

LOGAN WASH MINE
ANNUAL REPORT

Mine Permit No. M-1977-424
Anniversary Date: March 28, 2018

Prepared for

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**Logan Wash Mine
Annual Report
March 28th, 2017 – March 27th, 2018
Permit No. M-1977-424**

1.0 Introduction

This annual report has been prepared in accordance with regulations of the State of Colorado Division of Reclamation, Mining and Safety (DRMS) and the regulations promulgated by the Colorado Mined Land Reclamation Board. The information presented in this report pertains to the period March 28, 2017 to March 27, 2018 (reporting period). Projected reclamation activities for the following year are also presented.

The Logan Wash Mine, located approximately 12 miles northeast of De Beque, Colorado, is managed by Glenn Springs Holdings, Inc. (GSHI) for Occidental Oil Shale, Inc. (OOSI). The main mine portals are located in Section 25, Township 7 South, Range 97 West. A general site location map for the Logan Wash Mine is presented in Figure 1.

This annual report summarizes the reclamation status of the Logan Wash Mine. The Logan Wash Mine is currently under closure and reclamation status. During the reporting period reclamation maintenance work was conducted on the OOSI property. GSHI anticipates reclamation maintenance activities to continue in 2018.

In 2006, at the request of DRMS, OOSI prepared and submitted Amendment No. 1: Retort Water Pipeline and Evaporation Pond. Although these structures were constructed in 1984 after receiving permits from the U.S. Bureau of Land Management (BLM) and Garfield County, for unknown reasons the structures were not incorporated into the existing mine permit. On August 5th, 2008, DRMS approved the amendment and granted OOSI a 10-year extension of the reclamation period for Logan Wash Mine. This extension will allow for the potential further attenuation of solutes in the retort discharge water and allow OOSI to evaluate viable alternatives for final mine closure.

The remainder of this annual report is organized as follows:

- Section 2: Disturbed Acreage Status
- Section 3: Monitoring Activities in 2017
- Section 4: Reclamation Activities in 2017
- Section 5: Maintenance Activities in 2017
- Section 6: Anticipated Reclamation in the Year 2018
- Section 7: Anticipated Disturbance in the Year 2018
- Section 8: Threatened Species Designation

Please refer to Figure 1, the Logan Wash Mine Location Map, Figure 2, Logan Wash Mine Facilities, and Figure 3, the Logan Wash Mine Monitoring Wells for features discussed in this report. This report also refers to Exhibit E, the original reclamation plan, and Exhibit F, the reclamation map. Please see Exhibit E in the permit document files; a copy of Exhibit F is attached. In the report text, all acreage amounts have been rounded to the nearest tenth of an acre.

2.0 Disturbed Acreage Status

During the reporting period no additional acreage was disturbed. According to Exhibit E of the Reclamation Plan (1981) for Logan Wash Mine, 134.7 acres were approved for disturbance

within the permit area with an actual disturbance of 113.6 acres. This acreage has been revised to account for subsequent new disturbance and incorporation of the Evaporation Pond (Amendment No. 1) into the permit. See Table 1.0 for a summary of acreage reclamation status.

Annual reports have shown since at least 1985 that Area 23, Evaporation Pond and Pipeline, was initially a 14.8-acre disturbance. The 1985 annual report shows that approximately 5.1 acres of this acreage was reclaimed prior to the report's published date in spring 1986. Table 1.0 shows the Evaporation Pond and Pipeline acreage as Area 23. Table 1.0 also shows the disturbed acreage for the Soil Barrow Area that was added in 2005.

Based on this total acreage and reclamation performed, Table 1.0 shows that the estimated actual disturbed acreage was approximately 135.2 acres and of this amount, 61.7 acres are not to be reclaimed because Logan Wash Road is to remain in place for other users and a parcel of land was transferred to Chevron. This results in an approximate total of 73.5 acres requiring reclamation.

Historical documentation appears incomplete on the warrantee release of all reclamation areas at the mine. However, site inspections show that some original reclamation areas would readily qualify for warranty release and, in fact, may have been released. Documented releases are discussed in Section 2.4. In a DRMS warrantee release letter of January, 2006, DRMS stated that areas remaining as not reclaimed and not released are Areas 1, 2, 3, 4, 10, portions of Area 13, and the Soil Barrow Area. DRMS stated that the total adjusted remaining acreage for roads was estimated to be 10 acres, including road fill sidecast material areas; and that the total remaining acreage requiring reclamation (affected area) was 38.25 acres, including the Evaporation Pond. Calculations for this report indicate a slightly greater unreclaimed acreage of 42.4 acres as shown in the following table.

