



Environment

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Platte River Power Authority
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Submitted by:
AECOM
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PLATTE RIVER POWER AUTHORITY RAWHIDE STATION ANNUAL ASH MONOFILL INSPECTION REPORT

Final

Certification



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Colorado PE 32234

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- Attachment 2 Revised Design and Operations Plan for the Solid Waste Disposal Facility, Rawhide Energy Station, November 2007 (selected figures)
- Attachment 3 CDPHE Approval of Modification to Engineered Design and Operations Plan, Rawhide Energy Station Coal Ash Disposal Facility, January 25, 2008
- Attachment 4 CDPHE Approval of Construction Quality Assurance Report, Rawhide Energy Station Coal Ash Disposal Facility, March 12, 2010
- Attachment 5 Summary of CCR Monofill Volume
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1.0 Introduction

1.1 Objective

Per the Coal Combustion Residual (CCR) Rule published by the United States Environmental Protection Agency (USEPA) and entered into the Federal Register on April 17, 2015 (40 CFR 257.83 (b)), existing and new CCR landfills are required to be inspected annually by a qualified professional engineer to establish that the CCR unit is in good condition and that the design, construction, operation, and maintenance conform to standard engineering practices for this type of facility. The inspection includes review of documentation and weekly reports indicating the condition of the facility, and a visual inspection of the CCR unit, appurtenant structures, and any hydraulic structures underlying the base of the CCR unit to identify signs of failure or conditions that could lead to failure if not addressed.

The CCR rule is a self-implementing rule which regulates the handling and disposal of CCRs as non-hazardous solid waste under Subtitle D of the Resource Conservation and Recovery Act (RCRA). The context of this Section of the CFR is in compliance with Federal EPA Regulations, as they existed as of December 19, 2014.

The objective of this report prepared by AECOM Technical Services, Inc. (AECOM), on behalf of Platte River Power Authority (PRPA) is to present the results of the first annual inspection of the ash monofill at the Rawhide Energy Station Unit 1 (Rawhide), conducted in March 2016 per the CCR Rule established by the USEPA.

1.2 Outline of Rule Requirements

In accordance with the USEPA Final CCR Rule, AECOM was required to perform an annual inspection "To ensure that the design, construction, operation, and maintenance of the CCR unit is consistent with recognized and generally accepted good engineering standards". The minimum requirements, as per §257.84(b)(i) of the USEPA Final CCR Rule include the following:

- A review of available status and condition information including operational records, and previous inspections
- A visual inspection for signs of distress or malfunction
- An inspection report

The inspection (described in Section 3) was the first annual inspection designed to address the items listed below, pursuant to §257.84(b)(2) of the USEPA Final CCR Rule:

- (i) Any changes in geometry of the structure since the previous annual inspection;
- (ii) The approximate volume of CCR contained in the unit at the time of the inspection;
- (iii) Any appearances of an actual or potential structural weakness of the CCR unit, in addition to any existing conditions that are disrupting or have the potential to disrupt the operation and safety of the CCR unit; and
- (iv) Any other change(s) which may have affected the stability or operation of the CCR unit since the previous annual inspection."

Therefore, comparison to prior annual reports is not applicable for this first year.

1.3 Facility Description

The CCR landfill (ash monofill or monofill) at Rawhide is a Residual Solid Waste (RSW) landfill located in Larimer County, Colorado. The solid waste disposal site at Rawhide is located in the northwest corner of the property. In March 1981, Platte River Power Authority (PRPA) obtained a Certificate of Designation for the Northeast ¼ of Section 6 Township 10 North Range 68 West, and the Southern ½ of Section 31 Township 11 North Range 68 West.

Overall, Rawhide encompasses approximately 3,120 acres. In addition to the plant buildings, the major feature of the facility is a 500-acre cooling water reservoir which contains approximately 15,000 acre-feet of water. The power block area contains the boiler and turbine buildings, the air quality control equipment and the administrative offices. A rail spur along the northern edge of the site connects Rawhide with the mainline of the BNSF Railway and is used to deliver coal and construction materials for plant operations.

Six generating units are located at Rawhide. Units A, B, C, D, and F are fueled by natural gas, and Unit 1 is fueled by coal which produces the CCR solid wastes contained in the monofill. The coal used in Rawhide Unit 1 operation comes from the Powder River Basin in Wyoming.

CCR waste from Unit 1 operations is disposed of in an ash monofill comprised of two cells, described in this report as Cell 1 and Cell 2. The figure labeled as A.1 in Attachment 2 shows the location and general area occupied by Cells 1 and 2. Cell 1 (ca 1980-2007) is capped and no longer in use, but has not undergone official closure. On January 25, 2008, the Colorado Department of Public Health and Environment (CDPHE), Hazardous Materials and Waste Management Division approved a request to modify the original Engineered Design and Operations Plan (1980 EDOP). The EDOP modification allowed the facility to expand the current footprint of waste management for the monofill immediately to the west and adjoining Cell 1, into the area of current CCR disposal operations designated as Cell 2. A copy of the approval is included as Attachment 3. Similar to Cell 1, CCR waste placement in Cell 2 started behind a containment dike and progressively moves north.

Rawhide is owned and operated by PRPA. PRPA may be contacted as follows:

Rawhide Energy Station
Attn: Ms. Courtney Stewart
2700 E. County Road 82
Wellington, CO 80549

1.4 Solid Waste Stream

According to the 1980 EDOP, more than 99% of the solid wastes generated at Rawhide are a result of the combustion of coal and the cleaning of the flue gas produced by the combustion (FGC waste). The removal of sulfur dioxide and fly ash are required to comply with USEPA and CDPHE emission standards. Approximately 82% of the solid wastes produced at Rawhide come from the operation of the air quality control system. Bottom ash accounts for approximately 17.9% of the solid waste generated by Rawhide. The bottom ash produced in the combustion process is collected in the bottom of the boiler. That ash is then hydraulically sluiced to bottom ash ponds located near the boiler buildings. When the solids in the pond reach their storage capacity, the pond is dried out and the solids are dredged and hauled to the solid waste disposal area.

The remaining 0.1% of the solid wastes placed in the monofill is made up phosphorous sludges and inorganic construction materials.

The quantities of each segment of the waste stream, taken from the 1980 EDOP, are estimated in Table 1-1 below. Figure 3 in Attachment 1 (appended from the 1980 EDOP) provides an illustration of the solid waste stream and waste management.

Table 1-1: Estimated Solid Waste Quantities ⁽¹⁾

	Average Daily		Maximum Daily		Average Annual		Average Plant Life		
	Ton	acre-feet	Ton	acre-feet	Ton	acre-feet	Ton	acre-feet	
FGC Waste	175	0.11	262	0.16	64,000	39.2	2,240,000	1,370	82%
Bottom Ash	38	0.02	58	0.04	14,000	8.6	490,000	300	18%
Phosphorous Solids	-	-	-	-	-	0.23	2	8	<1%
Construction Materials	-	-	-	-	-	-	10,000	4	<1%
Total	213	0.13	320	0.02	78,000	48.08	2,299,002	1,682	100%

Notes:

⁽¹⁾ ED&OP 1980, Table 1 “Estimated Solid Waste Quantities”

- 82% flue gas residuals (75% fly ash, 17.7% spent lime product, 4.7% unreacted slaked lime, 2.3% unslaked lime, and 0.8% inert matter)
- 17.9% bottom ash (mostly sand and gravel-sized ash from the combustion process)
- 0.1% phosphorus sludge from tertiary treatment of the plant cooling water, plus inert construction waste.

In 2007, a revised EDOP for the new Cell 2 was prepared by Smith Geotechnical, Inc., which indicated that the CCR waste stream was to be comprised of products of coal combustion, flue gas cleaning wastes, phosphorous sludge, and construction wastes from the continued development and construction of Rawhide. The monofill expansion was to continue to be used for the disposal of approved products in current operations.

According to CDPHE, the CCR fill at Rawhide is a non-hazardous solid waste under Subtitle D of RCRA. The wastes deposited in Cells 1 and 2 are not combustible; there are no plans for providing fire hydrants or other control measures in the disposal area. The wastes are odorless and do not create rodent or insect issues since the wastes have no caloric value.

1.5 Facility Design and Components

1.5.1 Siting

Section 1.4.1 briefly describes the geologic conditions and siting considerations with respect to the geology and hydrogeology at the Unit 1 plant and at the monofill.

1.5.1.1 Geology

The geologic setting at Rawhide lies on the high plains located immediately east of the Colorado Front Range, where soil and bedrock units are incised by drainage from nearby mountains to the west, forming small, relatively minor valley and ridge topographic expressions. Elevations within the project area range from about 5,580 to 5,805 feet above mean sea level (amsl). The most distinctive topographic feature at Rawhide is a broad basin that occupies the center of the site and extends from northwest to southeast. Smooth ridges and rounded bluffs surround this basin and mark the transition to uplands that are 50 to 70 feet higher. It is within this basin that a site for the Rawhide monofill disposal area was selected. The cooling water reservoir occupies the lower portion of this valley to the south.

According to the United States Geological Survey (USGS) geologic map, bedrock at Rawhide consists of Cretaceous units including the Upper Pierre Shale Formation. Specifically, the majority of the Rawhide site lies on the Upper Pierre Shale Formation transition zone, the eastern extent of which transitions to

the Lower Fox Hills Sandstone downslope and east of the Rawhide site. The Pierre Shale transition zone is described as shale with interbedded sandstones. The portions 600 feet below the contact with the Fox Hills sandstone are mapped by the USGS as being the most permeable within the unit, yielding 5 to 15 gallons per minute in wells (Hershey and Schneider 1972). The Fox Hills Sandstone is described as a pale yellow, massive, silty, fine-grained sandstone with lenticular black shale partings but is not present on the Rawhide site.

The bedrock surface at the site is mapped as dipping east-southeast toward the cooling water reservoir. The geologic map indicates bedrock bedding structure in the area striking roughly north-south with shallow dips 5 to 10 degrees to the east. Several faults are recorded in the area surrounding Rawhide: the Rawhide Fault approximately 5 miles to the north, the Round Butte Fault approximately 4 miles northwest, and an unnamed fault is present about one mile north of the site. None of these faults are considered potentially active or have been associated with seismic events. The Rawhide site is considered to be in an area of overall minor seismicity.

Soils at the site are mapped as Pleistocene pediment deposits consisting of arkosic sands and gravel with minor amounts of red clay. More recent, relatively thin soils mantling the pediment deposits and bedrock in the area are likely wind-blown silts and clays.

The original geotechnical investigation for Rawhide was conducted by Black and Veatch in 1978/79. During the investigation three borings were drilled within or near the area of the monofill (B-94, B-95 and B-96). Boring B-95 encountered sands with varying silt and clay content in the upper 10 feet and claystone bedrock (very weathered shale) below. Borings B-94 and B-96 were completed to the west and east of the proposed monofill, respectively. At those locations, sands with varying silt and clay content were present to depths of 23 and 50 feet, and underlain by weathered shale bedrock.

The most recent investigation was performed by Smith Geotechnical in 2007, to classify soils and provide engineering recommendations for the footprint area of Cell 2. The investigation consisted of drilling and sampling seven borings. Subsurface information collected in the Smith Geotechnical report summarizes the soil and bedrock as follows:

A layer of clay was encountered in all borings from the ground surface to a maximum depth of eight (8) feet below grade. The clay was tan, moist, stiff to very stiff, and plastic. Claystone was encountered in all borings under the overburden clay at depths ranging from three to approximately twenty feet below grade. The claystone was generally tan, moist, soft, and completely to severely weathered.

Relevant soil borings in the area of the monofill from the 1980 and 2007 EDOP documents are included in Attachments 1 and 2. Figure 1.3 in Attachment 2 indicates areas where the borings were advanced in the monofill from both of these earlier investigations. Two new monitoring wells were installed along the southern boundary of the monofill during an investigation conducted in January and February, 2016 (locations added to Figure 1.3 cited above). These wells were installed as part of a broad investigation performed to further the understanding of shallow groundwater characteristics at the monofill and at the location of the bottom ash transfer (BAT) ponds.

