LOGAN WASH MINE
ANNUAL REPORT

Mine Permit No. M-1977-424
Anniversary Date: March 28, 2021

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Annual Report
March 28th, 2020 – March 27th, 2021
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, 2020 to March 27, 2021 (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 and maintenance work was conducted on the OOSI property. GSHI anticipates reclamation maintenance activities to continue in 2020, focusing on maintenance and operation of mine water discharge and the associated Evaporation Pond.

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.

The remainder of this annual report is organized as follows:

- Section 2: Disturbed Acreage Status
- Section 3: Monitoring Activities in 2020
- Section 4: Reclamation Activities in 2020
- Section 5: Maintenance Activities in 2020
- Section 6: Anticipated Reclamation in the Year 2021
- Section 7: Anticipated Disturbance in the Year 2021
- 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. Due to different interpretations of actual disturbed areas, measurement methods that have evolved over the years, and rounding, the interpreted total disturbed acreage, estimated acres reclaimed, acres released, and acres under reclamation may not sum perfectly.

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, and 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, also 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 approximately 42.5 acres.

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. However, over the last decade or so, the Lower Bench has naturally revegetated and portions may qualify for reclamation release.

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 through B-10" in Table 1. Reclamation of the main Logan Wash Road is not planned as this road has multiple BLM rights-of-way and is used by the public and for energy industry access.

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 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.

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.

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 2021. 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 1) the retort water pipeline which conveys retort mine water from the sealed L-1 portal at the mine site to the Evaporation Pond; 2) 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 3) 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 retort water (LW-Retort) and mine water (LW-001) are sampled for water quality at the Lower Bench Vault on a semi-annual basis.

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, have been sampled for water quality on a semi-annual basis. Well LW-22A, located some distance downgradient of the mine, was dropped from the sampling program in 2020. Well LWCW-1A will remain in place as a monitoring well until final permit closure. Well LW-22A is located on private land. The landowner may be interested in taking over ownership of the well.

Wells LW-108, LW-112, and LW-242 were abandoned in 2005 in accordance with Colorado Division of Water Resources rules. The other 3 wells, LW-32, LW-45, and LW-116, remain in place but will be scheduled for abandonment in the future. 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. Wells LW-121, LW-46, LW-47, LW-47A, and LW-106 were not located after a thorough search and are assumed to be 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

2.4.1 Areas Released of Warranty

Reclamation areas released from 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, some of which were released on September 30th, 1986. Areas 6, 8, 9, 12, 14, 15, 16, 17, 19, 20 and a portion of Area 13 (roads) (12.64 acres) were released on January 12th, 2006. A total of approximately 31.3 acres have been released of warranty. A summary of the estimated acreage released from warranty at Logan Wash Mine is shown in Table 4.

2.4.2 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 0.7-acre Soil Barrow Area, parts 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 23.2 acres (see Table 5).

For further clarification, 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 Lower Access Road (1.8 acres) of Area 13 was initially 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. The road is not considered under reclamation at this time.

The upper segment of the Lower Access Road (approximately 0.4 acres), 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. This portion of the road is being used to access the monitoring structures Upper Manhole and monitor well LWCW-1A.

Area 23 is the Evaporation Pond and Pipeline. The portion of Area 23 that has been revegetated is limited to the ground surface above the buried 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.

2.4.3 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 (Area 13, 4.8 acres), the Evaporation Pond Access Road (1.3 acres), and the Evaporation Pond and Pipeline (Area 23, 10.2 acres). Area 11, the Guard Gate, and Area 18, Logan Wash Road will not be reclaimed as they are no longer included in reclamation plans.

In addition, the lower segment of the Lower Access Road has not revegetated as a result of cattle grazing and dry conditions. The road is also being used to access Well LWCW-1A and the Upper Manhole monitoring locations. This road (1.4 acres) will be reclaimed after final mine closure. These unreclaimed surface areas comprise an approximate total of 21.3 acres (see Table 6).

2.4.4 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 part 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 20.7 acres.

As of this reporting period, approximately 31.3 acres have been released of warranty, 23.2 acres are under reclamation, and 21.3 acres are not currently under reclamation. Therefore, a total of approximately 44.5 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 (see Table 5).

Table 7 summarizes reclamation status at Logan Wash Mine.

3.0 Monitoring Activities in 2020

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) at the Lower Bench, and retort water at the Upper and Lower Manhole locations;
2) Semi-annual water quality sampling of
    a. Mine-water discharge at the Lower Bench Vault (LW-001);
    b. Retort-water discharge at the Lower Bench Vault (LW-Retort), the Lower Manhole (LW-LM); and at the Evaporation Pond);
    c. Groundwater at well LWCW-1A;
3) Measurement of the manometer installed in the Research Mine Vault (LW-002);
4) Precipitation;
5) Monitoring of the Evaporation Pond leak detection systems; and
6) Monitoring of salinity at the Evaporation Pond.

