NEVADA DIVISION OF ENVIRONMENTAL PROTECTION

FACT SHEET

(Pursuant to the Solid Waste Disposal Regulations of the Nevada Administrative Code [NAC] 444.641.3[b])

Permittee Name: Refuse Inc.

Facility Name: Lockwood Regional Landfill

Permit Number: SW214R03

Description of Proposed Permit Modification

None at this time

Location Information

The Lockwood Regional Landfill is located within Storey County approximately 10 miles east of Reno and approximately 1.5 miles southeast of the small community of Lockwood, Nevada. The Landfill is in a mountainous area within the northern limits of the Virginia Range and approximately one (1) mile south of the Truckee River. Lagomarsino Canyon and Long Valley Creek are located west of the Facility property boundary.

Proposed Action

None at this time

Facility Summary

Site Summary

Currently, the daily volume of waste received at the Landfill, based on a five (5) day work week (260 working days per year) is approximately 5,000 tons. The estimated waste volume incorporates Municipal Solid Waste (MSW) as well as construction and demolition debris. The Lockwood Regional Landfill also accepts certain approved Special Wastes as detailed in the Site's Operating Plan.

The capacity of the Landfill is 302.5 million CY. The Disposal Area is 856.5 acres. The permitted Disposal Area will incorporate a high density polyethylene (HDPE) liner system with a leachate collection and recovery system (LCRS) except for the previously permitted footprint with was constructed without a liner or leachate collection. The liner system consists of an 80-mil to 60-mil thick HDPE geomembrane installed on a prepared subgrade surface. The LCRS system consist of a network of perforated pipes enclosed within a free draining aggregate placed in strategic locations to address buildup of hydraulic head on the HDPE liner.

Site History

The Lockwood Regional Landfill is a MSWLF that presently has a permitted Disposal Area in a portion of a 2,673.49 acre parcel. Based on the April 2010 aerial survey the Landfill contained a waste volume of approximately 32.8 million cubic yards, of which approximately nine (9) million cubic yards were in place prior to 1994. Refuse, Inc. assumed Landfill operations in 1979 under a lease arrangement with the landowner, Storey County Properties, and operated through 1990 in accordance with a conceptual design plan prepared by EMCON Associates. Refuse, Inc. purchased the Landfill in 1990 and operated it under the Amended Special Use Permit issued by the Storey County Board of Commissioners from July 23, 1990 until it was amended in 2009. On January 20, 2009 a Second Amended Special Use Permit (SASUP) was issued to incorporate an area to the north of the existing Landfill. The Landfill currently operates under this SASUP (Storey County Board of

Commissioners, 2009). The average daily volume of waste received at the Landfill, based on a five (5) day work week (260 working days per year) is approximately 5,000 tons. The estimated waste volume incorporates Municipal Solid Waste (MSW) as well as construction and demolition debris. The Lockwood Regional Landfill also accepts certain approved Special Wastes as detailed in the Site's Operating Plan.

Physical Setting

The Lockwood Regional Landfill is located within Storey County approximately 10 miles east of Reno and approximately 1.5 miles southeast of the small community of Lockwood, Nevada. The Landfill is in a mountainous area within the northern limits of the Virginia Range and approximately one (1) mile south of the Truckee River. Lagomarsino Canyon and Long Valley Creek are located west of the Facility property boundary.

Site Topography

The Site is positioned on the western flank of Clark Mountain within the northern limits of the Virginia Range. The Site is characterized by steep-walled canyons that drain westerly toward Long Valley Creek. The currently permitted Landfill Disposal Area occupies two (2), narrow, west-draining canyons which outlet to Long Valley Creek. The larger and longer of these two (2) buried canyon drainages, known as the Main Canyon, is located just south of the northern boundary of the Landfill Disposal Area. The smaller of the two (2) canyons, known as Dean’s Canyon, is located within the southwestern portion of the current Landfill Disposal Area. The design extends further eastward and to the south of the Main Canyon. The proposed Disposal Area will incorporate portions of two (2) additional canyons, which are referred to as the Center Canyon and the South Canyon

Adjacent Land Uses

North: Refuse Inc. owns the property north of the permitted Disposal Area. This area is used for solidification ponds and final and interim cover borrow sources.
South: Approximately one (1) mile to the southwest of the site, Cemex Construction Materials owns a sand and gravel quarry. To the south of the Site are unimproved lands that are zoned with a Forestry designation.
West: To the west of the Site are unimproved lands that are zoned with a Forestry designation.
East: To the east of the Site are unimproved lands that are zoned with a Forestry designation.