Hydrogeology

The hydrogeology at Rawhide is discussed in the 1980 EDOP and in the "Final Report Investigation of the Groundwater Monitoring Program for the Bottom Ash Disposal Site," conducted by Lidstone and Anderson in 1989. According to the 1980 EDOP, hydrogeology of the RES site was originally investigated by drilling and installing twenty-one (21) monitoring wells. Data from the wells indicated that a groundwater table exists within the Pierre Shale bedrock below the site and in surficial deposits along Coal Creek. The report explained depth to groundwater varied across the site from 11 to 67 feet and follows a general gradient to the south-southeast. The shallow water table, as explained in the 1980 EDOP was determined to be directly recharged by infiltration from precipitation and surface runoff.

Groundwater was not encountered in any of the borings drilled in the Cell 2 footprint by Smith Geotechnical in 2007.

Lidstone and Anderson concluded that sufficient data was collected on the groundwater beneath the Rawhide site to determine a mound has formed in the shallow fractured Pierre Shale Aquifer in the vicinity of the cooling water reservoir. After a review of available documents on the current water levels

within the area, AECOM concludes that the monofill is hydraulically upgradient of any groundwater mound that may be created by the cooling water reservoir, and groundwater mounding associated with the cooling water reservoir would not affect the overall performance of the monofill disposal site.

1.5.2 Subgrade, Liner, and Leachate Collection

According to the 1980 EDOP, Cell 1 of the monofill was constructed by removing and stockpiling the existing topsoil over one to two acres at a time (approximately one year's waste generation at that time) then placing the CCR wastes directly on the existing grade. A complete earthen liner was not prescribed for solid waste collection in the 1980 EDOP. The EDOP did recommend that approximately 13 acres on the east side of Cell 1 receive an 18-inch-thick partial liner above elevation 5,740 feet to limit leachate movement southeastward along the dip of the bedrock. No evidence of the construction of this partial liner was identified in the documents reviewed by AECOM for this 2016 inspection.

Per the 1980 EDOP, based on the premises that "groundwater resources associated with the overall plant site are minor"; the general dip of the shale bedrock toward the southeast; low permeability of the waste material; and high evapotranspiration and diversion of limited precipitation around the monofill, "leachate from the landfill will be insignificant". The 1980 EDOP continues to explain, "Precipitation that falls on temporarily uncovered wastes in active fill areas will run off and be collected behind the temporary earth dike and held for evaporation. Any leachate that did leave the monofill was judged to be captured by the downstream cooling water dam and reservoir which is constructed down to bedrock and designed to minimize seepage."

According to the revised 2007 EDOP for Cell 2, that portion of the monofill is constructed similarly to Cell 1 by removing/stockpiling the existing topsoil over one to two acres at a time for use during reclamation activities and for daily cover. After clearing the topsoil, the active area is filled to approximately 21 feet above the existing grade with solid waste material. After filling and compacting the one to two acre section, a two-foot-thick earthen cover will be placed over the waste material. The cover material will be moisture conditioned, compacted, and reseeded.

A March 12, 2010 letter from CDPHE approved the Construction Quality Assessment Report for Cell 2 and is appended.

Groundwater protection for Cell 2 was based on similar premises and remedial actions for Cell 1 and include: limiting leachate produced through the use of soil cover and diversion away from the monofill; low permeability of the waste material, high evapotranspiration rates; stormwater diversions; and groundwater protection provided by the down-gradient cooling pond. Due to the combination of these safeguards, the 2007 EDOP determined the "leachate resulting from the Cell 2 monofill material will be insignificant".

1.5.3 Material Placement and Final Slopes

The 1980 EDOP indicated that CCR waste was to be placed typically 21 feet above grade, starting behind a compacted starter dike and moving northward. The ash was to be hauled and unloaded in a wetted condition to reduce fugitive dust, then placed in lifts and compacted. Figure 11 in Attachment 1 shows the solid waste disposal fill sequence for Cell 1. Table 1-2 from the 1980 EDOP provides the landfill volumetric and reclamation schedule for Cell 1.

Table 1-2: Cell 1 Landfill and Reclamation Schedule

Section Number	Section Area (acres)	Section Volume* (acre-feet)	Start of Fill Date (year)	Annual Filled & Reclaimed Area (acres)
1	9.8	200	1984**	2.3
2	18.7	425	1988	2.1
3	15.8	500	1997	1.5
4	17.6	545	2007	1.5
Totals	61.9	1670		

Notes:

*Volume capacity was based on mounding the material to an approximate height of 21 feet above level fill where required using 4:1 side slopes.

**Construction wastes were placed in this section beginning in 1980.

The 2007 EDOP retained the general placement features of the 1980 plan although based on start date, it would appear that Cell 2 replaced at least a portion of Section 4 in Cell 1. Figure 2 in Attachment 2 shows the solid waste disposal fill sequence for Cell 2. Table 1-3 below is from the 2007 EDOP and provides the landfill volumetric and reclamation schedule for Cell 2.

Table 1-3: Cell 2 Landfill and Reclamation Schedule

Section Number	Section Area (acres)	Estimated Storage Volume* (acre-feet)	Start of Fill Date** (year)	Annual Filled & Reclaimed Area (acres)
1A	15.60	330	2008	2.2
2A	16.00	370	2015	2.1
3A	14.62	465	2023	1.5
4A	14.69	455	2032	1.6
Totals	60.91	1620		

Notes:

*Storage volume capacity was based on mounding the material to an approximate height of 21 feet above level fill where required using 4:1 side slopes.

**Estimated fill time based on a yearly average of 80,000 tons/year and an estimated conversion of 1.0125 tons/cy.

The 2007 EDOP lists the following equipment and their respective uses for solid material placement in Cell 2:

- **Dump Trucks** These trucks will be used in transporting the solid waste to the disposal area.
- **Compactor Tractor and Blade** This tractor will be used for moving and compacting waste after dumping.
- **Water Spray Truck** This truck is for applying water to waste prior to compaction and wetting the haul roads to prevent fugitive dust emissions.
- **Scraper** This will be used for removal of topsoil prior to waste disposal and for depositing topsoil during reclamation.

- **Medium Size Farm Tractor** This tractor will be used to mix the ash and water prior to compaction. The tractor will also be used to seed and fertilize reclaimed areas.
- **Portable Irrigation Equipment** This equipment is for use in establishing the vegetative cover after reclamation.

Per Ms. Courtney Stewart (PRPA), the CCR disposed at the Rawhide monofill is transported from the combustion area by loading off-road haul trucks that transport the CCR to the working face of the monofill. The plant combustion/generation system generally runs 24 hours a day, seven days a week. Disposal operations are typically limited to three days a week on Monday, Tuesday, and Thursday. A summary of the volume of CCR contained in the monofill, prepared by PRPA from their records, is appended as Attachment 5.

1.5.4 Final Cap

For Cell 1, the 1980 EDOP noted that after each section was filled, a two-foot-thick earthen cover was to be placed, compacted and seeded. Finished surface grades were reported to be four-horizontal to one vertical (4H:1V) in the north-south direction. The 2007 EDOP retained the final covering and grade features of the 1980 plan. Figure 12 (Attachment 1) and Figure 3 (Attachment 2) provides a typical landfill north-south cross section from the 1980 EDOP and 2007 EDOP documents, respectively.

1.5.5 Stormwater Management

The 1980 EDOP suggested that precipitation runoff would be limited by excavation of a capture trench on the upgradient (north) side of the active face of Cell 1 to divert storm water around the landfill, with the main cooling water reservoir as the down-gradient destination.

The 2007 EDOP made recommendations for Cell 2 to control runoff during filling operations, by initially placing waste material at the center of the active area and progressively placing outward to the edges of the active area. Filling by this method tends to direct the runoff to the outside of the monofill section, where the water may be stored for treatment or evaporation. To prevent damage from stormwater runoff, a diversion channel along the west toe of Cell 1 was to be reproduced and constructed along the western edge of the monofill expansion (AECOM observed that a stormwater swale exists on the west perimeter of Cell 2). Also, an embankment berm (also functioning as a starter dike) was to be constructed at the southern end of the monofill expansion. The west diversion channel can pass the 100-year, 24-hour storm flows from the areas upstream of the monofill. The diversion channel is a permanent fixture to the monofill and will remain after the final closure of the monofill. The embankment berm (starter dike) can contain drainage from a 25-year, 24-hour event.

2.0 Review of Existing Information

In accordance with the USEPA Final CCR Rule, AECOM completed "A review of available information regarding the status and condition of the CCR unit, including, but not limited to, files available in the operating record (e.g., the results of inspections by a qualified person, and results of previous annual inspections) §257.84(b)(i)"

2.1 CCR Unit Documents and Operating Records

Below is a list of documents reviewed with respect to the ash monofill:

- Geotechnical Analysis Report, Platte River Power Authority Rawhide Project, Black & Veatch Consulting Engineers, July 1979.
- Engineering Report and Operational Plan for the Solid Waste Disposal Facility, Rawhide Energy Project, December 1980.
- Investigation of the Ground-Water Monitoring Program for the Bottom Ash Disposal Site. Lidstone & Anderson, Inc. March 1989.
- Addendum to Engineering Report and Operation Plan for the Solid Waste Disposal Facility. Rawhide Engineering Services, October 1997.
- Platte River Power Authority Rawhide Simple Cycle, Smith Geotechnical, March 2001.
- Subsurface Investigation, CGRS, Inc., July 2001.
- Groundwater Monitoring Report, CGRS, Inc., September 2002.
- Revised Design and Operations Plan for the Solid Waste Disposal Facility, Rawhide Energy Station, Smith Geotechnical, November 2007.
- Approval of Modification to Engineered Design and Operations Plan, Rawhide Energy Station Coal Ash Disposal Facility, issued by Colorado Department of Public Health and Environment, January 25, 2008.
- Approval of Construction Quality Assurance Report, Rawhide Energy Station Coal Ash Disposal Facility, issued by Colorado Department of Public Health and Environment, March 12, 2010.
- CCR Landfill Weekly Inspection Reports, Platte River Power Authority, January-April 2016.

Monofill Annual Volume Summary, 1998-2016 (PRPA file information).

3.0 Annual Inspection Summary

The annual inspection was conducted on Tuesday March 15th, 2016, starting at 9:00 am mountain standard time (MST) at the Rawhide administrative offices. A brief site safety meeting with video was held with a PRPA onsite safety manager prior to the field observations. The weather was partly cloudy, approximately 40 degrees Fahrenheit with moderate to high winds.

Personnel in attendance for the inspection included:

- Elliott Drumright, PE, AECOM
- Earl Underwood, PG, AECOM
- Courtney Stewart, Environmental Engineer, PRPA

The completed Federal CCR Annual Inspection form used during the inspection is appended as Attachment 6. A sample weekly inspection form used by PRPA is appended as Attachment 7. A photo log for the 2016 inspection is included as Attachment 8.

3.1 Strategy and Route

The general strategy and route of the inspection included a general walkover of Cells 1 and 2 of the ash monofill, and a driving inspection of the monofill along its perimeter and intermediate access roads. The inspection started and concluded at the plant administrative offices.

The inspection began by driving the entire monofill site with Courtney Stewart (PRPA) to gain orientation of the general area. After general orientation, the starter dike was inspected at the southern termination of Cell 2. The working face of Cell 2 was observed approximately 500 feet from the crest of the starter dike and the remaining interior area of Cell 2 was observed. By driving access roads, native soils stockpiled within Cell 2 were observed as well as the transition fill zone between Cell 1 and Cell 2. The southern portions of Cell 1 were then walked, and groundcover and geometry of final grades observed.

3.2 Facility Conditions

In general, the ash monofill at Cell 2 is well organized and maintained. It was apparent that the monofill does experience some transport of windblown ash when winds are very strong, as on the day of the inspection. Rawhide does have a fugitive dust plan in place which includes primary wetting of the ash at the plant prior to transport, plus additional spraying as required during placement in the monofill.

No other significant observations associated with the CCR regulations were noted. Some minor stormwater management and minor housekeeping items were noted and are discussed below:

- The starter dike at Cell 1 and Cell 2 appeared to be in good condition with minor amounts of animal burrows in the upper eight to 12 inches of the ground surface in isolated areas. Access roads over starter dike areas are maintained and have storm water drainage swales, preventing direct runoff onto the face of the starter dike.
- Between the starter dike and the working face of the monofill (Cell 2), the existing fill cap was observed in various stages from fully established stands of groundcover grasses and recently seeded grasses, to the cap placement and eventually fresh CCR from the working face extending some 60-65 feet to the south.
- The working face had end dumped material from the top elevation estimated at 5,725 feet. The material was loosely piled at the working face and terminated at the edge of an excavation at the bottom into the native soil. The excavation at the bottom was approximately seven feet, advanced into silty sand and silty clay overburden that contains some fine gravel. The excavation is made to create stockpiled material to be used as cover material for finish grades and growth media.
- The working face was approximately 525 feet extending in an east-west direction. At the eastern edge, the monofill was observed to partially cover the slope extending from Cell 1. This is the

transition zone between the two cells. Within the area of this transition zone, isolated low areas were observed to have moist or wet conditions.

