER
CONT	CONTINUOUS	LF	LINEAR FOOT	STL	STEEL
CONTR	CONTRACTOR	LLBB	LONG LEG BACK TO BACK	STRUCT	STRUCTURAL
COORD	COORDINATE			SYM	SYMMETRICAL
CP	COMPLETE PENETRATION	LLH	LONG LEG HORIZONTAL	T&B	TOP AND BOTTOM
				THK	THICK (NESS)
CTJ	CONSTRUCTION JOINT	LLV	LONG LEG VERTICAL	THRU	THROUGH
CTR	CENTER			T.A.	TOP OF
CY	CUBIC YARD	LP	LOW POINT	TOC	TOP OF CONCRETE
DBL	DOUBLE	MAX	MAXIMUM	TOF	TOP OF FOOTING
DET	DETAIL	MECH	MECHANICAL	TOG	TOP OF GRATING
DIA	DIAMETER	MIN	MINIMUM	TOS	TOP OF STEEL
DIAG	DIAGONAL	MISC	MISCELLANEOUS	HSS	HOLLOW STEEL SECTION
DKG	DECKING	MOM	MOMENT		
DO	DITTO	(N)	NEW	TYP	TYPICAL
DN	DOWN	NIC	NOT IN CONTRACT	UF	ULTRAFILTER
DWG	DRAWING	NOM	NOMINAL	UNO	UNLESS NOTED OTHERWISE
DWL	DOWEL	NO	NUMBER		
EA	EACH	NS	NEAR SIDE, NONSHRINK	VERT	VERTICAL
EF	EACH FACE			W/	WITH
EG	EXISTING GROUND	NTS	NOT TO SCALE	WF	WIDE FLANGE
EL OR ELEV	ELEVATION	OD	OUTSIDE DIAMETER	WHS	WELDED HEADED STUD
EQ	EQUAL	OPNG	OPENING		
EQUIP	EQUIPMENT	OPP	OPPOSITE	W/O	WITHOUT
EW	EACH WAY	PC	PIECE	WP	WORKPOINT
EX OR (E)	EXISTING	PEN	PENETRATION	WT	STRUCTURAL TEE
EXP	EXPANSION	℄	PLATE	WTP	WATER TREATMENT PLAN
EXT	EXTERIOR	PP	PARTIAL PENETRATION		
FD	FLOOR DRAIN			WWF	WELDED WIRE FABRIC
FF	FINISHED FLOOR	PSI	POUNDS PER SQUARE INCH		
FG	FINISHED GRADE				
FIN	FINISH				
FL	FLOWLINE				

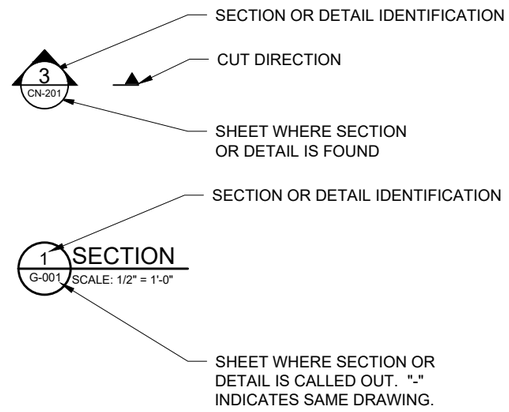
LEGEND

- PROPOSED EXPANSION
- PROPOSED CONSTRUCTION
- EXISTING CONSTRUCTION
- ROAD CENTER LINE
- EASEMENT LINE
- PROPERTY LINE
- MAJOR CONTOUR
- MINOR CONTOUR
- MAJOR CONTOUR DEPRESSION
- MINOR CONTOUR DEPRESSION
- SLOPE LINE
- HIDDEN CONCRETE
- VISIBLE CONCRETE
- EQUPMENT
- PROPOSED PIPELINE
- REBAR
- REBAR (CUT VIEW)

HATCH PATTERN

- EARTH
- GROUT (SECTION) OR CRUSHED STONE (PLAN)
- GRAVEL, RIPRAP OR STONE
- CONCRETE
- GRATING
- STEEL SECTION
- EXISTING STRUCTURE
- PROPOSED BUILDING
- PROPOSED FUTURE STRUCTURE/EQUIPMENT
- NATIVE BACKFILL
- EXISTING CULVERT
- PROPOSED CULVERT
- WATERSTOP

SECTION AND DETAIL CALLOUTS



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REV	REVISION DESCRIPTION	DATE	BY	CHECK	APPR
A	ISSUED FOR 60% DESIGN REVIEW	08/14/2024	JLB	ERN	TAH
B	ISSUED FOR REVIEW	08/14/2024	JLB	ERN	TAH

TITLE: GERNERAL ABBREVIATIONS AND LEGEND

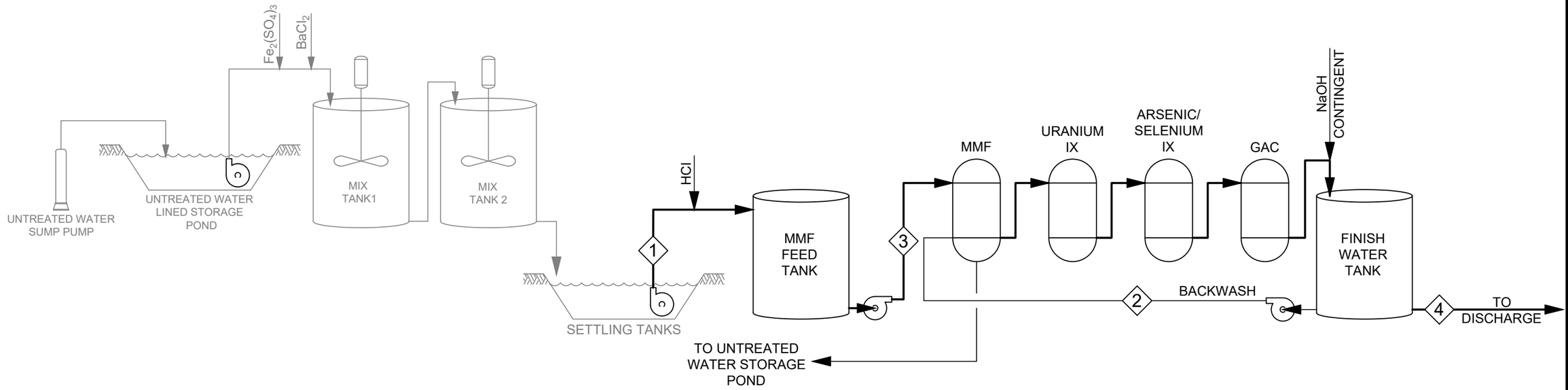
PROJECT: ENERGY FUEL RESOURCES
WHIRLWIND MINE DESIGN-BUILD

PROJECT NO. 24US0131

DATE: AUGUST 8, 2024

SCALE: N.T.S.

SHEET NO. G-002



PROCESS FLOW DIAGRAM

MASS BALANCE

Stream	**Unit**	**1**	**2**	**3**	**4**
Tag		MMF Feed	Backwash	Ion Exchange Feed	Effluent
Instantaneous Flow	GPM	21.3	20.3	21.3	21.3
Average Flow	GPM	21.0	0.3	20.8	20.8
	GPD	30303	406	30000	30000

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REV.	REVISION DESCRIPTION	DATE	BY	CHECK	APPR
A	ISSUED FOR 30% DESIGN REVIEW	06/11/2024	JLB	ERN	TAH
B	ISSUED FOR 60% DESIGN REVIEW	08/14/2024	JLB	ERN	TAH
C	ISSUED FOR REVIEW	08/27/2024	JLB	ERN	TAH

TITLE: PROCESS FLOW DIAGRAM

PROJECT: ENERGY FUEL RESOURCES
WHIRLWIND MINE DESIGN-BUILD

PROJECT NO.
24US0131

DATE:
JUNE 11, 2024

SCALE:
N.T.S.

SHEET NO.
G-100

8/27/2024 11:49 AM G-100.dwg

PIPE FITTINGS

- EXPANSION JOINT
- FLANGE SET
- FLEXIBLE HOSE
- HOSE CONNECTION
- ORIFICE FLANGES w/ PLATE
- QUICK DISCONNECT
- REDUCER, CONC.
- REDUCER, ECC
- RUPTURE DISK
- THREADED CAP
- VICTAULIC COUPLING
- WELDED CAP
- AIR GAP
- BLANK
- SPACER
- SPEC BLIND (CLOSED)
- SPEC BLIND (OPEN)

INSTRUMENTATION SYMBOLS

- BASKET STRAINER
- Y-STRAINER
- INLINE MIXER
- M — MAGNETIC METER
- T — THERMAL METER
- PROPELLER METER
- ULTRASONIC METER
- ROTOMETER
- ROTOMETER W/ INTEGRAL VALVE
- VENTURI
- DIAPHRAGM ISOLATOR
- CALIBRATION COLUMN
- PRESSURE ELEMENT
- RADAR LEVEL ELEMENT

ACTUATOR TYPES

- BACK PRESSURE REGULATOR (FLOW)
- C — CYLINDRICAL ACTUATOR
- DIAPHRAGM ACTUATOR
- E — ELECTRIC ACTUATOR
- F — FLOAT ACTUATOR
- PISTON ACTUATOR
- DIAPHRAGM ACTUATOR
- PRESSURE REDUCING REGULATOR (FLOW)
- M — MOTOR ACTUATOR
- S — SOLENOID ACTUATOR

PIPING SERVICES

ABBRV	DESCRIPTION
BA	BLOWER AIR
BR	BRINE
BW	BACKWASH
CH	CHEMICAL ADDITION
DW	POTABLE WATER
FW	FIRE WATER
GC	GLYCOL
IA	INSTRUMENT AIR
MW	MAKEDOWN WATER
NG	NATURAL GAS
PA	PLANT AIR
PW	PROCESS WATER
RW	RAW WATER
SC	SCUM
SW	SOFTENED WATER
TW	TREATED WATER
WA	FRESH/WELL WATER
WW	WASTE WATER
XR	EXCESS RECIRCULATION

TUBING SPECIFICATIONS

ABBRV	DESCRIPTION
HDPE	HIGH DENSITY POLYETHYLENE TUBING
LDPE	LOW DENSITY POLYETHYLENE TUBING
PTFE	PTFE (TEFLON) TUBING
PVDF	POLYVINYLIDENE DIFLUORIDE (VITON) TUBING
PP	POLYPROPYLENE TUBING
PU	POLYURETHANE TUBING
TU	TUBING (NON-SPECIFIC)

PIPE SPECIFICATIONS

ABBRV	DESCRIPTION
ABS	ACRYLONITRILE BUTADIENE STYRENE PIPE
PE11	HIGH DENSITY POLYETHYLENE - DR 11
PE17	HIGH DENSITY POLYETHYLENE - DR 17
PP1	POLYPROPYLENE PIPE
CPVC	CHLORINATED POLYVINYL CHLORIDE- SCH. 80
PVC	POLYVINYL CHLORIDE - SCH. 80
CSA1	CARBON STEEL PRESSURE CLASS 150 PSI
CSA2	CSA1 - EPOXY COATED
CSB1	CARBON STEEL PRESSURE CLASS 300 PSI
CSB2	CSB2 - EPOXY COATED
SSA1	STAINLESS STEEL PRESSURE CLASS 150 PSI
SSB1	STAINLESS STEEL PRESSURE CLASS 300 PSI

INSTRUMENT SYMBOLS

HMI/SCADA POINT
1 - INSTRUMENT TAG
2 - LOOP
3 - FUNCTION
4 - DESCRIPTION
5 - POINT NUMBER
6 - LOCATION

PLC I/O POINT
1 - INSTRUMENT TAG
2 - LOOP
3 - I/O TYPE
4 - ADDRESS
5 - DESCRIPTION
6 - DESCRIPTION

PRIMARY POWER DEVICE
1 - INSTRUMENT TAG
2 - LOOP
3 - TYPE
4 - DESCRIPTION
5 - VOLTAGE
6 - LOCATION

INSTRUMENT/CONTROL ELEMENT PRIMARY OPERATED
1 - INSTRUMENT TAG
2 - LOOP
3 - FUNCTION
4 - DESCRIPTION
5 - DESCRIPTION
6 - LOCATION

FIELD INSTRUMENT PRIMARY ELEMENT
1 - INSTRUMENT TAG
2 - LOOP
3 - FUNCTION
4 - DESCRIPTION
5 - DESCRIPTION
6 - LOCATION

PRIMARY FIELD EQUIPMENT POWERED
1 - INSTRUMENT TAG
2 - LOOP
3 - FUNCTION
4 - DESCRIPTION
5 - FURNISHED BY
6 - LOCATION

COMMON ABBREVIATIONS

ANALYSIS
- AE ANALYSIS ELEMENT
- AIT ANALYSIS INDICATING TRANSMITTER

FLOW
- A STATIC MIXER
- ACV ACTUATED CONTROL VALVE (OPEN CLOSE)
- FE FLOW ELEMENT
- FT FLOW TRANSMITTER
- FIT FLOW INDICATING TRANSMITTER
- FI FLOW INDICATOR
- FS FLOW SWITCH
- FSL FLOW SWITCH LOW
- FSH FLOW SWITCH HIGH
- FAL FLOW ALARM LOW
- FAH FLOW ALARM HIGH
- FCV FLOW CONTROL VALVE (POSITIONING)

CURRENT
- IT CURRENT TRANSMITTER
- IIT CURRENT INDICATING TRANSMITTER
- IY CURRENT TRANSDUCER
- II CURRENT INDICATOR
- IS CURRENT SWITCH
- ISL CURRENT SWITCH LOW
- ISH CURRENT SWITCH HIGH
- IPY CURRENT TO PRESSURE TRANSDUCER

LEVEL
- LE LEVEL ELEMENT
- LT LEVEL TRANSMITTER
- LIT LEVEL INDICATING TRANSMITTER
- LI LEVEL INDICATOR
- LS LEVEL SWITCH
- LSL LEVEL SWITCH LOW
- LSH LEVEL SWITCH HIGH
- LAL LEVEL ALARM LOW
- LAH LEVEL ALARM HIGH
- LCV LEVEL CONTROL VALVE

PRESSURE
- BPR BACK PRESSURE REGULATOR
- PE PRESSURE ELEMENT
- PT PRESSURE TRANSMITTER
- PIT PRESSURE INDICATING TRANSMITTER
- PI PRESSURE INDICATOR
- PS PRESSURE SWITCH
- PSL PRESSURE SWITCH LOW
- PSH PRESSURE SWITCH HIGH
- PAL PRESSURE ALARM LOW
- PAH PRESSURE ALARM HIGH
- PCV PRESSURE CONTROL VALVE
- PSV PRESSURE SAFETY VALVE
- PRV PRESSURE REDUCING VALVE

DIFFERENTIAL PRESSURE
- PDT DIFF PRESSURE TRANSMITTER
- PDIT DIFF PRESSURE INDICATING TRANSMITTER
- PDI DIFF PRESSURE INDICATOR
- PDS DIFF PRESSURE SWITCH
- PDSL DIFF PRESSURE SWITCH LOW
- PDSH DIFF PRESSURE SWITCH HIGH
- PDAL DIFF PRESSURE ALARM LOW
- PDAH DIFF PRESSURE ALARM HIGH
- PDCV DIFF PRESSURE CONTROL VALVE

TEMPERATURE
- TE TEMPERATURE ELEMENT
- TT TEMPERATURE TRANSMITTER
- TIT TEMPERATURE INDICATING TRANSMITTER
- TI TEMPERATURE INDICATOR
- TC TEMPERATURE CONTROLLER
- TS TEMPERATURE SWITCH
- TSL TEMPERATURE SWITCH LOW
- TSH TEMPERATURE SWITCH HIGH
- TAL TEMPERATURE ALARM LOW
- TAH TEMPERATURE ALARM HIGH
- TCV TEMPERATURE CONTROL VALVE

DIFFERENTIAL TEMPERATURE
- TDT DIFF TEMPERATURE TRANSMITTER
- TDIT DIFF TEMPERATURE INDICATING TRANSMITTER
- TDI DIFF TEMPERATURE INDICATOR
- TDS DIFF TEMPERATURE SWITCH
- TDSL DIFF TEMPERATURE SWITCH LOW
- TDSH DIFF TEMPERATURE SWITCH HIGH
- TDAL DIFF TEMPERATURE ALARM LOW
- TDAH DIFF TEMPERATURE ALARM HIGH
- TDCV DIFF TEMPERATURE CONTROL VALVE

POSITION
- ZIT POSITION INDICATING TRANSMITTER
- ZIC POSITION INDICATOR CLOSED
- ZC POSITION CONTROLLER SWITCH CLOSED
- ZO POSITION SWITCH OPEN
- ZIO POSITION INDICATOR OPEN

P&ID PILOT DEVICE
- HSA HAND-OFF-AUTO SWITCH
- HSLR LOCAL-OFF-REMOTE SWITCH
- HSS START-STOP SWITCH
- PBST START PUSH BUTTON
- PBSP STOP PUSH BUTTON
- PBOP OPEN PUSH BUTTON
- PBCL CLOSE PUSH BUTTON
- PBON ON PUSH BUTTON
- PBOF OFF PUSH BUTTON
- PBES EMERGENCY STOP PUSH BUTTON
- PBR RESET PUSH BUTTON
- PBUP PUSH BUTTON UP
- PBDN PUSH BUTTON DN
- PBRT PUSH BUTTON RIGHT
- PBLF PUSH BUTTON LEFT

MISCELLANEOUS
- EPS ELECTRIC TO PNEUMATIC SWITCH
- MS MOTOR STARTER
- HT MOISTURE/HUMIDITY TRANSMITTER
- HV HAND VALVE
- SP STATIC PRESSURE
- QT QUANTITY TRANSMITTER
- QP PRESSURE SETPOINT
- SI SPEED INDICATION
- ST SPEED TRANSMITTER
- UY MULTI-VARIABLE CONVERTER
- XV SOLENOID VALVE
- YA STATUS ALARM
- YR STATUS RUNNING

VALVE SYMBOLS

- BACKFLOW PREVENTION VALVE
- BALL VALVE
- BALL FLOAT VALVE
- BUTTERFLY VALVE
- CHECK BALL VALVE
- CORP STOP
- CHECK VALVE
- DIAPHRAGM VALVE
- DIVERTER VALVE
- GATE VALVE
- GLOBE VALVE
- KNIFE VALVE
- NEEDLE VALVE
- PINCH VALVE
- PLUG VALVE
- ROTARY VALVE
- RELIEF VALVE
- PRESSURE AND VACUUM RELIEF VALVE

LINE TYPES

- PRIMARY PROCESS
- PRIMARY PROCESS (EXISTING/FUTURE)
- SECONDARY PROCESS
- SECONDARY PROCESS (EXISTING/FUTURE)
- TERTIARY PROCESS
- TERTIARY PROCESS (EXISTING/FUTURE)
- ELECTRICAL LEAD
- PNEUMATIC SIGNAL
- DIGITAL SIGNAL
- CAPILLARY TUBING
- HYDRAULIC SIGNAL
- ELECTROMAGNETIC SIGNAL
- MECHANICAL LINK
- COPPER ETHERNET
- FIBER
- MODBUS
- PROFIBUS

LINE SYMBOLS

- FUSED CONN.
- THREADED CONN.
- SOCKETWELD CONN.
- SLOPE RISE/RUN — PIPE SLOPE
- FLOW ARROW
- TP — TIE POINT SYMBOL
- D — TO DRAIN SYSTEM
- CSA1 / CSB1 — SPEC BREAK
- BATTERY LIMIT — BATTERY LIMIT

PUMP SYMBOLS

CENTRIFUGAL PUMP, DIAPHRAGM PUMP, GEAR PUMP, SUMP PUMP, POSITIVE DISPLACEMENT PUMP, PROGRESSIVE CAVITY PUMP, DEEP WELL PUMP, SUBMERSIBLE PUMP

PIPE LINE IDENTIFICATION

PIPE NUMBER LEGEND

LINE SERVICE, LINE NUMBER, SIZE, SPECIFICATION, INSULATION IF REQUIRED

4"-100-WA-CSA1-HET

OFF PAGE CONNECTOR

SERVICE
DRAWING NO
ORIGIN OR DESTINATION

OFF PAGE CONNECTOR (OFF-SCOPE PIPING)

SERVICE

INSULATION AND HEAT TRACING

SYMBOLS
- IH - INSULATED
- HET - INSULATED & TRACED

ABBREVIATIONS

ABBRV	DESCRIPTION
IH	INSULATION, HEAT RETENTION
HET	INSULATION, ELECTRIC TRACING

Linkan
2720 Ruby Vista Dr. Suite 101
Elko, NV 89801
775-777-8003

REV	REVISION DESCRIPTION	DATE	BY	CHECK	APPR
A	ISSUED FOR 30% DESIGN REVIEW	06/11/2024	JLB	ERN	TAH
B	ISSUED FOR 60% DESIGN REVIEW	08/14/2024	JLB	ERN	TAH
C	ISSUED FOR REVIEW	08/27/2024	JLB	ERN	TAH

TITLE: PIPING AND INSTRUMENTATION LEGEND AND SYMBOLS

PROJECT: ENERGY FUEL RESOURCES WHIRLWIND MINE DESIGN-BUILD

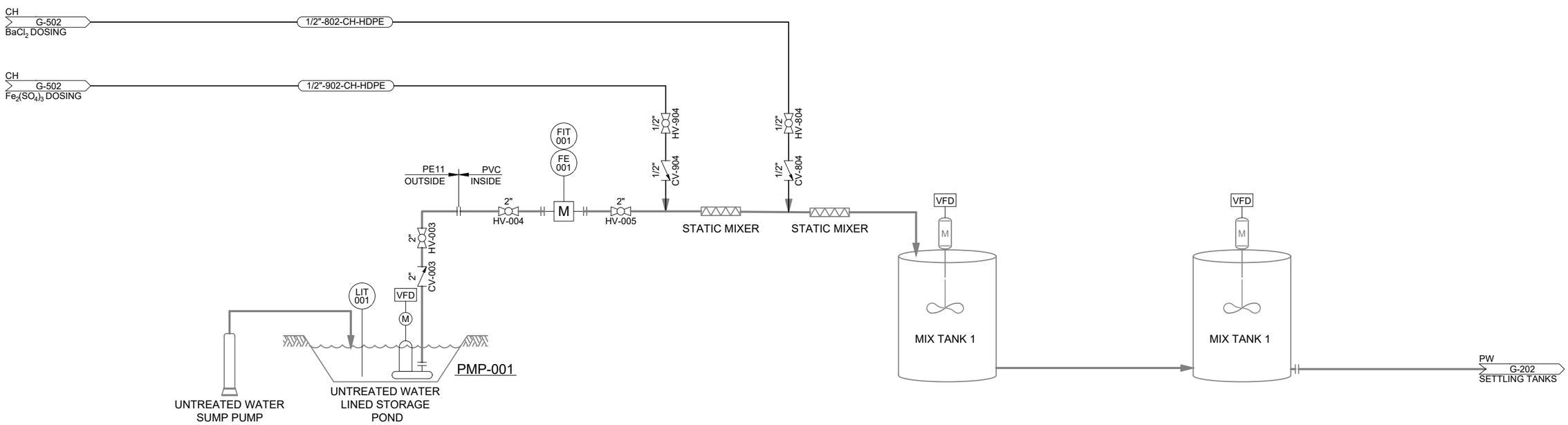
PROJECT NO. 24US0131

DATE: JUNE 11, 2024

SCALE: N.T.S.

SHEET NO. G-200

8/27/2024 11:49 AM G-200.dwg



REV	REVISION DESCRIPTION	DATE	BY	CHECK	APPR
A	ISSUED FOR 60% DESIGN REVIEW	08/14/2024	JLB	ERN	TAH
B	ISSUED FOR REVIEW	08/27/2024	JLB	ERN	TAH

Linkan
2720 Ruby Vista Dr. Suite 101
Elko, NV 89801
775-777-8003

TITLE: PIPING AND INSTRUMENTATION DIAGRAM
EXISTING LYNTEK SYSTEM

PROJECT: ENERGY FUEL RESOURCES
WHIRLWIND MINE DESIGN-BUILD

PROJECT NO.
24US0131

DATE:
AUGUST 8, 2024

SCALE:
N.T.S.