Area	Acreage	Area to be Requested for Release in 2018
1 – Mine Dump	13.36	Yes
2 – Upper Mine Bench	0.74	Yes
3 – Lower Mine Bench	2.10	No
4 – Research Mine Bench	4.26	Yes
10 – Helo Pad	0.24	Yes
Portions of Area 13*	10.9	Portions
Soil Barrow Area	0.65	Yes
Evaporation Pond	10.2	No
Total	42.4	

*See Section 2.2

Figures 4A and 4B illustrate the current reclamation status of disturbed areas and roads. The reclamation status of previously disturbed areas is discussed below.

2.1 Mine Areas

Other than roads and the Evaporation Pond and associated retort pipeline, the Lower Bench is the only remaining mine area (Area 1) that is not reclaimed. This area consists of 2.1 acres and is currently being used as mine access to monitor hydrological stations and general revegetation progress at other parts of the mine property.

2.2 Roads

2.2.1 Area 18: Logan Wash Access Road

Disturbed acreage associated with the Logan Wash Road or the “tramroad” was originally shown in the mine permit to be 53.4 acres. This road extends from its intersection with Road 45 up Logan Wash to and beyond the mine property. BLM records indicate that the original Logan Wash Road right-of-way (COC-223027) was 58.6 acres and includes all of the Upper Access Road up to the BLM-OOSI property boundary near the intersection of the Upper and Lower Bench Roads. However, the OOSI reclamation plan included the Upper Access Road in Area 13, Miscellaneous Access Roads.

A number of road turn-outs or cut and fill areas were constructed along Logan Wash Road and these areas were included in revised versions of the mine permit. These areas are shown as “B1-B-10” in Table 1. Reclamation of the main Logan Wash Road is not planned as this road is used by the public and for energy industry access.

However, it is anticipated that the Upper Access Road will be reclaimed at the appropriate time. The Upper Access Road extends from the main Logan Wash Road to the Research Mine and beyond to the intersection with the Upper Bench Road and Lower Bench Road; it is estimated to consist of 4.8 acres.

In the early 1980’s OOSI realigned portions of the Logan Wash Road. The realignment took place at several road segments, B1 through B10. The estimated acreage disturbance was approximately 6.0 acres. All of these segments, except B2, B3, B7, and B8 were released in 1986. Areas B2, B3, B7 and B8 have revegetated completely and will be submitted for warranty release in the near future.

2.1.2 Area 13: Miscellaneous Access Roads

Documentation that defines the locations of the Miscellaneous Access Roads (Area 13) in detail in the original reclamation plan is limited (see Table 2). Based on field observations, a number of older roads have been reclaimed and are no longer used. These roads are located on the slope above the Upper Bench and on the slope between the Upper Access Road and the Lower Access Road (see Figure 4A). It is uncertain what portions of these roads have been released from warranty, but it is assumed that some were released in 1986 because of their association with other areas released at that time.

The remaining and existing roads that may have been included in Area 13 are: 1) Upper Access Road, 4.8 acres; 2) Lower Access Road, 1.8 acres; 3) Upper Bench Road, 1.4 acres; 4) Lower Bench Road, 1.5 acres; and 5) Evaporation Pond Road, 1.3 acres. The lower portion of the Lower Access Road (approximately 1.36 acres) was associated with the Heater/Treater reclamation area (Table 2). These acreages have been estimated using GIS methods and assuming an average road width of 24 feet. Of these roads, the Upper Bench Road and a portion of the Lower Access road were revegetated in 2005 and will be submitted for warranty release in the near future. All other unreclaimed roads shall remain open for use in 2018. Therefore, the total estimated unreleased acreage for Area 13, Miscellaneous Access Roads, is 10.8 acres. This acreage is close to the acreage estimated by DRMS in January 2006 (10 acres).