- Cell 1 was observed to be in general conformance with the original 1980 EDOP, although the eastern slopes were measured at 2.7:1 (H:V), steeper than what was recommended in the north-south direction. The steepened slopes appeared to be performing well and showed no signs of distress.

Also per the 1980 EDOP, "The moistened wastes hauled to the disposal area will be spread into layers 6 to 8 inches thick and then thoroughly wetted by a sprayer truck. Complete mixing of the solid waste and water will be accomplished by a soils mixer before it is rolled and compacted". AECOM was advised that the flyash is thoroughly moistened at the point of collection before transport to the monofill, so lack of additional wetting at the point of placement is not considered to be significant. Although the method of compaction (dozing from a working face vs. compaction in lifts) also varies from the 1980 EDOP, the relatively gentle finished grades and results of a current stability analysis indicate that the alternate method of placement is acceptable (see Section 3.3 below).

3.3 Geometry of Monofill

As required by §257.84(b)(2)(i), other than encapsulating the finished west slope of Cell 1 by in-progress Cell 2, no changes in finished geometry were noted from those reported in previous documentation reviewed by AECOM. The 1980 and 2007 EDOP documents indicate that the general finished slope configuration should be at 4H:1V. This appears to be the case in the north-south direction, although on the eastern side of Cell 1, the slope was measured at 2.7:1 during the site investigation. AECOM is currently conducting stability analysis for Cells 1 and 2 and will address this condition in a separate report.

The facility slopes and benches appeared well graded and maintained. AECOM observed that the finished cover of Cell 1 (and the completed portion of Cell 2) are graded in a manner that discourages surface ponding and minimizes infiltration through the cover. The primary run-off swale is present on the west side of Cell 2 and appears to discharge through a pipe extending under the access road and to the front of the containment dike, allowing surface water to move by overland flow downstream to the cooling water reservoir.

AECOM observed progressive reclamation on top of Cell 2 with (from south-to-north): mature field grass, newly planted grass (evidenced by germination from a seed drill); newly-covered ash (minimum two-foot thickness of earth cover); and graded, uncovered ash at the working face of the fill (recently placed). Additionally, the surface of Cell 1 was observed to have a mature stand of established cover grass.

3.4 Approximate Volume

According to information by PRPA, the total volume of CCR in the monofill as of December 31, 2015, was 2,263,229 cubic yards (cy). At a projected 2016 CCR disposal rate of 62,183.1 tons per year or 5182 tons per month, and a density equivalent of 1.0125 tons/cy, on the date of the inspection (March 15, 2016), an estimated 2,276,025 cy of CCR was contained in the monofill (per CCR Regulation Section §257.84(b)(2)(ii)).

3.5 Structural Inspection

There was no observed structural weakness of the CCR monofill unit, nor any existing conditions that are disrupting or have the potential to disrupt the operation and safety of the CCR unit, per CCR Regulation Section §257.84(b)(2)(iii).

3.6 Additional Changes

The ash monofill and appurtenant structures did not show any signs of major distress or malfunction, per CCR Regulation Section §257.84(b)(1)(ii). AECOM did not observe any other changes which may affect the stability or operation of the monofill per CCR Regulation Section §257.84(b)(2)(iv).

4.0 Conclusions and Recommendations

As noted in the CCR Rules, “If a deficiency or release is identified during an inspection, the owner or operator must remedy the deficiency or release as soon as feasible and prepare documentation detailing the corrective measures taken [§257.84(b)(5)].”

No significant deficiencies or releases were identified during the inspection. Two items identified during the document review were regarded as “potential” deficiencies and are discussed in Section 4.2.1 below. Recommendations other than normal regular maintenance items were noted including:

- Increase dust mitigation efforts near the working face of Cell 2, particularly on windy days (see Attachments 1 and 2, respectively).
- Periodic monitoring and maintenance when slope and weather conditions allow minor rill erosion on slopes, to make sure they are not a progressive problem.
- Monitor and or mitigate small animal burrows on the starter dike slopes so that the associated loss of embankment is not accompanied by an increase in rill erosion.
- Continue surface water best management practices to prevent standing water on monofill surfaces especially the transition zones between Cell 1 and 2, where lower elevations may increase potential for standing water.

4.1 Recommendations Other Than Normal Maintenance

- PRPA should report any signs of distress, malfunction, or any appearances of an actual or potential structural weakness of the CCR monofill to CDPHE. Additionally, changes to the slope configuration, excessive erosion, sinkholes, or any disruption to the safe operation of monofill Cells 1 and 2 should also be reported immediately.
- If available, PRPA should provide records of compacted fill placement in Cell 1 and Cell 2 to add to the inspection record.
- From the documents available for review, there was no specific information that covered the starter dike design or construction. PRPA may consider providing any available documentation of the design and construction of the starter dikes at the southern end of Cells 1 and 2 to add to the inspection record.
- Continue groundwater monitoring on regular intervals to evaluate and if necessary, mitigate, rise in the phreatic surface within the monofill that may degrade stability.

4.2 Deficiencies Discovered

No significant deficiencies were noted as part of this annual inspection. However, no records were available confirming the construction of the partial clay liner mentioned in the 1980 EDOP intended for the eastern boundary of Cell 1. Furthermore, the reference to the specific area to receive the liner was either illegible or not included in the copy of Appendix 6 reviewed. Should PRPA have records of the construction of this liner, they should be made available and appended to this inspection report.

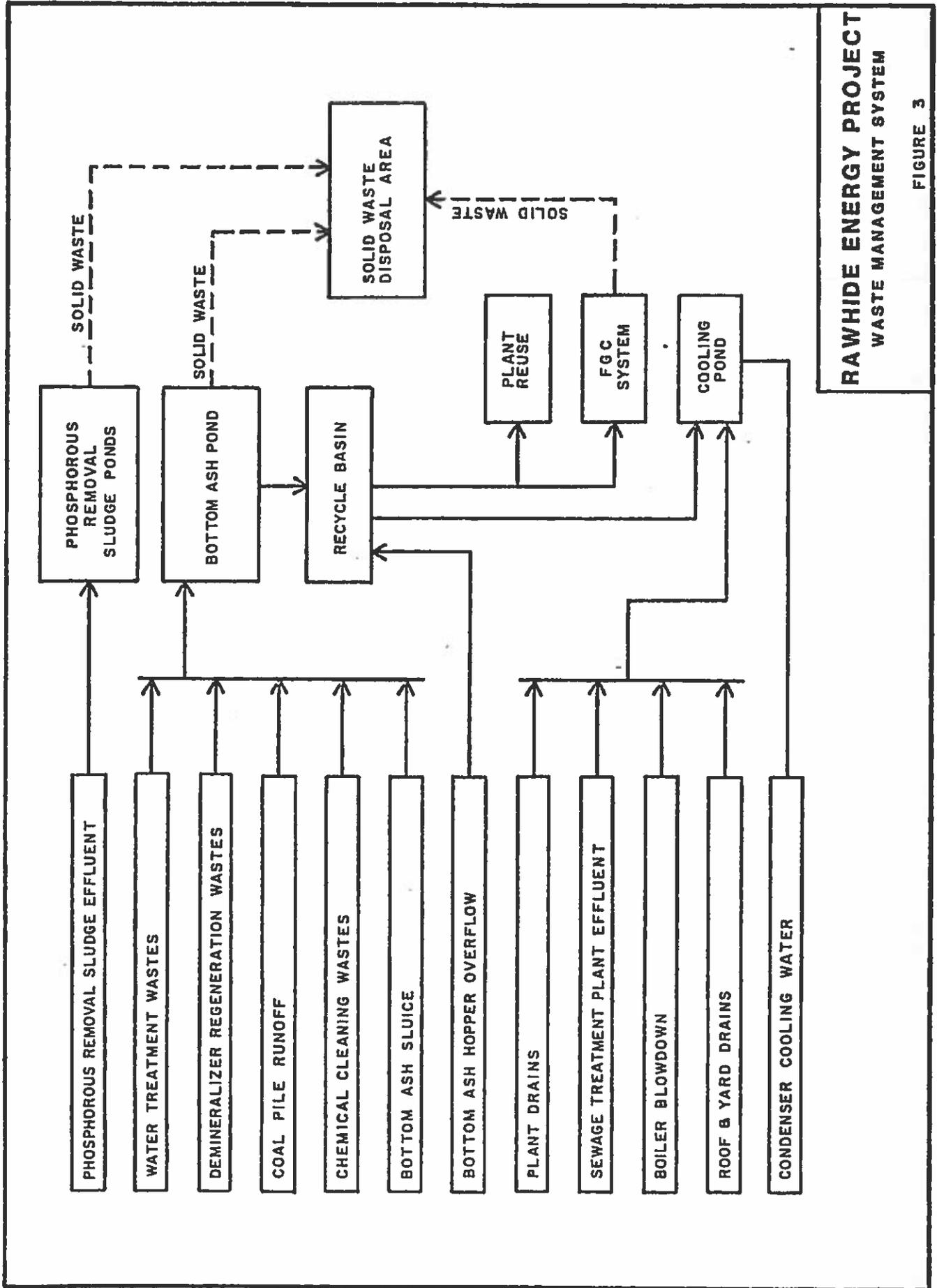
4.3 Corrective Measures Taken

No corrective measures for significant deficiencies were noted that need to be taken by PRPA as part of this annual inspection.