Climate

The Lockwood Regional Landfill is located in a high desert region within the rainshadow of the Sierra Nevada mountain range. The Site lies within one of the most arid regions within the United States. Precipitation at the Site is sparse with average annual precipitation on the order of 7.7 inches (Western Regional Climate Center, Sparks Station). Approximately half of the precipitation occurs as mixed rain and snow from December to March, with the remainder of the precipitation occurring in the form of rain during brief, sometimes intense, summer thunderstorms. Normal daily temperatures are mild overall, ranging between lows of approximately 50 degrees to highs of 80 to 90 degrees Fahrenheit in the summer. Normal wintertime daily temperatures typically range from lows in the mid-20 degrees to highs reaching 50 degrees. Nighttime freezing temperatures occur consistently from October into April, and can occur in September and May (WRCC).

Hydrographic Setting

The Landfill lies within the Tracy Segment Hydrographic Area of the Truckee River Basin. The Tracy Segment is located in a transition between the Sierra Nevada and the Basin and Range physiographic provinces. Its elevation and location within the rain shadow of the Sierra Nevada mountain range results in a semi-arid high desert environment. The largest drainage basin entirely within the Tracy Segment is Long Valley Creek (approximately 82 sq. mi.), which terminates at the Truckee River. Bedrock and basin-fill sediments comprise the major hydrogeologic units within the Tracy Segment. Bedrock hydrogeologic units consist of volcanic rock (primarily andesite, basalt, and rhyolite) that have accumulated as sequences of flows, flow breccias, tuffs, tuff-breccias, and conglomerates. Basin-fill sediment hydrogeologic units occur mostly beneath the relatively narrow Truckee River canyon and to a lesser extent, locally along ephemeral stream tributaries.

100 Year Flood Plain

Based on FIRM maps for the northern Long Valley Creek drainage system, revised on January 16, 2009 the Disposal Area is outside the 100-year flood boundary. The base flood elevations for Long Valley Creek at the Center Canyon west of the Landfill representing the 100 year flood event is 4539 feet above mean sea level (AMSL). The minimum elevation of the proposed Disposal Area is approximately 4,682 feet AMSL, or a minimum of 143 vertical feet above the base elevation of a 100 year flood within the nearest segment of Long Valley Creek.

Geologic Setting

Large-scale geologic mapping by Harold F. Bonham was performed from 1961-1965 and was reviewed for the current study. In his work entitled Geology and Mineral Deposits of Washoe and Storey Counties, Nevada (1969), he describes the Virginia Range as comprised of Mesozoic-age metamorphosed sedimentary and volcanic rocks intruded by granitic plutons and overlain by a thick section of Oligocene to Pleistocene-age volcanic and sedimentary rocks. Bonham (1969) describes the Landfill vicinity as consisting primarily of Pliocene and Pleistocene basalt and andesite flows representing two separate episodes of volcanism. On the western edge of the Site, he notes the possibility of the presence of Tertiary (Pliocene) age Kate Peak formation and sedimentary deposits correlating to the Coal Valley Formation. Schwartz and Faulds (2004) published a preliminary geologic map of most of the Chalk Hills quadrangle. The mapped area terminates near the southern extent of the proposed Disposal Area. Geologic units described by Schwartz and Faulds are in general agreement with those described by Bonham (1969). The geology within the proposed disposal area generally consists of older rhyolite and extensively altered volcanics underlying interfingered Tertiary-age sediments and basalt that are overlain by a sequence of basalt and andesite flows.

Hydrogeologic Setting

The depth to first groundwater beneath the future Disposal Area ranges from approximately 250 ft-bgs to 500 ft-bgs, or greater. First groundwater occurs under confined conditions primarily in fractured andesitic rock, and is overlain by an extensive vadose zone of generally low permeability materials as described in previous sections. Potentiometric surface maps have consistently shown an inferred groundwater flow direction to the north-northwest.

Groundwater beneath the future Disposal Area does not appear to receive recharge locally. The lack of seasonal water level responses and the very old age of the water (greater than 20,000 year old)

indicates that recharge likely occurs via through-flow from distal locations at higher elevations. The steep terrain in the site vicinity, the extremely low precipitation, the high runoff potential and the extensive vadose zone of generally low permeable materials all appear to greatly limit or preclude any local infiltration or recharge into the volcanic deposits beneath the future Disposal Area.