2.3 Structures

2.3.1 Vaults, Pipelines, and Evaporation Pond

Structures that remain at the mine site include two vault structures, one on the Lower Bench and one on the Research Mine Bench, one sealed ventilation shaft, and one capped and vented ventilation shaft. Pipelines include the retort water pipeline which conveys retort mine water from the sealed L-1 portal at the mine site to the Evaporation Pond; the Logan Wash Mine mine water drainage pipeline (LW-001) which extends from the sealed L1 portal to the Lower Bench Vault and then to an infiltration gallery on the Lower Bench; and the Research Mine mine water drainage pipeline (LW-002) which extends from the sealed Research Mine portal through the Research Mine Vault to the Lower Bench Vault and on to Lower Bench discharge point. See Figure 2 for the locations of these structures.

The two bench vaults are administered as confined space concrete structures with surface access-ways constructed just above grade. Depending on the final mine closure method, these structures may remain as permanent structures on the mine site to manage and monitor mine water drainage.

The retort water pipeline was constructed with manhole clean-outs approximately every 600 feet; two manholes, the Upper Manhole and Lower Manhole, are accessed periodically to measure retort water discharge rates. The Upper Manhole is located in the vicinity of the former Heater Treater (Area 15), in the upper part of Logan Wash near the confluence with Dry Gulch. The Lower Manhole is located immediately north of the Evaporation Pond, approximately 40 feet from the pond gate. Other manholes exist on the retort water pipeline that are buried by shallow road fill, colluvium, and vegetative litter, and have not been accessed in recent years.

2.3.2 Monitoring Wells

Monitoring wells associated with the Logan Wash Mine were constructed within and outside of the immediate mine area. Past reconnaissance has been conducted to locate and confirm the existence of these well sites. Eight wells were located and identified within the mine area and within Logan Wash. Several other wells were located at some distance from the mine (see Figure 3 and Table 3). Of the 8 identified wells in the mine area, two wells, Well LWCW-1A and Well LW-22A, will remain in place as monitoring wells until final permit closure. Well LWCW-1A and LW-22A are sampled for water quality on a semi-annual basis.

Wells LW-108, LW-112, and LW-242 were abandoned in 2005 in accordance with Colorado Division of Water Resources rules. The other 4 wells, LW-32, LW-45, and LW-116, remain in place in the case they may be of value in the evaluation of mine closure investigations. Casing access and downhole conditions are unknown for wells LW-32, LW-45, and LW-116. Reconnaissance to date has not revealed any other monitoring wells within the permit area and the Logan Wash drainage.

Reconnaissance for wells located outside the permitted area in distant drainages was conducted in past reporting periods. Wells LW-102 and LW-243 were located in Smith Gulch, Well LW-103 was located in Kelly Gulch, and Well LW-104 was located in Riley Gulch. Well LW-121, apparently constructed in Bowdish Gulch, was not located after a thorough search and is assumed abandoned. Wells LW-102, LW-104 and LW-243 were abandoned in 2007. Table 3 shows the status of well abandonment as of this reporting period.

2.4 Status Summary

Areas Released of Warranty

Reclamation areas released of warranty by DRMS include: Areas 5, 7, 21, and 22, and areas A5, A7, A21, A22, B1, B4, B6, B9, B10, and B11 (A areas have not been located on historical documents; B areas refer to Logan Wash Road realignments and other cut and fill areas) on September 30th, 1986; and areas 6, 8, 9, 12, 14, 15, 16, 17, 19, 20 and a portion of Area 13 (roads) (12.64 acres) on January 12th, 2006. A total of approximately 29.4 acres have been released of warranty.

Areas Under Reclamation

Areas in a state of reclamation (revegetation in progress) but not submitted for release to DRMS in the permit include Areas 1, 2, 3, 4, 10, and the 0.65-acre Soil Barrow Area, portions of Area 13, and road Areas B2, B3, B7 and B8. Areas 1 through 4 include the Upper and Lower Mine Dumps (face areas), Upper Mine Bench, Lower Mine Bench, and the Research Mine Bench and Dump, respectively. Area 10 is the former Helo Pad. Area 13 is Miscellaneous Access Roads. Areas under reclamation at this time total approximately 21.8 acres. Area 11, the Guard Gate, and Area 18, Logan Wash Road will not be reclaimed.