Monitoring of mine discharge waters, the Research Mine manometer, and the Evaporation Pond salinity and leak detection system is done on a monthly frequency except during access restrictions, mostly during the winter months. As mentioned, water quality sampling is done on a semi-annual basis in May and October. Monitoring data for the reporting period are shown in Table 8.

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 revisions to Exhibit E, the Reclamation Plan for Logan Wash Mine.

3.2 Mine-Water and Retort-Water Discharge

Long-term monitoring of retort water and mine water discharge is necessary to assess mine drainage behavior from the mine. The trend in discharge rates combined with water quality have implications for the future fate of the mine drainage water. A sudden change in mine drainage rates may require actions to adequately avoid costly environmental situations. 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.

During the summer of 2020, the flow meter experienced periods of false readings not representative of past readings. The data logger was removed and tests were run on the flow meter and converter. These tests were not conclusive and further testing must be conducted. It is hoped that the flow meter will be restored to normal operating conditions in the Spring of 2021. Retort water discharge is measured manually at the Upper Manhole and Lower Manhole locations. Table 8 shows the results of monitoring data collected at the mine in 2020, 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 usually occurs in May and October. As mentioned in the above section, knowledge of the water quality of mine drainage waters and its potential change over time is needed to assess the long-term fate of this water and final mine closure options.

In 2020, some changes were made to the monitoring and sampling program. This is because a new liner was installed in the Evaporation Pond in 2018, and OOSI considers evaporation as the preferred method of treatment for the retort water for the long-term. Monitoring at the mine in the last several years has included sites: LW-001 (mine water), LW-Retort (retort water), Big Seep (background seep above the mine), well LWCW-1A (point of compliance well), well LW-22

(downgradient alluvial well), and Lower Manhole (retort water just upstream of the Settling Pond). Beginning in 2018, biannual sampling of the Evaporation Pond was added to the monitoring program to comply with the BLM's renewed right-of-way of the Pond.

Beginning in 2020, monitoring locations Big Seep and well LW-22 were dropped from the sampling program. These sites have provided adequate baseline data and are not critically needed at this time.

In 2020, sampling was conducted of the mine discharge waters (mine water and retort water), and groundwater at one monitoring well location, in May and October 2020. The mine water discharge samples were collected from the retort water and mine water drainage pipelines inside the Lower Bench Vault.

Historical and 2020 analytical results for mine water (LW-001), and retort water (LW-Retort, LW-LM, and Evaporation Pond), are shown in Tables 9 and 10, respectively. LW-Retort represents samples collected at the Lower Bench Vault. The LW-LM site represents samples of the retort water at the Lower Manhole. The analytical results for samples collected during the reporting period do not indicate an improvement of retort water quality compared to past sampling events.

Well LWCW-1A is the point of compliance location and is located in Dry Gulch near the toe of the Lower Bench Mine Dump. The well is completed primarily in alluvium and colluvium, with a small interval in bedrock. Groundwater at well LWCW-1A was sampled in May and October in 2020.

Under stipulations for the Evaporation Pond BLM right-of-way, water quality sampling of the Evaporation Pond was added to the semi-annual sampling schedule in 2019. The Evaporation Pond (LW-Pond) was sampled in May and October of 2020. Water quality field parameters are measured at the Evaporation Pond during most Pond monitoring visits. The Logan Wash Mine Evaporation Pond – 2020 Water Quality Results report was submitted to BLM and DRMS in March 2021.

Locations sampled during the 2020 semi-annual sampling events are shown in Figure 6. Analytical data for these samples are shown in Table 11.

3.4 Research Mine Manometer Monitoring

The manometer installed in the Research Mine Vault is monitored and recorded on a monthly basis as access conditions allow 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 high ($\geq$ 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 2020. All manometer measurements made during the reporting period are shown in Table 8.

3.5 Evaporation Pond Leak Detection System

Monitoring of the historic Evaporation Pond Leak Detection Vault (old underlying pond liner) as well as Evaporation Pond Leak Detection Sumps (new overlying pond liner) is conducted on a monthly basis as access conditions allow. Monitoring of the Evaporation Pond Leak Detection Vault is conducted by visual observations and by continuous measurement of water pressure

(depth) in the vault sump using an installed pressure transducer. Figure 7 shows the depth of water in the detection vault during the reporting period. Visual observations showed the Detection Vault to be dry during 2020. Pressure transducer readings confirmed this. A metal cap was placed over the concrete collar of the vault in 2020; this likely contributed to the vault showing dry conditions throughout the year.

Three leak detection sumps were constructed during relining of the Settling Pond and Evaporation Pond in 2018. One sump was constructed on the west side of the Settling Pond and one sump each was constructed on the west and east sides of the Evaporation Pond. Each detection sump was constructed by installing a PVC monitoring pipe from the top edge of pond liner down the pond slope and in between the new secondary and primary liner. The PVC pipe allows for monitoring of the presence of collected pond water that may have leaked through the primary liner. No water was detected in the sumps during 2020.