The natural groundwater quality beneath the Facility is generally very poor. Low pH conditions have also been observed. The elevated concentrations of trace metals, iron, sulfate and the low pH conditions are consistent with the well documented geochemistry of hot springs systems in Nevada (White and Herpoulos 1983, White 1981) and are considered to be reflective of naturally occurring elements present within the hydrothermally altered andesite bedrock. Elevated TDS conditions are commonly associated with very old waters.

In general, groundwater beneath the Facility occurs in volcanic deposits that have been classified by the Nevada Bureau of Mines and Geology as amongst the lowest potential groundwater yield formations in the state. Single-well pumping tests performed in all LL-series wells on Site confirms a low yield.

Landfill Design

Base Liner System

A high density polyethylene (HDPE) geomembrane is proposed beneath the proposed Disposal Area. The HDPE will be 80-mils thick in areas where the waste is greater than 200-feet thick and 60-mils thick where the waste is less than 200-feet thick. Textured HDPE will be placed in the lower reach of the Center Canyon to provide additional frictional resistance for slope stability. The HDPE will be placed on a prepared subgrade with a maximum ½-inch particle size. In areas where bedrock outcrops are blasted to achieve design grades, the exposed bedrock surface will be smoothed with shotcrete.

Leachate Collection and Recovery System

The proposed design incorporates a leachate collection and recovery system (LCRS). Computer modeling which takes into account climatic conditions and site specific elements of the cover design, indicates that there will be essentially no leachate generated due to infiltration of water through the interim or final cover (Investigation Report, ASW 2011). The primary source of leachate generation will be precipitation that falls on open, lined areas and flows onto or under downgradient MSW. The leachate generation system is designed to accommodate these flows. The proposed LCRS consists of the following elements;

The down gradient edge of the liner at the north east corner of the currently permitted Disposal Area will incorporate a perforated HDPE LCRS pipe. The bottoms of the center and south canyons will contain a perforated HDPE LCRS pipe designed to accommodate the 100 year, 24-hour storm. These pipes were designed for the larger storm event to provide additional capacity for conveyance. The pipe will be placed in a trench to provide additional support to withstand the overlying waste loads. Fee draining gravel wrapped in a geotextile filter fabric will be placed around the perforated pipe. The LCRS pipes will gravity flow to lined leachate retention ponds constructed outside the toe of the proposed Landfill.

The liner anchor benches will act as LCRS collection ditches. As the benches are lined for a

subsequent phase of Landfill development, a 4-inch diameter corrugated HDPE pipe encased in filter fabric will be installed in the flow line of what was previously the run-on control ditch as described below. The ditches will flow into lined perimeter ditches which will gravity flow into the lined leachate retention ponds. There are three double lined leachate ponds associated with the proposed modification.

Run-On Controls

Run-on controls consist of main perimeter diversion channels constructed at the eastern perimeter of the proposed Disposal Area and intermediate diversion channels incorporated as part of the liner anchor benches. In order to minimize the amount of run-on that will contact MSW and to minimize the size of the intermittent run-on control channels, all run-on controls associate with the Center Canyon will be in place prior to waste placement. Development of the South Canyon will occur in the same manner. The main perimeter diversion channels will discharge run-on flow into existing drainage channels flowing into Long Valley Creek. The intermediate diversion channels will transmit run-on flow to the edge of the landfill where they will discharge along the perimeter of the downgradient toe of the landfill into drainage channels flowing to Long Valley Creek.

Run-off Controls

Run-off controls consist of containing sheet flow off of the top deck of the Landfill and transmitting it to riprap lined down chutes. Run-off from bench set-backs flows along the toe of the overlying bench and also discharges into the riprap lined down chutes. The down chutes transmit water down the benches and discharge at the downgradient toe of the Landfill. A ditch along the perimeter of the Landfill transmits run-off to naturally lined retention ponds. There are four stormwater retention ponds associated with the proposed modification.

Final Cover

An alternative earthen final cover (AEFC) consistent with the currently permitted Disposal Area is proposed for this modification. The cover will consist of a minimum of two (2) feet of appropriate soil overlying six (6) inches of interim cover.

Bench Design

The proposed bench design incorporates surface water controls and minimum slopes as required in the regulations (NAC 444.6885, NAC 444.6887). The Landfill will be developed in thirteen different phases shown on the design drawings.