SHEET NO.
G-201

8/27/2024 11:49 AM G-201.dwg

P-002
FEED PUMP
FLOW: 22 GPM, TDH: 15.6 FT
0.75HP 480V

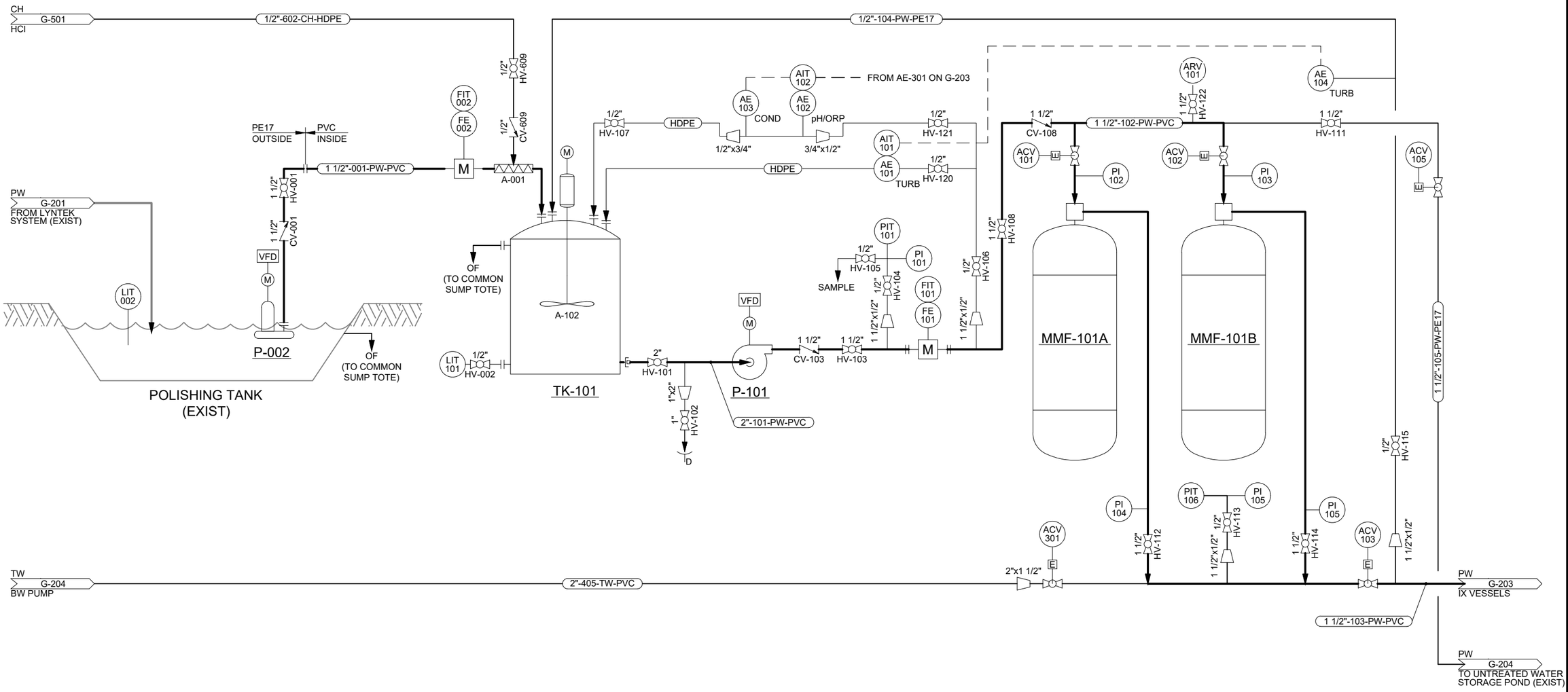
TK-101
MMF FEED TANK
MATERIAL: PLASTIC, VOLUME: 300 GAL
DIAMETER: 43" HEIGHT 60"

A-102
FEED TANK AGITATOR

P-101
MMF FEED TANK
FLOW: 22 GPM, TDH: 100.8 FT
3HP 480V

MMF-101A
MULTIMEDIA VESSEL A
FLUX:15.28GPM/SQ. FT
MAX PRESSURE: 150 PSIG

MMF-101B
MULTI MEDIA VESSEL B
FLUX:15.28GPM/SQ. FT
MAX PRESSURE: 150 PSIG



Linkan
2720 Ruby Vista Dr. Suite 101
Elko, NV 89801
775-777-8003

REV	REVISION DESCRIPTION	DATE	BY	CHECK	APPR
A	ISSUED FOR 30% DESIGN REVIEW	06/11/24	JLB	ERN	TAH
B	ISSUED FOR 60% DESIGN REVIEW	08/14/2024	JLB	ERN	TAH
C	ISSUED FOR REVIEW	08/27/2024	JLB	ERN	TAH

TITLE: PIPING AND INSTRUMENTATION DIAGRAM
MMF FEED AND VESSELS

PROJECT: ENERGY FUEL RESOURCES
WHIRLWIND MINE DESIGN-BUILD

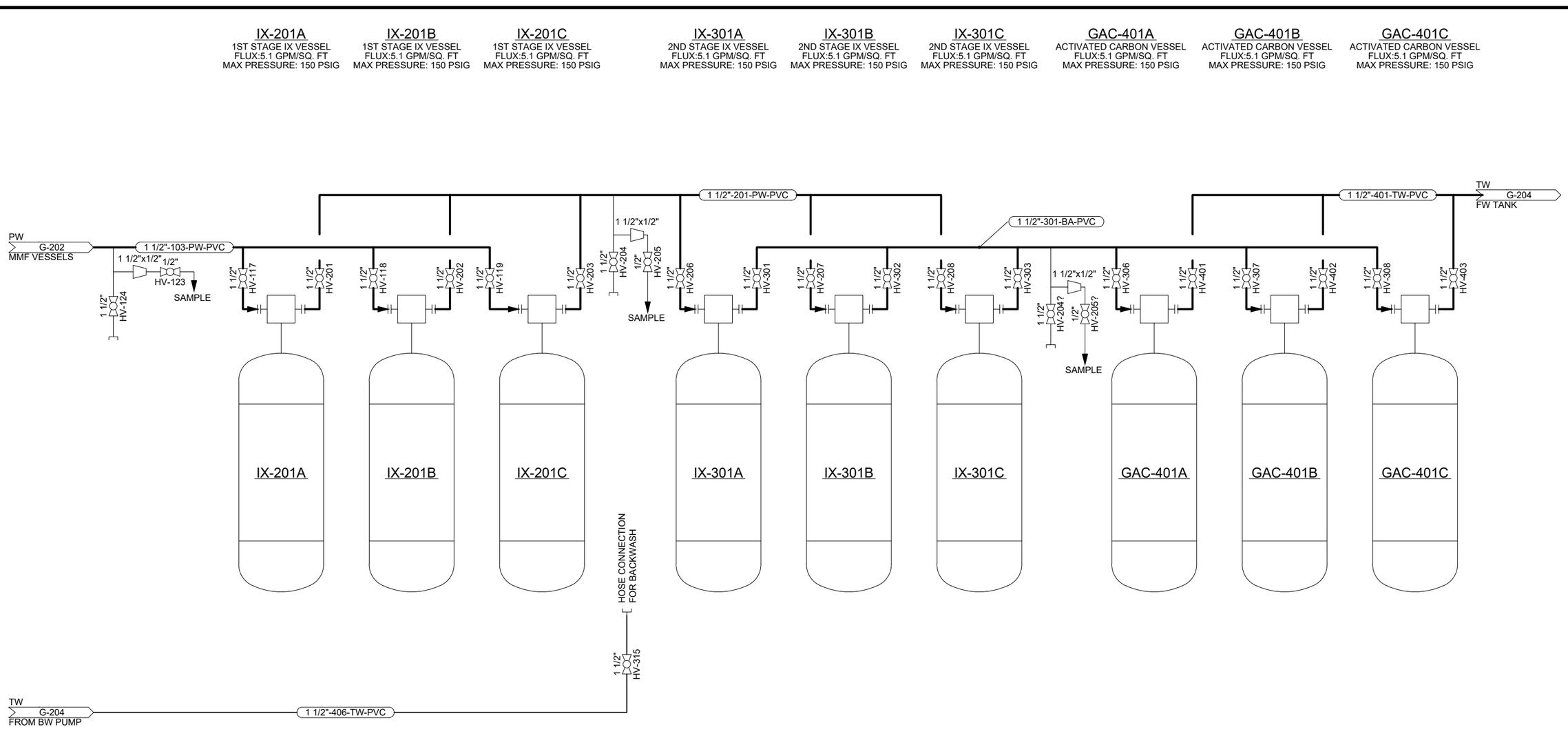
PROJECT NO.
24US0131

DATE:
JUNE 11, 2024

SCALE:
N.T.S.

SHEET NO.
G-202

8/27/2024 11:49 AM G-202.dwg



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2720 Ruby Vista Dr. Suite 101
Elko, NV 89801
775-777-8003

REV	REVISION DESCRIPTION	DATE	BY	CHECK	APPR
A	ISSUED FOR 30% DESIGN REVIEW	06/11/2024	JLB	ERN	TAH
B	ISSUED FOR 60% DESIGN REVIEW	08/14/2024	JLB	ERN	TAH
C	ISSUED FOR REVIEW	08/27/2024	JLB	ERN	TAH

TITLE: PIPING AND INSTRUMENTATION DIAGRAM
TWO STAGE IX & GAC VESSELS

PROJECT: ENERGY FUEL RESOURCES
WHIRLWIND MINE DESIGN-BUILD

PROJECT NO.
24US0131

DATE:
JUNE 11, 2024

SCALE:
N.T.S.

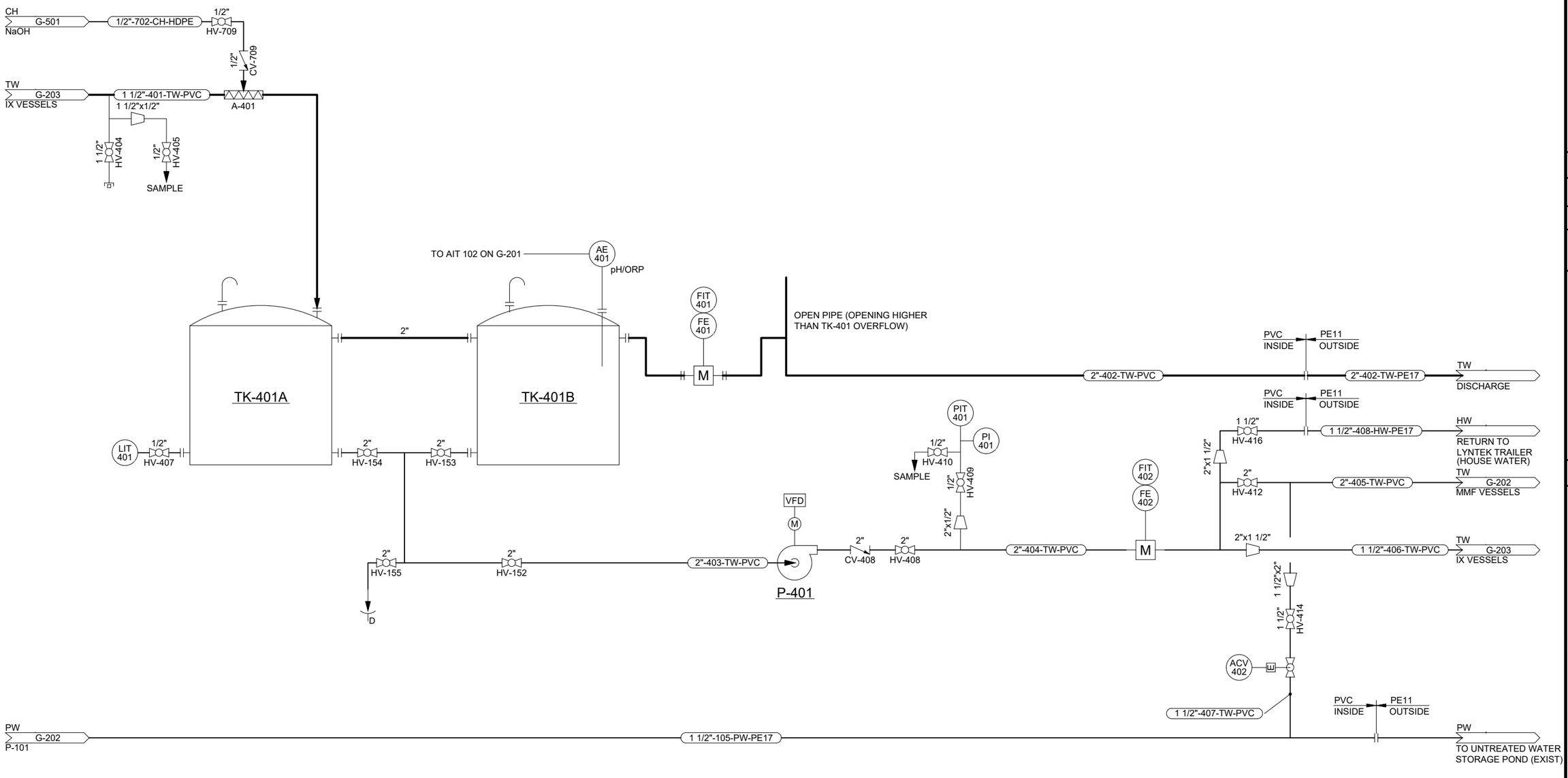
SHEET NO.
G-203

8/27/2024 11:49 AM G-203.dwg

TK-401A
FINISH WATER TANK
MATERIAL: PLASTIC, VOLUME: 300 GAL
DIAMETER: 43" HEIGHT 60"

TK-401B
FINISH WATER TANK
MATERIAL: PLASTIC, VOLUME: 300 GAL
DIAMETER: 43" HEIGHT 60"

P-401
MMF BACKWASH PUMP
FLOW: 41 GPM, TDH: 48.8 FT
3.0HP 480V



Linkan
2720 Ruby Vista Dr. Suite 101
Elko, NV 89801
775-777-8003

REV	REVISION DESCRIPTION	DATE	BY	CHECK	APPR
A	ISSUED FOR 30% DESIGN REVIEW	06/11/2024	JLB	ERN	TAH
B	ISSUED FOR 60% DESIGN REVIEW	08/14/2024	JLB	ERN	TAH
C	ISSUED FOR REVIEW	08/27/2024	JLB	ERN	TAH

TITLE: PIPING AND INSTRUMENTATION DIAGRAM
FINISH WATER DISTRIBUTION

PROJECT: ENERGY FUEL RESOURCES
WHIRLWIND MINE DESIGN-BUILD

PROJECT NO.
24US0131

DATE:
JUNE 11, 2024

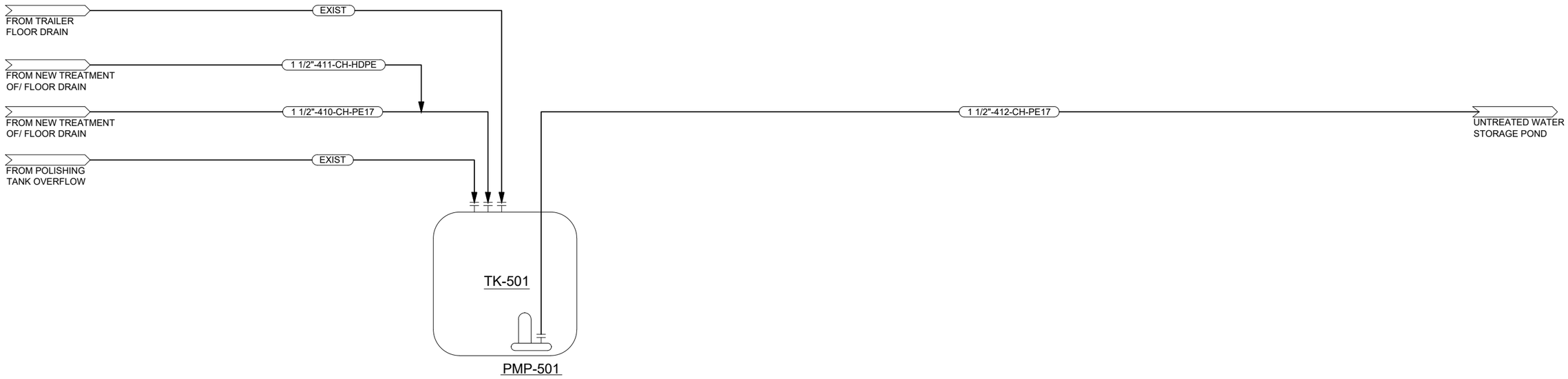
SCALE:
N.T.S.

SHEET NO.
G-204

8/27/2024 11:49 AM G-204.dwg

TK-501 TOTE
CONTENTS: OVERFLOW DRAINAGE HOLDING

PMP-501
OVERFLOW RECOVERY PUMP
FLOW: 47 GPM, TDH: 15 FT
0.5 HP 120V



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2720 Ruby Vista Dr. Suite 101
Elko, NV 89801
775-777-8003

REV.	REVISION DESCRIPTION	DATE	BY	CHECK	APPR
A	ISSUED FOR 60% DESIGN REVIEW	08/14/2024	JLB	ERN	TAH
B	ISSUED FOR REVIEW	08/27/2024	JLB	ERN	TAH

TITLE: PIPING AND INSTRUMENTATION DIAGRAM
OVERFLOW RECOVERY SYSTEM

PROJECT: ENERGY FUEL RESOURCES
WHIRLWIND MINE DESIGN-BUILD

PROJECT NO.
24US0131

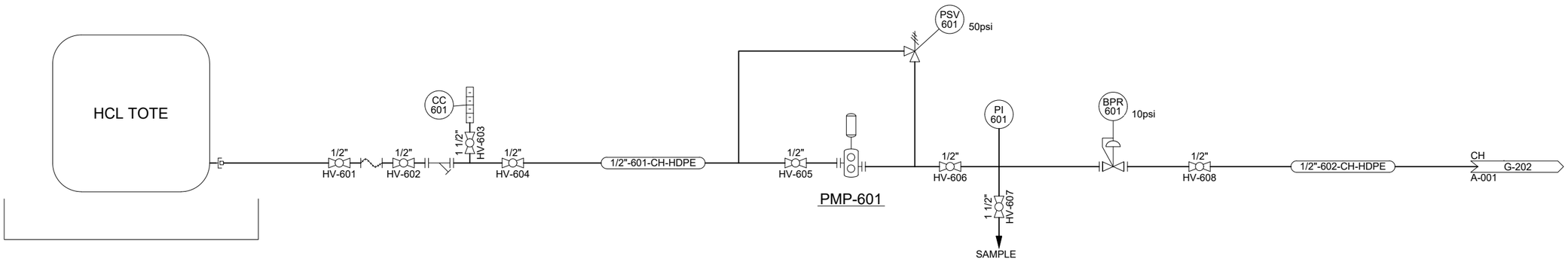
DATE:
AUGUST 8, 2024

SCALE:
N.T.S.

SHEET NO.
G-205

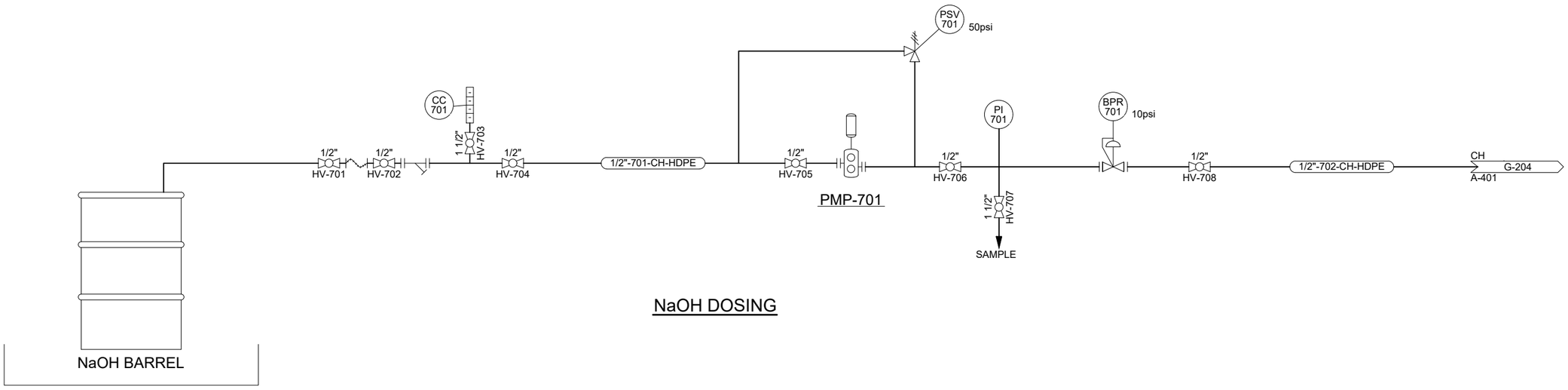
8/27/2024 11:49 AM G--205.dwg

PMP-601
HCL DOSING PUMP
FLOW: 2.0GPH, TDH 536FT
120V



HCL DOSING

PMP-701
NaOH DOSING PUMP
FLOW: 2.0GPH, TDH 536FT
120V



NaOH DOSING

Linkan
2720 Ruby Vista Dr. Suite 101
Elko, NV 89801
775-777-8003

REV	REVISION DESCRIPTION	DATE	BY	CHECK	APPR
A	ISSUED FOR 60% DESIGN REVIEW	08/14/2024	JLB	ERN	TAH
B	ISSUED FOR REVIEW	08/27/2024	JLB	ERN	TAH

TITLE: PIPING AND INSTRUMENTATION DIAGRAM
HCL AND NAOH DOSING

PROJECT: ENERGY FUEL RESOURCES
WHIRLWIND MINE DESIGN-BUILD

PROJECT NO.
24US0131

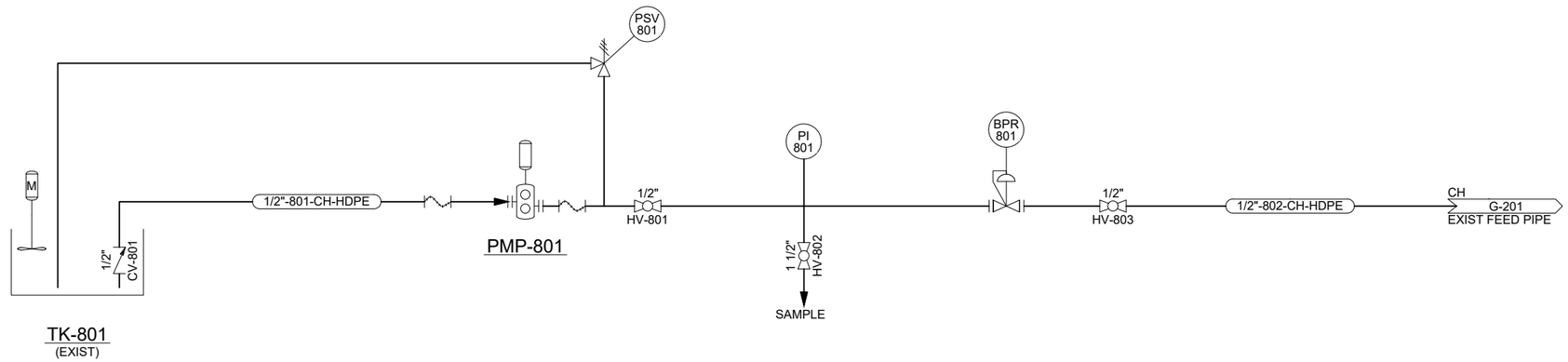
DATE:
AUGUST 8, 2024

SCALE:
N.T.S.

SHEET NO.
G-501

8/27/2024 11:49 AM G-501.dwg

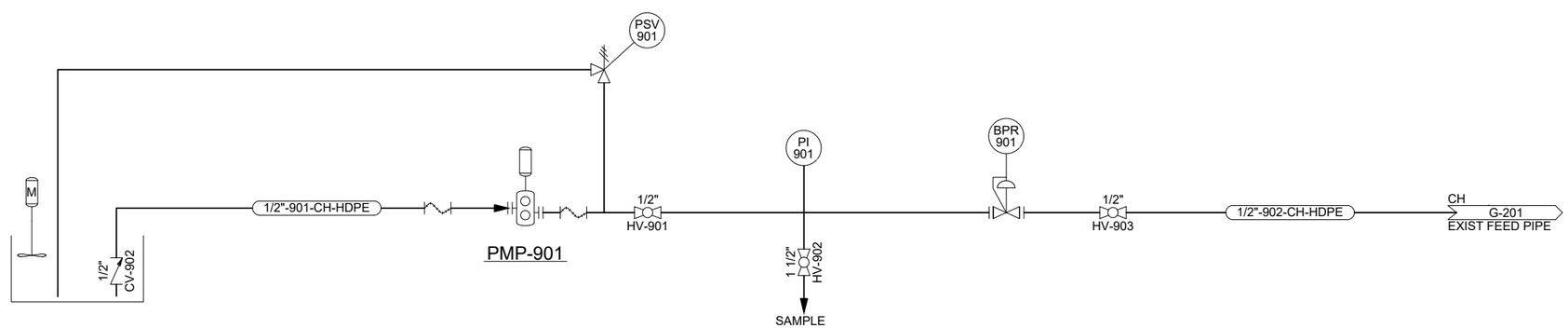
PMP-801
BARIUM CHLORIDE DOSING PUMP
FLOW: 2.0GPH, TDH 536FT
120V



TK-801
(EXIST)

$BACl_2$ DOSING

PMP-901
FERRIC SULFATE DOSING PUMP
FLOW: 2.0GPH, TDH 536FT
120V



TK-901
(EXIST)

$Fe_2(SO_4)_3$ DOSING

Linkan
2720 Ruby Vista Dr. Suite 101
Elko, NV 89801
775-777-8003

REV	REVISION DESCRIPTION	DATE	BY	CHECK	APPR
A	ISSUED FOR 60% DESIGN REVIEW	08/14/2024	JLB	ERN	TAH
B	ISSUED FOR REVIEW	08/27/2024	JLB	ERN	TAH

TITLE: PIPING AND INSTRUMENTATION DIAGRAM
BARIUM CL2 & FECL3 DOSING

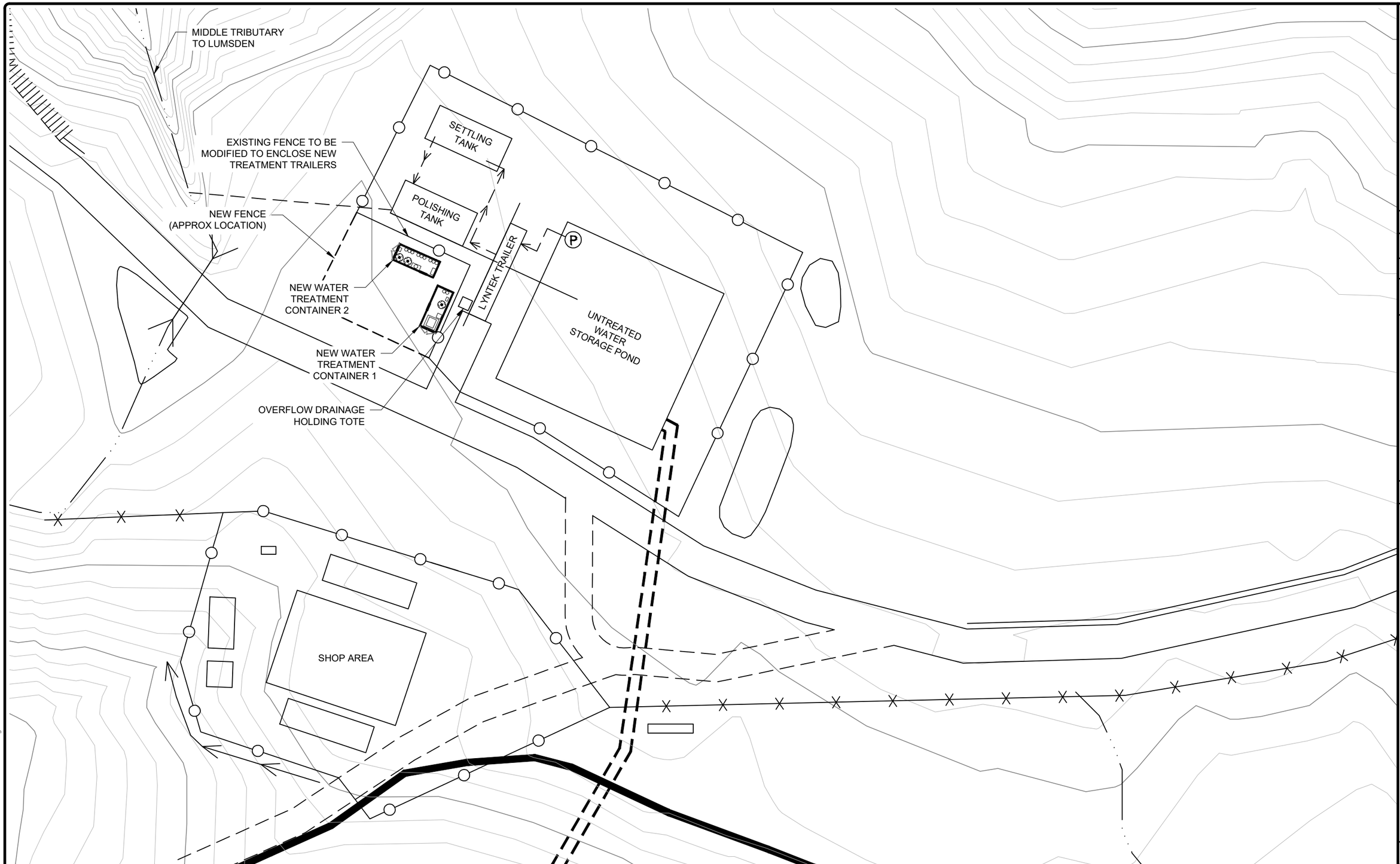
PROJECT: ENERGY FUEL RESOURCES
WHIRLWIND MINE DESIGN-BUILD

PROJECT NO.
24US0131

DATE:
AUGUST 8, 2024

SCALE:
N.T.S.

SHEET NO.
G-502



GENERAL NOTES:

1. .
2. .
3. .