Area 1, the Upper and Lower Mine Dump faces (13.4 acres) were revegetated during 2003-2005. Area 2, the Upper Mine Bench (0.7 acres) was revegetated in 2004 and 2005. Area 3, the Lower Mine Bench (2.1 acres) is used for reclamation monitoring and is currently under natural revegetation status. Area 4, the Research Mine Bench (2.7 acres) and Dump (1.5 acres), Area 10, the former Helo Pad (0.2 acres), and the Upper Bench Road and Lower Access Road areas of Area 13 were revegetated in the fall of 2005. However, cattle grazing and dry conditions prevented the lower portion of the Lower Access Road from revegetating (approximately 1.4 acres). This was not reseeded as the road is now being used to access the Upper Manhole and monitor Well LWCW-1A on a regular basis.

Area 23 is the Evaporation Pond and Pipeline. The portion of Area 23 that has been revegetated is limited to the retort water pipeline. The portion of Area 23 not revegetated or reclaimed is the Settling Pond and Evaporation Pond. According to the 1985 annual report, the original disturbed acreage of Area 23 was 14.9 acres, 5.1 acres of which was reclaimed before 1985, leaving 9.8 acres remaining to be reclaimed. Because the pond was not formally added to the permit until 2008, no reclaimed acreage has been released.

Area 13, Miscellaneous Access Roads (Table 2), includes a number of older roads that have been reclaimed. In this report the Mine Bench and Portal roads referred to in Table 2 consist of the Lower Access Road (1.8 acres), Upper Access Road (4.8 acres), Upper Bench Road (1.4 acres not including bench), and Lower Bench Road (1.5 acres not including bench).

The upper segment of the Lower Access Road, which had been impacted from a debris flow off the Lower Dump in 2004, was successfully revegetated in 2005, whereas the lower segment of the Lower Access Road (approximately 1.4 acres) has not shown significant plant growth. This is partially due to damage from seasonal cattle grazing.

Areas Not Under Reclamation

Areas currently not expected to be submitted for reclamation release in the near future are the Lower Bench (Area 3, 2.1 acres), the Lower Bench Road (Area 13, 1.5 acres), the Upper Access

Road (4.8 acres) and the Evaporation Pond Access Road (1.3 acres), and the Evaporation Pond and Pipeline (Area 23, 10.2 acres). In addition, the lower segment of the Lower Access Road, approximately 1.4 acres, will be reclaimed after final mine closure. This portion of the road is used to access Well LWCW-1A and the Upper Manhole monitoring locations. These unreclaimed surface areas comprise an approximate total of 21.3 acres.

Areas to Be Requested for Release

Table 1.0 shows that the estimated actual disturbed acreage was 135.2 acres and of this amount, 61.7 acres was not to be reclaimed because Logan Wash Road is to remain in place for other users, and a parcel of land was transferred to Chevron (Guard Gate, Area 11). Therefore, the total estimated acreage requiring reclamation is 73.5 acres.

OOSI anticipates requesting release of warranty for portions of Areas 1 (13.4 acres), Area 2 (0.7 acres), and Areas 4 (4.3 acres), and 10 (0.2 acres), the revegetated portions of Area 13 (Upper Bench Road, 1.4 acres, and the upper portion of the Lower Access Road (0.4 acres), and the Soil Barrow Area (0.7 acres) in the near future. These revegetated areas total approximately 21.1 acres.

As of this reporting period, approximately 31.3 acres have been released of warranty, 21.1 acres are under reclamation, and 21.3 acres are not currently under reclamation. Therefore, a total of 42.4 acres require release at this time. It is anticipated that most of the acres under reclamation will be submitted for warranty release in the near future.

The following table summarizes reclamation status at Logan Wash Mine.

Acreage Status Category	Estimated Acreage
Total original disturbed/used acres	135.2
Acres not to be reclaimed (Logan Wash Road, Chevron land)	61.7
Total acres requiring reclamation	73.5
Total acres released to date	31.3
Total new disturbed acres this reporting period	0.0
Total new acreage under reclamation this reporting period	0.0
Total acres under reclamation to date	21.1
Total estimated acres not currently under reclamation	21.3
Total estimated reclaimed acres needing release	42.4

3.0 Monitoring Activities in 2017

Monitoring activities at the Logan Wash Mine during the reporting period consisted of periodic monitoring of mine water discharge and related sampling activities. These activities included: 1) discharge measurement of the mine water at LW-001 (former Colorado Discharge Permit System [CDPS] Outfall 001) and retort water; 2) semi-annual sampling of the mine-water discharge and retort-water discharge, groundwater at Wells LWCW-1A and LW-22A, and surface water at the Big Seep sample location; 3) measurement of the manometer installed in the Research Mine Vault (LW-002); 4) precipitation; 5) monitoring of the Evaporation Pond leak detection system; and 6) Daylight Bench stability monitoring. Monitoring data for the reporting period are shown in Table 4.