Final Landfill Bench Plan

The landfill will be constructed in 13 phases as described below:

- Phase 1 – Consists of placing C & D debris in the expansion portion of benches 4B through 7B at the north east corner of the existing landfill.
- Phase 2 – Consists of installing HDPE up to anchor benches RN-1A and RN-1B and placing waste in benches 2 through 5 in the center canyon.
- Phase 3 – Consists of extending the HDPE liner to anchor benches RN-2A and RN-2B, converting anchor benches RN-1A and RN-1B to LCRS ditches and placing waste in benches 6 through 7 in the center canyon. Bench 7 in the center canyon ties into bench 7 that was placed in the currently permitted Disposal Area.

- Phase 4 – Consists of extending the HDPE to anchor benches RN-3A and RN-3B in the center canyon. HDPE is also placed on top of the C & D extending up to the liner anchor at the north east corner. This phase includes placing waste on bench 8 extending from the north east through the center canyon.
- Phase 5 – Consists of extending the HDPE to anchor benches RN-4A and RN-4B in the center canyon and north east areas and placing waste in bench 9 across the north east area and through the center canyon.
- Phase 6 – Consists of extending the HDPE to anchor benches RN-5A, RN-5B and RN-5C. This phase includes placing waste in bench 10 in the north east area and through the center canyon.
- Phase7 – Consists of installing HDPE in the south canyon to anchor benches RN- 6A and RN-6B. This phase includes placing waste in benches 4A through 10A in the south canyon.
- Phase 8 – Consists of extending the HDPE to cover the eastern portion of the ridge between the center and south canyons and extending the HDPE at the north east. This phase includes placing waste in bench 11 which extends from the north east area through the south canyon,
- Phase 9 – Consists of extending the HDPE to cover the remaining portion of the ridge between the center and south canyons and extending the HDPE at the north east. This phase includes placing waste in bench 12 which extends from the north east area through the south canyon,
- Phase 10 – Consists of extending the HDPE in the north east area and placing waste in bench 13. Bench 13 extends from the north east area through the south canyon.
- Phase 11 – Consists of extending the HDPE in the north east area and placing waste in bench 14. Bench 14 extends from the north east area through the south canyon.
- Phase 12 – Consists of extending the HDPE in the north east area and placing waste in bench 15. Bench 15 extends from the north east area through the south canyon.
- Phase 13 – No additional HDPE is required. This phase consists of placing waste in benches 16 through 20.

Current Bench (Cell) Construction Practices

The discharged waste is pushed by mechanical means, from the trench to the top of a disposal cell and compacted horizontally as presented below. Placed lifts generally do not exceed two (2) feet in vertical thickness prior to compaction in accordance with NAC 444.686. The public dumping area is ocated at least 30 feet away from the edge of the push trench. Waste spotters are employed to witness the public's disposal operations, monitor for any excluded wastes and maintain the necessary spacing required for their safety. The cover material (primarily intermediate and final cover) is graded to prevent water infiltration and minimize leachate. The overall drainage gradient away from each constructed lift is three (3) percent in accordance with NAC 444.688 (1) (f). The working face of the cell at the end of the day is constructed to a slope of approximately 3H:1V (horizontal to vertical).

Slope Geometry and Drainage

The finish face of the Landfill benches consists of individual cell slopes inclined at 3H:1V with 20 foot-wide setbacks from the underlying cell. The width and cross-slope of the intermediate slope benches are designed to accommodate access of maintenance equipment and convey slope stormwater run-off during a 24-hour, 25-year storm event. Based on the slope profile described, the overall design Landfill slope inclination is approximately 4H:1V. Stormwater run-off collected within

the Landfill is diverted to perimeter run-off collection channels which outlet into on-site retention ponds.

Landfill Cover

An alternative earthen final cover (AEFC), also known as an evapotranspirative (ET) cover, is the final cover design. Sparks, Nevada has an average annual precipitation of approximately 7.7-inches. The climate's annual demand for water referred to as potential evapotranspiration (PET) is approximately 76-inches, nearly 10 times greater than the average annual precipitation. Additionally, it can be seen in Figure 3.1-1 that for every month of the year, the climate's demand for water (PET) far exceeds the actual supply of water (precipitation). Consequently, an AEFC designed to take advantage of variances between the demand for water and actual supply of water such as an ET Covers is well suited for the Site. To support the AEFC design an extensive borrow source investigation, laboratory testing program and modeling effort were implemented. The borrow source investigation involved excavating sixty one (61) test pits. AEFC cover performance was predicted using the UNSAT-H computer modeling software.