WTP OVERALL SITE PLAN

SCALE: 1"=40'-0"

Linkan
2720 Ruby Vista Dr. Suite 101
Elko, NV 89801
775-777-8003

REV	REVISION DESCRIPTION	DATE	BY	CHECK	APPR
A	ISSUED FOR 60% DESIGN REVIEW	08/15/2024	JLB	ERN	TAH
B	ISSUED FOR REVIEW	08/27/2024	JLB	ERN	TAH

TITLE: GENERAL ARRANGEMENT
WTP SITE PLAN

PROJECT: ENERGY FUELS RESOURCES
WHIRLWIND MINE DESIGN-BUILD

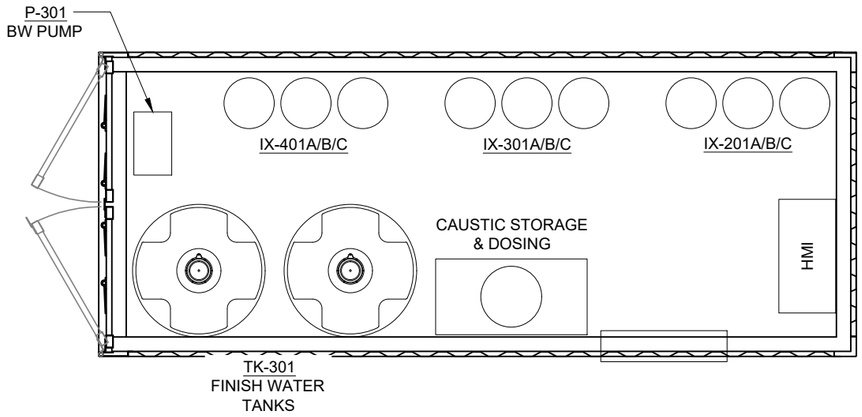
PROJECT NO.
24US0131

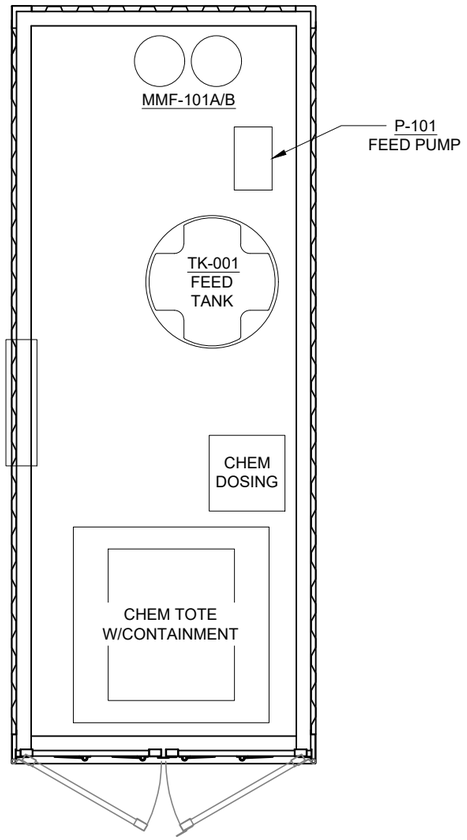
DATE:
AUGUST 13, 2024

SCALE:
1"=40'-0"

SHEET NO.
C-100

8/27/2024 11:54 AM ---- C-100.dwg





WTP PLAN

SCALE: 1/4"=1'-0"

REV.	REVISION DESCRIPTION	DATE	BY	CHECK	APPR
A	ISSUED FOR 30% DESIGN REVIEW	06/12/2024	JLB	ERN	TAH
B	ISSUED FOR 60% DESIGN REVIEW	08/14/2024	JLB	ERN	TAH
C	ISSUED FOR REVIEW	08/27/2024	JLB	ERN	TAH

Linkan
2720 Ruby Vista Dr. Suite 101
Elko, NV 89801
775-777-8003

TITLE: GENERAL ARRANGEMENT
WTP PLAN VIEW

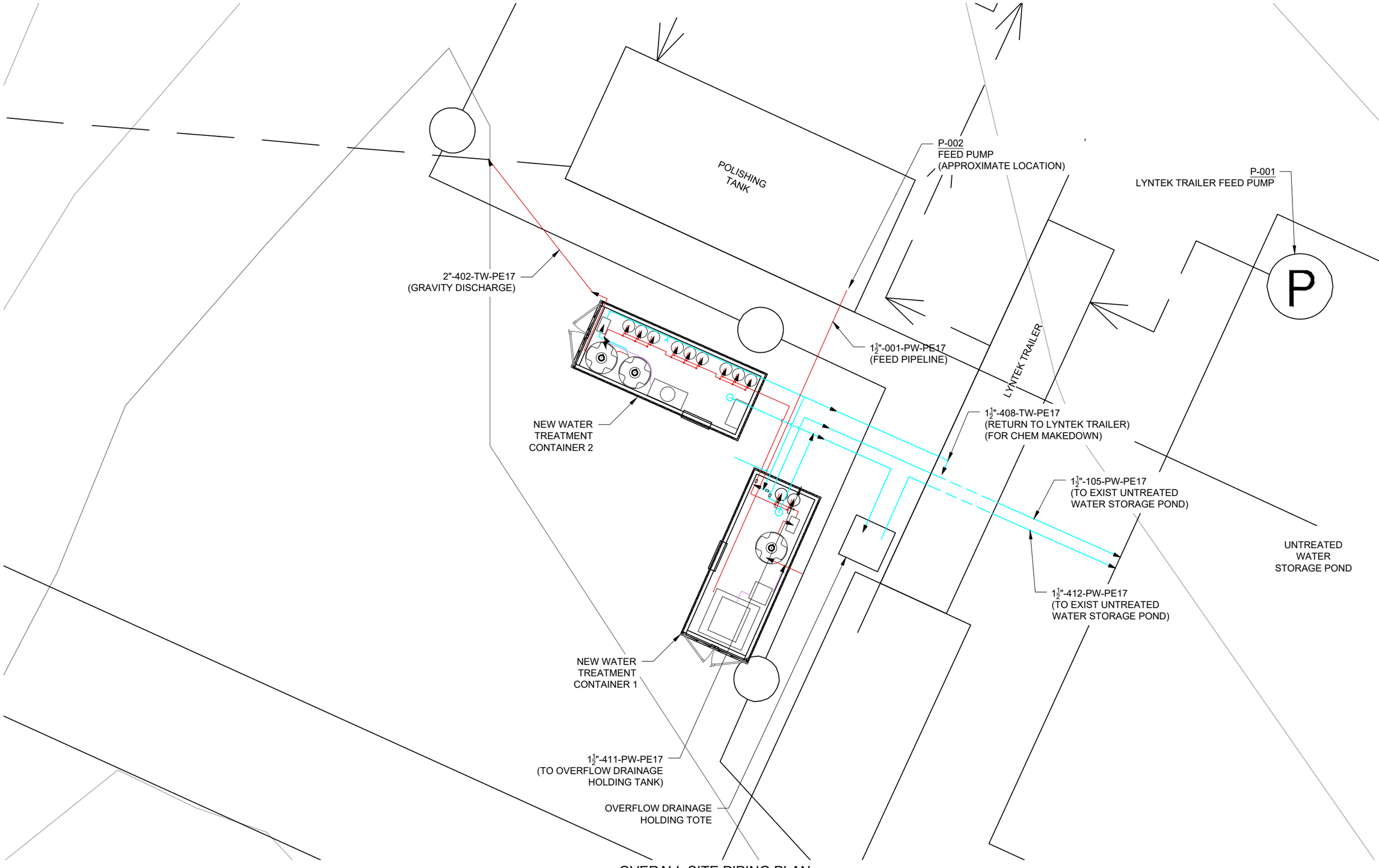
PROJECT: ENERGY FUELS RESOURCES
WHIRLWIND MINE DESIGN-BUILD

PROJECT NO.
24US0131

DATE:
JUNE 05, 2024

SCALE:
1"=3'-0"

SHEET NO.
C-101



OVERALL SITE PIPING PLAN

SCALE: 1"=10'-0"

Linkan
2720 Ruby Vista Dr. Suite 101
Elko, NV 89801
775-777-8003

REV.	REVISION DESCRIPTION	DATE	BY	CHECK	APPR
A	ISSUED FOR 60% DESIGN REVIEW	08/14/2024	JLB	ERN	TAH
B	ISSUED FOR REVIEW	08/27/2024	JLB	ERN	TAH

TITLE: PIPING
WTP SITE PLAN

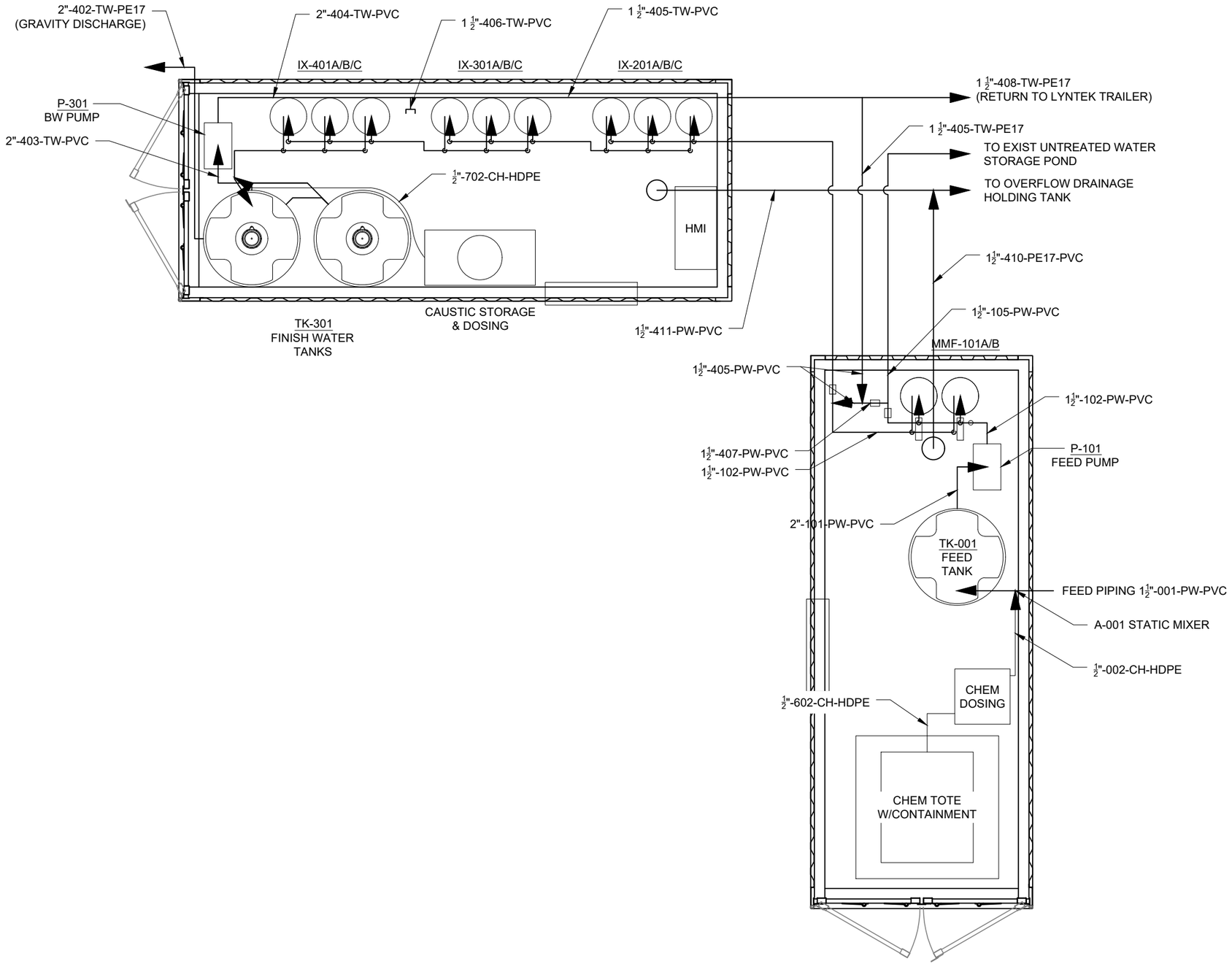
PROJECT: ENERGY FUELS RESOURCES
WHIRLWIND MINE DESIGN-BUILD

PROJECT NO.
24US0131

DATE:
AUGUST 13, 2024

SCALE:
1"=10'-0"

SHEET NO.
P-100



WTP PIPING PLAN

SCALE: 1/4"=1'-0"

Linkan
2720 Ruby Vista Dr. Suite 101
Elko, NV 89801
775-777-8003

REV.	REVISION DESCRIPTION	DATE	BY	CHECK	APPR
A	ISSUED FOR 30% DESIGN REVIEW	06/12/2024	JLB	ERN	TAH
B	ISSUED FOR 60% DESIGN REVIEW	08/14/2024	JLB	ERN	TAH
C	ISSUED FOR REVIEW	08/27/2024	JLB	ERN	TAH

TITLE: PIPING
WTP PLAN

PROJECT: ENERGY FUELS RESOURCES
WHIRLWIND MINE DESIGN-BUILD

PROJECT NO.
24US0131

DATE:
AUGUST 13, 2024

SCALE:
1/4"=1'-0"

SHEET NO.
P-101

Attachment 3

Third-Party Pilot Testing Analytical Results

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: Linkan Engineering
Project: Not Indicated
Lab ID: H24050738-001
Client Sample ID: Whirlwind Mine As Received

Report Date: 06/04/24
Collection Date: 05/23/24 11:00
DateReceived: 05/24/24
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
Solids, Total Suspended TSS @ 105 C	3	mg/L	J	10		A2540 D	05/24/24 12:44 / dpw
Solids, Total Dissolved TDS @ 180 C	353	mg/L		20		A2540 C	05/24/24 13:06 / dpw
INORGANICS							
Alkalinity, Total as CaCO3	300	mg/L		4		A2320 B	05/29/24 12:48 / dpw
Bicarbonate as HCO3	350	mg/L		4		A2320 B	05/29/24 12:48 / dpw
Carbonate as CO3	6	mg/L		4		A2320 B	05/29/24 12:48 / dpw
Chloride	19	mg/L		1		E300.0	05/28/24 18:00 / eer
Sulfate	2	mg/L		1		E300.0	05/28/24 18:00 / eer
Fluoride	0.3	mg/L		0.1		E300.0	05/28/24 18:00 / eer
Sulfide	ND	mg/L		0.04		A4500-S D	05/24/24 18:11 / dpw
Sulfide as Hydrogen Sulfide (H2S)	ND	mg/L		0.04		A4500-S D	05/24/24 18:11 / dpw
AGGREGATE ORGANICS							
Oxygen Demand, Chemical (COD)	ND	mg/L		5		E410.4	05/29/24 08:55 / eer
NUTRIENTS							
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	05/31/24 14:05 / JAR
Nitrogen, Nitrate as N	0.02	mg/L		0.01		E353.2	06/03/24 10:16 / rrs
Nitrogen, Nitrate+Nitrite as N	0.02	mg/L		0.01		E353.2	05/29/24 16:02 / JAR
Nitrogen, Nitrite as N	ND	mg/L		0.01		E353.2	05/24/24 14:27 / JAR
Nitrogen, Inorganic	ND	mg/L		0.05		Calculation	06/03/24 10:16 / rrs
Phosphorus, Orthophosphate as P	ND	mg/L		0.005		E365.1	05/24/24 16:32 / JAR
METALS, DISSOLVED							
Arsenic	0.004	mg/L		0.001		E200.8	05/29/24 16:35 / dck
Iron	0.005	mg/L	J	0.02		E200.8	05/29/24 16:35 / dck
Manganese	0.002	mg/L		0.001		E200.8	05/29/24 16:35 / dck
METALS, TOTAL							
Chromium, Hexavalent	ND	mg/L	H	0.01		A3500-Cr B	05/24/24 11:49 / eer
Chromium, Trivalent	ND	mg/L		0.01		Calculation	06/04/24 11:19 / JCS
POTENTIALLY DISSOLVED							
Cadmium	ND	mg/L		0.001		E200.8	05/29/24 16:39 / dck
Copper	0.001	mg/L	J	0.005		E200.8	05/29/24 16:39 / dck
Lead	ND	mg/L		0.001		E200.8	05/29/24 16:39 / dck
Nickel	0.0004	mg/L	J	0.005		E200.8	05/29/24 16:39 / dck
Selenium	0.0003	mg/L	J	0.001		E200.8	05/29/24 16:39 / dck
Silver	ND	mg/L		0.001		E200.8	05/29/24 16:39 / dck
Zinc	0.002	mg/L	J	0.01		E200.8	05/29/24 16:39 / dck
METALS, TOTAL RECOVERABLE							
Aluminum	0.02	mg/L	J	0.03		E200.8	05/29/24 16:43 / dck
Arsenic	0.006	mg/L		0.001		E200.8	05/29/24 16:43 / dck

Report Definitions:

RL - Analyte Reporting Limit
MCL - Maximum Contaminant Level
QCL - Quality Control Limit
ND - Not detected at the Reporting Limit (RL)
H - Analysis performed past the method holding time
J - Estimated value - analyte was present but less than the Reporting Limit (RL)

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: Linkan Engineering
Project: Not Indicated
Lab ID: H24050738-001
Client Sample ID: Whirlwind Mine As Received

Report Date: 06/04/24
Collection Date: 05/23/24 11:00
DateReceived: 05/24/24
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
METALS, TOTAL RECOVERABLE							
Chromium	ND	mg/L		0.005		E200.8	05/29/24 16:43 / dck
Iron	0.41	mg/L		0.02		E200.8	05/29/24 16:43 / dck
Molybdenum	0.007	mg/L		0.001		E200.8	05/29/24 16:43 / dck
Uranium	0.0335	mg/L		0.0003		E200.8	05/29/24 16:43 / dck
Vanadium	0.0008	mg/L	J	0.01		E200.8	05/29/24 16:43 / dck
Zinc	0.01	mg/L		0.01		E200.8	05/29/24 16:43 / dck
METALS, TOTAL							
Antimony	ND	mg/L		0.001		E200.8	05/30/24 00:32 / dck
Barium	0.21	mg/L		0.05		E200.8	05/30/24 00:32 / dck
Beryllium	ND	mg/L		0.001		E200.8	05/30/24 18:12 / dck
Boron	0.11	mg/L		0.05		E200.7	05/29/24 10:46 / slj
Calcium	11	mg/L		1		E200.7	05/29/24 10:46 / slj
Magnesium	6	mg/L		1		E200.7	05/29/24 10:46 / slj
Manganese	0.013	mg/L		0.001		E200.8	05/30/24 00:32 / dck
Mercury	0.003	ug/L	J	0.005		E245.1	05/30/24 17:52 / eli-b
Potassium	10	mg/L		1		E200.7	05/29/24 10:46 / slj
Sodium	123	mg/L		1		E200.7	05/29/24 10:46 / slj
Thallium	8E-06	mg/L	J	0.0005		E200.8	05/30/24 00:32 / dck
ORGANIC CHARACTERISTICS							
Oil & Grease (HEM)	2	mg/L	JL	5		E1664A	05/30/24 09:31 / eli-b

- The reporting limit for Oil and Grease by E1664 was increased due to EPA method requirements.

Report Definitions:

RL - Analyte Reporting Limit
QCL - Quality Control Limit
J - Estimated value - analyte was present but less than the Reporting Limit (RL)
MCL - Maximum Contaminant Level
ND - Not detected at the Reporting Limit (RL)
L -Lowest available reporting limit for the analytical method used and/or volume submitted

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: Linkan Engineering
Project: Not Indicated
Lab ID: H24060617-001
Client Sample ID: Whirlwind Spike

Report Date: 06/28/24
Collection Date: 06/17/24 16:45
DateReceived: 06/20/24
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
METALS, TOTAL							
Arsenic	0.051	mg/L		0.001		E200.8	06/22/24 12:29 / dck
Selenium	0.021	mg/L		0.001		E200.8	06/22/24 12:29 / dck

Report Definitions:
RL - Analyte Reporting Limit
QCL - Quality Control Limit
MCL - Maximum Contaminant Level
ND - Not detected at the Reporting Limit (RL)

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: Linkan Engineering
Project: Not Indicated
Lab ID: H24060617-005
Client Sample ID: Test 1 Permit

Report Date: 06/28/24
Collection Date: 06/18/24 14:30
DateReceived: 06/20/24
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
Solids, Total Suspended TSS @ 105 C	ND	mg/L		10		A2540 D	06/20/24 13:27 / dpw
Solids, Total Dissolved TDS @ 180 C	422	mg/L		20		A2540 C	06/20/24 13:16 / ctl
INORGANICS							
Chloride	74	mg/L		1		E300.0	06/25/24 12:25 / SRW
Sulfide	ND	mg/L		0.04		A4500-S D	06/24/24 14:39 / dpw
Sulfide as Hydrogen Sulfide (H2S)	ND	mg/L		0.04		A4500-S D	06/24/24 14:39 / dpw
AGGREGATE ORGANICS							
Oxygen Demand, Chemical (COD)	27	mg/L		5		E410.4	06/26/24 14:05 / SRW
NUTRIENTS							
Nitrogen, Ammonia as N	ND	mg/L		0.05		E350.1	06/20/24 14:02 / JAR
Nitrogen, Nitrate+Nitrite as N	0.25	mg/L		0.01		E353.2	06/20/24 19:47 / JAR
Nitrogen, Inorganic	0.25	mg/L		0.05		Calculation	06/21/24 11:32 / JCS
METALS, DISSOLVED							
Iron	0.002	mg/L	J	0.02		E200.8	06/22/24 12:53 / dck
Manganese	0.003	mg/L		0.001		E200.8	06/22/24 12:53 / dck
METALS, TOTAL							
Chromium, Hexavalent	ND	mg/L	H	0.01		A3500-Cr B	06/20/24 14:12 / dpw
Chromium, Trivalent	ND	mg/L		0.01		Calculation	06/26/24 08:19 / JCS
POTENTIALLY DISSOLVED							
Cadmium	ND	mg/L		0.001		E200.8	06/22/24 13:08 / dck
Copper	0.002	mg/L	J	0.005		E200.8	06/22/24 13:08 / dck
Lead	ND	mg/L		0.001		E200.8	06/22/24 13:08 / dck
Nickel	0.0001	mg/L	J	0.005		E200.8	06/22/24 13:08 / dck
Selenium	0.00004	mg/L	J	0.001		E200.8	06/22/24 13:08 / dck
Silver	4E-06	mg/L	J	0.001		E200.8	06/22/24 13:08 / dck
Zinc	0.006	mg/L	J	0.01		E200.8	06/22/24 13:08 / dck
METALS, TOTAL RECOVERABLE							
Aluminum	ND	mg/L		0.03		E200.8	06/22/24 13:15 / dck
Arsenic	0.0002	mg/L	J	0.001		E200.8	06/22/24 13:15 / dck
Iron	0.007	mg/L	J	0.02		E200.8	06/22/24 13:15 / dck
Molybdenum	0.00004	mg/L	J	0.001		E200.8	06/22/24 13:15 / dck
Uranium	0.00003	mg/L	J	0.0003		E200.8	06/22/24 13:15 / dck
Vanadium	ND	mg/L		0.01		E200.8	06/22/24 13:15 / dck
Zinc	0.006	mg/L	J	0.01		E200.8	06/22/24 13:15 / dck
METALS, TOTAL							
Antimony	ND	mg/L		0.001		E200.8	06/22/24 13:12 / dck
Barium	0.58	mg/L		0.05		E200.8	06/22/24 13:12 / dck

Report Definitions:

RL - Analyte Reporting Limit
MCL - Maximum Contaminant Level
QCL - Quality Control Limit
ND - Not detected at the Reporting Limit (RL)
H - Analysis performed past the method holding time
J - Estimated value - analyte was present but less than the Reporting Limit (RL)

LABORATORY ANALYTICAL REPORT

Prepared by Helena, MT Branch

Client: Linkan Engineering
Project: Not Indicated
Lab ID: H24060617-005
Client Sample ID: Test 1 Permit

Report Date: 06/28/24
Collection Date: 06/18/24 14:30
DateReceived: 06/20/24
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
METALS, TOTAL							
Beryllium	0.00006	mg/L	J	0.001		E200.8	06/22/24 13:12 / dck
Boron	0.05	mg/L	J	0.05		E200.7	06/23/24 12:21 / slj
Calcium	8	mg/L		1		E200.7	06/23/24 12:21 / slj
Magnesium	2	mg/L		1		E200.7	06/23/24 12:21 / slj
Manganese	0.0003	mg/L	J	0.001		E200.8	06/22/24 13:12 / dck
Mercury	0.003	ug/L	J	0.005		E245.1	06/24/24 11:02 / kjb
Potassium	11	mg/L		1		E200.7	06/23/24 12:21 / slj
Sodium	131	mg/L		1		E200.7	06/23/24 12:21 / slj
Thallium	0.00002	mg/L	J	0.0005		E200.8	06/22/24 13:12 / dck
ORGANIC CHARACTERISTICS							
Oil & Grease (HEM)	ND	mg/L	L	5		E1664A	06/24/24 09:17 / eli-b

- The reporting limit for Oil and Grease by E1664 was increased due to EPA method requirements.

Report Definitions:

RL - Analyte Reporting Limit
QCL - Quality Control Limit
J - Estimated value - analyte was present but less than the Reporting Limit (RL)
MCL - Maximum Contaminant Level
ND - Not detected at the Reporting Limit (RL)
L -Lowest available reporting limit for the analytical method used and/or volume submitted

Attachment 4

Third-Party Pilot Testing Whole Effluent Toxicity Report

COVE ENVIRONMENTAL

Whole Effluent Toxicity (WET) Test Summary

Report ID: LINKAN062724
Sample Dates: June 26th, July 2nd, and 5th, 2024

STUDY SUMMARY

Client/Facility Name: Linkan Engineering
Client Contact: Drew Horseman
Client Phone: 775-777-8003 x305
Facility Location: 2720 Ruby Vista Drive Elko, Nevada 89801

Client ID: 216
Sample Location: Test 1 Permit
Test Type: Toxicity Testing

SAMPLE COLLECTION DATA			Collection Completed	
Sample #	**Description**	**Type**	**Date**	**Time**
062724-06	Test 1 Permit	Grab	6/26/24	1200
070324-01	Post $FeCl_3/BaCl_2$	Grab	7/02/24	1445
070324-02	Post HCl Filtered	Grab	7/02/24	1450
070624-01	Post $FeCl_3/BaCl_2$	Grab	7/05/24	1200

SAMPLE RECEIPT DATA				
Sample #	**Date Rcvd**	**Time Rcvd**	**Temp (°C)**	**Condition on Receipt**
062724-06	6/27/24	1050	4.6	Satisfactory
070324-01	7/03/24	0945	5.6	Satisfactory
070324-02	7/03/24	0945	5.4	Satisfactory
070624-01	7/06/24	1110	5.6	Satisfactory

Test Method/Description:

Short Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms (EPA-821-R-02-013) 7-day Chronic Toxicity, Static Renewal, w/ *Ceriodaphnia dubia* (Method 1002.0) and w/ *Pimephales promelas* (Method 1000.0)

Statistical Software Utilized: CETIS™ v. 2.1.4.3

Source of Test Organisms: Cove in-house cultures

Chronic Dilution Concentrations: 0% and 100%

CHRONIC TEST RESULTS

C. dubia	6/27 Syn 0% (control)	6/27 Test 1 Permit	6/29 Syn 0% (control)	6/29 PAC	7/3 Syn 0% (control)	7/3 Post $FeCl_3/BaCl_2$ Untreated	7/3 Post $FeCl_3/BaCl_2$ Lab Grade HCl	7/3 Post (Linkan HCl) Filtered	7/6 Post $FeCl_3/BaCl_2$ Lab Grade HCl + Linkan Resin
Survival (%)	100	0	100	100	100	100	100	0	0
Ave. Neos	N/A	0.0	39.2	39.2	38.8	35.6	37.4	0.0	0.0
P. promelas	**6/27 Syn 0% (control)**	**6/27 Test 1 Permit**	**6/29 Syn 0% (control)**	**6/29 PAC**	**7/3 Syn 0% (control)**	**7/3 Post $FeCl_3/BaCl_2$ Untreated**	**7/3 Post $FeCl_3/BaCl_2$ Lab Grade HCl**	**7/3 Post (Linkan HCl) Filtered**	**7/6 Post $FeCl_3/BaCl_2$ Lab Grade HCl + Linkan Resin**
Survival (%)	100	0	100	100	100	100	100	60	0
Growth Ave	N/A	0.0	0.416	0.472	0.425	0.446	0.404	0.328	0.0

Results Summary: Test 1 Permit water initially tested on 6/27 induced immediate lethal toxicity to both species. TIE treatments of EDTA, Ambient Degradation, C18, and Reconstitution to MH did not reduce toxicity to either species. PAC treatment was found to completely remove toxicity to both species, however. Upon further discussion intermittent samples were sent on 7/3 to determine if laboratory grade HCl vs non-laboratory grade HCl for pH adjustment would reduce toxicity. It was found that the Post $FeCl_3/BaCl_2$ water both untreated and pH adjusted with laboratory grade HCl did not induce toxicity to either species. Water that was sent post HCl adjustment (non-lab grade) and filtration induced acute toxicity to the *C. dubia* and chronic toxicity to the *P. promelas*. Post $FeCl_3/BaCl_2$ was sent on 7/6 as well as the resin used in the facility, it was found that the combination or laboratory grade HCl and the resin used in the Linkan facility induced toxicity again to both species.

Recommendations: It is Cove's recommendation to either look further into the HCl and resins used at the facility, or to start an isotherm study to determine the amount of PAC necessary to properly treat the effluent prior to discharge.

STUDY CONDITIONS AND PROCEDURES

Table A Summary of Effluent Toxicity Test Conditions for the Daphnid (*Ceriodaphnia dubia)*	
1. Test type:	Static renewal
2. Temperature:	25°C ± 1°C
3. Light quality:	Ambient laboratory illumination
4. Light intensity:	50 - 100 ft-c (ambient laboratory levels)
5. Photoperiod:	16 hours light, 8 hours darkness
6. Test chamber size:	30 mL
7. Test solution volume:	15 mL
8. Renewal of test solutions:	Daily
9. Age of test organisms:	Less than 24 hours old
10. No. of organisms per test chamber:	1
11. No. of replicate test chambers per concentration:	5
12. No. of organisms per test concentration:	5
13. Test vessel randomization:	Randomized
14. Feeding regimen:	Fed 0.1 ml of YCT and *Selenastrum capricornutum* algal suspension per test chamber daily
15. Aeration:	None
16. Dilution water:	Synthetic, Moderately Hard
17. Effluent concentrations:	0% and 100%
18. Test duration:	Until 60% of the organisms have had 3 broods (up to 8 days)
19. Endpoints:	Survival and reproduction
20. Test acceptability:	≥80% survival and an average of ≥15 young produced per surviving female in controls. CV% in control and critical dilutions ≤40% in tests not demonstrating significant lethality in the critical dilution.