3.1 CDPS (NPDES) Permit Termination

The former CDPS permit for Logan Wash Mine (permit no. CO0048816) that permitted two outfalls, Outfall 001 (Logan Wash Mine, main lower portal [L1 Portal] discharge) and Outfall 002 (Research Mine discharge), was terminated on July 1, 2014. Any mine discharge from the former Outfalls 001 and 002 is being infiltrated into the Lower Mine Bench. For more information regarding the Research Mine portal closure and management of the Research Mine drainage see TR No. 4 and TR No. 6, which present significant revisions to Exhibit E, the Reclamation Plan for Logan Wash Mine.

3.2 Mine-Water and Retort-Water Discharge

Discharge measurements of mine water (former Outfall 001) and retort water discharge and were conducted on a quarterly or more frequent basis when access allowed. Continuous flow (meter) monitoring of Outfall 001 water came on line in August, 2011 as part of a requirement of the former CDPS permit. These data were collected by OOSI to assess and evaluate mine closure effectiveness, to support operation and maintenance of the Evaporation Pond and future water management options and to meet state requirements. The flow meter is still operating and data are periodically recorded and data logger downloaded per the schedule described above. Retort water discharge is measured manually at the Upper Manhole location. Table 4 shows the results of monitoring data collected at the mine in 2017, and Figure 5 shows the results for the 001 flow meter (LW-001 mine water discharge) and the measured discharge for retort water at the Upper Manhole. The figure shows that the 001 discharge has steadily decreased since 2011.

3.3 Water Quality Monitoring

Water quality monitoring continued at the mine site on a semi-annual schedule. Sampling was conducted of mine discharge waters (mine water and retort water), groundwater at two monitoring well locations, and surface water at one spring site in May and October, 2017. Sampling of retort mine drainage water and mine water (former Outfall 001) is conducted to evaluate mine discharge water quality with time in support of final mine closure. The samples were collected from the retort water and mine water drainage pipelines inside the Lower Bench Vault.

Historical and 2017 analytical results for mine water (LW-001), retort water (LW-Retort), and Well LWCW-1A are shown in Tables 5, 6, and 7, respectively. The analytical results for samples collected during the reporting period do not indicate a significant improvement of retort water quality compared to past sampling events.

One of the locations, “Big Seep”, is considered to be a potential source water of mine water discharge and may represent background conditions. “Big Seep” emanates from the rock wall above the Daylight Portal and was sampled in May and October of 2017. In addition, samples were collected from Well LW-22A, an alluvial well located in Logan Wash located approximately 2.25 miles down Logan Wash from the mine. Samples of the retort water flowing through the Lower Manhole (LW-LM) were also collected. Locations sampled during the 2017 semi-annual sampling events are shown in Figure 6. Analytical data from all of these samples are shown in Table 8.

3.4 Research Mine Manometer Monitoring

The manometer installed in the Research Mine Vault is monitored and recorded on a monthly basis and on a more frequent basis in the spring months of April and May, or until the peak level begins to subside. If manometer measurements were to indicate a very high (≥ 36 inches) reading for more than a week's time, the water in the mine can be released and allowed to infiltrate at the Lower Bench. The manometer readings did not indicate a rise in water level within the Research Mine workings in 2017. All manometer measurements made during the reporting period are shown in Table 4.

3.5 Evaporation Pond Leak Detection System

Monitoring of the Evaporation Pond Leak Detection Vault is conducted by continuous measurement of water pressure (depth) in the vault sump using an installed pressure transducer. On-site monitoring is conducted monthly as access conditions allow. Figure 7 shows the depth of water in the detection vault during the reporting period. Water levels within the vault sump did not fluctuate significantly during the reporting period.