3.6 Temperature and Precipitation

Temperature and precipitation were 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. The Evaporation Pond gauge is not equipped with a wind screen. Each gauge measures precipitation with an automated logger that is downloaded annually. Precipitation data collected in 2020 showed a total precipitation of 9.77 and 8.04 inches, for the Lower Bench and Evaporation Pond, respectively (see Figure 8). Both rain gauges recorded from April 5, 2019 to December 13, 2019. The NWS Cooperative Network Altenburn, CO station (Coop # 050214, elevation 5,690 feet AMSL), located 13.3 miles northwest of the mine, recorded total precipitation of 9.83 inches for the year of 2020. The annual average precipitation for this station is 16.25 inches.

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. A subcontractor, Geo-Smith Engineering, began surveying the Daylight Bench for slope movement in May 2011.

Prior to a survey conducted in October 2013, no significant movement of the survey monuments was observed. The October 2013 survey noted that 2 of 6 survey points indicated minor to small (0.42 ft.) amounts of movement. A survey conducted in June 2014 also noted that 2 of 5 extension stake sets indicated 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 was 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 2020

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 2020 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. Unfortunately, despite installed fencing, cattle accessed the mine area a number of times in 2019 and seriously damaged reclamation grasses on the Upper Mine Bench and Road and the Lower Mine Bench and Road. These areas will be monitored for recovery and overall vegetation coverage in 2021. Some hand seeding may be implemented.

Areas within the designated Evaporation Pond area were disturbed during pond relining construction in 2018 (see Section 5.2). These areas were seeded with a native seed mix and biodegradable erosion blankets were placed on the steeper, more vulnerable slopes. Good germination and growth of grasses was evident in the spring of 2020 in these areas. The steeper slopes have remained stable.

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, high walls, 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 systems. 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 primarily on a monthly basis depending on site access conditions. Inspections focused on mine roads, headwalls, portal closures, bench surfaces, dump faces, road conditions, and constructed storm drainage and rip-rap channels. Maintenance of mine roads including the Evaporation Pond Road, Lower Access Road, Upper Access Road, Lower Bench Road, and Logan Wash Road are done on an as-needed basis to mitigate stormwater impacts to the road surface. Mine water discharge rates and Evaporation Pond water levels were periodically monitored and recorded (Section 3.2). No other mine maintenance was required during the reporting period.

5.2 Evaporation Pond Maintenance

Maintenance of the Settling Pond and Evaporation Pond include inspection of: 1) discharge rates to the ponds from the mine retort water plumbing system; 2) pond liner, egress ladder integrity; 2) the leak detection systems; 3) wildlife security fence; 4) stormwater drainage ditches and access road conditions.,

Figures 9 and 10 show the liner design and layout of as-built features of the pond, respectively.

6.0 Anticipated Reclamation in the Year 2021

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 2021.

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 and stormwater control maintenance, weed and brush control, leak detection sump pump maintenance, liner repair, and other maintenance as needed.

OOSI anticipates submittal of several revegetated areas for reclamation (warranty) release in 2021. A request for release of reclamation responsibility was submitted to DRMS in October 2020. A reclamation inspection by DRMS is expected to occur in 2021.

7.0 Anticipated Disturbance in the Year 2021

At this time, no new disturbance is anticipated to occur in 2021 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, if needed (see Section 8.0). Maintenance of mine roads and stormwater control features 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 11). 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 12). 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 46 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%
2018	Insufficient Data to Determine	33%
2019	15%	46%
2020	16%	38%

On June 27, 2020, three state personnel along with WWL Staff Scientist, 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, Delia Malone, and Savanna Smith of Colorado Natural Heritage Program (CNHP).

9.0 Retort Water Spill

A retort water spill occurred from Manhole No. 10 on the retort water pipeline on May 26, 2020. This was a result of a plug of sludge in the pipeline at that manhole that prevented continuous flow in the pipe. WWL was on location that day conducting sampling work. The retort was shut-in at the Lower Bench Vault and the manhole was vacuumed clean with a vac-truck. It is estimated that approximately 200 to 400 gallons of retort water seeped from the manhole and ran down the bar ditch along Logan Wash Road. Soil sampling and analysis was conducted of the wetted soils. The analytical results showed undetectable concentrations of benzene, toluene, ethylbenzene, and xylenes (BTEX) and semi-volatile compounds. Diesel Range Organic (DRO) compounds were detected at 8 mg/Kg and Gasoline Range Organic compounds were not detected. These results were less that the Total Petroleum Hydrocarbon threshold used by the Colorado Division of Oil and Public Safety. Metal concentration results were compared to background samples and were not of concern.

A letter report describing the spill and the analytical results was prepared and submitted to DRMS and the U.S. Bureau of Land Management on June 29, 2020. Both agencies did not require further action.