Table B Summary of Effluent Toxicity Test Conditions for the Fathead Minnow (*Pimephales promelas)*	
1. Test type:	Static renewal
2. Temperature:	25°C ± 1°C
3. Light quality:	Ambient laboratory illumination
4. Light intensity:	50 - 100 ft-c (ambient laboratory levels)
5. Photoperiod:	16 hours light / 8 hours darkness
6. Test chamber size:	500 mL
7. Test solution volume:	250 mL
8. Renewal of test solutions:	Daily
9. Age of test organisms	Less than 24-hour old
10. No. of organisms per chamber:	5
11. No. of replicate test chambers per concentration:	2
12. No. of organisms per concentration:	10
13. Test vessel randomization:	Randomized
14. Feeding regimen:	Fed 0.2 ml newly hatched brine shrimp twice daily, 6 hrs between feedings. Larvae were not fed during the final 12 hours of the test.
15. Cleaning:	Siphoned daily, immediately before solution renewal.
16. Aeration:	None
17. Dilution water:	Synthetic, Moderately Hard
18. Effluent concentrations:	0% and 100%
19. Test duration:	7 days
20. Endpoints:	Survival and growth (weight)
21. Test acceptability:	≥80% survival in controls; average dry weight of surviving controls ≥0.25 mg. CV% of control and critical dilutions should not exceed 40% in tests not demonstrating significant lethality in the critical dilution.

Statement of Authorization

I certify that this study report was either prepared by me or under my direction. This study was conducted in accordance with Cove Standard Operating Procedures and Quality Manual. Any deviations have been noted accordingly. This report is accurate and complete and has been reviewed according to Cove quality assurance procedures.

Shannon Scott, Laboratory Director

Test results presented in this report relate only to the samples tested.

This test report shall not be reproduced except in full, without written approval of the laboratory.

Unless otherwise noted, toxicity testing was conducted at the Cove Aquatic Toxicity Laboratory located at: 3400 W. Lakeview Rd. Stillwater, OK 74075

EPA Laboratory ID: OK01095
Oklahoma Department of Environmental Quality Laboratory ID: 9961
Laboratory Certification: Arkansas #88-1578, Iowa #414, Kansas #E10412 (NELAC), New Jersey #OK007, Oklahoma #9961, Pennsylvania #68-05448, Texas #T104704537-22-9, Florida #E871177, Wisconsin #399154580

Attachment 5

Representative Safety Data Sheets

Document6

Safety Data Sheet
BARIUM CHLORIDE DIHYD

Version 1.0 Revision Date: 11/05/2022

SECTION 1. IDENTIFICATION

Product name : BARIUM CHLORIDE DIHYD

Synonyms : No data available

Restricted Uses : No data available

Manufacturer or supplier's details

Company : Univar Solutions Canada Ltd.
Address 64 Arrow Road
North York, ON, M9M 2L9
Canada

Emergency telephone number:
Local Emergency Contact : During Office hours Monday-Friday, 8.00 am - 4.30 pm (Pacific Standard Time) : 1-866-686-4827

Additional Information: : Responsible Party: Product Compliance Department
E-mail: SDSNA@univarsolutions.com
SDS Requests: 1-855-429-2661
Website: www.univarsolutions.com

SECTION 2. HAZARD IDENTIFICATION

Hazardous Classification of the substance or mixture

Acute toxicity (Oral) : Category 3

Acute toxicity (Inhalation) : Category 4

Label elements

Hazard pictograms :

Signal word : Danger

Hazard statements : H301 Toxic if swallowed.
H332 Harmful if inhaled.

Precautionary statements : **Prevention:**
P261 Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.
P264 Wash skin thoroughly after handling.
P270 Do not eat, drink or smoke when using this product.
P271 Use only outdoors or in a well-ventilated area.
Response:
P301 + P310 + P330 IF SWALLOWED: Immediately call a POISON CENTER/ doctor. Rinse mouth.
P304 + P340 + P312 IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/ doctor if you feel unwell.
Storage:
P405 Store locked up.

Disposal:
P501 Dispose of contents/ container to an approved waste disposal plant.

Other hazards
None known.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Hazardous components

CAS-No.	Chemical name	% by Weight	Synonyms
10326-27-9	Barium chloride, dihydrate	80 - 100	Barium chloride, dihydrate

Actual concentration or concentration range is withheld as a trade secret

SECTION 4. FIRST-AID MEASURES

General advice : Move out of dangerous area.
Consult a physician.
Show this safety data sheet to the doctor in attendance.
Symptoms of poisoning may appear several hours later.
Do not leave the victim unattended.

If inhaled : Consult a physician after significant exposure.
If unconscious, place in recovery position and seek medical advice.

In case of eye contact : Flush eyes with water as a precaution.
Remove contact lenses.
Protect unharmed eye.
Keep eye wide open while rinsing.
If eye irritation persists, consult a specialist.

If swallowed : Induce vomiting immediately and call a physician.
Keep respiratory tract clear.
Do not give milk or alcoholic beverages.
Never give anything by mouth to an unconscious person.
If symptoms persist, call a physician.
Take victim immediately to hospital.

SECTION 5. FIREFIGHTING MEASURES

Unsuitable extinguishing media : High volume water jet

Specific hazards during fire-fighting : Do not allow run-off from fire fighting to enter drains or water courses.

Hazardous combustion products : No hazardous combustion products are known

Further information : Collect contaminated fire extinguishing water separately. This must not be discharged into drains.
Fire residues and contaminated fire extinguishing water must

		be disposed of in accordance with local regulations.
Special protective equipment for firefighters	:	Wear self-contained breathing apparatus for firefighting if necessary.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures	:	Use personal protective equipment. Avoid dust formation. Avoid breathing dust. Ensure adequate ventilation.
Environmental precautions	:	Prevent product from entering drains. Prevent further leakage or spillage if safe to do so. If the product contaminates rivers and lakes or drains inform respective authorities.
Methods and materials for containment and cleaning up	:	Keep in suitable, closed containers for disposal.

SECTION 7. HANDLING AND STORAGE

Advice on protection against fire and explosion	:	Avoid dust formation. Provide appropriate exhaust ventilation at places where dust is formed.
Advice on safe handling	:	Avoid formation of respirable particles. Do not breathe vapours/dust. For personal protection see section 8. Smoking, eating and drinking should be prohibited in the application area. Provide sufficient air exchange and/or exhaust in work rooms. Dispose of rinse water in accordance with local and national regulations.
Conditions for safe storage	:	Prevent unauthorized access. Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage. Observe label precautions. Electrical installations / working materials must comply with the technological safety standards.

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Components with workplace control parameters

Contains no substances with occupational exposure limit values.

Personal protective equipment

Respiratory protection	:	No personal respiratory protective equipment normally required. In the case of dust or aerosol formation use respirator with an approved filter. Dust safety masks are recommended when the dust concentration is more than 10 mg/m3.

Hand protection

Remarks	:	The suitability for a specific workplace should be discussed with the producers of the protective gloves.
Eye protection	:	Eye wash bottle with pure water Tightly fitting safety goggles
Skin and body protection	:	Dust impervious protective suit Choose body protection according to the amount and concentration of the dangerous substance at the work place.
Hygiene measures	:	Avoid contact with skin, eyes and clothing. When using do not eat or drink. When using do not smoke. Wash hands before breaks and immediately after handling the product.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	:	solid
Colour	:	No data available
Odour	:	No data available
Odour Threshold	:	No data available
pH	:	No data available
Freezing Point	:	No data available
Boiling Point	:	No data available
Flash point	:	No data available
Evaporation rate	:	No data available
Flammability (solid, gas)	:	No data available
Upper explosion limit	:	No data available
Lower explosion limit	:	No data available
Vapour pressure	:	No data available
Relative vapour density	:	No data available
Relative density	:	No data available
Density	:	No data available
Water solubility	:	No data available
Solubility in other solvents	:	No data available
Partition coefficient: n-octanol/water	:	No data available
Auto-ignition temperature	:	No data available
Thermal decomposition	:	No data available

SECTION 10. STABILITY AND REACTIVITY

Reactivity	:	No decomposition if stored and applied as directed.
Chemical stability	:	No decomposition if stored and applied as directed.
Possibility of hazardous reactions	:	No decomposition if stored and applied as directed.
Conditions to avoid	:	No data available

Incompatible materials : Strong oxidizing agents

SECTION 11. TOXICOLOGICAL INFORMATION

Acute toxicity

Components:

10326-27-9:

Acute oral toxicity : Assessment: The component/mixture is toxic after single ingestion.

Acute inhalation toxicity : Assessment: The component/mixture is moderately toxic after short term inhalation.

ACGIH No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.

Further information

Product:

Remarks: No data available

SECTION 12. ECOLOGICAL INFORMATION

Ecotoxicity

No data available

Persistence and degradability

No data available

Bioaccumulative potential

No data available

Mobility in soil

No data available

Other adverse effects

Product:

Additional ecological information : No data available

SECTION 13. DISPOSAL CONSIDERATIONS

Disposal methods

Waste from residues	:	Do not dispose of waste into sewer. Do not contaminate ponds, waterways or ditches with chemical or used container. Send to a licensed waste management company.
Contaminated packaging	:	Empty remaining contents. Dispose of as unused product. Do not re-use empty containers.

SECTION 14. TRANSPORT INFORMATION

TDG (Transportation of Dangerous Goods):
UN1564, BARIUM COMPOUND, N.O.S., (Barium chloride, dihydrate), 6.1, III

IATA (International Air Transport Association):
UN1564, BARIUM COMPOUND, N.O.S., (Barium chloride, dihydrate) , 6.1, III

IMDG (International Maritime Dangerous Goods):
UN1564, BARIUM COMPOUND, N.O.S., (Barium chloride, dihydrate), 6.1, III

SECTION 15. REGULATORY INFORMATION

This product has been classified according to the hazard criteria of the Hazardous Products Regulations (HPR) and the SDS contains all of the information required by the HPR.

The components of this product are reported in the following inventories:

TSCA	:	On TSCA Inventory
DSL	:	All components of this product are on the Canadian DSL
AICS	:	not determined
NZIoC	:	not determined
ENCS	:	not determined
KECI	:	not determined
PICCS	:	not determined
IECSC	:	not determined

SECTION 16. OTHER INFORMATION

The information accumulated is based on the data of which we are aware and is believed to be correct as of the date hereof. Since this information may be applied under conditions beyond our control and with which we may be unfamiliar and since data made become available subsequently to the date hereof, we do not assume any responsibility for the results of its use. Recipients are advised to confirm in advance of need that the information is current, applicable, and suitable to their circumstances. This SDS has

been prepared by Univar Solutions EHS Product Compliance Department (1-855-429-2661) SDSNA@univarsolutions.com.

Revision Date : 11/05/2022

Material number:
16181420, 16175960, 16168317

Key or legend to abbreviations and acronyms used in the safety data sheet			
ACGIH	American Conference of Government Industrial Hygienists	LD50	Lethal Dose 50%
AICS	Australia, Inventory of Chemical Substances	LOAEL	Lowest Observed Adverse Effect Level
DSL	Canada, Domestic Substances List	NFPA	National Fire Protection Agency
NDSL	Canada, Non-Domestic Substances List	NIOSH	National Institute for Occupational Safety & Health
CNS	Central Nervous System	NTP	National Toxicology Program
CAS	Chemical Abstract Service	NZIoC	New Zealand Inventory of Chemicals
EC50	Effective Concentration	NOAEL	No Observable Adverse Effect Level
EC50	Effective Concentration 50%	NOEC	No Observed Effect Concentration
EGEST	EOSCA Generic Exposure Scenario Tool	OSHA	Occupational Safety & Health Administration
EOSCA	European Oilfield Specialty Chemicals Association	PEL	Permissible Exposure Limit
EINECS	European Inventory of Existing Chemical Substances	PICCS	Philippines Inventory of Commercial Chemical Substances
MAK	Germany Maximum Concentration Values	PRNT	Presumed Not Toxic
GHS	Globally Harmonized System	RCRA	Resource Conservation Recovery Act
>=	Greater Than or Equal To	STEL	Short-term Exposure Limit
IC50	Inhibition Concentration 50%	SARA	Superfund Amendments and Reauthorization Act.
IARC	International Agency for Research on Cancer	TLV	Threshold Limit Value
IECSC	Inventory of Existing Chemical Substances in China	TWA	Time Weighted Average
ENCS	Japan, Inventory of Existing and New Chemical Substances	TSCA	Toxic Substance Control Act
KECI	Korea, Existing Chemical Inventory	UVCB	Unknown or Variable Composition, Complex Reaction Products, and Biological Materials
<=	Less Than or Equal To	WHMIS	Workplace Hazardous Materials Information System
LC50		Lethal Concentration 50%	

Safety Data Sheet
PIX 312 FERRIC SULPHATE

Version 1.2 Revision Date: 11/05/2022

SECTION 1. IDENTIFICATION

Product name : PIX 312 FERRIC SULPHATE

Synonyms : No data available

Recommended use of the chemical and restrictions on use

Recommended use : Water treatment

Restricted Uses : No data available

Manufacturer or supplier's details

Company : Univar Solutions Canada Ltd.
Address 64 Arrow Road
North York, ON, M9M 2L9
Canada

Emergency telephone number:
Local Emergency Contact : During Office hours Monday-Friday, 8.00 am - 4.30 pm (Pacific Standard Time) : 1-866-686-4827

Additional Information: : Responsible Party: Product Compliance Department
E-mail: SDSNA@univarsolutions.com
SDS Requests: 1-855-429-2661
Website: www.univarsolutions.com

SECTION 2. HAZARD IDENTIFICATION

Hazardous Classification of the substance or mixture

Corrosive to metals : Category 1

Acute toxicity (Oral) : Category 4

Skin irritation : Category 2

Serious eye damage : Category 1

Label elements

Hazard pictograms :

Signal word : Danger

Hazard statements : H290 May be corrosive to metals.
H302 Harmful if swallowed.
H315 Causes skin irritation.
H318 Causes serious eye damage.

Precautionary statements : **Prevention:**
P234 Keep only in original packaging.
P264 Wash skin thoroughly after handling.
P270 Do not eat, drink or smoke when using this product.

P280 Wear protective gloves/ eye protection/ face protection.
Response:
P301 + P312 + P330 IF SWALLOWED: Call a POISON CENTER/ doctor if you feel unwell. Rinse mouth.
P302 + P352 IF ON SKIN: Wash with plenty of water.
P305 + P351 + P338 + P310 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER/ doctor.
P332 + P313 If skin irritation occurs: Get medical advice/ attention.
P362 + P364 Take off contaminated clothing and wash it before reuse.
P390 Absorb spillage to prevent material damage.
Disposal:
P501 Dispose of contents/ container to an approved waste disposal plant.

Other hazards

None known.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Substance / Mixture : Mixture

Hazardous components

CAS-No.	Chemical name	% by Weight	Synonyms
10028-22-5	Iron (III) sulfate	30 - 60	diiron tris(sulphate)

Actual concentration or concentration range is withheld as a trade secret

SECTION 4. FIRST-AID MEASURES

General advice : Move out of dangerous area.
Consult a physician.
Show this safety data sheet to the doctor in attendance.
Do not leave the victim unattended.

If inhaled : If unconscious, place in recovery position and seek medical advice.
If symptoms persist, call a physician.

In case of skin contact : Immediate medical treatment is necessary as untreated wounds from corrosion of the skin heal slowly and with difficulty.
If on skin, rinse well with water.
If on clothes, remove clothes.

In case of eye contact : Small amounts splashed into eyes can cause irreversible tissue damage and blindness.
In the case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
Continue rinsing eyes during transport to hospital.
Remove contact lenses.

		Protect unharmed eye. Keep eye wide open while rinsing. If eye irritation persists, consult a specialist. Take victim immediately to hospital.
If swallowed	:	Keep respiratory tract clear. Do NOT induce vomiting. Do not give milk or alcoholic beverages. Never give anything by mouth to an unconscious person. If symptoms persist, call a physician. Take victim immediately to hospital.

SECTION 5. FIREFIGHTING MEASURES

Suitable extinguishing media	:	Carbon dioxide (CO2) Foam Dry powder Water mist
Unsuitable extinguishing media	:	High volume water jet
Specific hazards during fire-fighting	:	Do not allow run-off from fire fighting to enter drains or water courses.
Hazardous combustion products	:	sulfur oxides
Further information	:	Collect contaminated fire extinguishing water separately. This must not be discharged into drains. Fire residues and contaminated fire extinguishing water must be disposed of in accordance with local regulations.
Special protective equipment for firefighters	:	Wear self-contained breathing apparatus for firefighting if necessary.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures	:	Use personal protective equipment.
Environmental precautions	:	Prevent product from entering drains. Prevent further leakage or spillage if safe to do so. If the product contaminates rivers and lakes or drains inform respective authorities.
Methods and materials for containment and cleaning up	:	Neutralize with chalk, alkali solution or ammonia. Soak up with inert absorbent material (e.g. sand, silica gel, acid binder, universal binder, sawdust). Keep in suitable, closed containers for disposal.

SECTION 7. HANDLING AND STORAGE

Advice on protection against fire and explosion	:	Normal measures for preventive fire protection.

Advice on safe handling	:	Do not breathe vapours/dust. Avoid exposure - obtain special instructions before use. Avoid contact with skin and eyes. For personal protection see section 8. Smoking, eating and drinking should be prohibited in the application area. To avoid spills during handling keep bottle on a metal tray. Dispose of rinse water in accordance with local and national regulations. Persons susceptible to skin sensitisation problems or asthma, allergies, chronic or recurrent respiratory disease should not be employed in any process in which this mixture is being used.
Conditions for safe storage	:	Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage. Observe label precautions. Electrical installations / working materials must comply with the technological safety standards.
Materials to avoid	:	Do not store near acids.

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Components with workplace control parameters

CAS-No.	Components	Value type (Form of exposure)	Control parameters / Permissible concentration	Basis
10028-22-5	Iron (III) sulfate	TWA	1 mg/m3 (Iron)	CA AB OEL
		TWAEV	1 mg/m3 (Iron)	CA QC OEL
		TWA	1 mg/m3 (Iron)	CA BC OEL
		STEL	2 mg/m3 (Iron)	CA BC OEL

Personal protective equipment

Hand protection

Remarks	:	The suitability for a specific workplace should be discussed with the producers of the protective gloves.
Eye protection	:	Eye wash bottle with pure water Tightly fitting safety goggles Wear face-shield and protective suit for abnormal processing problems.
Skin and body protection	:	Impervious clothing Choose body protection according to the amount and concentration of the dangerous substance at the work place.
Hygiene measures	:	When using do not eat or drink. When using do not smoke. Wash hands before breaks and at the end of workday.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	:	liquid
Colour	:	red, brown
Odour	:	Acidic
Odour Threshold	:	No data available
pH	:	< 2
Freezing Point	:	No data available
Boiling Point	:	No data available
Flash point	:	does not flash
Evaporation rate	:	No data available
Flammability (solid, gas)	:	No data available
Upper explosion limit	:	No data available
Lower explosion limit	:	No data available
Vapour pressure	:	No data available
Relative vapour density	:	No data available
Relative density	:	No data available
Density	:	No data available
Water solubility	:	No data available
Solubility in other solvents	:	No data available
Partition coefficient: n-octanol/water	:	No data available
Auto-ignition temperature	:	No data available
Thermal decomposition	:	No data available

SECTION 10. STABILITY AND REACTIVITY

Reactivity	:	No dangerous reaction known under conditions of normal use.
Chemical stability	:	Stable under normal conditions.
Possibility of hazardous reactions	:	No hazards to be specially mentioned.
Conditions to avoid	:	Keep away from heat, flame, sparks and other ignition sources.
Incompatible materials	:	Bases galvanized metals Oxidizing agents

SECTION 11. TOXICOLOGICAL INFORMATION

Acute toxicity

Components:

10028-22-5:

Acute oral toxicity	:	LD50 (Rat, female): 500 mg/kg

Test substance: Information given is based on data obtained from similar substances.
Assessment: The component/mixture is moderately toxic after single ingestion.

Skin corrosion/irritation

Components:
10028-22-5:
Species: Rabbit
Result: Irritating to skin.

Serious eye damage/eye irritation

Components:
10028-22-5:
Species: Rabbit
Result: Risk of serious damage to eyes.

Respiratory or skin sensitisation

Components:
10028-22-5:
Test Type: Maximization test
Species: Guinea pig
Result: May cause sensitisation by skin contact.

ACGIH No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.

Further information

Product:
Remarks: No data available

SECTION 12. ECOLOGICAL INFORMATION

Ecotoxicity
No data available

Persistence and degradability
No data available

Bioaccumulative potential
No data available

Mobility in soil
No data available

Other adverse effects

Product:

Additional ecological information : No data available

SECTION 13. DISPOSAL CONSIDERATIONS

Disposal methods

Waste from residues : Do not dispose of waste into sewer.
Do not contaminate ponds, waterways or ditches with chemical or used container.
Send to a licensed waste management company.
Dispose of in accordance with all applicable local, state and federal regulations.
For assistance with your waste management needs - including disposal, recycling and waste stream reduction, contact Univar Solutions ChemCare: 1-800-637-7922

Contaminated packaging : Empty remaining contents.
Dispose of as unused product.
Do not re-use empty containers.

SECTION 14. TRANSPORT INFORMATION

TDG (Transportation of Dangerous Goods):
UN3264, CORROSIVE LIQUID, ACIDIC, INORGANIC, N.O.S., (DIIRON TRIS(SULPHATE)), 8, III

IATA (International Air Transport Association):
UN3264, Corrosive liquid, acidic, inorganic, n.o.s., (DIIRON TRIS(SULPHATE)) , 8, III

IMDG (International Maritime Dangerous Goods):
UN3264, CORROSIVE LIQUID, ACIDIC, INORGANIC, N.O.S., (DIIRON TRIS(SULPHATE)), 8, III

SECTION 15. REGULATORY INFORMATION

This product has been classified according to the hazard criteria of the Hazardous Products Regulations (HPR) and the SDS contains all of the information required by the HPR.

NPRI Components : 7664-93-9

The components of this product are reported in the following inventories:

TSCA : On TSCA Inventory

DSL : All components of this product are on the Canadian DSL

AICS : On the inventory, or in compliance with the inventory

NZIoC : On the inventory, or in compliance with the inventory

ENCS	:	On the inventory, or in compliance with the inventory
KECI	:	On the inventory, or in compliance with the inventory
PICCS	:	On the inventory, or in compliance with the inventory
IECSC	:	On the inventory, or in compliance with the inventory

SECTION 16. OTHER INFORMATION

The information accumulated is based on the data of which we are aware and is believed to be correct as of the date hereof. Since this information may be applied under conditions beyond our control and with which we may be unfamiliar and since data made become available subsequently to the date hereof, we do not assume any responsibility for the results of its use. Recipients are advised to confirm in advance of need that the information is current, applicable, and suitable to their circumstances. This SDS has been prepared by Univar Solutions EHS Product Compliance Department (1-855-429-2661) SDSNA@univarsolutions.com.

Revision Date : 11/05/2022

Material number:
16192948, 16175874, 16176961, 16168946

Key or legend to abbreviations and acronyms used in the safety data sheet			
ACGIH	American Conference of Government Industrial Hygienists	LD50	Lethal Dose 50%
AICS	Australia, Inventory of Chemical Substances	LOAEL	Lowest Observed Adverse Effect Level
DSL	Canada, Domestic Substances List	NFPA	National Fire Protection Agency
NDSL	Canada, Non-Domestic Substances List	NIOSH	National Institute for Occupational Safety & Health
CNS	Central Nervous System	NTP	National Toxicology Program
CAS	Chemical Abstract Service	NZIoC	New Zealand Inventory of Chemicals
EC50	Effective Concentration	NOAEL	No Observable Adverse Effect Level
EC50	Effective Concentration 50%	NOEC	No Observed Effect Concentration
EGEST	EOSCA Generic Exposure Scenario Tool	OSHA	Occupational Safety & Health Administration
EOSCA	European Oilfield Specialty Chemicals Association	PEL	Permissible Exposure Limit
EINECS	European Inventory of Existing Chemical Substances	PICCS	Philippines Inventory of Commercial Chemical Substances
MAK	Germany Maximum Concentration Values	PRNT	Presumed Not Toxic
GHS	Globally Harmonized System	RCRA	Resource Conservation Recovery Act
>=	Greater Than or Equal To	STEL	Short-term Exposure Limit
IC50	Inhibition Concentration 50%	SARA	Superfund Amendments and Reauthorization Act.
IARC	International Agency for Research on Cancer	TLV	Threshold Limit Value

IECSC	Inventory of Existing Chemical Substances in China	TWA	Time Weighted Average
ENCS	Japan, Inventory of Existing and New Chemical Substances	TSCA	Toxic Substance Control Act
KECI	Korea, Existing Chemical Inventory	UVCB	Unknown or Variable Composition, Complex Reaction Products, and Biological Materials
<=	Less Than or Equal To	WHMIS	Workplace Hazardous Materials Information System
LC50		Lethal Concentration 50%	

Sierra Chemical Co.

Material Safety Data Sheet

This MSDS has been prepared within the guidelines of the Federal OSHA Hazard Communication Standard, 29CFR 1910.1200.

Product Name: Hydrochloric Acid – 17 to 39%

I. GENERAL INFORMATION

Supplier: Sierra Chemical Co.
Address: 2302 Larkin Cr.
Sparks, NV 89431

Emergency Phone: (800) 424-9300
Information Phone: (775) 358-0888
CHEMTREC Phone: (800) 424-9300

Issue Date: 03/18/2010

II. PRODUCT INGREDIENTS

Product Name: Hydrochloric Acid, HCl (17 to 39%)

General or Generic Identification: Inorganic Acid, Muriatic Acid, Dilute Hydrochloric Acid

Chemical Formula: HCl

Hazardous Components

Ingredient	Baume Degree	% by Weight	Ceiling Pel	Ceiling TLV
Hydrogen Chloride	11.4 to 23°	17 to 39%	5PPM / 7MG/M³	5PPM / 7MG/M³
Water	N/A	61 to 83%	N/A	N/A

III. HAZARDOUS HEALTH DATA

PRINCIPLE HEALTH HAZARDS, INCLUDING SIGNIFICANT ROUTES, EFFECTS, SYMPTOMS OF OVEREXPOSURE, AND MEDICAL CONDITIONS AGGRAVATED BY EXPOSURES MAY BE:

Eye: Rapidly causes severe burns, possibly with permanent impairment of vision.

Skin Contact: Rapidly causes severe burns.

Skin Absorption: Not likely to be absorbed in toxic amounts.

Inhalation: OSHA 8 hour “TWA” and ACGIH “TLV” = 5 PPM (7MG/M³). These are also ceiling limits.

Ingestion: The greatest hazard is the corrosive action.

Carcinogenicity: Not listed as carcinogen by IARC, NTF, OSHA or ACGIH

IV. FIRST AID

Eye Contact: Immediately flush with clean water, holding eyelids open for fifteen (15) minutes. Call a physician. Do not use chemical antidotes. Speed is essential.

Skin Contact: Immediately flush exposed area with water for fifteen (15) minutes. Remove all contaminated clothing (do not reuse until laundered). Seek medical evaluation. Keep affected area cool.

Inhalation: Immediately remove to fresh air. Call a physician. If breathing is difficult, give oxygen (6 liters per minute). If breathing has stopped, give artificial respiration.

Ingestion: DO NOT INDUCE VOMITING. Give large quantities of water. Call a physician immediately. Keep warm. Never give anything by mouth to an unconscious person.

V. FIRE AND EXPLOSION HAZARD DATA

Flash point: N/A (Will not burn)

Explosive Limits
Upper: N/A
Lower: N/A

Extinguishing media: Water fog, CO_2, Dry Chemical, or as appropriate for combustibles in area.

Hazardous Thermal Decomposition Products: May form toxic materials; hydrogen chloride, acid vapors.

Unusual Fire and Explosion Hazards: Reacts with most metals to produce potentially explosive hydrogen gas. Explosive concentrations of hydrogen may accumulate inside metal equipment.

Special Fire Fighting Procedures: Use water spray to cool containers and control vapors. Run-off from fire control may cause pollution. Wear self-contained breathing apparatus with a full face-piece operated in pressure-demand or other positive pressure mode and full body protection (see section 8 for more information on personal protective equipment) clothing when fighting fires.