3.6 Precipitation

Precipitation was monitored on the Lower Bench and at the Evaporation Pond through the use of Novalynx Corporation Model 260-2101SK-P rain gauge instruments. The Lower Bench gauge is typically operational from April through December, depending on access to the bench. The Evaporation Pond gauge was installed for the first time in May, 2015. Each gauge measures precipitation with an automated logger that is downloaded annually. Precipitation data collected in 2017 showed a total precipitation of 11.46 and 6.32 inches, for the Lower Bench and Evaporation Pond, respectively (see Figure 8). Data from the Lower Bench gauge was not plotted in Figure 8 because of a timing malfunction in the logging system. Both rain gauges recorded from April 13, 2017 to January 31, 2018. The NWS Cooperative Network Altenburn, CO station (Coop # 050214, elevation 5,690 feet AMSL) recorded total precipitation of 10.33 inches for April 2017 through January 2018. The Evaporation Pond gauge is not equipped with a wind screen.

3.7 Daylight Bench Slope Stability Monitoring

The Daylight Bench was constructed to support sealing of the Daylight Portal in 2004. Tension cracks and minor subsidence was first observed in 2009 on the small bench. The contractor Geo-Smith Engineering has continued to survey the Daylight Bench for slope movement since May, 2011. A survey was conducted on April 24, 2017.

Prior to the October, 2013 survey, no significant movement of the survey monuments was observed. The October 2013 survey noted that 2 of 6 survey points have shown minor to small (0.42 ft.) amounts of movement. The June 2014 survey also noted that 2 of 5 extension stake sets have shown minor (0.07 ft.) amounts of movement. Throughout 2015 minor movement was detected in 1 of 6 survey points. This movement is localized as no movement has been detected in the other extension stakes or survey monuments. Due to deteriorating weather during the May 2016 survey, incomplete observation prevented error analysis of the data. The 2016 survey results from extension stake measurement suggests ongoing localized movement at 2 of the 5 extension stake sets. Physical observations of the Daylight Bench do not indicate ongoing slope failure. No further surveying will be conducted at the Daylight Bench.

4.0 Reclamation Activities in 2017

Monitoring activities described in Section 3 are considered activities that contribute to successful overall mine reclamation. Other reclamation activities conducted at the Logan Wash Mine in 2017 are discussed in the following sections.

4.1 Revegetation Maintenance

Areas seeded during past revegetation work are self-sustaining; it is anticipated that the irrigation system used during early revegetation will not be used in the future.

No revegetation work (weed removal or mowing) was conducted.

4.2 Well Abandonment

No monitoring wells were abandoned during the reporting period.

5.0 Maintenance Activities

Maintenance activities included periodic inspections of mine roads, benches, portals, mine water drainage systems associated with the retorts and general mine workings, as well as the inspection of Evaporation Pond facilities including the pond's liner, security fencing, operation, and leak detection system. Maintenance activities conducted at the mine and Evaporation Pond are summarized in the following sections.

5.1 Mine Maintenance

During the reporting period, inspections of the Logan Wash Mine site occurred on a weekly to monthly basis. Inspections focused on mine roads, headwalls, portal closures, bench surfaces, dump faces, road conditions, and constructed storm drainage and rip-rap channels. Mine water discharge rates and Evaporation Pond water levels were periodically monitored and recorded (Section 3.2). Ruts on the Lower Bench Road were filled and regraded and permanent gates were installed at the Upper Access Road cattle crossing in September 2017. No other mine maintenance was required during the reporting period.

5.2 Evaporation Pond Maintenance

Maintenance of the Evaporation Pond included inspection of: 1) discharge rates to the pond from the mine retort water plumbing system; 2) the leak detection vault; 3) wildlife security fence; 4) stormwater drainage ditches; and 5) general conditions of the pond, liner, and egress ladders. Egress ladders were repaired or replaced in March 2017. The leak detection vault sump pump and associated float switch and plumbing were replaced in April 2017. Two liner repairs were made on the freeboard area of the Settling Pond liner.

An inspection camera was used to determine the condition of the leak detection system's three pipes that drain into the leak detection vault. The camera cable had a range of 40 meters (131 feet). Along the inspected length, the pipes were found to be intact with minimal mineral precipitation.