5.0 References

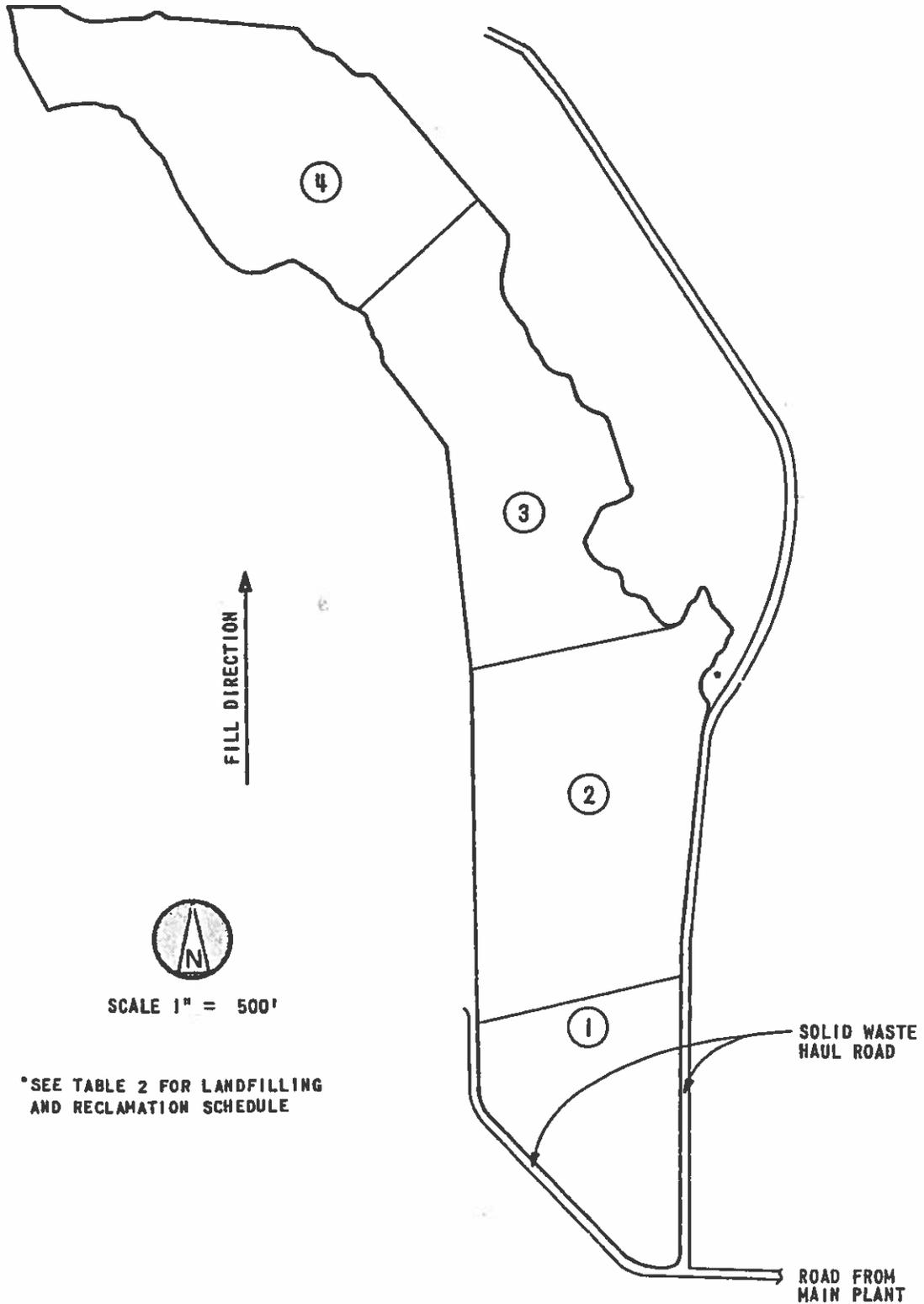
- Geotechnical Analysis, Report Platte River Power Authority Rawhide Project, Black & Veatch Consulting Engineers, July 1979.
- Engineering Report and Operational Plan for the Solid Waste Disposal Facility, Rawhide Energy Project, Platte River Power Authority, December 1980.
- Investigation of the Ground-Water Monitoring Program for the Bottom Ash Disposal Site. Lidstone & Anderson, Inc. March 1989.
- Addendum to Engineering Report and Operation Plan for the Solid Waste Disposal Facility, Rawhide Engineering Services, October 1997.
- Platte River Power Authority Rawhide Simple Cycle, Smith Geotechnical. March 2001.
- Subsurface Investigation, CGRS, Inc., July 2001.
- Groundwater Monitoring Report, CGRS, Inc., September 2002.
- Revised Design and Operations Plan for the Solid Waste Disposal Facility Rawhide Energy Station, Smith Geotechnical, November 2007.
- Approval of Modification to Engineered Design and Operations Plan, Rawhide Energy Station Coal Ash Disposal Facility, issued by Colorado Department of Public Health and Environment, January 25, 2008.
- Approval of Construction Quality Assurance Report, Rawhide Energy Station Coal Ash Disposal Facility, issued by Colorado Department of Public Health and Environment., March 12, 2010.
- CCR Landfill Weekly Inspection Reports, Platte River Power Authority, January-April 2016.
- Monofill Annual Volume Summary, 1998-2016 (PRPA file information).

**Attachment 1
Engineering Report and
Operational Plan for the
Solid Waste Disposal
Facility, Rawhide Energy
Project, December 1980
(selected figures)**



RAWHIDE ENERGY PROJECT
WASTE MANAGEMENT SYSTEM

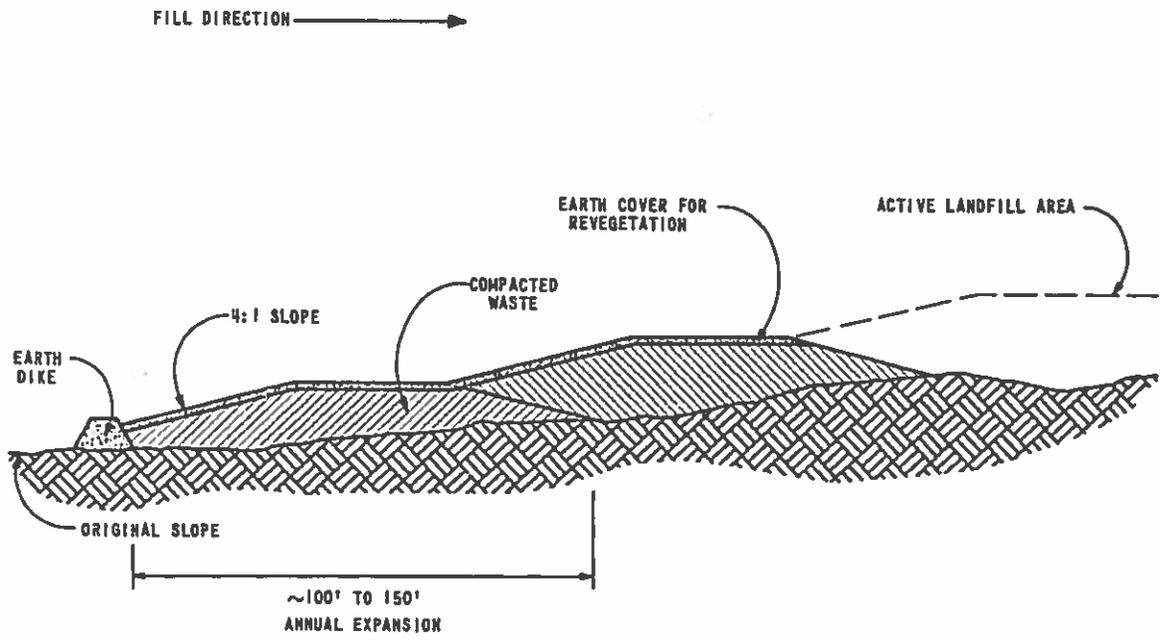
FIGURE 3



*SEE TABLE 2 FOR LANDFILLING AND RECLAMATION SCHEDULE

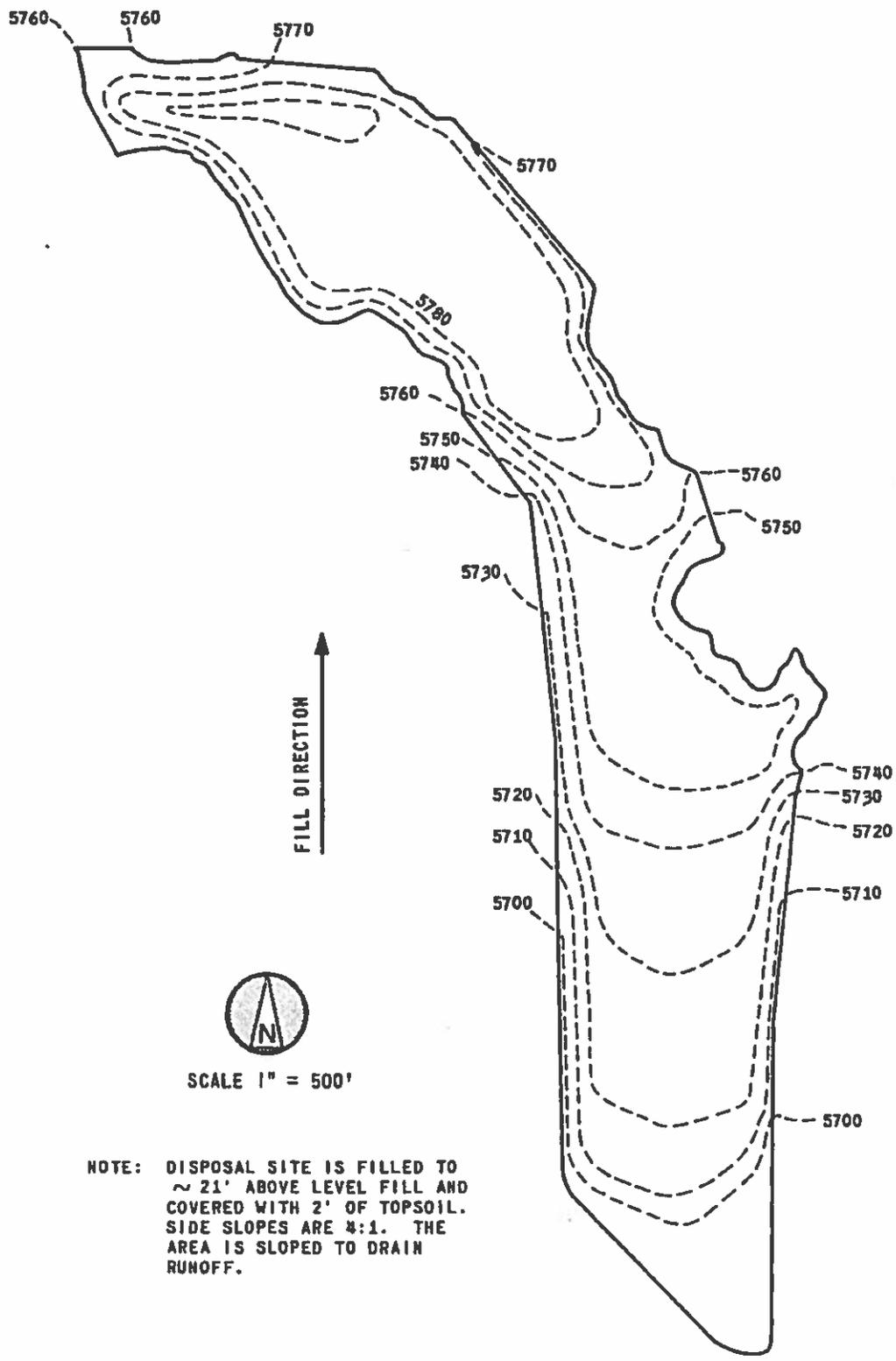
SOLID WASTE DISPOSAL SITE FILL SEQUENCE * (CELL 1)

FIGURE II



LANDFILL AND RECLAMATION OPERATION
TYPICAL NORTH-SOUTH CROSS SECTION

FIGURE 12



NOTE: DISPOSAL SITE IS FILLED TO ~ 21' ABOVE LEVEL FILL AND COVERED WITH 2' OF TOPSOIL. SIDE SLOPES ARE 4:1. THE AREA IS SLOPED TO DRAIN RUNOFF.

SOLID WASTE DISPOSAL SITE
FINAL CONTOURS (CELL 1)