VI. SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED

REPORTABLE QUANTITY (RQ): 5,000 lb (100% Basis) APPROX. 1,300 GALLONS

Small spills: Cover the contaminated surface with Sodium Bicarbonate, Soda Ash or Lime. Mix and add water if necessary to form a slurry. Scoop up slurry and wash site with Sodium Bicarbonate solution.

Large spills: Evacuate persons from area that are not equipped with proper protective equipment (see

section 8). Stay upwind of any spill. Stop leak at source. Dike to prevent spreading. Pump to non-metallic salvage truck / tank.

VII. SAFE HANDLING AND STORAGE

- Do not get in eyes, on skin or clothing
- Avoid breathing vapors
- Wash thoroughly with soap and water after handling
- Wear all recommended protective equipment when handling
- Keep containers tightly closed
- Keep away from heat, sparks and flame
- Keep in cool place
- Do not store or mix with cyanides, amines, sulfides, oxidizers or formaldehyde
- Protect containers from mechanical damage

VIII. PERSONAL PROTECTION DATA

Ventilation: If possible, provide sufficient mechanical (general and/or local exhaust) ventilation to maintain exposure below exposure limits.

Respiratory protection: For exposure levels greater than 5PPM but no more than 50PPM use a NIOSH approved respirator for Hydrogen Chloride gas, or Hydrogen Chloride mists in order to maintain exposure levels below exposure limits. For gas concentration greater than 50PPM, use supplied air, full face-piece respirator or self-contained breathing apparatus.

Protective gloves: Wear acid resistant gloves such as; rubber or neoprene polyvinyl chloride.

Eye protection: Chemical splash goggles as a minimum. Face shield use is also advisable.

Other protective equipment: Rubber or plastic aprons, coats, shoes, hard hat with brim. Long sleeve wool, polyester, or acrylic clothing as a minimum. In case of emergency, or where there is a possibility of considerable exposure. Wear complete acid suit with hood and forced air or self-contained breathing apparatus.

IX. PHYSICAL AND CHEMICAL PROPERTIES

Property	Refinement	Value				
		17%	25%	31.5%	35.2%	38.5%
Initial Boiling Point	Water=212°F	221°F	219°F	183°	144°F	106°F
Vapor Pressure	760 MM Hg @ 20°C	0.1MM	2MM	20MM	84MM	260MM
Freezing Point	Water=32°F	-40°F	-122°F	-49°F	-29°F	-18°F
Specific Gravity	Water=1.0	1.085	1.13	1.16	1.18	1.20
Evaporation Rate	Butyl Acetate=1			>1		
Solubility in Cold Water				45%		

Description: Colorless to yellow, acrid, pungent liquid

X. REACTIVITY DATA

Stability: Stable

Incompatibility: Materials to avoid; most metals, bases,alkalis, metallis oxides, amines, carbonates, sulfides,strong oxidizers and hypochlorite solution.

- Reacts with metals to give hydrogen gas
- Reacts with oxidizers to give chlorine gas
- Reacts with cyanides to give hydrogen cyanide gas
- Reacts with sulfides to give hydrogen sulfide gas
- Reacts with formaldehyde to give bischloromethyl ether (an OSHA regulated carcinogen)
- Reacts with amines to form ammonia
- Reacts with carbonates to form carbon dioxide

Hazardous Polymerization: Will not occur

XI. TOXICOLOGICAL INFORMATION

Notes to Physician

Eyes

Liquid: Conjuctival edema and corneal destruction that may cause blindness. Pain, tearing and photophobia.

Vapor: Eye irritant. May cause permanent eyesight damage.

Skin: Sever pain with burns and possible ulceration. Usually penetrates the full thickness of the skin. Significant skin permeation and systemic toxicity after contact appears unlikely.

Inhalation: Can completely destroy mucous membranes. Can cause choking, coughing, headache, dizziness. Pulmonary edema may follow after several hours (24-48 hours). Fatality may occur from gross overexposure, particularly in individuals with pre-existing lung diseases.

Ingestion: Severe burning of the mouth, pharynx, abdomen, corrosion of upper gastro-intestinal tract, followed by vomiting. Dental erosions, weakness from falling blood pressure. Asphyxia may occur from edema of the glottis.

Target Organs: Respiratory system, eyes and skin.

XII. ECOLOGICAL INFORMATION

Animal Test Data

1. LC_{50} (RAT): 3124 PPM/1 HOURS @ 100% HCl
2. LD_{50} (RABBIT): 900 mg/kg 100% HCl

3. AQUATIC TOXICITY: Hydrochloric Acid is slightly toxic (96 hour LC50 = 50 – 500 mg/liter). The 96 hour LC50 in Mosquito Fish is 282 mg/liter

XIII. DISPOSAL CONSIDERATIONS

Waste disposal methods: Comply with all federal, state and local regulations.

XIV. TRANSPORTATION INFORMATION

Hazard Classification (DOT): Corrosive

Proper D.O.T. Shipping name: Hydrochloric Acid, 8, UN 1789, PGII

D.O.T. Code Number: 49-302-28

Standard Transportation Commodity Code (STTC): 28-194-50

XV. REGULATORY INFORMATION

CAS Number: 7647-01-0

NIOSH Registry No.: MW 4025000

Other Registries: ANABSTR, APILIT, APILIT2, APIPAT, APIPAT2, BEILSTEIN, BIOBUSINESS, BIOSIS, CA, CAOLD, CAPREVIEWS, CASREACT, CEN, CHEMINFORMRX, CHEMLIST, CBNB, CIN, CJACS, CSCHEM, CSNB, DETHERM, DIPPR, DSL, EINECS, EMBASE, GMELIN, HSDS, IFICDB, IFIPAT, IFIUDB, IPA, JANAF, MEDLINE, MRCK, MSDS-PEST, MSDS-SUM, PDLCOM, PIRA, PNI, PROMT, RTECS, TOXLINE, TOXLIT, TRCTHERMO, TSCA, USAN, VTB.

OSHA Hazard Communications Health Hazard Classification: Corrosive

Sara Title III Hazard Category: This product is a toxic chemical subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR Part 372.

Hazardous Materials Identification System (HMIS) Rating:

Health	Flammability	Reactivity	Protective Equipment
3	0	0	X

National Fire Protection Association (NFPA) Rating:

Health	Flammability	Reactivity	Special Notice
3	0	0	None

XVI. MISCELLANEOUS INFORMATION

Disclaimer

Sierra Chemical Co. expressly disclaims all express or implied warranties of merchantibility and fitness for a particular purpose with respect to the product or information provided herein, and shall under no circumstances be liable for incidental or consequential damages.

Do not use ingredient information and/or ingredient percentages in this MSDS as a product specification. For product specification information, refer to a Product Specification Sheet and/or a Certificate of Analysis. These can be obtained from your local Sierra Chemical Co. Sales Office.

All information appearing herein is based upon data obtained from the manufacturer and/or recognized technical sources. While the information is believed to be accurate, Sierra Chemical Co. makes no representations as to its accuracy or sufficiency. Conditions of use are beyond Sierra Chemical's control. Therefore, users are responsible to verify this data under their own operating conditions to determine whether the product is suitable for their particular purposes, and they assume all risks of their use, handling, and disposal of the product or from the publication or use of, or reliance upon, information contained herein. This information relates only to the product designated herein and does not relate to its use in combination with any other material or in any other process.

Safety Data Sheet
CAUSTIC SODA 25%

Version 1.4 Revision Date: 01/10/2024

SECTION 1. IDENTIFICATION

Product name : CAUSTIC SODA 25%

Synonyms : Sodium Hydroxide

Recommended use of the chemical and restrictions on use

Recommended use : Reserved for industrial and professional use.

Restricted Uses : None known.

Manufacturer or supplier's details

Company : Univar Solutions Canada Ltd.
Address 64 Arrow Road
North York, ON, M9M 2L9
Canada

Emergency telephone number:
Local Emergency Contact : During Office hours Monday-Friday, 8.00 am - 4.30 pm (Pacific Standard Time) : 1-866-686-4827

Additional Information: : Responsible Party: Product Compliance Department
E-mail: SDSNA@univarsolutions.com
SDS Requests: 1-855-429-2661
Website: www.univarsolutions.com

SECTION 2. HAZARD IDENTIFICATION

Hazardous Classification of the substance or mixture

Corrosive to metals : Category 1

Skin corrosion : Category 1A

Serious eye damage : Category 1

Label elements

Hazard pictograms :

Signal word : Danger

Hazard statements : H290 May be corrosive to metals.
H314 Causes severe skin burns and eye damage.

Precautionary statements : **Prevention:**
P234 Keep only in original packaging.
P264 Wash skin thoroughly after handling.
P280 Wear protective gloves/ protective clothing/ eye protection/ face protection.
Response:
P301 + P330 + P331 IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.

P303 + P361 + P353 IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water.
P304 + P340 + P310 IF INHALED: Remove person to fresh air and keep comfortable for breathing. Immediately call a POISON CENTER/ doctor.
P305 + P351 + P338 + P310 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER/ doctor.
P363 Wash contaminated clothing before reuse.
P390 Absorb spillage to prevent material damage.
Storage:
P405 Store locked up.
Disposal:
P501 Dispose of contents/ container to an approved waste disposal plant.

Other hazards

None known.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Substance / Mixture : Mixture

Hazardous components

CAS-No.	Chemical name	% by Weight	Synonyms
1310-73-2	Sodium hydroxide	10 - 30	Sodium hydroxide

Actual concentration or concentration range is withheld as a trade secret

SECTION 4. FIRST-AID MEASURES

General advice : Move out of dangerous area.
Consult a physician.
Show this safety data sheet to the doctor in attendance.
Do not leave the victim unattended.

If inhaled : If unconscious, place in recovery position and seek medical advice.
If symptoms persist, call a physician.

In case of skin contact : Immediate medical treatment is necessary as untreated wounds from corrosion of the skin heal slowly and with difficulty.
If on skin, rinse well with water.
If on clothes, remove clothes.

In case of eye contact : Small amounts splashed into eyes can cause irreversible tissue damage and blindness.
In the case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
Continue rinsing eyes during transport to hospital.
Remove contact lenses.
Protect unharmed eye.
Keep eye wide open while rinsing.

		If eye irritation persists, consult a specialist. Take victim immediately to hospital.
If swallowed	:	Keep respiratory tract clear. Do not induce vomiting without medical advice. Do not give milk or alcoholic beverages. Never give anything by mouth to an unconscious person. If symptoms persist, call a physician. Take victim immediately to hospital.

SECTION 5. FIREFIGHTING MEASURES

Suitable extinguishing media	:	Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.
Unsuitable extinguishing media	:	High volume water jet
Specific hazards during firefighting	:	Do not allow run-off from fire fighting to enter drains or water courses.
Hazardous combustion products	:	No hazardous combustion products are known
Further information	:	Collect contaminated fire extinguishing water separately. This must not be discharged into drains. Fire residues and contaminated fire extinguishing water must be disposed of in accordance with local regulations.
Special protective equipment for firefighters	:	Wear self-contained breathing apparatus for firefighting if necessary.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures	:	Use personal protective equipment.
Environmental precautions	:	Prevent product from entering drains. Prevent further leakage or spillage if safe to do so. If the product contaminates rivers and lakes or drains inform respective authorities.
Methods and materials for containment and cleaning up	:	Neutralise with acid. Soak up with inert absorbent material (e.g. sand, silica gel, acid binder, universal binder, sawdust). Keep in suitable, closed containers for disposal.

SECTION 7. HANDLING AND STORAGE

Advice on protection against fire and explosion	:	Normal measures for preventive fire protection.
Advice on safe handling	:	Do not breathe vapours/dust. Avoid contact with skin and eyes. For personal protection see section 8.

		Smoking, eating and drinking should be prohibited in the application area. To avoid spills during handling keep bottle on a metal tray. Dispose of rinse water in accordance with local and national regulations.
Conditions for safe storage	:	Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage. Observe label precautions. Electrical installations / working materials must comply with the technological safety standards.
Recommended storage temperature	:	> 10 °C

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Components with workplace control parameters

CAS-No.	Components	Value type (Form of exposure)	Control parameters / Permissible concentration	Basis
1310-73-2	Sodium hydroxide	(c)	2 mg/m3	CA AB OEL
		C	2 mg/m3	CA BC OEL
		C	2 mg/m3	CA QC OEL

Personal protective equipment

Hand protection

Remarks	:	The suitability for a specific workplace should be discussed with the producers of the protective gloves.
Eye protection	:	Eye wash bottle with pure water Tightly fitting safety goggles Wear face-shield and protective suit for abnormal processing problems.
Skin and body protection	:	Impervious clothing Choose body protection according to the amount and concentration of the dangerous substance at the work place.
Hygiene measures	:	When using do not eat or drink. When using do not smoke. Wash hands before breaks and at the end of workday.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	:	liquid
Colour	:	colourless
Odour	:	odourless
Odour Threshold	:	No data available
pH	:	14 @ 20 - 25 °C (68 - 77 °F)
Freezing Point (Freezing Point)	:	-18 °C (-0.40 °F)

Boiling Point	:	No data available
Flash point	:	94 °C (201 °F) No data available
Evaporation rate	:	No data available
Flammability (solid, gas)	:	No data available
Upper explosion limit	:	No data available
Lower explosion limit	:	No data available
Vapour pressure	:	No data available
Relative vapour density	:	No data available
Relative density	:	1.27 - 1.28 @ 20 - 25 °C (68 - 77 °F) Reference substance: (water = 1)
Density	:	No data available
Water solubility	:	No data available
Solubility in other solvents	:	No data available
Partition coefficient: n-octanol/water	:	No data available
Auto-ignition temperature	:	No data available
Thermal decomposition	:	No data available

SECTION 10. STABILITY AND REACTIVITY

Reactivity	:	No dangerous reaction known under conditions of normal use.
Chemical stability	:	Stable under normal conditions.
Possibility of hazardous reactions	:	No decomposition if stored and applied as directed.
Conditions to avoid	:	Keep away from heat, flame, sparks and other ignition sources.
Incompatible materials	:	Acids Halogenated compounds Metals organic nitro compounds Zinc

SECTION 11. TOXICOLOGICAL INFORMATION

Skin corrosion/irritation

Components:

1310-73-2:
Species: Rabbit
Result: Causes severe burns.

Serious eye damage/eye irritation

Components:

1310-73-2:
Species: Rabbit
Result: Risk of serious damage to eyes.

ACGIH	No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.

Further information

Product:
Remarks: No data available

SECTION 12. ECOLOGICAL INFORMATION

Ecotoxicity
No data available

Persistence and degradability
No data available

Bioaccumulative potential
No data available

Mobility in soil
No data available

Other adverse effects

Product:

Additional ecological information	:	No data available

SECTION 13. DISPOSAL CONSIDERATIONS

Disposal methods

Waste from residues	:	Dispose of in accordance with all applicable local, state and federal regulations. For assistance with your waste management needs - including disposal, recycling and waste stream reduction, contact Univar Solutions ChemCare: 1-800-637-7922 Dispose of in accordance with all applicable local, state and federal regulations. For assistance with your waste management needs - including disposal, recycling and waste stream reduction, contact Univar Solutions ChemCare: 1-800-637-7922
Contaminated packaging	:	Empty remaining contents.

Dispose of as unused product.
Do not re-use empty containers.

SECTION 14. TRANSPORT INFORMATION

TDG (Transportation of Dangerous Goods):
UN1824, SODIUM HYDROXIDE SOLUTION, 8, II

IATA (International Air Transport Association):
UN1824, Sodium hydroxide solution, 8, II

IMDG (International Maritime Dangerous Goods):
UN1824, SODIUM HYDROXIDE SOLUTION, 8, II, Flash Point:94 °C(201 °F)

SECTION 15. REGULATORY INFORMATION

This product has been classified according to the hazard criteria of the Hazardous Products Regulations (HPR) and the SDS contains all of the information required by the HPR.

The components of this product are reported in the following inventories:

TSCA	:	Listed on TSCA
DSL	:	All components of this product are on the Canadian DSL
AICS	:	On the inventory, or in compliance with the inventory
NZIoC	:	On the inventory, or in compliance with the inventory
ENCS	:	Not in compliance with the inventory
KECI	:	On the inventory, or in compliance with the inventory
PICCS	:	On the inventory, or in compliance with the inventory
IECSC	:	On the inventory, or in compliance with the inventory

SECTION 16. OTHER INFORMATION

The information accumulated is based on the data of which we are aware and is believed to be correct as of the date hereof. Since this information may be applied under conditions beyond our control and with which we may be unfamiliar and since data made become available subsequently to the date hereof, we do not assume any responsibility for the results of its use. Recipients are advised to confirm in advance of need that the information is current, applicable, and suitable to their circumstances. This SDS has been prepared by Univar Solutions EHS Product Compliance Department (1-855-429-2661) SDSNA@univarsolutions.com.

Revision Date : 01/10/2024

Material number:
16212546, 16212036, 16209256, 16197210, 16206616, 16206171, 16181533, 16192173, 16192016, 16132255, 16158399, 16146684, 16182270, 16148128, 16162026, 16188797, 16145004, 16188640, 16163721, 16162553, 16147855, 16151729, 16147016, 16002081, 16002153, 16163814, 16181444, 16185708, 16185366, 16178437, 16176600, 16176259, 16175654, 16175444, 16175415, 16174721, 16176744, 16170086, 16169860, 16169683, 16146335, 16146334, 16143884, 16145401, 16145323, 16145278, 16145243, 16145242, 16125921, 16116103, 16113730, 755848, 650799, 546389, 70561, 53072, 574261, 53570, 16150734, 16149350, 16149457, 16144981, 16145777, 16147137, 16163653, 102698, 16160832, 16137556, 16137474, 16137324, 16152197, 16158393, 16152426, 16144481, 16147885, 16159715, 16143521, 16160487, 16160771, 16160572, 16160486, 16147888, 16147884, 16147854, 16147799, 16148872, 16144724, 16144461, 16148802, 16152705, 16136108, 16135793, 16135298, 16143511, 16143409, 16143472, 16143461, 16143389, 16142429, 16140693

Key or legend to abbreviations and acronyms used in the safety data sheet			
ACGIH	American Conference of Government Industrial Hygienists	LD50	Lethal Dose 50%
AICS	Australia, Inventory of Chemical Substances	LOAEL	Lowest Observed Adverse Effect Level
DSL	Canada, Domestic Substances List	NFPA	National Fire Protection Agency
NDSL	Canada, Non-Domestic Substances List	NIOSH	National Institute for Occupational Safety & Health
CNS	Central Nervous System	NTP	National Toxicology Program
CAS	Chemical Abstract Service	NZIoC	New Zealand Inventory of Chemicals
EC50	Effective Concentration	NOAEL	No Observable Adverse Effect Level
EC50	Effective Concentration 50%	NOEC	No Observed Effect Concentration
EGEST	EOSCA Generic Exposure Scenario Tool	OSHA	Occupational Safety & Health Administration
EOSCA	European Oilfield Specialty Chemicals Association	PEL	Permissible Exposure Limit
EINECS	European Inventory of Existing Chemical Substances	PICCS	Philippines Inventory of Commercial Chemical Substances
MAK	Germany Maximum Concentration Values	PRNT	Presumed Not Toxic
GHS	Globally Harmonized System	RCRA	Resource Conservation Recovery Act
>=	Greater Than or Equal To	STEL	Short-term Exposure Limit
IC50	Inhibition Concentration 50%	SARA	Superfund Amendments and Reauthorization Act.
IARC	International Agency for Research on Cancer	TLV	Threshold Limit Value
IECSC	Inventory of Existing Chemical Substances in China	TWA	Time Weighted Average
ENCS	Japan, Inventory of Existing and New Chemical Substances	TSCA	Toxic Substance Control Act
KECI	Korea, Existing Chemical Inventory	UVCB	Unknown or Variable Composition, Complex Reaction Products, and Biological Materials
<=	Less Than or Equal To	WHMIS	Workplace Hazardous Materials Information System

LC50	Lethal Concentration 50%

Appendix L

CDHPE 2015 Discharge Permit

COLORADO
Department of Public
Health & Environment

Dedicated to protecting and improving the health and environment of the people of Colorado

Stephen Antony, Pres
Energy Fuels Resources Corp
225 Union Blvd Ste 600
Lakewood, CO 80228

TO: Energy Fuels Resources Corp

FROM: WQCD Permits Section 303-692-3517

DATE: February 12, 2015

RE: **Amendment of Permit, Colorado Wastewater Discharge Permit System**
Permit No., CO0047562

Attachments:
Modification 1 to Permit CO0047562
Modification 1 to Fact Sheet CO0047562

Enclosed please find a copy of the Modified Permit which was issued under the Colorado Water Quality Control Act. You are legally obligated to comply with all terms and conditions of the permit and certifications.

We have the following contacts on file, if any of this information changes from the date your application was submitted until we issue your permit, please send a revised application/change of contacts form

Permittee Contact the person authorized to sign and certify the permit application. This person receives all permit correspondences *[Including invoice; is contacted for any questions relating to the facility; and receives DMRs as appropriate]* and is the person responsible for ensuring compliance with the permit

Stephen Antony, Pres
Energy Fuels Resources Corp
225 Union Blvd Ste 600
Lakewood, CO 80228
Phone number: 303-974-2142
Email: santony@energyfuels.com

Facility Contact *(contacted for general inquiries regarding the facility):*

Andrea Reither, Spec
Energy Fuels Resources Corp
225 Union Blvd Ste 600
Lakewood, CO 80228
Phone number: 303-389-4133
Email: areither@energyfuels.com

Billing Contact *(receives the invoice pertaining to the permit certification):*

Andrea Reither, Spec
Energy Fuels Resources Corp
225 Union Blvd Ste 600
Lakewood, CO 80228
Phone number: 303-389-4133
Email: areither@energyfuels.com

DMR Contact:

Stephen Antony, Pres
Energy Fuels Resources Corp
225 Union Blvd Ste 600
Lakewood, CO 80228
Phone number: 303-974-2142
Email: santony@energyfuels.com

If you have any questions, feel free to contact the Permits Section and refer to the permit number CO0047562. We have detailed email and telephone contact information available on the Division website at the "Division Contacts". You may also contact us by calling the permits line at 303-692-3517.

Colorado Department of Public Health and Environment

COLORADO DISCHARGE PERMIT SYSTEM (CDPS)
FACT SHEET TO PERMIT NUMBER CO0047562
ENERGY FUELS RESOURCES (USA) INC., WHIRLWIND PROJECT
MESA COUNTY

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I. TYPE OF PERMIT

A. Permit Type: Modification 1 to Industrial Major, without Public Notice Minor Modification

B. Discharge To: Surface Water

II. FACILITY INFORMATION

A. SIC Code: 1094, Uranium, Radium and Vanadium Ores

B. Facility Location: 30100 5/10 RoadGateway, CO 81522
Mesa County
S1/2 of NW ¼ of Section 36, T51N, R20W NMPM
Latitude: 38.642°N, Longitude: 109.048° W

C. Permitted Feature: 001A, following treatment and prior to mixing with the receiving stream. 38.6433°, 109.0489°

The location(s) provided above will serve as the point(s) of compliance for this permit and are appropriate as they are located after all treatment and prior to discharge to the receiving water.

D. Facility Flows: 0.03 MGD

III. PURPOSE OF MODIFICATION

The purpose of this modification to correct the expiration date of February 28, 2020 to reflect the leap year.

IV. CHANGE AS RESULT OF THE MODIFICATION

The expiration date has been changed to February 29, 2010

Loretta Houk
February 10, 2015

Colorado Department of Public Health and Environment

AUTHORIZATION TO DISCHARGE UNDER THE COLORADO DISCHARGE PERMIT SYSTEM PERMIT NUMBER CO0047562

In compliance with the provisions of the Colorado Water Quality Control Act, (25-8-101 et seq., CRS, 1973 as amended), for both discharges to surface and ground waters, and the Federal Water Pollution Control Act, as amended (33 U.S.C. 1251 et seq.; the "Act"), for discharges to surface waters only, the

Energy Fuels Resources (USA) Inc.

is authorized to discharge from the Whirlwind Project wastewater treatment facility located **in the S1/2 of NW1/4 Section 36, T51N, R20W, NMPM; at 30100 5/10 Road, Gateway, CO 81522; Latitude 38 38.5 'N, Longitude 109 2.9'W.**

to **the Middle Fork of Lumsden Creek**

in accordance with effluent limitations, monitoring requirements and other conditions set forth in Parts I and II hereof. All discharges authorized herein shall be consistent with the terms and conditions of this permit.

The applicant may demand an adjudicatory hearing within thirty (30) calendar days of the date of issuance of the final permit determination, per the Colorado Discharge Permit System Regulations, 61.7(1). Should the applicant choose to contest any of the effluent limitations, monitoring requirements or other conditions contained herein, the applicant must comply with Section 24-4-104 CRS and the Colorado Discharge Permit System Regulations. Failure to contest any such effluent limitation, monitoring requirement, or other condition, constitutes consent to the condition by the Applicant.

This permit and the authorization to discharge shall expire at midnight February 29, 2020

Modified, Reissued and Signed this 10th day of February 2015

COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT

Janet S. Kieler

Digitally signed by Janet S. Kieler
DN: dc=local, dc=dphe, ou=Divisions, ou=WQC, ou=Users, cn=Janet S. Kieler, email=janet.kieler@state.co.us
Date: 2015.02.11 16:10:28 -07'00'

Janet Kieler, Permits Section Manager
Water Quality Control Division

Permit Action Summary:
Modification 1: Minor Modification Issued February 10th 2015, Effective March 1, 2015, title page
Orginally Issued January 22, 2015, Effective March 1, 2015

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PART I

A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

1. Permitted Feature(s)

Beginning no later than the effective date of this permit and lasting through the expiration date, the permittee is authorized to discharge from, and self monitoring samples taken in accordance with the monitoring requirements shall be obtained from permitted feature(s):

001A following treatment and prior to mixing with the receiving stream. 38.6433°, 109.0489°

The location(s) provided above will serve as the point(s) of compliance for this permit and are appropriate as they are located after all treatment and prior to discharge to the receiving water. Any discharge to the waters of the State from a point source other than specifically authorized by this permit is prohibited.

In accordance with the Water Quality Control Commission Regulations for Effluent Limitations, Section 62.4, and the Colorado Discharge Permit System Regulations, Section 61.8(2), 5 C.C.R. 1002-61, the permitted discharge shall not contain effluent parameter concentrations which exceed the limitations specified below or exceed the specified flow limitation.

Prior to the time that any industrial materials or activities are exposed to precipitation that would result in a stormwater discharge from the facility subject to federal effluent limitation guidelines (ELGs) or other sampling, the permittee must request a modification of the permit, which will allow the Division an opportunity to re-evaluate the effluent limitations, terms and conditions consistent with the change in mining status.

2. Limitations, Monitoring Frequencies and Sample Types

In order to obtain an indication of the probable compliance or noncompliance with the effluent limitations specified in Part I.A, the permittee shall monitor all effluent parameters at the frequencies and sample types specified below. Such monitoring will begin immediately and last for the life of the permit unless otherwise noted. The results of such monitoring shall be reported on the Discharge Monitoring Report form (See Part I.D.)

Self-monitoring sampling by the permittee for compliance with the effluent monitoring requirements specified in this permit, shall be performed at the location(s) noted in Part I.A.1 above. If the permittee, using an approved analytical method, monitors any parameter more frequently than required by this permit, then the results of such monitoring shall be included in the calculation and reporting of the values required in the Discharge Monitoring Report Form (DMRs) or other forms as required by the Division. Such increased frequency shall also be indicated.

Oil and Grease Monitoring: For every permitted feature with oil and grease monitoring, in the event an oil sheen or floating oil is observed, a grab sample shall be collected, analyzed, and reported on the appropriate DMR. In addition, corrective action shall be taken immediately to mitigate the discharge of oil and grease. A description of the corrective action taken should be included with the DMR.