- The saturated hydraulic conductivity in the upper one (1) foot of the cover was increased by up to two (2) orders of magnitude so that run-off was zero. This conservatively allowed all precipitation to infiltrate into each cover profile.
- Vegetation on the final cover was specified as only 5-percent plant with a leaf area index (LAI) of 1. These parameters correspond to a poor stand of grass.
- The interim cover was modeled with no vegetation.
- An extreme year with annual precipitation nearly twice the average annual precipitation was applied for three consecutive years in a row. There was no percolation of water through either the final or interim cover predicted by any of the simulations.

Slope Stability

Stability of the final slope configurations at the Lockwood Regional Landfill were analyzed under both static conditions and conditions incorporating earthquake loads and pseudo-static conditions. Stability evaluations were performed by classical limit equilibrium methods and by review of the performance of similar MSWLF slope s under both static and dynamic loading conditions (Siegel et al. (1990), EERC (1994), and Buranek and Prasad (1991)). Slope stability modeling results of design refuse slopes, with both geomembrane lined base layers and non-geomembrane lined base layers (bedrock), indicate that slopes analyzed should remain stable under static conditions.

Settlement

Settlement data from the currently permitted obtained since 1995 were used to estimate settlement for the proposed Landfill. A maximum differential settlement of 3.75 feet distributed over a horizontal distance of 670-feet was estimated. With respect to final cover integrity, the estimated amount of differential settlement is insignificant. There will be no detrimental impacts to the final cover due to differential settlement. With respect to surface drainage, over a distance of 670-feet the calculated differential settlement amounts to a 0.5-percent change in surface grade. If required, this minor amount of grade change can be easily mitigated during post closure and care. Impacts of differential settlement on intermediate benches will be minor

Surface Water Controls Surface water control entails control of run-on and run-off. Run-on, in the

context of a landfill, is defined as stormwaters that tend to flow from natural slopes toward the Disposal Area. Run-off is defined as stormwaters that tend to flow off of the interim and final cover of a landfill. The design presented demonstrates compliance with NAC 444.680 and NAC 444.684. Run-on is controlled through two systems of control channels; perimeter channels and intermediate channels. The majority of run-on collection from contributing watersheds to the Site will be handled by perimeter run-on collection channels constructed outside the eastern limits of the proposed Disposal Area. The design flows from the upgradient watershed areas was determined for the 100-year 24-hour precipitation event to size the perimeter collection channels. Intermediate run-on control channels will be constructed inside the proposed Disposal Area to minimize run-on coming in contact with areas that have MSW. The intermediate run-on channels will transition into liner anchor benches and then once covered by waste they become leachate collection ditches. Intermediate run-on channels were designed for the 25-year 24-hour precipitation event over the maximum amount of exposed lined area contributing to the channel. Run-off originating from the Landfill will be conveyed within a separate drainage system to a set of three (3) existing collection ponds and three (3) new collection ponds

Leachate Collection and Recovery System A leachate collection and recovery system is proposed for the permit modification. Typically an LCRS system is designed to accommodate leachate that may be generated through percolation of precipitation through the interim and final cover. There are two general pipe networks associated with the LCRS. One network is designed for the canyon bottoms and eastern perimeter between the currently permitted and proposed Disposal Areas and the other network will be placed in the intermediate run-on channels on the liner anchor benches. For the LCRS network designed for the canyon bottoms and eastern perimeter, collection of leachate occurs through gravel packed, geofabric wrapped, standard dimension ratio smooth wall perforated polyethylene pipes. Pipes in this network were divided into sections by construction phase, and sized to accommodate maximum flow and overburden pressure.

Document Availability

The ADMINISTRATIVE RECORD, which includes the DRAFT PERMIT, and correspondence are available for public review by appointment between 8:00 AM and 5:00 PM, Monday through Friday, at the Division offices located at: 901 S. Stewart St., Suite 4001, Carson City, NV 89701-5249.
Contact: Paul Eckert at (775) 687-9477, or by e-mail at: PEckert@ndep.nv.gov

Procedure for Public Review

Questions or comments may be submitted on or before the end of the public comment period.

In writing: Paul Eckert, P.E.
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web: News and Public Notices

The Division's Notice of Intent to approve the modified Permit for this facility, subject to the conditions contained in the Permit, will be published in a local newspaper. Additionally, the Public Notice will be mailed to interested persons on our mailing list. The Division will accept written comments on the proposed draft permit

from all interested persons until the end of the public comment period.

Will there be a public hearing?

N/A

When does the comment period end?

N/A