FIGURE 13

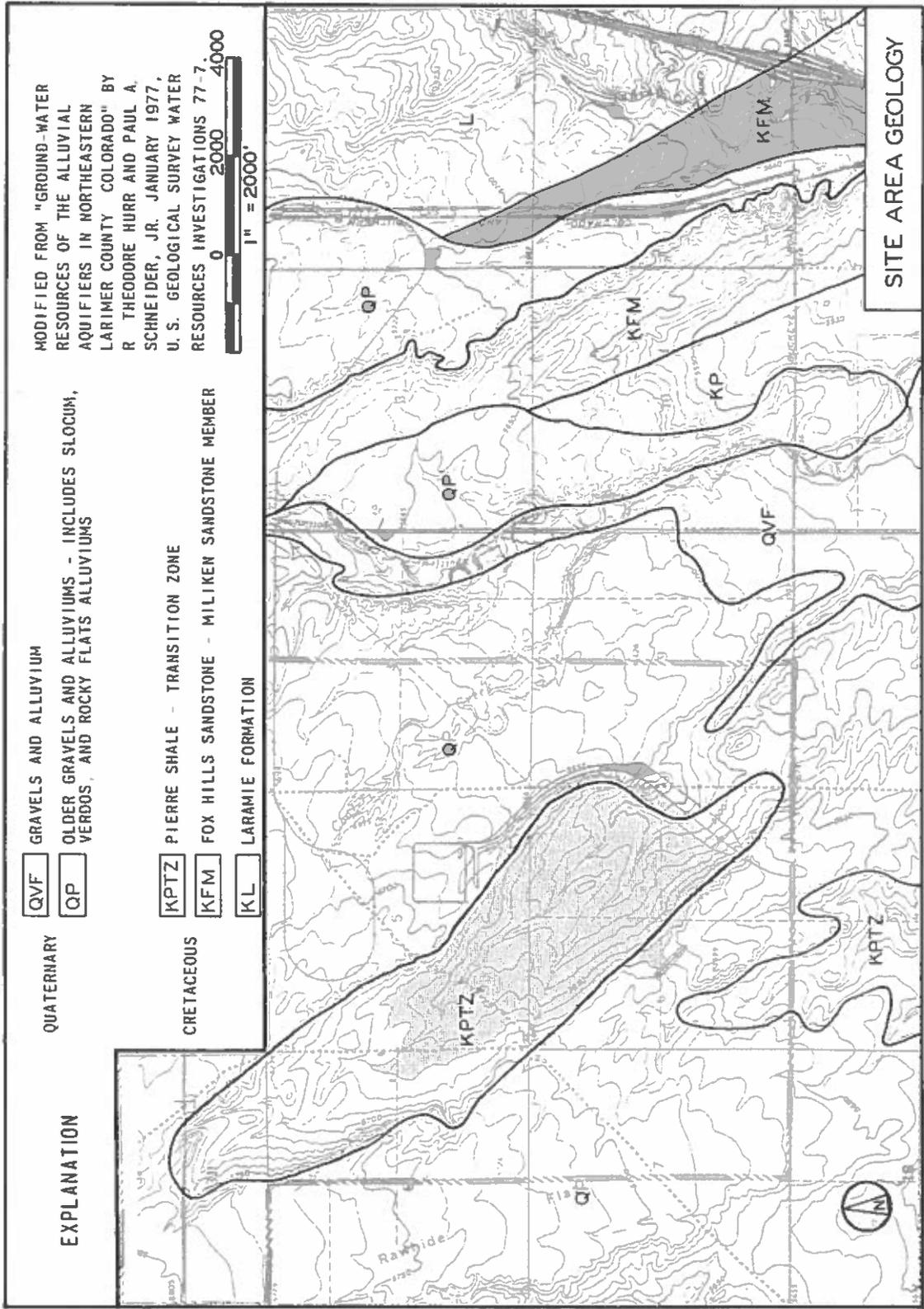


FIGURE - 2

LOG OF BORING

BLACK & VEATCH
Consulting Engineers

BORING NO. B-92

CLIENT Platte River Power Authority		PROJECT NO. 7750	SHEET OF 1 2
PROJECT Rawhide Energy Project		LOCATION N-558,940 E-2,127,170	ELEVATION 5681.3
DRILLING CONTRACTOR Hogan & Olhausen, Inc.		DRILL RIG TYPE AND NO. C.M.E. 55	DRILLER C. Dearmore
DIRECTION AND INCLINATION OF HOLE Vertical		DATE 2-17-78	INSPECTOR L. Almaleh

DEPTH IN FEET	LOG	CLASSIFICATION OF MATERIAL (DESCRIPTION)	ELEV. FT., MSL	SAMPLER & BIT	BLOWS/6 IN. INCREMENTS (PER FOOT)	SAMPLE RECOVERY	PENETROMETER READING, TSF	REMARKS
5	[Hatched pattern]	SILTY CLAY; tan-yellow, stiff, trace fine sand, moist, v calcareous (CL) (severely to completely weathered shale)		2" SB	15-20-22 (42)	0.8		Boring advanced w/4" diameter solid-stem auger
10	[Horizontal line pattern]	SHALE; sev wx, olv, sft, sandy, fossiliferous Continued on next page	5670.3					Boring continued w/NWM double tube core barrel w/diamond bit using water as drilling fluid

FIGURE 205

LOG OF BORING

BLACK & VEATCH
Consulting Engineers

BORING NO. B-92

PROJECT				PROJECT NO.		SHEET OF		
Rawhide Energy Project				7750		2 2		
DEPTH IN FEET	LOG	UNIT	CLASSIFICATION OF MATERIAL (DESCRIPTION)	ELEV. FT., MSL	SAMPLE OR RUN	N	% REC % ROD	REMARKS
15		PIERRE SHALE	SHALE; weathered, olive green and gray, iron oxide stained, soft to medium, sandy, occasionally fossiliferous, calcareous in part	5661.9	R-1		$\frac{100}{15}$	20° joint
	R-2					$\frac{100}{8}$		
20			SHALE; gray, medium to moderately hard, silty, occasionally sandy, occasional thin fossiliferous zones, calcareous in part		R-3		$\frac{92}{0}$	
					C.L.O.4'			
25					R-4		$\frac{98}{60}$	
			C.L.O.1'					
30				5647.9	R-5		$\frac{96}{37}$	30% circulation loss during Run 5
					C.L.O.2'			
35								Bottom of boring @ 33.4'

FIGURE 206

P-ST-019A

LOG OF BORING

BLACK & VEATCH
Consulting Engineers

BORING NO. B-94

CLIENT Platte River Power Authority		PROJECT NO. 7750	SHEET 1 OF 1
PROJECT Rawhide Energy Project		LOCATION N-561,410 E-2,122,980	ELEVATION 5794.5
DRILLING CONTRACTOR Hogan & Olhausen, Inc.		DRILL RIG TYPE AND NO. C.M.E. 55	DRILLER C. Dearmore
DIRECTION AND INCLINATION OF HOLE Vertical		DATE 2-16-78	INSPECTOR L. Almaleh

DEPTH IN FEET	LOG	CLASSIFICATION OF MATERIAL (DESCRIPTION)	ELEV. FT., MSL	SAMPLER & BIT	BLOWS/6 IN. INCREMENTS (PER FOOT)	SAMPLE RECOVERY	PENETROMETER READING, TSF	REMARKS
5		CLAYEY SAND; tan, medium dense, moist, very calcareous (SC)		2" SB	6-5-8 (14)	0.9		Boring advanced w/4" diameter solid-stem auger
10		SILTY SAND; tan, dense, coarse to fine-grained, little to some fine gravel, moist, calc (SM)		2" SB	7-18-19 (37)	1.3		
15		SAND; light pale brown, medium dense to dense, trace of fine gravel, little silt, calcareous (SW-SM)		2" SB	10-13-15 (28)	1.4		
20		reddish-brown, less fines SAND; orng, med, fn-grnd, sm silt, mst, lmnt stng (SP-SM)	5775.6	2" SB 3" TW	13-23-10 (33)	1.4 0.3		
25		SANDY SHALE; sev wx, olv, soft, sm silt, sm cl, mst	5770.0	3" TW		0.5	45+	
								Bottom of boring @ 24.5'

P-ST-016A

LOG OF BORING

BLACK & VEATCH
Consulting Engineers

BORING NO. B-95

CLIENT Platte River Power Authority		PROJECT NO. 7750	SHEET OF 1 2
PROJECT Rawhide Energy Project		LOCATION N-562,320 E-2,125,100	ELEVATION 5772.0
DRILLING CONTRACTOR Hogan & Olhausen, Inc.		DRILL RIG TYPE AND NO. C.M.E. 55	DRILLER C. Dearmore
DIRECTION AND INCLINATION OF HOLE Vertical		DATE 2-15-78	INSPECTOR L. Almaleh

DEPTH IN FEET	LOG	CLASSIFICATION OF MATERIAL (DESCRIPTION)	ELEV. FT., MSL	SAMPLER & BIT	BLOWS/6 IN. INCREMENTS (PER FOOT)	SAMPLE RECOVERY	PENETROMETER READING, TSF	REMARKS
5		SILTY SAND; crs to fn-grnd, tan to white, medium dense, trace fine gravel, moist, calcareous (SM-SC)		2" SB	3-7-7 (14)	1.2		Boring advanced w/4" diameter solid-stem auger
		clay content increasing		2" SB	7-4-4 (8)	1.2		
10		alternating layers of SM and SC		2" SB	10-14-19 (33)			
15		SHALE; severely to com weathered, gray-green, little silt, moist, calcareous	5756.6					
		Continued on next page						Boring continued w/NWM double tube core barrel w/diamond bit using water as drilling fluid

LOG OF BORING

BLACK & VEATCH
Consulting Engineers

BORING NO. B-95

PROJECT				PROJECT NO.	SHEET OF			
Rawhide Energy Project				7750	2	2		
DEPTH IN FEET	LOG	UNIT	CLASSIFICATION OF MATERIAL (DESCRIPTION)	ELEV. FT., MSL	SAMPLE OR RUN	N	% REC % ROD	REMARKS
		PIERRE SHALE	SHALE; severely weathered, olive green and gray, soft to medium, silty, sandy, iron oxide stained	5740.9	R-1		$\frac{69}{0}$	5° joint 20° joint approximate 5 gallon water loss during Run 3 50% circulation loss from 31.1' to 34.0'
					C.L. 1.0'			
					R-2		$\frac{100}{0}$	
					R-3		$\frac{100}{38}$	
			R-4		$\frac{43}{0}$			
			R-5		$\frac{70}{15}$			
			C.L. 0.6'					
SHALE; slightly weathered, gray, medium to moderately hard, silty, sandy, fossiliferous, calcareous in part	5733.4	R-6		$\frac{100}{66}$				
		R-7		$\frac{64}{40}$				
C.L. 0.9'								
40								Bottom of boring @ 38.6'

P-ST-019A

FIGURE 210

LOG OF BORING

BLACK & VEATCH
Consulting Engineers

BORING NO. B-96

CLIENT Platte River Power Authority		PROJECT NO. 7750	SHEET OF 1 2
PROJECT Rawhide Energy Project		LOCATION N-561,410 E-2,127,270	ELEVATION 5761.5
DRILLING CONTRACTOR Hogan & Olhausen, Inc.		DRILL RIG TYPE AND NO. C.M.E. 55	DRILLER C. Dearmore
DIRECTION AND INCLINATION OF HOLE Vertical		DATE 2-17-78	INSPECTOR L. Almaleh

DEPTH IN FEET	LOG	CLASSIFICATION OF MATERIAL (DESCRIPTION)	ELEV. FT., MSL	SAMPLER & BIT	BLOWS/6 IN. INCREMENTS (PER FOOT)	SAMPLE RECOVERY	PENETROMETER READING, TSF	REMARKS
5		SAND; white, medium dense, coarse to fine-grained, little to some silt, little fine gravel, moist, very calcareous (SM)		2" SB	5-5-12 (17)	1.2		Boring advanced w/4" diameter solid-stem auger
10		(SP-SM)		2" SB	12-19-25 (44)	1.5		
15		medium dense, trace to some fine gravel (SP-SM) a layer of silt (ML) at ≈ 16'		3" TW		2.1	2.5	
20				2" SB	5-10-12 (22)	1.2		
25				2" SB	18-25-25 (50)	1.4		
30		becoming very dense		2" SB	20-38-35 (73)	1.5		
35				2" SB	30-40-25 (65)	1.5		
		Continued on next page						

FIGURE 211

LOG OF BORING

BLACK & VEATCH
Consulting Engineers

BORING NO. B-96

PROJECT Rawhide Energy Project				PROJECT NO. 7750		SHEET OF 2 2		
DEPTH IN FEET	LOG	CLASSIFICATION OF MATERIAL (DESCRIPTION)	ELEV. FT., MSL	SAMPLER & BIT	BLOWS/6IN. INCREMENTS (PER FOOT)	SAMPLE RECOVERY	PENETROMETER READING, TSF	REMARKS
40	[stippled pattern]	reddish-tan, little silt		2" SB	25-37-33 (70)	1.5		
45	[stippled pattern]	trace fine gravel, trace clay (SW)		2" SB	21-50-45 (95)	1.5		
50	[stippled pattern]	SHALE; sev wx, olv-grn, sft ltl fn snd, mst, v fs1	5710.1	3" TW	32-43-45 (88)	1.0	4.5	
55	[stippled pattern]							Bottom of boring @ 51.4'

P-ST-017A

FIGURE 212

BYRND NO. **B-126**

CONSULTING ENGINEERS

CLIENT		PROJECT NO.	ELEVATION	SHEET	OF
Piedra River Power Authority		7750	5711.6	1	1
PROJECT		LOCATION	DATE	START	FINISH
Favada Energy Project		N-569, 117 E-2, 126, 470	6/1/79	6/1/79	6/1/79
DEPTH (FEET)	DEPTH PER FOOT RECOVERED	LOG	CLASSIFICATION	ELEVATION (FEET)	REMARKS
10	10	55	Silty Clay; dark grayish brown; firm; moist; trace roots; trace gravel (topsoil)	5704.5	During drilling 3/8" diameter collection tubes
18	18	58	Sandy Clay; pale yellow; firm; dry; highly calcareous; trace gravel; Clayey Sand; light olive brown; dense; fine to coarse grained; dry; some gravel; highly calcareous	5704.5	
26	26	58	Shale; silty; olive; highly weathered; severely iron stained	5704.5	
34	34	58	grading; dark olive gray; moderately weathered; less iron staining	5691.6	Bottom of casing with split tube cor. bit with carbide insert bit used with as dry fluid
42	42	58	highly calcareous 16.8'-17.0' below 17.0' grading olive	5691.6	
50	50	58		5691.6	Bottom of casing at 19.4' water level not recorded

P-31-02-2

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CLIENT		PROJECT NO.	ELEVATION	SHEET OF		
Plate River Power Authority		7740	5751.0	1	1	
PROJECT		LOCATION	DATE	START	FINISH	
Plate River Energy Project		N-501,120 E-2,100,000	6/1/79	6/1/79	6/1/79	
DEPTH (FEET)	DEPTH (METERS)	SP. GR. VALUE	CLASSIFICATION	ELEVATION (FEET)	UNIT	REMARKS
0	0		Sand, clay; dark brown; fine slightly moist; trace roots; some gravel (topsoil)		CL	Bo. line drilled w/6" diameter hollow stem auger
1	0.3	23	Clayey sand; pink; medium dense; fine grained; dry; trace roots; calcareous		SC	
5	1.5		Gravelly sand; pink; dense; fine to medium grained; slightly moist; trace clay; calcareous		SP	
10	3.0	30	Sandy gravel; light brown		GP	
15	4.5		Clayey sand; light yellowish brown; medium dense; fine grained; slightly moist; highly calcareous		SC	
20	6.0	32	Shale; silty; sandy; olive; slightly calcareous; highly weathered; iron stained throughout	5733.0		
25	7.5	180	grading olive gray			
30	9.0	155	grading dark olive gray; moderately weathered			
35	10.5	50/2"	grading dark gray; slightly weathered			
40	12.0		very dark gray; thick bedded; fresh			
45	13.5			572.1		Bo. line cont'd with split tube sampler with calipers in constant connection with flow line. No. 10.9 water level not reached.