Outfall 001A

ICIS Code	Effluent Parameter	Effluent Limitations Maximum Concentrations			Monitoring Requirements	
		30-Day Average	7-Day Average	Daily Maximum	Frequency	Sample Type
50050	Effluent Flow (MGD)	0.03		Report	Continuous	Recorder
00400	pH (su)			6.5-9.0	Weekly	Grab
00640	Total Inorganic Nitrogen (mg/l)	NA		Report	Weekly	Composite
00530	TSS, effluent (mg/l)	20	30		Weekly	Composite
84066	Oil and Grease (visual)			Report	Weekly	Visual
03582	Oil and Grease (mg/l)			10	Contingent	Grab
70295	TDS (mg/l)	Report		Report	Quarterly	Composite
01104	Al, TR (µg/l) Until 12/31/2018	Report		Report	Weekly	Composite
01104	Al, TR (µg/l) Beginning 1/1/2019	189		1324	Weekly	Composite
00978	As, TR (µg/l) Until 12/31/2018	100		NA	Weekly	Composite
00978	As, TR (µg/l) Beginning 1/1/2019	10		NA	Weekly	Composite
01313	Cd, PD (µg/l)	Report		Report	Weekly	Composite
04262	Cr+3, TR (µg/l)	NA		Report	Weekly	Grab
01306	Cu, PD (µg/l)	Report		Report	Weekly	Composite
01046	Fe, Dis (µg/l)	Report		NA	Weekly	Composite
00980	Fe, TR (µg/l) Until 12/31/2018	Report		NA	Weekly	Composite
00980	Fe, TR (µg/l) Beginning 1/1/2019	1000		NA	Weekly	Composite
01318	Pb, PD (µg/l) Until 12/31/2018	Report		Report	Weekly	Composite
01318	Pb, PD (µg/l) Beginning 1/1/2019	1.2		30	Weekly	Composite
01056	Mn, Dis (µg/l) Until 12/31/2018	200		Report	Weekly	Composite
01056	Mn, Dis (µg/l) Beginning 1/1/2019	50		2370	Weekly	Composite
01129	Mo, TR (µg/l)	Report		NA	Weekly	Composite
71900	Hg, Tot (µg/l)	Report		NA	Weekly	Composite
01322	Ni, PD (µg/l)	Report		Report	Weekly	Composite
01323	Se, PD (µg/l) Until 12/31/2018	20		Report	Weekly	Composite
01323	Se, PD (µg/l) Beginning 1/1/2019	4.6		18	Weekly	Composite
01304	Ag, PD (µg/l)	Report		Report	Weekly	Composite
22708	U, TR (µg/l) Until 12/31/2018	700		1100	Weekly	Composite
22708	U, TR (µg/l) Beginning 1/1/2019	30		1100	Weekly	Composite
01094	Zn, TR (µg/l)	500		1000	Weekly	Composite
01303	Zn, PD (µg/l) Until 12/31/2018	Report		Report	Weekly	Composite
01303	Zn, PD (µg/l) Beginning 1/1/2019	65		89	Weekly	Composite

Outfall 001A, continued

ICIS Code	Effluent Parameter	Effluent Limitations Maximum Concentrations			Monitoring Requirements	
		30-Day Average	7-Day Average	Daily Maximum	Frequency	Sample Type
51202	Sulfide as H2S (mg/l) Until 12/31/2018	Report		NA	Weekly	Composite
51202	Sulfide as H2S (mg/l) Beginning 1/1/2019	0.002		NA	Weekly	Composite
01128	Vanadium, TR (µg/l)	Report		Report	Weekly	Composite
81017	COD (mg/l)	100		200	Weekly	Composite
11503	Radium 226 + 228, Total (picocuries/L)			5	Weekly	Composite
09503	Radium 226, Dis (picocuries/L)	3		5	Weekly	Composite
	WET, chronic					
TKP6C	Static Renewal 7 Day Chronic *Pimephales promelas*			NOEC or IC25 ≥ IWC	Quarterly	3 Composites / Test*
TKP3B	Static Renewal 7 Day Chronic *Ceriodaphnia dubia*			NOEC or IC25 ≥ IWC	Quarterly	3 Composites / Test*

* 3 composite samples may be taken over the duration of plant operation but not to exceed 5 days.

3. **Salinity Parameters**

In order to obtain an indication of the quantity of Salinity, measured as total dissolved solids (TDS), being discharged from the site the permittee shall monitor the wastewater effluent. Self-monitoring samples taken in compliance with the monitoring requirements specified above shall be taken at those locations listed in Part I.A.1.

4. **Special Monitoring**

The facility will collect and analyze the *influent* to the facility and submit the results within a year after this permit becomes effective.

B. TERMS AND CONDITIONS

1. **Facilities Operation and Maintenance**

The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee as necessary to achieve compliance with the conditions of this permit. Proper operation and maintenance also includes effective performance, and adequate laboratory and process controls, including appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems when installed by the permittee only when necessary to achieve compliance with the conditions of the permit.

Any sludge produced at the wastewater treatment facility shall be disposed of in accordance with State and Federal guidelines and regulations. The permittee shall take all reasonable steps to minimize or prevent any discharge of sludge use or disposal in violation of this permit which has a reasonable likelihood of adversely affecting human health or the environment. As necessary, accelerated or additional monitoring to determine the nature and impact of the noncomplying discharge is required.

2. Compliance Schedule(s)

a. Activities to Meet Aluminum (TR), Arsenic (TR), Iron (TR), Lead (PD), Manganese (Dis), Selenium (PD), Uranium (TR), Zinc (PD) and Sulfide Final Limits – In order to meet the final limits, the following schedule for construction (if deemed necessary by the permittee) are included in the permit.

Code	Event	Description	Due Date
43699	Facility Evaluation Plan	Submit a report that identifies sources of Aluminum, Arsenic, Iron, Lead, Manganese, Selenium, Uranium, Zinc and Sulfide to the wastewater treatment facility and identifies strategies to control these sources or treatment alternatives such that compliance with the final limitations may be attained.	3/31/15
00899	Implementation Schedule	Submit a progress report summarizing the progress in implementing the strategies to control sources such that compliance with the final of Aluminum, Arsenic, Iron, Lead, Manganese, Selenium, Uranium, Zinc and Sulfide limitations may be attained.	3/31/16
00899	Implementation Schedule	Submit a progress report summarizing the progress in implementing the strategies to control sources such that compliance with the final of Aluminum, Arsenic, Iron, Lead, Manganese, Selenium, Uranium, Zinc and Sulfide limitations may be attained.	12/31/16
00899	Implementation Schedule	Submit a progress report summarizing the progress in implementing the strategies to control sources such that compliance with the final of Aluminum, Arsenic, Iron, Lead, Manganese, Selenium, Uranium, Zinc and Sulfide limitations may be attained.	12/31/17
CS017	Achieve Final Compliance with Emissions or Discharge Limits	Submit study results that show compliance has been attained with the final Aluminum, Arsenic, Iron, Lead, Manganese, Selenium, Uranium, Zinc and Sulfide limitations.	12/31/18

Regulation 61.8(3)(n)(i) states that a report should be submitted to the Division no later than 14 calendar days following each date identified in the schedule of compliance. The 14 days have already been incorporated into the above dates and therefore all reports are due on or before the date listed in the table.

3. Chronic WET Testing -Outfall(s):001A

a. General Chronic WET Testing and Reporting Requirements

The permittee shall conduct the chronic WET test using *Ceriodaphnia dubia and Pimephales promelas*, as a static renewal 7-day test using three separate composite samples (which may be taken over the duration of plant operation but not to exceed 5 days). The permittee shall conduct each chronic WET test in accordance with the 40 CFR Part 136 methods described in Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Water to Freshwater Organisms, Fourth Edition, October 2002 (EPA-821-R-02-013) or the most current edition.

The following minimum dilution series should be used: 0% effluent (control), 20%, 40%, 60%, 80%, and 100% effluent. If the permittee uses more dilutions than prescribed, and accelerated testing is to be performed, the same dilution series shall be used in the accelerated testing (if applicable) as was initially used in the failed test.

Tests shall be done at the frequency listed in Part I.A.2. Test results shall be reported along with the Discharge Monitoring Report (DMR) submitted for the end of the reporting period when the sample was taken. (i.e., WET testing results for the calendar quarter ending March 31 shall be reported with the DMR due April 28, etc.) The permittee shall

submit all laboratory statistical summary sheets, summaries of the determination of a valid, invalid or inconclusive test, and copies of the chain of custody forms, along with the DMR for the reporting period.

If a test is considered invalid, the permittee is required to perform additional testing during the monitoring period to obtain a valid test result. Failure to obtain a valid test result during the monitoring period shall result in a violation of the permit for failure to monitor.

b. Violations of the Permit Limit, Failure of One Test Statistical Endpoint and Division Notification

A chronic WET test is considered a violation of a permit limitation when both the NOEC and the IC25 are at any effluent concentration less than the IWC. The IWC for this permit has been determined to be **100%** effluent.

A chronic WET test is considered to have failed one of the two statistical endpoints when either the NOEC or the IC_{25} are at any effluent concentration less than the IWC. The IWC for this permit has been determined to be **100%** effluent.

In the event of a permit violation, or when two consecutive reporting periods have resulted in failure of one of the two statistical endpoints (regardless of which statistical endpoints are failed), the permittee must provide written notification to the Division. Such notification should explain whether it was a violation or two consecutive failures of a single endpoint, and must indicate whether accelerated testing or a Toxicity Identification Evaluation or Toxicity Reduction Evaluation (TIE or TRE) is being performed, unless otherwise exempted, in writing, by the Division. **Notification must be received by the Division within 14 calendar days of the permittee receiving notice of the WET testing results.**

c. Automatic Compliance Response

The permittee is responsible for implementing the automatic compliance response provisions of this permit when one of the following occurs:

- there is a violation of the permit limit (both the NOEC and the IC25 endpoints are less than the applicable IWC)
- two consecutive monitoring periods have resulted in failure of one of the two statistical endpoints (either the IC25 or the NOEC)
- the permittee is otherwise informed by the Division that a compliance response is necessary

When one of the above listed events occurs, the following automatic compliance response shall apply. The permittee shall either:

- conduct accelerated testing using the single species found to be more sensitive
- conduct a Toxicity Identification Evaluation (TIE) or a Toxicity Reduction Evaluation (TRE) investigation as described below.

i. Accelerated Testing

If accelerated testing is being performed, testing will be at least once every two weeks for up to five tests, running only one test at a time, using only the IC25 statistical endpoint to determine if the test passed or failed at the appropriate IWC. Accelerated testing shall continue until; 1) two consecutive tests fail or three of five tests fail, in which case a pattern of toxicity has been demonstrated or 2) two consecutive tests pass or three of five tests pass, in which case no pattern of toxicity has been found. Note that the same dilution series should be used in the accelerated testing as was used in the initial test(s) that result in the accelerated testing requirement.

If accelerated testing is required due to failure of one statistical endpoint in two consecutive monitoring periods, and in both of those failures it was the NOEC endpoint that was failed, then the NOEC shall be the only statistical endpoint used to determined whether the accelerated testing passed or failed at the appropriate IWC. Note that the same dilution series should be used in the accelerated testing as was used in the initial test(s) that result in the accelerated testing requirement.

If no pattern of toxicity is found the toxicity episode is considered to be ended and routine testing is to resume. If a pattern of toxicity is found, a TIE/TRE investigation is to be performed. If a pattern of toxicity is not demonstrated but a significant level of erratic toxicity is found, the Division may require an increased frequency of routine monitoring or

some other modified approach. The permittee shall provide written notification of the results within 14 calendar days of completion of the Pattern of Toxicity/No Toxicity demonstration.

ii. Toxicity Identification Evaluation (TIE) or Toxicity Reduction Evaluation (TRE)

If a TIE or a TRE is being performed, the results of the investigation are to be received by the Division within 180 calendar days of the demonstration chronic WET in the routine test, as defined above, or if accelerated testing was performed, the date the pattern of toxicity is demonstrated. A status report is to be provided to the Division at the 60 and 120 calendar day points of the TIE or TRE investigation. The Division may extend the time frame for investigation where reasonable justification exists. A request for an extension must be made in writing and received prior to the 180 calendar day deadline. Such request must include a justification and supporting data for such an extension.

Under a TIE, the permittee may use the time for investigation to conduct a preliminary TIE (PTIE) or move directly into the TIE. A PTIE consists of a brief search for possible sources of WET, where a specific parameter(s) is reasonably suspected to have caused such toxicity, and could be identified more simply and cost effectively than a formal TIE. If the PTIE allows resolution of the WET incident, the TIE need not necessarily be conducted in its entirety. If, however, WET is not identified or resolved during the PTIE, the TIE must be conducted within the allowed 180 calendar day time frame.

The Division recommends that the EPA guidance documents regarding TIEs be followed. If another method is to be used, this procedure should be submitted to the Division prior to initiating the TIE.

If the pollutant(s) causing toxicity is/are identified, and is/are controlled by a permit effluent limitation(s), this permit may be modified upon request to adjust permit requirements regarding the automatic compliance response.

If the pollutant(s) causing toxicity is/are identified, and is/are not controlled by a permit effluent limitation(s), the Division may develop limitations the parameter(s), and the permit may be reopened to include these limitations.

If the pollutant causing toxicity is not able to be identified, or is unable to be specifically identified, or is not able to be controlled by an effluent limit, the permittee will be required to perform either item 1 or item 2 below.

l) Conduct an investigation which demonstrates actual instream aquatic life conditions upstream and downstream of the discharge, or identify, for Division approval, and conduct an alternative investigation which demonstrates the actual instream impact. This should include WET testing and chemical analyses of the ambient water. Depending on the results of the study, the permittee may also be required to identify the control program necessary to eliminate the toxicity and its cost. Data collected may be presented to the WQCC for consideration at the next appropriate triennial review of the stream standards;

2) Move to a TRE by identifying the necessary control program or activity and proceed with elimination of the toxicity so as to meet the WET effluent limit.

If toxicity spontaneously disappears in the midst of a TIE, the permittee shall notify the Division within 10 calendar days of such disappearance. The Division may require the permittee to conduct accelerated testing to demonstrate that no pattern of toxicity exists, or may amend the permit to require an increased frequency of WET testing for some period of time. If no pattern of toxicity is demonstrated through the accelerated testing or the increased monitoring frequency, the toxicity incident response will be closed and normal WET testing shall resume.

The control program developed during a TRE consists of the measures determined to be the most feasible to eliminate WET. This may happen through the identification of the toxicant(s) and then a control program aimed specifically at that toxicant(s) or through the identification of more general toxicant treatability processes. A control program is to be developed and submitted to the Division within 180 calendar days of beginning a TRE. Status reports on the TRE are to be provided to the Division at the 60 and 120 calendar day points of the TRE investigation.

If toxicity spontaneously disappears in the midst of a TRE, the permittee shall notify the Division within 10 calendar days of such disappearance. The Division may require the permittee to conduct accelerated testing to demonstrate that no pattern of toxicity exists, or may amend the permit to require an increased frequency for some period of time. If no

pattern of toxicity is demonstrated through the accelerated testing or the increased monitoring frequency, the toxicity incident response will be closed and normal WET testing shall resume.

d. Toxicity Reopener

This permit may be reopened and modified to include additional or modified numerical permit limitations, new or modified compliance response requirements, changes in the WET testing protocol, the addition of both acute and chronic WET requirements, or any other conditions related to the control of toxicants.

4. Storm Exemption - Facilities Permitted to Discharge

If the permittee intends to use the 10-year, 24-hour storm exemption, a report must be submitted to the Division within 90 calendar days after the effective date of this permit, documenting that the facility is designed, constructed and will be maintained to contain or treat:

a. The maximum volume of wastewater which would be generated by the facility during a 24-hour period without an increase in volume from precipitation; and

b. The maximum volume of wastewater resulting from a 10-year, 24-hour precipitation event, including the volume which would result from all areas contributing runoff to the individual treatment facility (i.e., all runoff not diverted from the active mining area or the mill area).

In addition, if a discharge occurs as a result of the 10-year, 24-hour storm volume being exceeded and the permittee wishes to claim an affirmative defense to a violation of the technology based effluent limitations, the permittee shall submit, within 5 days of the said discharge, documentation that the facility was maintained to contain or treat the previously specified volumes. The permittee must also submit documentation of the storm event, including the precipitation recorded at the closest official precipitation gauge station (or the permittee's own gauge), the volume of runoff produced and the steps taken to maintain treatment and minimize the amount of overflow.

For claiming a storm water exemption, the permittee must also adequately demonstrate that all reasonable management, containment, and treatment options have been optimally utilized.

The storm event exemptions are only applicable for the following parameters at this facility, which are based upon Federal BAT/BPT limitations:

Total Suspended Solids
Chemical Oxygen Demand
Total Recoverable Zinc
Dissolved Radium 226

All data/documentation required by the section which can not be reported on applicable discharge monitoring report forms (DMRs) shall be reported in a letter as an attachment to the DMR. Submittal of documentation of containment, maintenance and precipitation records above does not exempt the permittee from the notification requirements of Part II.A.4. of this permit.

C. DEFINITIONS OF TERMS

1. "Acute Toxicity" - The acute toxicity limitation is exceeded if the LC50 is at any effluent concentration less than or equal to the IWC indicated in this permit.

2. "Antidegradation limits" – See "Two (2) - Year Rolling Average".

3. "Chronic toxicity", which includes lethality and growth or reproduction, occurs when the NOEC and IC25 are at an effluent concentration less than the IWC indicated in this permit.

4. "Composite" sample is a minimum of four (4) grab samples collected at equally spaced two (2) hour intervals and proportioned according to flow. For a SBR type treatment system, a composite sample is defined as sampling equal aliquots during the beginning, middle and end of a decant period, for two consecutive periods during a day (if possible).

5. "Continuous" measurement, is a measurement obtained from an automatic recording device which continually measures the effluent for the parameter in question, or that provides measurements at specified intervals.

6. "Daily Maximum limitation" for all parameters (except temperature, pH and dissolved oxygen) means the limitation for this parameter shall be applied as an average of all samples collected in one calendar day. For these parameters the DMR shall include the highest of the daily averages. For pH and dissolved oxygen, this means an instantaneous maximum (and/or instantaneous minimum) value. The instantaneous value is defined as the analytical result of any individual sample. For pH and dissolved oxygen, DMRs shall include the maximum (and/or minimum) of all instantaneous values within the calendar month. Any value beyond the noted daily maximum limitation for the indicated parameter shall be considered a violation of this permit. For temperature, see Daily Maximum Temperature.

7. "Daily Maximum Temperature (DM)" is defined in the Basic Standards and Methodologies for Surface Water 1002-31, as the highest two-hour average water temperature recorded during a given 24-hour period. This will be determined using a rolling 2-hour maximum temperature. If data is collected every 15 minutes, a 2 hour maximum can be determined on every data point after the initial 2 hours of collection. Note that the time periods that overlap days (Wednesday night to Thursday morning) do not matter as the reported value on the DMR is the greatest of all the 2-hour averages.

   For example data points collected at:
   08:15, 08:30, 08:45, 09:00, 09:15, 09:30, 09:45, 10:00, would be averaged for a single 2 hour average data point
   08:30, 08:45, 09:00, 09:15, 09:30, 09:45, 10:00, 10:15, would be averaged for a single 2 hour average data point
   08:45, 09:00, 09:15, 09:30, 09:45, 10:00, 10:15, 10:30, would be averaged for a single 2 hour average data point

   This would continue throughout the course of a calendar day. The highest of these 2 hour averages over a month would be reported on the DMR as the daily maximum temperature. At the end/beginning of a month, the collected data should be used for the month that contains the greatest number of minutes in the 2-hour maximum. Data from 11 pm to 12:59 am, would fall in the previous month. Data collected from 11:01 pm to 1:00 am would fall in the new month.

8. "Dissolved (D) metals fraction" is defined in the Basic Standards and Methodologies for Surface Water 1002-31, as that portion of a water and suspended sediment sample which passed through a 0.40 or 0.45 UM (micron) membrane filter. Determinations of "dissolved" constituents are made using the filtrate. This may include some very small (colloidal) suspended particles which passed through the membrane filter as well as the amount of substance present in true chemical solution.

9. "Geometric mean" for *E. coli* bacteria concentrations, the thirty (30) day and seven (7) day averages shall be determined as the geometric mean of all samples collected in a thirty (30) day period and the geometric mean of all samples taken in a seven (7) consecutive day period respectively. The geometric mean may be calculated using two different methods. For the methods shown, a, b, c, d, etc. are individual sample results, and n is the total number of samples.

   Method 1:

   Geometric Mean = $(a*b*c*d*...)^{(1/n)}$ "*" - means multiply

   Method 2:

   Geometric Mean = antilog ([log(a)+log(b)+log(c)+log(d)+...]/n)

   Graphical methods, even though they may also employ the use of logarithms, may introduce significant error and may not be used.

   In calculating the geometric mean, for those individual sample results that are reported by the analytical laboratory to be "less than" a numeric value, a value of 1 should be used in the calculations. If all individual analytical results for the month are reported to be less than numeric values, then report "less than" the largest of those numeric values on the monthly DMR. Otherwise, report the calculated value.

   For any individual analytical result of "too numerous to count" (TNTC), that analysis shall be considered to be invalid and another sample shall be promptly collected for analysis. If another sample cannot be collected within the same sampling

period for which the invalid sample was collected (during the same month if monthly sampling is required, during the same week if weekly sampling is required, etc.), then the following procedures apply:

i. A minimum of two samples shall be collected for coliform analysis within the next sampling period.

ii. If the sampling frequency is monthly or less frequent: For the period with the invalid sample results, leave the spaces on the corresponding DMR for reporting coliform results empty and attach to the DMR a letter noting that a result of TNTC was obtained for that period, and explain why another sample for that period had not been collected.

If the sampling frequency is more frequent than monthly: Eliminate the result of TNTC from any further calculations, and use all the other results obtained within that month for reporting purposes. Attach a letter noting that a result of TNTC was obtained, and list all individual analytical results and corresponding sampling dates for that month.

10. "Grab" sample, is a single "dip and take" sample so as to be representative of the parameter being monitored.

11. "IC25" or "Inhibition Concentration" is a point estimate of the toxicant concentration that would cause a given percent reduction in a non-lethal biological measurement (e.g. growth or reproduction) calculated from a continuous model (i.e. interpolation method). IC25 is a point estimate of the toxic concentration that would cause a 25-percent reduction in a non-lethal biological measurement.

12. "In-situ" measurement is defined as a single reading, observation or measurement taken in the field at the point of discharge.

13. "Instantaneous" measurement is a single reading, observation, or measurement performed on site using existing monitoring facilities.

14. "LC50" or "Lethal Concentration" is the toxic or effluent concentration that would cause death in 50 percent of the test organisms over a specified period of time.

15. "Maximum Weekly Average Temperature (MWAT)" is defined in the Basic Standards and Methodologies for Surface Water 1002-31, as an implementation statistic that is calculated from field monitoring data. The MWAT is calculated as the largest mathematical mean of multiple, equally spaced, daily temperatures over a seven-day consecutive period, with a minimum of three data points spaced equally through the day. For lakes and reservoirs, the MWAT is assumed to be equivalent to the maximum WAT from at least three profiles distributed throughout the growing season (generally July-September).

    The MWAT is calculated by averaging all temperature data points collected during a calendar day, and then averaging the daily average temperatures for 7 consecutive days. This 7 day averaging period is a rolling average, i.e. on the 8th day, the MWAT will be the averages of the daily averages of days 2-8. The value to be reported on the DMR is the highest of all the rolling 7-day averages throughout the month. For those days that are at the end/beginning of the month, the data shall be reported for the month that contains 4 of the 7 days.

    Day 1: Average of all temperature data collected during the calendar day.
    Day 2: Average of all temperature data collected during the calendar day.
    Day 3: Average of all temperature data collected during the calendar day.
    Day 4: Average of all temperature data collected during the calendar day.
    Day 5: Average of all temperature data collected during the calendar day.
    Day 6: Average of all temperature data collected during the calendar day.
    Day 7: Average of all temperature data collected during the calendar day.
    1st MWAT Calculation as average of previous 7 days
    Day 8: Average of all temperature data collected during the calendar day.
    2nd MWAT Calculation as average of previous 7 days
    Day 9: Average of all temperature data collected during the calendar day.
    3rd MWAT Calculation as average of previous 7 days

16. "NOEC" or "No-Observed-Effect-Concentration" is the highest concentration of toxicant to which organisms are exposed in a full life cycle or partial life cycle (short term) test, that causes no observable adverse effects on the test organisms (i.e. the highest concentration of toxicant in which the values for the observed responses are not statistically different from the controls). This value is used, along with other factors, to determine toxicity limits in permits.

17. "Potentially dissolved (PD) metals fraction" is defined in the Basic Standards and Methodologies for Surface Water 1002-31, as that portion of a constituent measured from the filtrate of a water and suspended sediment sample that was first treated with nitric acid to a pH of 2 or less and let stand for 8 to 96 hours prior to sample filtration using a 0.40 or 0.45-UM (micron) membrane filter. Note the "potentially dissolved" method cannot be used where nitric acid will interfere with the analytical procedure used for the constituent measured.

18. "Practical Quantitation Limit (PQL)" means the minimum concentration of an analyte (substance) that can be measured with a high degree of confidence that the analyte is present at or above that concentration. The use of PQL in this document may refer to those PQLs shown in Part I.D of this permit or the PQLs of an individual laboratory.

19. "Quarterly measurement frequency" means samples may be collected at any time during the calendar quarter if a continual discharge occurs. If the discharge is intermittent, then samples shall be collected during the period that discharge occurs.

20. "Recorder" requires the continuous operation of a chart and/or totalizer (or drinking water rotor meters or pump hour meters where previously approved.)

21. SAR and Adjusted SAR - The equation for calculation of SAR-adj is:

$$SAR\text{-}adj = \frac{Na^{+}}{\sqrt{\frac{Ca_x + Mg^{++}}{2}}}$$

Where:

Na^{+} = Sodium in the effluent reported in meq/l
Mg^{++} = Magnesium in the effluent reported in meq/l
Ca_x = calcium (in meq/l) in the effluent modified due to the ratio of bicarbonate to calcium

The values for sodium (Na^{+}), calcium (Ca^{++}), bicarbonate (HCO_3^{-}) and magnesium (Mg^{++}) in this equation are expressed in units of milliequivalents per liter (meq/l). Generally, data for these parameters are reported in terms of mg/l, which must then be converted to calculate the SAR. The conversions are:

$$\text{meq/l} = \frac{Concentration\ in\ mg/l}{Equivalent\ weight\ in\ mg/meq}$$

Where the equivalent weights are determined based on the atomic weight of the element divided by the ion's charge:

Na^{+} = 23.0 mg/meq (atomic weight of 23, charge of 1)
Ca^{++} = 20.0 mg/meq (atomic weight of 40.078, charge of 2)
Mg^{++} = 12.15 mg/meq (atomic weight of 24.3, charge of 2)
HCO_3^{-} = 61 mg/mep (atomic weight of 61, charge of 1)

The *EC* and the HCO_3^{-}/Ca^{++} ratio in the effluent (calculated by dividing the HCO_3^{-} in meq/l by the Ca^{++} in meq/l) are used to determine the Ca_x using the following table.