As requested by the BLM, soil samples were collected from beneath the Evaporation Pond liner in dry areas and also in areas that were flooded. Eight locations were sampled beneath the liner at

intervals of 0 to 1 and 3 to 4 feet, this is approximately equivalent to depths of 5 to 6 and 8 to 9 feet below ground surface at the top of the pond liner slope (the 5 to 6 foot interval is the first foot below the liner and the 8 to 9 foot interval begins 3 feet below the liner). Three background soil samples were collected from three different locations along the perimeter of the pond. Sample locations are shown in Figure 9 and analytical results are shown in Table 9.

Samples of sediments and precipitated salts within the Evaporation Pond were collected in July of 2017 for Toxicity Characteristic Leaching Procedure (TCLP) analysis. Samples were collected as composite samples consisting of multiple grab samples from random locations. A composite salt and sediment sample were collected from both the north half and the south half of the pond. Analytical results are shown in Table 10.

6.0 Anticipated Reclamation in the Year 2018

Because the fate of retort water discharge is currently being assessed under Amendment No. 1, OOSI does not anticipate revegetation or reclamation of any unreclaimed roads or disturbed surface areas at the mine site in 2018.

Saplings that were planted on the mine dump faces will be assessed for overall health and mortality. No mechanical irrigation of these saplings is anticipated. Roads not reclaimed will be maintained. Transplanting of *P. debilis* will be conducted if deemed necessary for plants located on the Lower Bench Road; plants will be moved to the fill slope area adjacent to the road (see Section 8.0).

Evaporation Pond maintenance will include access road maintenance, weed and brush control, leak detection sump pump maintenance, liner repair, and other maintenance as needed. OOSI is working on plans to reline the existing pond. DRMS will be informed when design plans are complete; a technical revision will be prepared, if required.

OOSI anticipates submittal of several revegetated areas for reclamation (warranty) release in 2018.

7.0 Anticipated Disturbance in the Year 2018

OOSI is in the process of evaluating final mine closure alternatives, focusing on mine water management. No new disturbance is anticipated to occur in 2018 at this time within the mine permit area associated with OOSI mine permit activities. Minor ground disturbance may occur on the Lower Bench Road which is currently not under reclamation, during transplanting of *P. debilis* species (see Section 8.0). Should construction associated with the relining of the Evaporation Pond commence in 2018, disturbance of previously undisturbed ground may be required. If so, the disturbance will be described in a submitted Technical Revision. Maintenance of mine roads will be conducted as necessary.

8.0 Threatened Species Designation

On July 27, 2011, the U.S. Department of Interior, Fish and Wildlife Service (USFW), listed the plant *Penstemon debilis* (Parachute beardtongue or *P. debilis*) as “threatened” status under the Endangered Species Act of 1973 (Act). The critical habitat for the plant is in Garfield County and the Logan Wash Mine site falls within this critical habitat. Numerous *P. debilis* plants have been observed growing within and along the flanks of the Upper Access Road from the Research Mine portal area to the north on the Upper Mine Bench Road and Lower Mine Bench Road. An Article of Designation (AOD) was signed by Colorado Parks and Wildlife (CPW), OOSI, and Oxy WTP

in early 2015 and finalized on February 3, 2015. The AOD allows for OOSI to mitigate impact to *P. debilis* habitat while conducting reclamation obligations under the DRMS mine permit.

A site plant survey conducted by BLM, USFWS, CPW (Colorado Natural Areas Program [CNAP]), and WWL in September, 2014 resulted in a number of *P. debilis* locations being mapped on both OOSI and BLM lands from the Research Mine to the Lower Bench (Figure 10). On March 25, 2015, 39 *P. debilis* plants were transplanted from the Lower Bench Road to the nearby road cut slope that is undisturbed by vehicle/equipment traffic (Figure 11). The transplanted *P. debilis* have been monitored for production and mortality on an annual basis, providing access was achievable and snow cover negligible. Results from monitoring of the transplanted *P. debilis* indicate a current mortality rate of approximately 33 percent. The table below shows the mortality rate for each year since transplanting in 2015.

Year	New Mortality (Calendar Year)	Mortality (2015 to Date)
2015	15%	15%
2016	10%	26%
2017	7%	33%

On June 27, 2017, three state personnel along with WWL Field Technician, Shelby Goodwin, visited Logan Wash Mine to conduct quantitative monitoring on a population of *P. debilis* near the Lower Bench Road. Attendees included the following: Jill Handwerk and Delia Malone, Colorado Natural Heritage Program (CNHP), and one BLM intern, Sara Fritsch.