BLAIR & SEATON
CONSULTING ENGINEERS

LOG OF BORING

Appendix G
Page 13 of 17

BORING NO. **B-128**

CLIENT		PROJECT NO.	ELEVATION	SHEET	OF			
Pillsbury Fiber Filter Authority		1750	5731.7	1	1			
PROJECT		LOCATION	DATE	START	FINISH			
Recovery Energy Project		N-551,760 E-2,126,250	6/4/79	6/4/79	6/4/79			
DEPTH (FEET)	PERCENT RECOVERY	ROD	SPT N VALUE	SAMPLE LOG	CLASSIFICATION	ELEVATION (FEET)	UNIT	REMARKS
0					Silty Clay; brown; soft; dry; trace roots; some sand (Topsoil)		CL	Boring drilled w/6" diameter hollow stem auger
					Sandy Clay; yellowish brown; firm; dry; trace gravel; highly calcareous		CL	
					Silty Clay; olive; stiff; some sand; dry; calcareous (Residual Shale)	5735.7	CL	
			94		Shale; silty; sandy; olive gray; highly weathered; iron stained throughout			
			106		grading; moderately weathered			
			127		grading olive gray and dark gray banded; medium bedded; calcareous vertical iron stained fracture			
2					grading dark gray; slightly weathered; occasional anhydrite partings			Boring cont'd w/10" split tube core bit with carbide insert bit using water as drill fluid
93			3			5707.3		
								Bottom of boring at 24.4' water level not recorded

F-SI-0174

FIGURE _____



BLACK & VEATCH
CONSULTING ENGINEERS

LOG OF BORING

Appendix E
Page 14 of 17

BORING NO. **B-129**

CLIENT		PROJECT NO.	ELEVATION	SHEET OF				
Platte River Power Authority		7750	5777.0	1	2			
PROJECT		LOCATION	DATE	START	FINISH			
Ra-hide Energy Project		N-502,510 E-2,126,150	6/4/79	6/4/79	6/4/79			
DEPTH (FEET)	PERCENT RECOVERY	WATER	SPT VALUE	SAMPLE LOG	CLASSIFICATION	ELEVATION (FEET)	UNIT	REMARKS
0					Sandy Clay; dark brown; firm; trace roots; some gravel; (topsoil)		CL	Bottom drilled
1					Sandy Gravel; light brown; medium dense; dry		GP	4 1/2" diameter follow string
4.5			45		Gravelly Sand; brown; dense; fine to coarse grained; dry; calcareous		SP	
28			28		Clayey Sand; very pale brown; medium dense; fine grained; dry; highly calcareous		SC	
48			48		Clayey Sand; light brown; medium dense; fine to medium grained; dry; calcareous; trace gravel		SC	
54			54		grading; fine to coarse grained; numerous gravel		SC	
52			52					
21			21		Sandy Clay; hard; yellowish brown; slightly moist; calcareous		CL	
30			30		Gravelly Sand; light brown; dense; fine to coarse grained; dry; calcareous		SP	
34			34		Sand; Clay; brownish yellow; very stiff; slightly moist; calcareous	5742.9	CL-SC	
					grading; moist			
					grading; clay; sand			
					grading; fine olive gray			

P-21-0764

FIGURE _____



BLACK & VEATCH
CONSULTING ENGINEERS

LOG OF BORING

Appendix B
Page 15 of 17

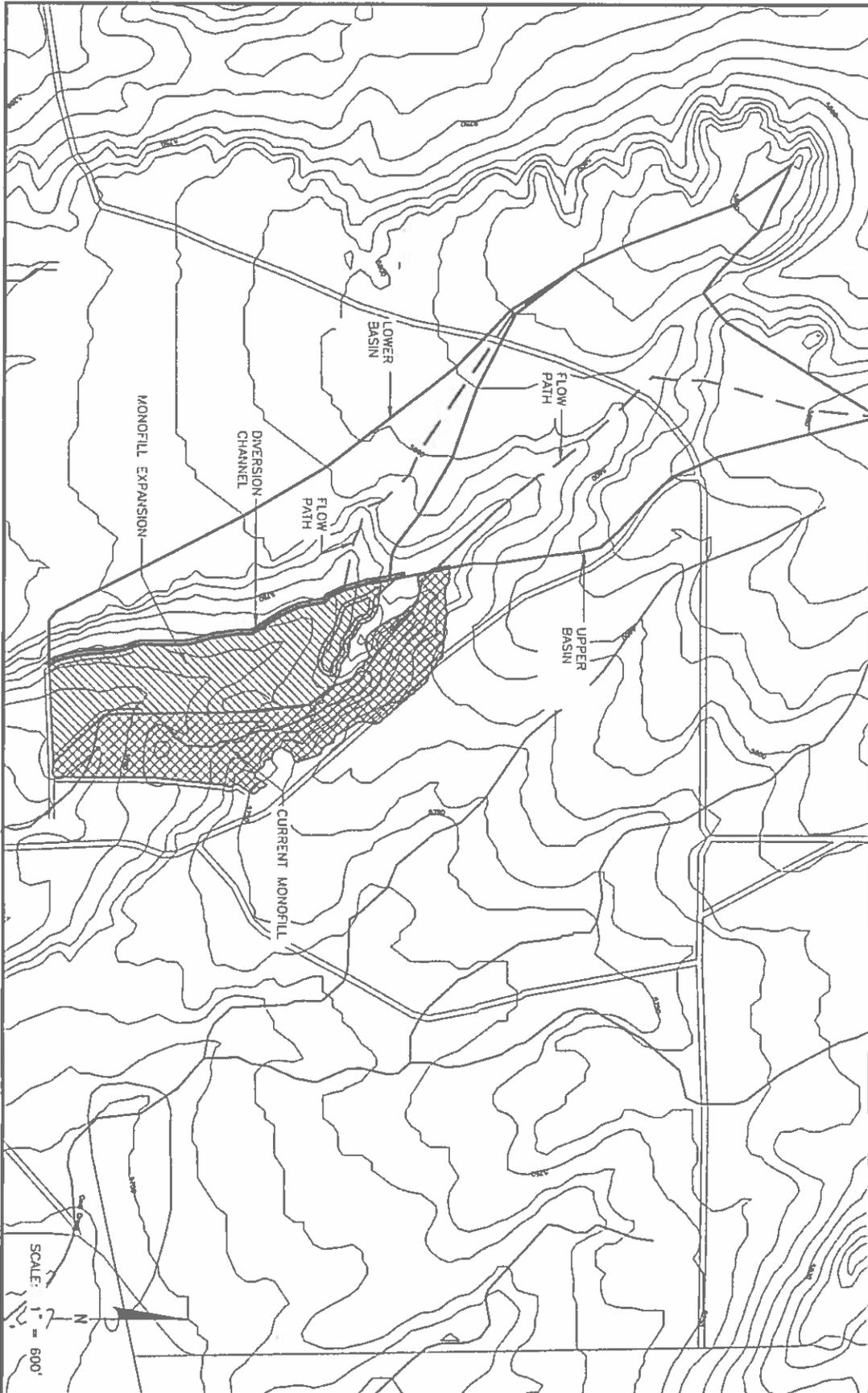
BORING NO. **B-129 ctd.**

CLIENT		PROJECT NO.	ELEVATION	SHEET OF				
Missouri River Power Authority		7750	5777.0	2	2			
PROJECT		LOCATION	DATE	START	FINISH			
Radium Energy Project		N-562,510 E-2,120,150	6/4/75		6/14/75			
DEPTH (FEET)	PERCENT RECOVERY	NO. OF SPT BLOWN	SPT VALUE	SAMPLE LOG	CLASSIFICATION	ELEVATION (FEET)	SPILL	REMARKS
1					trace gravel			
2			15					
3						5730.5		
4					Shale; silty; sandy; olive gray; medium bedded; highly weathered; iron stained throughout fractures at intervals of 0.1' calcareous at 50.9'		PIERRE SHALE	Boring conducted with split tube core bit with carbide insert bit using water at orific fluid
5			137/5'		below 51.2' dark gray and olive mottled; moderately weathered			
6	71	71				5722.6		
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1 of 2

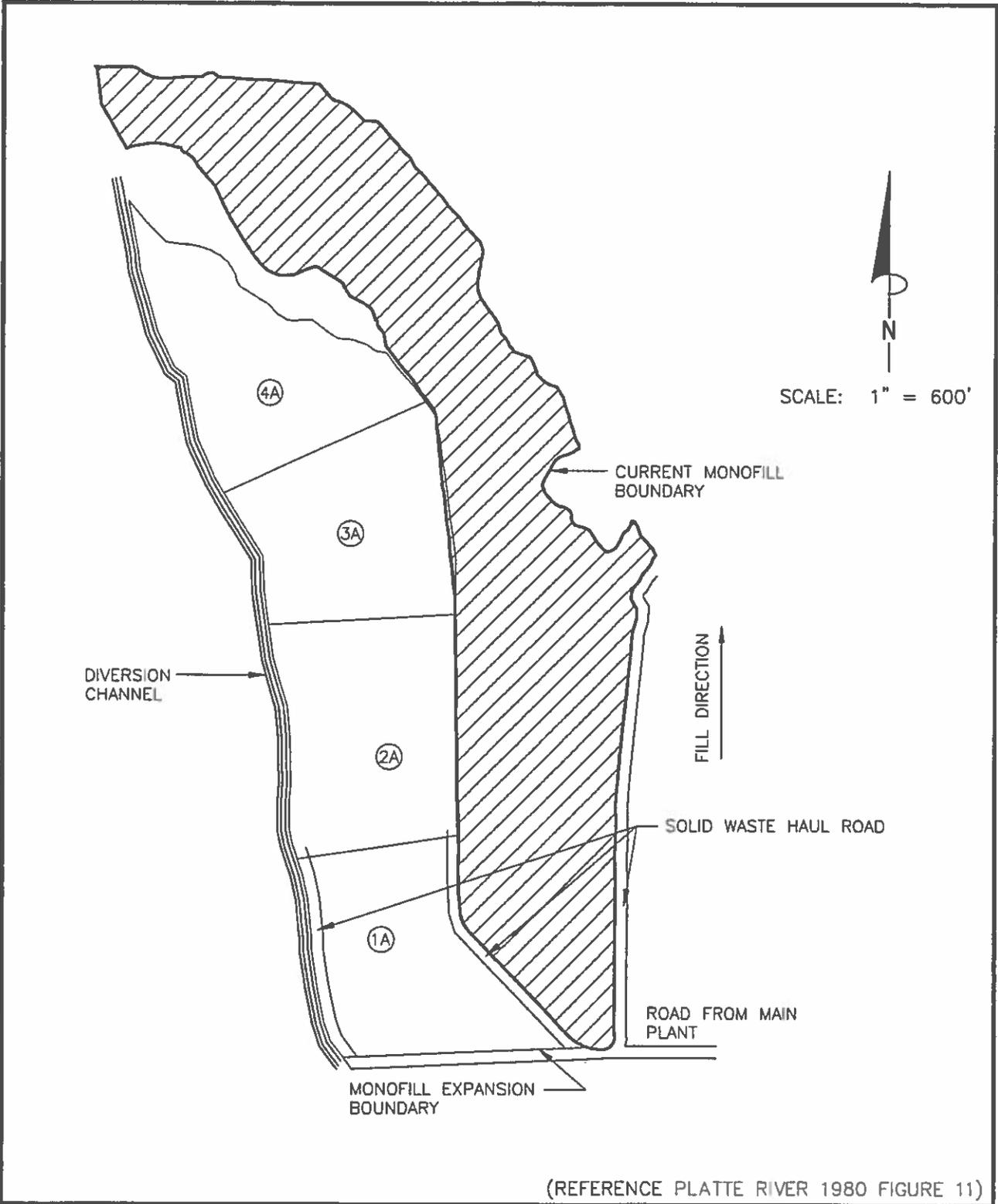
**Attachment 2
Revised Design and
Operations Plan for the
Solid Waste Disposal
Facility, Rawhide Energy
Station, November 2007
(selected figures)**