Table – Modified Calcium Determination for Adjusted Sodium Adsorption Ratio

		HCO_3/Ca Ratio And *EC* [1, 2, 3]											
		Salinity of Effluent (*EC*)(dS/m)											
		0.1	**0.2**	**0.3**	**0.5**	**0.7**	**1.0**	**1.5**	**2.0**	**3.0**	**4.0**	**6.0**	**8.0**
Ratio of HCO_3/Ca	**.05**	13.20	13.61	13.92	14.40	14.79	15.26	15.91	16.43	17.28	17.97	19.07	19.94
	.10	8.31	8.57	8.77	9.07	9.31	9.62	10.02	10.35	10.89	11.32	12.01	12.56
	.15	6.34	6.54	6.69	6.92	7.11	7.34	7.65	7.90	8.31	8.64	9.17	9.58
	.20	5.24	5.40	5.52	5.71	5.87	6.06	6.31	6.52	6.86	7.13	7.57	7.91
	.25	4.51	4.65	4.76	4.92	5.06	5.22	5.44	5.62	5.91	6.15	6.52	6.82

.30	4.00	4.12	4.21	4.36	4.48	4.62	4.82	4.98	5.24	5.44	5.77	6.04
.35	3.61	3.72	3.80	3.94	4.04	4.17	4.35	4.49	4.72	4.91	5.21	5.45
.40	3.30	3.40	3.48	3.60	3.70	3.82	3.98	4.11	4.32	4.49	4.77	4.98
.45	3.05	3.14	3.22	3.33	3.42	3.53	3.68	3.80	4.00	4.15	4.41	4.61
.50	2.84	2.93	3.00	3.10	3.19	3.29	3.43	3.54	3.72	3.87	4.11	4.30
.75	2.17	2.24	2.29	2.37	2.43	2.51	2.62	2.70	2.84	2.95	3.14	3.28
1.00	1.79	1.85	1.89	1.96	2.01	2.09	2.16	2.23	2.35	2.44	2.59	2.71
1.25	1.54	1.59	1.63	1.68	1.73	1.78	1.86	1.92	2.02	2.10	2.23	2.33
1.50	1.37	1.41	1.44	1.49	1.53	1.58	1.65	1.70	1.79	1.86	1.97	2.07
1.75	1.23	1.27	1.30	1.35	1.38	1.43	1.49	1.54	1.62	1.68	1.78	1.86
2.00	1.13	1.16	1.19	1.23	1.26	1.31	1.36	1.40	1.48	1.54	1.63	1.70
2.25	1.04	1.08	1.10	1.14	1.17	1.21	1.26	1.30	1.37	1.42	1.51	1.58
2.50	0.97	1.00	1.02	1.06	1.09	1.12	1.17	1.21	1.27	1.32	1.40	1.47
3.00	0.85	0.89	0.91	0.94	0.96	1.00	1.04	1.07	1.13	1.17	1.24	1.30
3.50	0.78	0.80	0.82	0.85	0.87	0.90	0.94	0.97	1.02	1.06	1.12	1.17
4.00	0.71	0.73	0.75	0.78	0.80	0.82	0.86	0.88	0.93	0.97	1.03	1.07
4.50	0.66	0.68	0.69	0.72	0.74	0.76	0.79	0.82	0.86	0.90	0.95	0.99
5.00	0.61	0.63	0.65	0.67	0.69	0.71	0.74	0.76	0.80	0.83	0.88	0.93
7.00	0.49	0.50	0.52	0.53	0.55	0.57	0.59	0.61	0.64	0.67	0.71	0.74
10.00	0.39	0.40	0.41	0.42	0.43	0.45	0.47	0.48	0.51	0.53	0.56	0.58
20.00	0.24	0.25	0.26	0.26	0.27	0.28	0.29	0.30	0.32	0.33	0.35	0.37
30.00	0.18	0.19	0.20	0.20	0.21	0.21	0.22	0.23	0.24	0.25	0.27	0.28

[1] Adapted from Suarez (1981).

[2] Assumes a soil source of calcium from lime ($CaCO_3$) or silicates; no precipitation of magnesium, and partial pressure of CO_2 near the soil surface (P_{CO2}) is 0.0007 atmospheres.

[3] Ca_x, HCO_3, Ca are reported in meq/l; EC is in dS/m (deciSiemens per meter).

Because values will not always be quantified at the exact *EC* or HCO_3^-/Ca^{++} ratio in the table, the resulting Ca_x must be determined based on the closest value to the calculated value. For example, for a calculated *EC* of 2.45 dS/m, the column for the *EC* of 2.0 would be used. However, for a calculated *EC* of 5.1, the corresponding column for the *EC* of 6.0 would be used. Similarly, for a HCO_3^-/Ca^{++} ratio of 25.1, the row for the 30 ratio would be used.

The Division acknowledges that some effluents may have electrical conductivity levels that fall outside of this table, and others have bicarbonate to calcium ratios that fall outside this table. For example, some data reflect HCO_3^-/Ca^{++} ratios greater than 30 due to bicarbonate concentrations reported greater than 1000 mg/l versus calcium concentrations generally less than 10 mg/l (i.e., corresponding to HCO_3^-/Ca^{++} ratios greater than 100). Despite these high values exceeding the chart's boundaries, it is noted that the higher the HCO_3^-/Ca^{++} ratio, the greater the SAR-adj. Thus, using the Ca_x values corresponding to the final row containing bicarbonate/calcium ratios of 30, the permittee will actually calculate an SAR-adj that is less than the value calculated if additional rows reflecting HCO_3^-/Ca^{++} ratios of greater than 100 were added.

22. "Seven (7) day average" means, with the exception of fecal coliform or *E. coli* bacteria (see geometric mean), the arithmetic mean of all samples collected in a seven (7) consecutive day period. Such seven (7) day averages shall be calculated for all calendar weeks, which are defined as beginning on Sunday and ending on Saturday. If the calendar week overlaps two months (i.e. the Sunday is in one month and the Saturday in the following month), the seven (7) day average calculated for that calendar week shall be associated with the month that contains the Saturday. Samples may not be used for more than one (1) reporting period. **(See the "Analytical and Sampling Methods for Monitoring and Reporting Section in Part I.D.3 for guidance on calculating averages and reporting analytical results that are less than the PQL).**

23. "Thirty (30) day average" means, except for fecal coliform or *E. coli* bacteria (see geometric mean), the arithmetic mean of all samples collected during a thirty (30) consecutive-day period. The permittee shall report the appropriate mean of all self-monitoring sample data collected during the calendar month on the Discharge Monitoring Reports. Samples shall not be used for more than one (1) reporting period. **(See the "Analytical and Sampling Methods for Monitoring and Reporting Section in Part I.D.3 for guidance on calculating averages and reporting analytical results that are less than the PQL).**

24. Toxicity Identification Evaluation (TIE) is a set of site-specific procedures used to identify the specific chemical(s) causing effluent toxicity.

25. "Total Inorganic Nitrogen (T.I.N.)" is an aggregate parameter determined based on ammonia, nitrate and nitrite concentrations. To determine T.I.N. concentrations, the facility must monitor for total ammonia and total nitrate plus nitrite (or nitrate and nitrite individually) on the same days. The calculated T.I.N. concentrations in mg/L shall then be determined as the sum of the analytical results of same-day sampling for total ammonia (as N) in mg/L, and total nitrate plus nitrite (as N) in mg/L (or nitrate as N and nitrite as N individually). From these calculated T.I.N. concentrations, the daily maximum and thirty (30) day average concentrations for T.I.N. shall be determined in the same manner as set out in the definitions for the daily maximum and thirty (30) day average. **(See the "Analytical and Sampling Methods for Monitoring and Reporting Section in Part I.D.5 for guidance on calculating averages and reporting analytical results that are less than the PQL).**

26. "Total Metals" means the concentration of metals determined on an unfiltered sample following vigorous digestion (Section 4.1.3), or the sum of the concentrations of metals in both the dissolved and suspended fractions, as described in Manual of Methods for Chemical Analysis of Water and Wastes, U.S. Environmental Protection Agency, March 1979, or its equivalent.

27. "Total Recoverable Metals" means that portion of a water and suspended sediment sample measured by the total recoverable analytical procedure described in Methods for Chemical Analysis of Water and Wastes, U.S. Environmental Protection Agency, March 1979 or its equivalent.

28. Toxicity Reduction Evaluation (TRE) is a site-specific study conducted in a step-wise process to identify the causative agents of effluent toxicity, isolate the source of toxicity, evaluate the effectiveness of toxicity control options, and then confirm the reduction in effluent toxicity after the control measures are put in place.

29. "Twenty four (24) hour composite" sample is a combination of at least eight (8) sample aliquots of at least 100 milliliters, collected at equally spaced intervals during the operating hours of a facility over a twenty-four (24) hour period. For volatile pollutants, aliquots must be combined in the laboratory immediately before analysis. The composite must be flow proportional; either the time interval between each aliquot or the volume of each aliquot must be proportional to either the wastewater or effluent flow at the time of sampling or the total wastewater or effluent flow since the collection of the previous aliquot. Aliquots may be collected manually or automatically.

30. "Twice Monthly" monitoring frequency means that two samples shall be collected each calendar month on separate weeks with at least one full week between the two sample dates. Also, there shall be at least one full week between the second sample of a month and the first sample of the following month.

31. "Two (2) -Year Rolling Average" - Antidegradation limits apply as the average of all data collected in a two (2) year (24-month) period. These limits become effective upon the effective date of the permit, but are not reportable on a DMR until two years (typically 24 months) of data have been collected. After data has been collected for 24 months, the 30-day averages for each month are then averaged together to determine the two-year rolling average (using data from month 1 to month 24, then month 2 to month 25, month 3 to month 26, etc).

    For ammonia, two-year rolling averages may be set up for individual months, or may be grouped together for several months. For individual months (every month has a different two-year rolling average limit) the two-year average is reportable after two months of data are collected.

    Example: Permit is effective Jan 2010 and there is a two-year rolling average limit specific to the month of January.

    Jan 2010 DMR – Nothing to Report
    Jan 2011 DMR – 2-Year Average of Jan 2010 and Jan 2011
    Jan 2012 DMR – 2-Year Average of Jan 2011 and Jan 2012, etc.

    Where several months have the same two-year average limit, it is reportable on the DMR after two months of data have been collected for every month in the group.

    Example: Permit is effective Jan 2010 and there is a two-year rolling average limit specific to the months of Jan, Feb, June.

1st Reportable DMR – June 2011 - 2-Year Average Jan 2010 Feb 2010 June 2010 Jan 2011 Feb 2011 June 2011
2nd Reportable DMR – Jan 2012 - 2-Year Average Feb 2010 June 2010 Jan 2011 Feb 2011 June 2011 Jan 2012
3rd Reportable DMR – Feb 2012 - 2-Year Average June 2010 Jan 2011 Feb 2011 June 2011 Jan 2012 Feb 2012, etc.

(See the "Analytical and Sampling Methods for Monitoring and Reporting Section in Part I.D.3 for guidance on calculating averages and reporting analytical results that are less than the PQL).

32. "Visual" observation is observing the discharge to check for the presence of a visible sheen or floating oil.

33. "Water Quality Control Division" or "Division" means the state Water Quality Control Division as established in 25-8-101 et al.)

Additional relevant definitions are found in the Colorado Water Quality Control Act, CRS §§ 25-8-101 et seq., the Colorado Discharge Permit System Regulations, Regulation 61 (5 CCR 1002-61) and other applicable regulations.

D. GENERAL MONITORING, SAMPLING AND REPORTING REQUIREMENTS

5. Routine Reporting of Data

Reporting of the data gathered in compliance with Part I.A or Part I.B shall be on a **monthly** basis. Reporting of all data gathered shall comply with the requirements of Part I.D. (General Requirements). Monitoring results shall be summarized for each calendar month and reported on Division approved discharge monitoring report (DMR) forms (EPA form 3320-1).

The permittee must submit these forms either by mail, or by using the Division's Net-DMR service (when available). If mailed, one form shall be mailed to the Division, as indicated below, so that the DMR is received no later than the 28th day of the following month (for example, the DMR for the first calendar quarter must be received by the Division by April 28th). If no discharge occurs during the reporting period, "No Discharge" shall be reported.

The original signed copy of each discharge monitoring report (DMR) shall be submitted to the Division at the following address:

Colorado Department of Public Health and Environment
Water Quality Control Division
WQCD-P-B2
4300 Cherry Creek Drive South
Denver, Colorado 80246-1530

The Discharge Monitoring Report forms shall be filled out accurately and completely in accordance with requirements of this permit and the instructions on the forms. They shall be signed by an authorized person as identified in Part I.D.8.

6. Representative Sampling

Samples and measurements taken for the respective identified monitoring points as required herein shall be representative of the volume and nature of the monitored discharge. All samples shall be taken at the monitoring points specified in this permit and, unless otherwise specified, before the effluent joins or is diluted by any other wastestream, body of water, or substance. Monitoring points shall not be changed without notification to and approval by the Division.

7. Influent and Effluent Sampling Points

Influent (if required) and effluent sampling points shall be so designed or modified so that: 1) a sample of the influent can be obtained after preliminary treatment and prior to primary or biological treatment and 2) a sample of the effluent can be obtained at a point after the final treatment process and prior to discharge to state waters. The permittee shall provide access to the Division to sample at these points.

8. **Analytical and Sampling Methods for Monitoring and Reporting**

The permittee shall install, calibrate, use and maintain monitoring methods and equipment, including biological and indicated pollutant monitoring methods. All sampling shall be performed by the permittee according to specified methods in 40 C.F.R. Part 136; methods approved by EPA pursuant to 40 C.F.R. Part 136; or methods approved by the Division, in the absence of a method specified in or approved pursuant to 40 C.F.R. Part 136.

Numeric Limits

If the permit contains a numeric effluent limit for a parameter, the analytical method and PQL selected for all monitoring conducted in accordance with this permit for that parameter shall be the one that can measure at or below the numeric effluent limit. If all specified analytical methods and corresponding PQLs are greater than the numeric effluent limit, then the analytical method with the lowest PQL shall be used.

When the analytical method which complies with the above requirements has a PQL greater than the permit limit, and the permittee's analytical result is less than the PQL (the PQL achieved by the lab), the permittee shall report "BDL" on the DMR. Such reports will not be considered as violations of the permit limit, as long as the PQL obtained is lower or equal to the PQL in the table below.

When the analytical method which complies with the above requirements has a PQL that is equal to or less than the permit limitation, and the permittee's analytical result is less than the PQL, "< X" (where X = the actual PQL achieved by the laboratory) shall be reported on the DMR. For parameters that have a report only limitation, and the permittee's analytical result is less than the PQL, "< X" (where X = the actual PQL achieved by the laboratory) shall be reported on the DMR.

Report Only Limits

If the permit contains a report only requirement for a parameter, the analytical method and PQL chosen shall be one that can measure at or below the potential numeric effluent limit(s) (maximum allowable pollutant concentration as shown in the WQA or fact sheet). If all analytical methods and corresponding PQLs are greater than the potential numeric effluent limit(s), then the analytical method with the lowest PQL shall be used.

When the analytical method which complies with the above requirements has a PQL that is equal to or less than the permit limitation, and the permittee's analytical result is less than the PQL, "< X" (where X = the actual PQL achieved by the laboratory) shall be reported on the DMR. For parameters that have a report only limitation, and the permittee's analytical result is less than the PQL, "< X" (where X = the actual PQL achieved by the laboratory) shall be reported on the DMR.

Interim Report Only Followed By a Numeric Limit

If the permit contains an interim effluent limitation (a limit is report until such time as a numeric effluent limit becomes effective) for a parameter, the analytical method and PQL chosen for all monitoring conducted in accordance with this permit for the parameter shall be one that can measure to the final numeric effluent limit. If all analytical methods and corresponding PQLs are greater than the final numeric effluent limit (s), then the analytical method with the lowest PQL shall be used.

While the report only limit is effective, the reporting requirements shall follow those under the Report Only Limits section. Once the numeric limit is effective, the reporting requirements shall follow the numeric limits reporting requirements.

T.I.N.

For parameters such as TIN, the analytical methods chosen shall be those that can measure to the potential or final numeric effluent limit, based on the sum of the PQLs for nitrate, nitrite and ammonia.

Calculating Averages

In the calculation of average concentrations (i.e. daily average, 7- day average, 30-day average, 2-year rolling average) any individual analytical result that is less than the PQL shall be considered to be zero for the calculation purposes. When reporting:

If all individual analytical results are less than the PQL, the permittee shall report either "BDL" or "<X" (where X = the actual PQL achieved by the laboratory), following the guidance above.

If one or more individual results is greater than the PQL, an average shall be calculated and reported. Note that it does not matter if the final calculated average is greater or less than the PQL, **it must be reported as a value**.

Note that when calculating T.I.N. for a single sampling event, any value less than the PQL (for total ammonia, total nitrite, or total nitrate) shall be treated as zero. The T.I.N. concentration for a single sampling event shall then be determined as the sum of the analytical results (zeros if applicable) of same day sampling for total ammonia and total nitrite and total nitrate. From these calculated T.I.N. concentrations, the daily maximum and thirty day average concentrations shall be calculated and must be reported as a value.

PQLs

The PQLs for specific parameters, as determined by the State Laboratory (November 2008) are provided below for reference. If the analytical method cannot achieve a PQL that is less than or equal to the permit limit, then the method, or a more precise method, must achieve a PQL that is less than or equal to the PQL in the table below. A listing of the PQLs for further organic parameters that must meet the above requirement can be found in the Division's Practical Quantitation Limitation Guidance Document, July 2008. This document is available on the Division's website at www.coloradowaterpermits.com.

These limits apply to the total recoverable or the potentially dissolved fraction of metals.

For hexavalent chromium, samples must be unacidified so dissolved concentrations will be measured rather than potentially dissolved concentrations.

Effluent Parameter	Practical Quantitation Limits	Effluent Parameter	Practical Quantitation Limits
Aluminum	50 µg/l		
Arsenic	1 µg/l	N-Ammonia	1 mg/l
Barium	5 µg/l	N-Ammonia (low-level)	50 µg/l
Beryllium	1 µg/l	N-Nitrate/Nitrite	0.5 mg/l
BOD / CBOD	1 mg/l	N-Nitrate	0.5 mg/l
Boron	50 µg/l	N-Nitrite	10 µg/l
Cadmium	1 µg/l	Total Nitrogen	0.5 mg/l
Calcium	20 µg/l	Total Phosphorus	10 µg/l
Chloride	2 mg/l		
Chlorine	0.1 mg/l	Radium 226	1 pCi/l
Total Residual Chlorine		Radium 228	1 pCi/l
DPD colorimetric	0.10 mg/l	Selenium	1 µg/l
Amperometric titration	0.05 mg/l	Silver	0.5 µg/l
Chromium	20 µg/l	Sodium	0.2 mg/l
Chromium, Hexavalent	20 µg/l	Sulfate	5 mg/l
Copper	5 µg/l	Sulfide	0.2 mg/l
Cyanide (Direct / Distilled)	10 µg/l	Total Dissolved Solids	10 mg/l
Cyanide, WAD+A47	10 µg/l	Total Suspended Solids	10 mg/l
Fluoride	0.1 mg/l	Thallium	1 µg/l
Iron	10 µg/l	Uranium	1 µg/l
Lead	1 µg/l	Zinc	10 µg/l
Magnesium	20 µg/l		
Manganese	2 µg/l	Phenols	15 µg/l
Mercury	0.1 µg/l	Nonylphenol D7065	10 µg/l
Mercury (low-level)	0.003 µg/l	Nonylphenol D7485	0.33 µg/l
Nickel	50 µg/l		

9. Records

a. The permittee shall establish and maintain records. Those records shall include, but not be limited to, the following:

i. The date, type, exact place, and time of sampling or measurements;
ii. The individual(s) who performed the sampling or measurements;
iii. The date(s) the analyses were performed;
iv. The individual(s) who performed the analyses;
v. The analytical techniques or methods used; and
vi. The results of such analyses.
vii. Any other observations which may result in an impact on the quality or quantity of the discharge as indicated in 40 CFR 122.44 (i)(1)(iii).

b. The permittee shall retain for a minimum of three (3) years records of all monitoring information, including all original strip chart recordings for continuous monitoring instrumentation, all calibration and maintenance records, copies of all reports required by this permit and records of all data used to complete the application for this permit. This period of retention shall be extended during the course of any unresolved litigation regarding the discharge of pollutants by the permittee or when requested by the Division or Regional Administrator.

10. Flow Measuring Device

If not already a part of the permitted facility, within ninety (90) days after the effective date of the permit, a flow measuring device shall be installed to give representative values of effluent quantities at the respective discharge points. Unless specifically exempted, or modified in Part I.A of this permit, a flow measuring device will be applicable at all designated discharge points.

At the request of the Division, the permittee shall show proof of the accuracy of any flow-measuring device used in obtaining data submitted in the monitoring report. The flow-measuring device must indicate values within ten (10) percent of the actual flow being measured.

11. Signatory and Certification Requirements

a. All reports and other information required by the Division, shall be signed and certified for accuracy by the permittee in accord with the following criteria:

i) In the case of corporations, by a responsible corporate officer. For purposes of this section, the responsible corporate officer is responsible for the overall operation of the facility from which the discharge described in the form originates;

ii) In the case of a partnership, by a general partner;

iii) In the case of a sole proprietorship, by the proprietor;

iv) In the case of a municipal, state, or other public facility, by either a principal executive officer, or ranking elected official. For purposes of this section, a principal executive officer has responsibility for the overall operation of the facility from which the discharge originates;

v) By a duly authorized representative of a person described above, only if:

1) The authorization is made in writing by a person described in i, ii, iii, or iv above;

2) The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity such as the position of plant manager, operator of a well or a well field, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters for the company. (A duly authorized representative may thus be either a named individual or any individual occupying a named position); and,

3) The written authorization is submitted to the Division.

b. If an authorization as described in this section is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of this section must be submitted to the Division prior to or together with any reports, information, or applications to be signed by an authorized representative.

The permittee, or the duly authorized representative shall make and sign the following certification on all such documents:

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

PART II

A. NOTIFICATION REQUIREMENTS

1. Notification to Parties

All notification requirements under this section shall be directed as follows:

a. Oral Notifications, during normal business hours shall be to:

Water Quality Protection Section – Industrial Compliance Program
Water Quality Control Division
Telephone: (303) 692-3500

b. Written notification shall be to:

Water Quality Protection Section – Industrial Compliance Program
Water Quality Control Division
Colorado Department of Public Health and Environment
WQCD-WQP-B2
4300 Cherry Creek Drive South
Denver, CO 80246-1530

2. Change in Discharge

The permittee shall give advance notice to the Division, in writing, of any planned physical alterations or additions to the permitted facility. Notice is required only when:

a. The alteration or addition could significantly change the nature or increase the quantity of pollutants discharged, or;

b. The alteration or addition results in a significant change in the permittee's sludge use or disposal practices, and such alteration, addition, or change may justify the application of permit conditions that are different from or absent in the existing permit, including notification of additional use or disposal sites not reported pursuant to an approved land application plan.

Whenever notification of any planned physical alterations or additions to the permitted facility is required pursuant to this section, the permittee shall furnish the Division such plans and specifications which the Division deems reasonably necessary to evaluate the effect on the discharge, the stream, or ground water. If the Division finds that such new or altered discharge might be inconsistent with the conditions of the permit, the Division shall require a new or revised permit application and shall follow the procedures specified in Sections 61.5 through 61.6, and 61.15 of the Colorado Discharge Permit System Regulations.

3. Noncompliance Notification

The permittee shall give advance notice to the Division, in writing, of any planned changes in the permitted facility or activity that may result in noncompliance with permit requirements.

a. If, for any reason, the permittee does not comply with or will be unable to comply with any discharge limitations or standards specified in this permit, the permittee shall, at a minimum, provide the Division with the following information:

i) A description of the noncompliance and its cause;

ii) The period of noncompliance, including exact dates and times and/or the anticipated time when the discharge will return to compliance; and

iii) Steps being taken to reduce, eliminate, and prevent recurrence of the noncomplying discharge.

b. The permittee shall report the following circumstances **orally within twenty-four (24) hours** from the time the permittee becomes aware of the circumstances, and shall mail to the Division a written report containing the information requested in Part II.A.4 (a) **within five (5) working days** after becoming aware of the following circumstances:

i) Circumstances leading to any noncompliance which may endanger health or the environment regardless of the cause of the incident;

ii) Circumstances leading to any unanticipated bypass which exceeds any effluent limitations in the permit;

iii) Circumstances leading to any upset which causes an exceedance of any effluent limitation in the permit;

iv) Daily maximum violations for any of the pollutants limited by Part I.A of this permit as specified in Part III of this permit. This includes any toxic pollutant or hazardous substance or any pollutant specifically identified as the method to control any toxic pollutant or hazardous substance.

c. Unless otherwise indicated in this permit, the permittee shall report instances of non-compliance which are not required to be reported within 24-hours at the time Discharge Monitoring Reports are submitted. The reports shall contain the information listed in sub-paragraph (a) of this section.

4. Transfer of Ownership or Control

The permittee shall notify the Division, in writing, thirty (30) calendar days in advance of a proposed transfer of the permit.

a. Except as provided in paragraph b. of this section, a permit may be transferred by a permittee only if the permit has been modified or revoked and reissued as provided in Section 61.8(8) of the Colorado Discharge Permit System Regulations, to identify the new permittee and to incorporate such other requirements as may be necessary under the Federal Act.

b. A permit may be automatically transferred to a new permittee if:

i) The current permittee notifies the Division in writing 30 calendar days in advance of the proposed transfer date; and

ii) The notice includes a written agreement between the existing and new permittee(s) containing a specific date for transfer of permit responsibility, coverage and liability between them; and

iii) The Division does not notify the existing permittee and the proposed new permittee of its intent to modify, or revoke and reissue the permit.

iv) Fee requirements of the Colorado Discharge Permit System Regulations, Section 61.15, have been met.

5. Other Notification Requirements

Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule in the permit, shall be submitted on the date listed in the compliance schedule section. The fourteen (14) calendar day provision in Regulation 61.8(4)(n)(i) has been incorporated into the due date.

The permittee's notification of all anticipated noncompliance does not stay any permit condition.

All existing manufacturing, commercial, mining, and silvicultural dischargers must notify the Division as soon as they know or have reason to believe:

a. That any activity has occurred or will occur which would result in the discharge, on a routine or frequent basis, of any toxic pollutant which is not limited in the permit, if that discharge will exceed the highest of the following "notification levels":

i) One hundred micrograms per liter (100 µg/l);

ii) Two hundred micrograms per liter (200 µg/l) for acrolein and acrylonitrile; five hundred micrograms per liter (500 µg/l) for 2.4-dinitrophenol and 2-methyl-4.6-dinitrophenol; and one milligram per liter (1.0 mg/l) for antimony;

iii) Five (5) times the maximum concentration value reported for that pollutant in the permit application in accordance with Section 61.4(2)(g).

iv) The level established by the Division in accordance with 40 C.F.R. § 122.44(f).

b. That any activity has occurred or will occur which would result in any discharge, on a non-routine or infrequent basis, of a toxic pollutant which is not limited in the permit, if that discharge will exceed the highest of the following "notification levels":

i) Five hundred micrograms per liter (500 µg/l);

ii) One milligram per liter (1 mg/l) for antimony; and

iii) Ten (10) times the maximum concentration value reported for that pollutant in the permit application.

iv) The level established by the Division in accordance with 40 C.F.R. § 122.44(f).

6. Bypass Notification

If the permittee knows in advance of the need for a bypass, a notice shall be submitted, at least ten (10) calendar days before the date of the bypass, to the Division. The bypass shall be subject to Division approval and limitations imposed by the Division. Violations of requirements imposed by the Division will constitute a violation of this permit.

7. Bypass

a. "Bypass" means the intentional diversion of waste streams from any portion of a treatment facility.

b. Bypasses are prohibited and the Division may take enforcement action against the permittee for bypass, unless:

i) The bypass is unavoidable to prevent loss of life, personal injury, or severe property damage;

ii) There were no feasible alternatives to bypass such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass which occurred during normal periods of equipment downtime or preventive maintenance; and

iii) Proper notices were submitted in compliance with Part II.A.5.

c. "Severe property damage" as used in this Subsection means substantial physical damage to the treatment facilities which causes them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.

d. The permittee may allow a bypass to occur which does not cause effluent limitations to be exceeded, but only if it also is for essential maintenance or to assure optimal operation. These bypasses are not subject to the provisions of paragraph (a) above.

e. The Division may approve an anticipated bypass, after considering adverse effects, if the Division determines that the bypass will meet the conditions specified in paragraph (a) above.

8. Upsets

a. "Upset" means an exceptional incident in which there is unintentional and temporary noncompliance with permit effluent limitations because of factors beyond the reasonable control of the permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventative maintenance, or careless or improper operation.

b. Effect of an Upset

An upset constitutes an affirmative defense to an action brought for noncompliance with permit effluent limitations if the requirements of paragraph (b) of this section are met. No determination made during administrative review of claims that noncompliance was caused by upset, and before an action for noncompliance, is final administrative action subject to judicial review.

c. Conditions Necessary for a Demonstration of Upset

A permittee who wishes to establish the affirmative defense of upset shall demonstrate through properly signed contemporaneous operating logs, or other relevant evidence that:

i) An upset occurred and that the permittee can identify the specific cause(s) of the upset; and

ii) The permitted facility was at the time being properly operated and maintained; and

iii) The permittee submitted proper notice of the upset as required in Part II.A.4. of this permit (24-hour notice); and
iv) The permittee complied with any remedial measure necessary to minimize or prevent any discharge or sludge use or disposal in violation of this permit which has a reason able likelihood of adversely affecting human health or the environment.

In addition to the demonstration required above, a permittee who wishes to establish the affirmative defense of upset for a violation of effluent limitations based upon water quality standards shall also demonstrate through monitoring, modeling or other methods that the relevant standards were achieved in the receiving water.

d. Burden of Proof

In any enforcement proceeding the permittee seeking to establish the occurrence of an upset has the burden of proof.

9. Submission of Incorrect or Incomplete Information

Where the permittee becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or in any report to the Division, the permittee shall promptly submit such facts or information.