Project: 07.028
 Date: November 2007

FIGURE A.1
MONOFILL EXPANSION BASINS

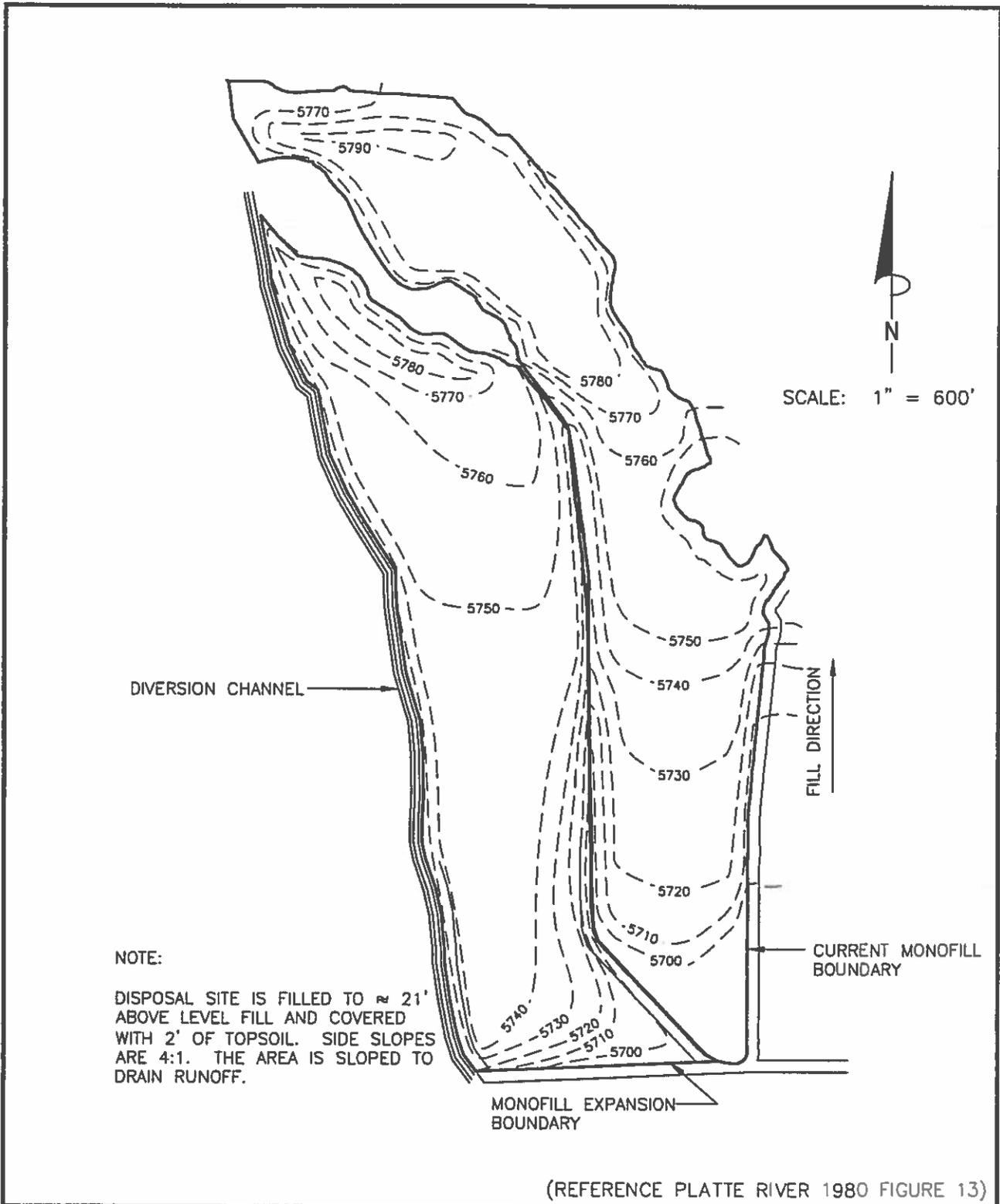




Project: 07.028
 Date: November 2007

FIGURE 2
SOLID WASTE DISPOSAL SITE FILL
SEQUENCE



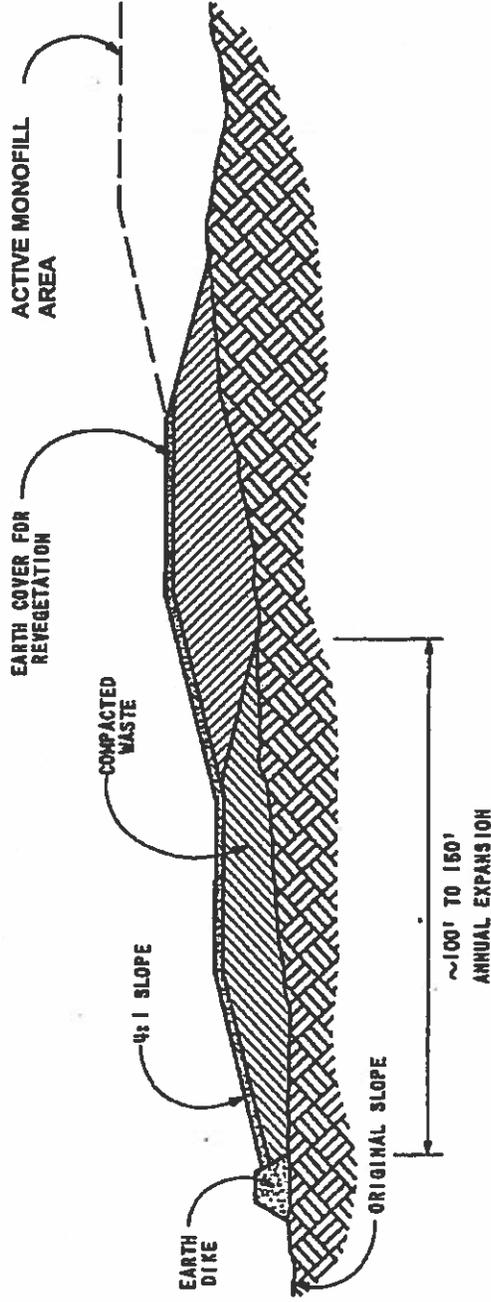


Project: 07.028
Date: November 2007

FIGURE 4
SOLID WASTE DISPOSAL SITE FINAL CONTOURS



FILL DIRECTION →



(REFERENCE PLATTE RIVER 1980 FIGURE 12)

Project: 07.028

Date: November 2007

FIGURE 3
FILLING AND RECLAMATION OPERATION;
TYPICAL NORTH-SOUTH CROSS SECTION



BORING LOG

BORING NO. BH-1

PROJECT Rawhide Ash Landfill		JOB NO. 07.028		SHEET OF 1 1	
CLIENT PRPA		FIELD ENGINEER Kent Flowers			
DRILLING COMPANY High Plains Drilling		DRILL RIG CME-55 Buggy with 4"CFA			
LOCATION		ELEVATION Grade		DATE 07/18/07	
DEPTH (Feet)	LOG	DESCRIPTION OF MATERIAL	BLOWS/6 IN. INCREMENTS (PER FOOT)	REC.	REMARKS
0		TOPSOIL:			
		CLAY: tan, damp, very stiff, plastic, with fine grained sand	9/17 (26)	4	
5		CLAYSTONE: tan moist, very soft, complete weathering, plastic	50 for 12" (>50)	4	
10		CLAYSTONE: tan moist, very soft, very severe weathering, plastic	50 for 8" (>50)	4	
		EOH:			
15					
20					
25					
30					

BORING LOG

BORING NO. BH-2

PROJECT Rawhide Ash Landfill		JOB NO. 07.028	SHEET OF 1 1
CLIENT PRPA		FIELD ENGINEER Kent Flowers	
DRILLING COMPANY High Plains Drilling		DRILL RIG CME-55 Buggy with 4"CFA	
LOCATION	ELEVATION Grade	DATE 07/18/07	

DEPTH (Feet)	LOG	DESCRIPTION OF MATERIAL	BLOWS/6 IN. INCREMENTS (PER FOOT)	REC.	REMARKS
0	▨	TOPSOIL:			
5	▨	CLAYSTONE: tan moist, very soft, complete weathering, plastic	10 / 16 (26)	4	
10	▨	CLAYSTONE: tan, moist, soft. very severe weathering. plastic EOH:	50 for 11" (>50)	4	
15					
20					
25					
30					

BORING LOG

BORING NO. BH-3

PROJECT Rawhide Ash Landfill		JOB NO. 07.028	SHEET 1	OF 1
CLIENT PRPA		FIELD ENGINEER Kent Flowers		
DRILLING COMPANY High Plains Drilling		DRILL RIG CME-55 Buggy with 4"CFA		
LOCATION	ELEVATION Grade	DATE 07/18/07		

DEPTH (Feet)	LOG	DESCRIPTION OF MATERIAL	BLOWS/6 IN. INCREMENTS (PER FOOT)	REC.	REMARKS
0		TOPSOIL:			
		CLAY: tan, damp, very stiff, plastic, with fine grained sand	8/9 (17)	4	
5		CLAY: tan, damp, plastic, very stiff, with fine grained sand	9/11 (20)	4	
		CLAYSTONE: tan, moist, very soft, very severe weathering, plastic	50 for 12" (>50)	4	
10		EOH:			
15					
20					
25					
30					

BORING LOG

BORING NO. BH-4

PROJECT Rawhide Ash Landfill		JOB NO. 07.028	SHEET OF 1 1
CLIENT PRPA		FIELD ENGINEER Kent Flowers	
DRILLING COMPANY High Plains Drilling		DRILL RIG CME-55 Buggy with 4"CFA	
LOCATION	ELEVATION Grade	DATE 07/18/07	

DEPTH (Feet)	LOG	DESCRIPTION OF MATERIAL	BLOWS/6 IN. INCREMENTS (PER FOOT)	REC.	REMARKS
0		TOPSOIL:			
5		CLAY: tan, damp, stiff, plastic, with fine grained sand	6/4 (10)	4	
10		CLAYSTONE: tan, moist, very soft, complete weathering, plastic EOH:	14/15 (29)	4	
15		CLAYSTONE: tan, moist, soft very severe weathering, plastic EOH:	50 for 7" (>50)	4	
20					
25					
30					

BORING LOG

BORING NO. BH-5

PROJECT Rawhide Ash Landfill		JOB NO. 07.028	SHEET OF 1 1
CLIENT PRPA		FIELD ENGINEER Kent Flowers	
DRILLING COMPANY High Plains Drilling		DRILL RIG CME-55 Buggy with 4"CFA	
LOCATION	ELEVATION Grade	DATE 07/18/07	

DEPTH (Feet)	LOG	DESCRIPTION OF MATERIAL	BLOWS/6 IN. INCREMENTS (PER FOOT)	REC.	REMARKS
0		TOPSOIL:			
5		CLAYSTONE: tan, moist, very soft, complete weathering, plastic	11/18 (29)	4	
10		CLAYSTONE: tan, moist, soft, very severe weathering, plastic EOH: EOH:	50 for 11" (>50)	4	
15					
20					
25					
30					