B. RESPONSIBILITIES

1. Reduction, Loss, or Failure of Treatment Facility

The permittee has the duty to halt or reduce any activity if necessary to maintain compliance with the effluent limitations of the permit. Upon reduction, loss, or failure of the treatment facility, the permittee shall, to the extent necessary to maintain compliance with its permit, control production, control sources of wastewater, or all discharges, until the facility is restored or an alternative method of treatment is provided. This provision also applies to power failures, unless an alternative power source sufficient to operate the wastewater control facilities is provided.

It shall not be a defense for a permittee in an enforcement action that it would be necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

2. Inspections and Right to Entry

The permittee shall allow the Division and/or the authorized representative, upon the presentation of credentials:

a. To enter upon the permittee's premises where a regulated facility or activity is located or in which any records are required to be kept under the terms and conditions of this permit;

b. At reasonable times to have access to and copy any records required to be kept under the terms and conditions of this permit and to inspect any monitoring equipment or monitoring method required in the permit; and

c. To enter upon the permittee's premises in a reasonable manner and at a reasonable time to inspect and/or investigate, any actual, suspected, or potential source of water pollution, or to ascertain compliance or non compliance with the Colorado Water Quality Control Act or any other applicable state or federal statute or regulation or any order promulgated by the Division. The investigation may include, but is not limited to, the following: sampling of any discharge and/or process waters, the taking of photographs, interviewing of any person having knowledge related to the discharge permit or alleged violation, access to any and all facilities or areas within the permittee's premises that may have any affect on the discharge, permit, or alleged violation. Such entry is also authorized for the purpose of inspecting and copying records required to be kept concerning any effluent source.

d. The permittee shall provide access to the Division to sample the discharge at a point after the final treatment process but prior to the discharge mixing with state waters upon presentation of proper credentials.

In the making of such inspections, investigations, and determinations, the Division, insofar as practicable, may designate as its authorized representatives any qualified personnel of the Department of Agriculture. The Division may also request assistance from any other state or local agency or institution.

3. Duty to Provide Information

The permittee shall furnish to the Division, within a reasonable time, any information which the Division may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit, or to determine compliance with this permit. The permittee shall also furnish to the Division, upon request, copies of records required to be kept by this permit.

4. Availability of Reports

Except for data determined to be confidential under Section 308 of the Federal Clean Water Act and the Colorado Discharge Permit System Regulations 5 CCR 1002-61, Section 61.5(4), all reports prepared in accordance with the terms of this permit shall be available for public inspection at the offices of the Division and the Environmental Protection Agency.

The name and address of the permit applicant(s) and permittee(s), permit applications, permits and effluent data shall not be considered confidential. Knowingly making false statement on any such report may result in the imposition of criminal penalties as provided for in Section 309 of the Federal Clean Water Act, and Section 25-8-610 C.R.S.

5. Modification, Suspension, Revocation, or Termination of Permits By the Division

The filing of a request by the permittee for a permit modification, revocation and reissuance, termination or a notification of planned changes or anticipated noncompliance, does not stay any permit condition.

a. A permit may be modified, suspended, or terminated in whole or in part during its term for reasons determined by the Division including, but not limited to, the following:

   i) Violation of any terms or conditions of the permit;

   ii) Obtaining a permit by misrepresentation or failing to disclose any fact which is material to the granting or denial of a permit or to the establishment of terms or conditions of the permit; or

   iii) Materially false or inaccurate statements or information in the permit application or the permit.

   iv) A determination that the permitted activity endangers human health or the classified or existing uses of state waters and can only be regulated to acceptable levels by permit modifications or termination.

b. A permit may be modified in whole or in part for the following causes, provided that such modification complies with the provisions of Section 61.10 of the Colorado Discharge Permit System Regulations:

   i) There are material and substantial alterations or additions to the permitted facility or activity which occurred after permit issuance which justify the application of permit conditions that are different or absent in the existing permit.

ii) The Division has received new information which was not available at the time of permit issuance (other than revised regulations, guidance, or test methods) and which would have justified the application of different permit conditions at the time of issuance. For permits issued to new sources or new dischargers, this cause includes information derived from effluent testing required under Section 61.4(7)(e) of the Colorado Discharge Permit System Regulations. This provision allows a modification of the permit to include conditions that are less stringent than the existing permit only to the extent allowed under Section 61.10 of the Colorado Discharge Permit System Regulations.

iii) The standards or regulations on which the permit was based have been changed by promulgation of amended standards or regulations or by judicial decision after the permit was issued. Permits may be modified during their terms for this cause only as follows:

(A) The permit condition requested to be modified was based on a promulgated effluent limitation guideline, EPA approved water quality standard, or an effluent limitation set forth in 5 CCR 1002-62, § 62 et seq.; and

(B) EPA has revised, withdrawn, or modified that portion of the regulation or effluent limitation guideline on which the permit condition was based, or has approved a Commission action with respect to the water quality standard or effluent limitation on which the permit condition was based; and

(C) The permittee requests modification after the notice of final action by which the EPA effluent limitation guideline, water quality standard, or effluent limitation is revised, withdrawn, or modified; or

(D) For judicial decisions, a court of competent jurisdiction has remanded and stayed EPA promulgated regulations or effluent limitation guidelines, if the remand and stay concern that portion of the regulations or guidelines on which the permit condition was based and a request is filed by the permittee in accordance with this Regulation, within ninety (90) calendar days of judicial remand.

iv) The Division determines that good cause exists to modify a permit condition because of events over which the permittee has no control and for which there is no reasonable available remedy.

v) Where the Division has completed, and EPA approved, a total maximum daily load (TMDL) which includes a wasteload allocation for the discharge(s) authorized under the permit.

vi) The permittee has received a variance.

vii) When required to incorporate applicable toxic effluent limitation or standards adopted pursuant to § 307(a) of the Federal act.

viii) When required by the reopener conditions in the permit.

ix) As necessary under 40 C.F.R. 403.8(e), to include a compliance schedule for the development of a pretreatment program.

x) When the level of discharge of any pollutant which is not limited in the permit exceeds the level which can be achieved by the technology-based treatment requirements appropriate to the permittee under Section 61.8(2) of the Colorado Discharge Permit System Regulations.

xi) To establish a pollutant notification level required in Section 61.8(5) of the Colorado Discharge Permit System Regulations.

xii) To correct technical mistakes, such as errors in calculation, or mistaken interpretations of law made in determining permit conditions, to the extent allowed in Section 61.10 of the Colorado State Discharge Permit System Regulations.

xiii) When required by a permit condition to incorporate a land application plan for beneficial reuse of sewage sludge, to revise an existing land application plan, or to add a land application plan.

xiv) When another State whose waters may be affected by the discharge has not been notified.

xv) For any other cause provided in Section 61.10 of the Colorado Discharge Permit System Regulations.

c. At the request of a permittee, the Division may modify or terminate a permit and issue a new permit if the following conditions are met:

i) The Regional Administrator has been notified of the proposed modification or termination and does not object in writing within thirty (30) calendar days of receipt of notification,

ii) The Division finds that the permittee has shown reasonable grounds consistent with the Federal and State statutes and regulations for such modifications or termination;

iii) Requirements of Section 61.15 of the Colorado Discharge Permit System Regulations have been met, and

iv) Requirements of public notice have been met.

d. For permit modification, termination, or revocation and reissuance, the Division may request additional information from the permittee. In the case of a modified permit, the Division may require the submission of an updated application. In the case of revoked and reissued permit, the Division shall require the submission of a new application.

e. Permit modification (except for minor modifications), termination or revocation and reissuance actions shall be subject to the requirements of Sections 61.5(2), 61.5(3), 61.6, 61.7 and 61.15 of the Colorado Discharge Permit System Regulations. The Division shall act on a permit modification request, other than minor modification requests, within 180 calendar days of receipt thereof. Except for minor modifications, the terms of the existing permit govern and are enforceable until the newly issued permit is formally modified or revoked and reissued following public notice.

f. Upon consent by the permittee, the Division may make minor permit modifications without following the requirements of Sections 61.5(2), 61.5(3), 61.7, and 61.15 of the Colorado Discharge Permit System Regulations. Minor modifications to permits are limited to:

i) Correcting typographical errors; or

ii) Increasing the frequency of monitoring or reporting by the permittee; or

iii) Changing an interim date in a schedule of compliance, provided the new date of compliance is not more than 120 calendar days after the date specific in the existing permit and does not interfere with attainment of the final compliance date requirement; or

iv) Allowing for a transfer in ownership or operational control of a facility where the Division determines that no other change in the permit is necessary, provided that a written agreement containing a specific date for transfer of permit responsibility, coverage and liability between the current and new permittees has been submitted to the Division; or

v) Changing the construction schedule for a discharger which is a new source, but no such change shall affect a discharger's obligation to have all pollution control equipment installed and in operation prior to discharge; or

vi) Deleting a point source outfall when the discharge from that outfall is terminated and does not result in discharge of pollutants from other outfalls except in accordance with permit limits.

vii) Incorporating conditions of a POTW pretreatment program that has been approved in accordance with the procedures in 40 CFR 403.11 (or a modification thereto that has been approved in accordance with the procedures in 40 CFR 403.18) as enforceable conditions of the POTW's permits.

g. When a permit is modified, only the conditions subject to modification are reopened. If a permit is revoked and reissued, the entire permit is reopened and subject to revision and the permit is reissued for a new term.

h. The filing of a request by the permittee for a permit modification, revocation and reissuance or termination does not stay any permit condition.

i. All permit modifications and reissuances are subject to the antibacksliding provisions set forth in 61.10(e) through (g).

j. If cause does not exist under this section, the Division shall not modify or revoke and reissue the permit.

6. Oil and Hazardous Substance Liability

Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties to which the permittee is or may be subject to under Section 311 (Oil and Hazardous Substance Liability) of the Clean Water Act.

7. State Laws

Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties established pursuant to any applicable State law or regulation under authority granted by Section 510 of the Clean Water Act. Nothing in this permit shall be construed to prevent or limit application of any emergency power of the division.

8. Permit Violations

Failure to comply with any terms and/or conditions of this permit shall be a violation of this permit. The discharge of any pollutant identified in this permit more frequently than or at a level in excess of that authorized shall constitute a violation of the permit. Except as provided elsewhere in this permit, nothing in this permit shall be construed to relieve the permittee from civil or criminal penalties for noncompliance (40 CFR 122.41(a)(1)).

9. Severability

The provisions of this permit are severable. If any provisions or the application of any provision of this permit to any circumstances, is held invalid, the application of such provision to other circumstances and the application of the remainder of this permit shall not be affected.

10. Confidentiality

Any information relating to any secret process, method of manufacture or production, or sales or marketing data which has been declared confidential by the permittee, and which may be acquired, ascertained, or discovered, whether in any sampling investigation, emergency investigation, or otherwise, shall not be publicly disclosed by any member, officer, or employee of the Commission or the Division, but shall be kept confidential. Any person seeking to invoke the protection of this Subsection (12) shall bear the burden of proving its applicability. This section shall never be interpreted as preventing full disclosure of effluent data.

11. Fees

The permittee is required to submit payment of an annual fee as set forth in the 2005 amendments to the Water Quality Control Act. Section 25-8-502 (l) (b), and the Colorado Discharge Permit System Regulations 5 CCR l002-61, Section 61.l5 as amended. Failure to submit the required fee when due and payable is a violation of the permit and will result in enforcement action pursuant to Section 25-8-60l et. seq., C.R.S. l973 as amended.

12. Duration of Permit

The duration of a permit shall be for a fixed term and shall not exceed five (5) years. If the permittee desires to continue to discharge, a permit renewal application shall be submitted at least one hundred eighty (180) calendar days before this permit expires. Filing of a timely and complete application shall cause the expired permit to continue in force to the effective date of the new permit. The permit's duration may be extended only through administrative extensions and not through interim modifications.If the permittee anticipates there will be no discharge after the expiration date of this permit, the Division should be promptly notified so that it can terminate the permit in accordance with Part II.B.4.

13. Section 307 Toxics

If a toxic effluent standard or prohibition, including any applicable schedule of compliance specified, is established by regulation pursuant to Section 307 of the Federal Act for a toxic pollutant which is present in the permittee's discharge and such standard or prohibition is more stringent than any limitation upon such pollutant in the discharge permit, the Division shall institute proceedings to modify or revoke and reissue the permit to conform to the toxic effluent standard or prohibition.

14. Effect of Permit Issuance

a. The issuance of a permit does not convey any property or water rights in either real or personal property, or stream flows or any exclusive privilege.

b. The issuance of a permit does not authorize any injury to person or property or any invasion of personal rights, nor does it authorize the infringement of federal, state, or local laws or regulations.

c. Except for any toxic effluent standard or prohibition imposed under Section 307 of the Federal act or any standard for sewage sludge use or disposal under Section 405(d) of the Federal act, compliance with a permit during its term constitutes compliance, for purposes of enforcement, with Sections 301, 302, 306, 318, 403, and 405(a) and (b) of the Federal act. However, a permit may be modified, revoked and reissued, or terminated during its term for cause as set forth in Section 61.8(8) of the Colorado Discharge Permit System Regulations.

d. Compliance with a permit condition which implements a particular standard for biosolid use or disposal shall be an affirmative defense in any enforcement action brought for a violation of that standard for biosolid use or disposal.

PART III
CATEGORICAL INDUSTRIES

Aluminum Forming
Asbestos Manufacturing
Battery Manufacturing
Builders' Paper and Board Mills
Canned & Preserved Fruits and Vegetables Processing
Canned & Preserved Seafood Processing
Carbon Black Manufacturing
Cement Manufacturing
Coal Mining
Coil Coating
Copper Forming
Dairy Products Processing
Electrical and Electronic Components
Electroplating
Explosives Manufacturing
Feedlots
Ferroalloy Manufacturing
Fertilizer Manufacturing
Glass Manufacturing
Grain Mills
Gum and Wood Chemicals Manufacturing
Hospital
Ink Formulation
Inorganic Chemicals Manufacturing
Iron and Steel Manufacturing
Leather Tanning and Finishing
Meat Products
Metal Finishing
Metal Molding and Casting (Foundries)
Mineral Mining and Processing
Nonferrous Metals Manufacturing
Nonferrous Metals Forming and Metal Powders
Oil and Gas Extraction
Organic Chemicals, Plastics, and Synthetic Fibers
Ore Mining and Dressing
Paint Formulation
Paving and Roofing Materials (Tars and Asphalt)
Pesticide Chemicals
Petroleum Refining
Pharmaceutical Manufacturing
Phosphate Manufacturing
Photographic
Plastics Molding and Forming
Porcelain Enameling
Pulp, Paper, and Paperboard Manufacturing
Rubber Manufacturing
Soap and Detergent Manufacturing
Steam Electric Power Generating
Sugar Processing
Textile Mills
Timber Products Processing

PRIORITY POLLUTANTS AND HAZARDOUS SUBSTANCES
ORGANIC TOXIC POLLUTANTS IN EACH OF FOUR FRACTIONS
IN ANALYSIS BY GAS CHROMATOGRAPHY/MASS SPECTROSCOPY (GC/MS)

Volatiles	**Base/Neutral**	**Acid Compounds**	**Pesticides**
acrolein	acenaphthene	2-chlorophenol	aldrin
acrylonitrile	acenaphthylene	2,4-dichlorophenol	alpha-BHC
benzene	anthracene	2,4,-dimethylphenol	beta-BHC
bromoform	benzidine	4,6-dinitro-o-cresol	gamma-BHC
carbon tetrachloride	benzo(a)anthracene	2,4-dinitrophenol	delta-BHC
chlorobenzene	benzo(a)pyrene	2-nitrophenol	chlordane
chlorodibromomethane	3,4-benzofluoranthene	4-nitrophenol	4,4'-DDT
chloroethane	benzo(ghi)perylene	p-chloro-m-cresol	4,4'-DDE
2-chloroethylvinyl ether	benzo(k)fluoranthene	pentachlorophenol	4,4'-DDD
chloroform	bis(2-chloroethoxy)methane	phenol	dieldrin
dichlorobromomethane	bis(2-chloroethyl)ether	2,4,6-trichlorophenol	alpha-endosulfan
1,1-dichlorethane	bis(2-chloroisopropyl)ether		beta-endosulfan
1,2-dichlorethane	bis(2-ethylhexyl)phthalate		endosulfan sulfate
1,1-dichlorethylene	4-bromophenyl phenyl ether		endrin
1,2-dichlorpropane	butylbenzyl phthalate		endrin aldehyde
1,3-dichlorpropylene	2-chloronaphthalene		heptachlor
ethylbenzene	4-chlorophenyl phenyl ether		heptachlor epoxide
methyl bromide	chrysene		PCB-1242
methyl chloride	dibenzo(a,h)anthracene		PCB-1254
methylene chloride	1,2-dichlorobenzene		PCB-1221

PRIORITY POLLUTANTS AND HAZARDOUS SUBSTANCES

ORGANIC TOXIC POLLUTANTS IN EACH OF FOUR FRACTIONS
IN ANALYSIS BY GAS CHROMATOGRAPHY/MASS SPECTROSCOPY (GC/MS)

Volatiles	Base/Neutral	Acid Compounds	Pesticides
1,1,2,2-tetrachloroethane	1,3-dichlorobenzene		PCB-1232
tetrachloroethylene	1,4-dichlorobenzene		PCB-1248
toluene	3,3-dichlorobenzidine		PCB-1260
1,2-trans-dichloroethylene	diethyl phthalate		PCB-1016
1,1,1-trichloroethane	dimethyl phthalate		toxaphene
1,1,2-trichloroethane	di-n-butyl phthalate		
trichloroethylene	2,4-dinitrotoluene		
vinyl chloride	2,6-dinitrotoluene		
	di-n-octyl phthalate		
	1,2-diphenylhydrazine (as azobenzene)		
	fluorene		
	fluoranthene		
	hexachlorobenzene		
	hexachlorobutadiene		
	hexachlorcyclopentadiene		
	hexachloroethane		
	indeno(1,2,3-cd)pyrene		
	isophorone		
	naphthalene		
	nitrobenzene		
	N-nitrosodimethylamine		
	N-nitrosodi-n-propylamine		
	N-nitrosodiphenylamine		
	phenanthrene		
	pyrene		
	1,2,4-trichlorobenzene		

OTHER TOXIC POLLUTANTS (AMMONIA, METALS AND CYANIDE) AND TOTAL PHENOLS

Antimony, Total
Arsenic, Total
Beryllium, Total
Cadmium, Total
Chromium, Total
Copper, Total
Lead, Total
Mercury, Total
Nickel, Total
Selenium, Total
Silver, Total
Thallium, Total
Zinc, Total
Cyanide, Total
Phenols, Total

TOXIC POLLUTANTS AND HAZARDOUS SUBSTANCES

REQUIRED TO BE IDENTIFIED BY EXISTING DISCHARGERS
IF EXPECTED TO BE PRESENT

Toxic Pollutants

Asbestos

Hazardous Substances

Acetaldehyde
Allyl alcohol
Allyl chloride
Amyl acetate
Aniline
Benzonitrile
Benzyl chloride
Butyl acetate
Butylamine
Captan
Carbaryl
Carbofuran
Carbon disulfide
Chlorpyrifos
Coumaphos
Cresol
Crotonaldehyde
Cyclohexane
2,4-D(2,4-Dichlorophenoxy acetic acid)
Diazinon
Dicamba
Dichlobenil
Dichlone
2,2-Dichloropropionic acid
Dichlorvos
Diethyl amine
Dimethyl amine
Dinitrobenzene
Diquat
Disulfoton
Diuron
Epichlorohydrin
Ethanolamine
Ethion
Ethylene diamine
Ethylene dibromide
Formaldehyde
Furfural
Guthion
Isoprene
Isopropanolamine
Keithane
Kepone
Malathion
Mercaptodimethur
Methoxychlor
Methyl mercaptan
Methyl methacrylate
Methyl parathion
Mexacarbate
Monoethyl amine
Monomethyl amine
Naled
Napthenic acid
Nitrotoluene
Parathion
Phenolsulfanate
Phosgene
Propargite
Propylene oxide
Pyrethrins
Quinoline
Resorcinol
Strontium
Strychnine
Styrene
TDE (Tetrachlorodiphenylethane)
2,4,5-T (2,4,5-Trichlorophenoxy acetic acid)
2,4,5-TP [2-(2,4,5-Trichlorophenoxy) propanoic acid]
Trichlorofan
Triethylamine
Trimethylamine
Uranium
Vandium
Vinyl Acetate
Xylene
Xylenol
Zirconium

RECLAMATION COST
ESTIMATE QUOTES

Iron Woman MINING SERVICES LLC

5680 Emerson Street
Denver, CO 80216
T: 303-399-5534
F: 720-484-6463

8/13/2024
Attn: Nick Martin – Environmental Manager
Budgetary Estimate – Whirlwind Mine Decline Bulkhead

Dear Mr. Martin

Per your request, I have provided a high-level budgetary estimate for the installation of a decline bulkhead in the Whirlwind Uranium Mine. As you are aware, Iron Woman Mining Services has installed multiple bulkheads of this type in the State of Colorado and one of the largest concrete bulkhead complexes in North America, at the Whiskey Island Salt Mine in Cleveland, Ohio. Iron Woman is currently constructing a 10x10'x10' concrete bulkhead 1,600 feet underground in the Yak Tunnel in Leadville. This project, in many ways, is similar to the Whirlwind (with the exception that the Yak Tunnel has a functioning ventilation system and 480V power at the bulkhead location). I have real and accurate cost metrics from this project that can be applied to your budgetary estimate. For these reasons, Iron Woman considers itself to be a subject matter expert and highly competent in developing cost estimates for these types of projects.

The budgetary estimate below should only be referenced as a baseline comparison against previous budgets for the purpose of bonding and not as a formal and detailed cost proposal. This estimate does not include the "potential" tasks associated with the rehabilitation of the tunnel access, as, without a site visit, it is impossible to determine what requirements are associated with ground improvements and stabilization, water management, and ventilation.

Best Regards,

John Trujillo
Senior Program Manager
Iron Woman Mining Services, LLC.

Whirlwind Mine Budgetary Estimate

- Preconstruction Planning - $25,000.00
- Bulkhead Engineering and Design - $45,000.00
- Mobilization and Staging - $65,000.00
- Ground Improvements - *Excluded due to insufficient site inspection information*
- Radiation Monitoring – *Not included due to insufficient hazard metrics*
- Ventilation system procurements and installation - $85,000.00 (rental if available, more if purchased out right)
    - *Note. A ventilation study will need to be conducted to ensure an adequate ventilation design is installed.*
- Overexcavation & Prep - $35,000.00
- Bulkhead Construction - $150,000.00
- Interface Grouting - $45,000.00
- Demobilization - $50,000.00
- Site Support Facilities (Generators, Dry Facility, Water Tanks, Fuel, etc.) - $75,000.00

Total Construction Cost - $575,000.00

8/27/2024
Energy Fuels
Whirlwind Bulkhead
Dawn Kolkman

Job Scope:

Form up and pour bulkhead per state requirements.

Total estimate for this project: $202,182.66

This estimate is for one bulkhead.
Thank you for allowing Thirsty Bird Energy Services to be a part of this project.
If you have any questions please feel free to call.

Zach Larimore
Ops Manager
Thirsty Bird Energy Services
(970) 314-5777
zachlarimore@thirstybirdllc.com

RAM Enterprise, Inc.
1225 West Main Elko, NV 89801
Phone 775/738-3997 Fax 775/738-4261
info@ram-enterprise.com www.ram-enterprise.com

Thursday, August 29, 2024

Nick Martin
Energy Fuels Resources (USA) Inc.
225 Union Blvd. Suite 600
Lakewood, CO. 80228

Quotation Number: **CP3022**
Reference: **Underground Bulkhead**
CONFIDENTIAL

Dear Nick:

RAM Enterprise, Inc. is familiar with the work hereinafter described and the conditions affecting the work. Per your recent emailed request, RAM Enterprise, Inc. hereby submits this **budgetary estimate**, which includes the following scope of work, with exceptions as noted:

RAM Construction

1. Mobilize a 5-man crew to the site
2. Perform necessary FLRA, job kickoff meeting, and necessary paperwork
3. Prep area for the bulkhead placement
4. Install and tie rebar form bulkhed
5. Install grout lines and install bulkhead to pump grout after concrete placement
6. Pour concrete and pump grout
7. Demobilize
8. This estimate is based on 5 technicians working eight 12-hour day shifts

RAM will provide the following:
- Engineering of the bulkhead
- Reach forklift
- Mini X with a hammer and skid steer
- All crafts and tools to do the work
- All materials
- Forms and rebar
- Concrete
- Crew transportation
- Vent bag and ventilation fan

Energy Fuels will provide the following:
- Mine supervision
- Fuel and lubricants for equipment
- Mine radio communication
- Adequate laydowns for materials and equipment
- Permitting
- Site training
- Gieger counter/air monitor for air testing/logging

RAM Enterprise, Inc. proposes to furnish all mobilization, expenses, labor, supplies, equipment listed above, and supervision necessary for completion of the above-mentioned scope of work for a **budgetary estimated** price of **$619,729.52**

Mobilization	$15,376.00
Equipment	$79,914.00
Materials	$60,000.00
Subcontractors	$80,000.00
Labor	$285,439.52
Expenses	$99,000.00
Total	**$619,729.52**

Contractors Licenses

AK	AZ	CA	ID	NM	NV	NV	TN	UT	WY
1003140 General Contractor	ROC251948 A General Engineering ROC302858 CR11-Electrical	968820 A General Engineering	RCE-33404 Contracting Business RCE-24658 Electrical	GF08 372460	0045094 A General Engineering 0076658 C-2 Electrical	0073779 B-2 Residential Sm Com 0067462 C-5 Concrete	73802 HC-E Mining Surface & UG	7518505-5501 E100-General Engineering S200-Electrical	C-43257 Electrical

RAM Enterprise, Inc.
1225 West Main Elko, NV 89801
Phone 775/738-3997 Fax 775/738-4261
info@ram-enterprise.com www.ram-enterprise.com

Please Note: At the beginning of each shift, you will be required to provide RAM's foreman with the name and phone number of your representative who will be available to approve any required Field Change Orders and to sign our Notice of Completion at the end of the shift.

The following items are excluded from our proposal:

- The cost of any changes in the scope of work not defined before this proposal was offered
- Forces of nature or disasters of any kind to include rain, floods, plant emergencies, and earthquakes
- Stand-by time not caused by RAM Enterprise, Inc.
- Any items of work not specifically called out in the items of work included in the above scope
- Prices are exclusive of taxes, duties, and fees unless otherwise quoted
- The cost to you if the job is scheduled then cancelled without 24 hours' notice will be $2500 in addition to the resale value of any materials purchased between award and cancellation

Payment Terms: Net 30 days unless otherwise agreed in writing

This proposal document is to be used only for evaluation of RAM Enterprise, Inc. pricing and terms and conditions for the above-mentioned project. The owner is not granted an implied or expressed license to use this proposal or work plan in any other manner, including without limitation the copying or reproduction of same.

This proposal may be withdrawn if not accepted within 30 days.

Please feel free to contact me if you have any questions. Thank you for giving us this opportunity to be of service to you.

Sincerely,

Troy Pool
Project Manager, Underground Construction
Cell (775) 927-0420
tpool@ram-enterprise.com

7/18/2024
Energy Fuels
Whirlwind Mine
Dawn Kolkman

Job Scope:

Remove pond liner at Whirlwind mine and haul to Broad Canyon landfill.
Re-shape pond and clean up.

Total estimate for this project: $45,492.00

This estimate includes liner disposal fees.
Thank you for allowing Thirsty Bird Energy Services to be a part of this project.
If you have any questions please feel free to call.

Zach Larimore
Ops Manager
Thirsty Bird Energy Services
(970) 314-5777
zachlarimore@thirstybirdllc.com

3/14/2022
Energy Fuels
Beaver Mine
Race Fisher

Job Scope:

Remove power poles and line. Remove power line from surface to underground bay. Remove fuel line from surface to underground fuel bay. Plug holes and cap with 3' of concrete.

Power pole removal:	$400.00	per pole
Power line removal:	$2.00	per ft.
Plug holes from surface to fuel bay:	$2,500.00	

This estimate includes haulage and disposal.
Thank you for allowing Thirsty Bird Energy Services to be a part of this project.
If you have any questions please feel free to call.

Zach Larimore
Ops Manager
Thirsty Bird Energy Services
(970) 314-5777