BORING LOG

BORING NO. BH-6

PROJECT Rawhide Ash Landfill		JOB NO. 07.028	SHEET OF 1 1
CLIENT PRPA		FIELD ENGINEER Kent Flowers	
DRILLING COMPANY High Plains Drilling		DRILL RIG CME-55 Buggy with 4"CFA	
LOCATION	ELEVATION Grade	DATE 07/18/07	

DEPTH (Feet)	LOG	DESCRIPTION OF MATERIAL	BLOWS/6 IN. INCREMENTS (PER FOOT)	REC.	REMARKS
0		TOPSOIL:			
5		CLAY: tan moist, stiff, plastic, with fine grained sand	5/8 (13)	4	
10		CLAYSTONE: tan, moist, very soft, very severe weathering, plastic EOH:	50 for 12" (>50)	4	
15					
20					
25					
30					

BORING LOG

BORING NO. BH-7

PROJECT Rawhide Ash Landfill		JOB NO. 07.028		SHEET OF 1 1	
CLIENT PRPA			FIELD ENGINEER Kent Flowers		
DRILLING COMPANY High Plains Drilling			DRILL RIG CME-55 Buggy with 4"CFA		
LOCATION		ELEVATION Grade	DATE 07/18/07		
DEPTH (Feet)	LOG	DESCRIPTION OF MATERIAL	BLOWS/6 IN. INCREMENTS (PER FOOT)	REC.	REMARKS
0		TOPSOIL:			
0		CLAY: tan moist, very stiff, plastic, with fine grained sand	9/8 (17)	4	
5		CLAY: tan moist, very stiff, plastic, with fine grained sand	9/10 (19)	4	
10		CLAYSTONE: tan, moist, very soft, complete weathering, plastic	11/19 (30)	4	
15		CLAYSTONE: tan, moist, soft, very severe weathering, plastic	50 for 9"	4	
15		EOH:			
20					
25					
30					

**Attachment 3
CDPHE Approval of
Modification to Engineered
Design and Operations
Plan, Rawhide Energy
Station Coal Ash Disposal
Facility, January 25, 2008**

STATE OF COLORADO

Bill Ritter, Jr., Governor
James B. Martin, Executive Director

Dedicated to protecting and improving the health and environment of the people of Colorado

4300 Cherry Creek Dr. S.
Denver, Colorado 80246-1530
Phone (303) 692-2000
TDD Line (303) 691-7700
Located in Glendale, Colorado

Laboratory Services Division
8100 Lowry Blvd.
Denver, Colorado 80230-6928
(303) 692-3090

<http://www.cdphe.state.co.us>



Colorado Department
of Public Health
and Environment

CERTIFIED MAIL #7005 1820 0000 3213 5517
Return Receipt Requested

January 25, 2008

Mr. Christopher R. Wood
Platte River Power Authority
2000 E. Horsetooth Road
Fort Collins, Colorado 80525

RE: Approval of Modification to Engineered Design and Operations Plan
Rawhide Energy Station Coal Ash Disposal Facility
Larimer County, Colorado
SW/LAR/RAW 2.2

Dear Mr. Wood:

Thank you for providing the Colorado Department of Public Health and Environment, Hazardous Materials and Waste Management Division ("the Division") with your request to modify the Engineered Design and Operations Plan ("EDOP") for the Rawhide Energy Station Coal Ash Disposal facility in Larimer County, Colorado ("the facility"). The EDOP was submitted to the Division under the requirements of the "Regulations Pertaining to Solid Wastes Sites and Facilities" (6 CCR 1007-2, "the Regulations") and the Section 30-20-100 *et. seq.* of the Colorado Revised Statutes ("Colorado Solid Waste Act," "the Act.").

The proposed EDOP modification would allow the facility to expand the current footprint of waste management area for the facility's landfill to the west of the current waste disposal site. The expansion of approximately 60.91 acres would allow for the facility to begin management of wastes in the remainder of the entire permitted site area of 122.91 acres, as approved in the facility's Certificate of Designation granted by Larimer County. The expansion would include construction of a permanent surface water diversion canal to the western border of the proposed waste pile expansion. This diversion canal was originally proposed and approved in the original EDOP and will be constructed adjacent to the waste. The expansion is proposed to begin at the south of the permitted area, working its way to the north of the facility. Borehole sample data in support of the proposed expansion indicate that soil and ground water conditions in the area are similar to those observed in the current waste management area.

Mr. Christopher R. Wood
Platte River Power Authority
January 25, 2008
Page 2 of 2

Based on the information provided, the Division approves the modified EDOP as submitted. This EDOP modification incorporates by reference the Department's January 24, 2008 approved waiver for explosive gas monitoring at the site. As required under Section 3.2.7 of the Regulations, you must provide the Division and the local governing body having jurisdiction (Larimer County Commissioners) with a report documenting that the design construction for the expansion of the facility has been completed in accordance with the approved EDOP ("Construction Quality Assurance report," "CQA report") prior to accepting and managing waste in each proposed expansion module identified in the EDOP. The CQA report must be signed by a Colorado registered professional engineer and reviewed and approved by the Department. In addition, any financial assurance established for the facility must be adjusted to take into account the increase in acreage size where wastes are being managed. This information must be submitted in the facility's next financial assurance update due to the Division.

In closing, please note the Department is authorized to bill for its review of technical submittals pursuant to 30-20-109(2)(b). An invoice for the Division's review of the above referenced document will be transmitted under separate cover.

If you have any additional questions or concerns, please contact me at (303) 692-3347, or by e-mail at caren.johannes@state.co.us.

Sincerely,



Caren Johannes
Solid Waste Unit
Solid and Hazardous Waste Program

cc: Larimer County Commissioners
Mr. Rich Grossmann, Larimer County Department of Health and Environment

STATE OF COLORADO

Bill Ritter, Jr., Governor
James B. Martin, Executive Director

Dedicated to protecting and improving the health and environment of the people of Colorado

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Denver, Colorado 80246-1530 8100 Lowry Blvd.
Phone (303) 692-2000 Denver, Colorado 80230-6928
TDD Line (303) 691-7700 (303) 692-3090
Located in Glendale, Colorado
<http://www.cdph.state.co.us>



Colorado Department
of Public Health
and Environment

January 24, 2008

Mr. Christopher R. Wood
Platte River Power Authority
2000 E. Horsetooth Road
Fort Collins, Colorado 80525

RE: Waiver Request for Explosive Gas Monitoring
Design and Operations Plan, Coal Ash Disposal Facility
Rawhide Energy Station, Larimer County, Colorado
SW/LAR/RAW 2.5

Dear Mr. Wood:

Thank you for providing the Colorado Department of Public Health and Environment, Hazardous Materials and Waste Management Division ("the Division") with your waiver request to delete requirements for explosive gas monitoring at the Rawhide Energy Station Coal Ash Disposal facility in Larimer County, Colorado ("the facility"). This request was made based on the non-putrescent nature of the material being disposed at the facility (waste bottom ash, phosphorus sludge and inorganic construction wastes) as per the facility's Design and Operations Plan and Certificate of Designation.

Based on the information provided, the Division approves the waiver as submitted. This waiver shall be incorporated into the facility's Design and Operation Plan. At any time the facility no longer meets the waiver criteria, the waiver is void and ceases to exist. We have consulted with Larimer County on our approval of the waiver. If you have any additional questions or concerns, please contact me at (303) 692-3347, or by e-mail at caren.johannes@state.co.us.

Sincerely,

Caren Johannes
Solid Waste Unit
Solid and Hazardous Waste Program

cc: Mr. Rich Grossmann, Larimer County Department of Health and Environment
Larimer County Commissioners

**Attachment 4
CDPHE Approval of
Construction Quality
Assurance Report,
Rawhide Energy Station
Coal Ash Disposal Facility,
March 12, 2010**

STATE OF COLORADO

Bill Ritter, Jr., Governor
James B. Martin, Executive Director

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Denver, Colorado 80246-1530 8100 Lowry Blvd.
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Colorado Department
of Public Health
and Environment

March 12, 2010

Mr. Christopher R. Wood
Platte River Power Authority
2000 E. Horsetooth Road
Fort Collins, Colorado 80525

RE: Approval of Construction Quality Assurance Report
Rawhide Energy Station Coal Ash Disposal Facility
Larimer County, Colorado
SW/LAR/RAW 2.3

Dear Mr. Wood:

Thank you for providing the Colorado Department of Public Health and Environment, Hazardous Materials and Waste Management Division ("the Division") with the Construction Quality Assurance Report for the Monofill Expansion Project ("the CQA Report") for the Rawhide Energy Station Coal Ash Disposal facility in Larimer County, Colorado ("the facility"). The CQA Report was submitted to the Division under the requirements of the "Regulations Pertaining to Solid Wastes Sites and Facilities" (6 CCR 1007-2, "the Regulations") and the Section 30-20-100 *et. seq.* of the Colorado Revised Statutes ("Colorado Solid Waste Act," "the Act"). The CQA Report as reviewed by the Division included both the November 2009 report on the expansion project received by the Division January 5, 2010 and the "as-built" drawings requested from the facility February 8, 2010 and received by the Division on February 16, 2010.

The CQA Report provides a description of final construction and engineered drawings of the cell expansion conducted at the facility in September and October 2009. The report also includes information concerning the redesign of the drainage swale for the expansion at the facility to divert and control storm water drainage from the monofill for the 100-year, 24-hour event and construction of an embankment berm at the southern end of the monofill expansion to contain drainage from a 25-year, 24-hour event. The drainage swale was reconfigured as a trapezoidal channel with a base width of 30 feet and a maximum grade of 1.25 percent from its original design of base width 10 feet and maximum grade

Mr. Christopher R. Wood
Platte River Power Authority
March 12, 2010
Page 2 of 2

of 0.5 percent. The report states that the original dimensions for the swale, when overlaid on the topographic map for the expansion area, would have caused erosion problems for the monofill.

Based on our review, the Division approves the CQA Report as submitted. Please ensure that financial assurance documents for the facility are adjusted to take into account the increase in area where wastes are being managed.

In closing, please note the Department is authorized to bill for its review of technical submittals pursuant to 30-20-109(2)(b). An invoice for the Division's review of the above referenced document will be transmitted under separate cover.

If you have any additional questions or concerns, please contact me at (303) 692-3347, or by e-mail at carenjohannes@state.co.us.

Sincerely,



Caren Johannes
Solid Waste Unit
Solid and Hazardous Waste Program

cc: Larimer County Commissioners
Mr. Rich Grossmann, Larimer County Department of Health and Environment

**Attachment 5
Summary of CCR Monofill
Volume**

**FUELS, EMISSIONS and WASTE SUMMARY
RAHWIDE ENERGY STATION**

Current as of 12/31/15

-- ANNUAL FUEL, MATERIAL CONSUMPTION and WASTE INFO. --

YEAR	Scrubber/ Baghouse Info.				Coal Info., Handling and Consumption					COAL ASH WASTE				TOPSOIL				
	Live tons	Stack Rate %	SO2 % Removed	SO2 (tons) Emitted ¹	Sulfate (tons) Collected	Received Ktons	Stack-out Ktons	Reclaim Ktons	Burned Ktons	% Ash	S303/8304 Ash Sales tons	S301 / S302 / S303 / S304 Flyash/Slurb tons	S308 Bottom Ash tons	S305 / S306 TOTAL tons	Cumulative Topsoil @ 2 feet avg. acre ft.	yr		
1984	2,950.0	0.777	47.0%	1,912.5	2,544.0				645.5	4.88%		32,818.0	4,821.9	37,639.9	7.1	1		
1985	6,008.0	0.880	78.9%	1,399.3	7,849.7	1,160.3						1,121.6	4.83%	59,802.0	8,128.0	68,028.0	14.2	2
1986	4,375.5	0.842	82.8%	849.4	6,133.5	1,046.0	185.4	190.8	1,051.4	4.81%		53,495.4	7,585.9	61,081.3	21.2	3		
1987	4,384.5	0.803	80.5%	1,012.0	6,268.6	1,141.7	35.1	35.4	1,109.3	5.19%		59,587.9	8,635.9	68,223.8	28.3	4		
1988	5,600.0	0.841	82.5%	1,146.6	8,108.1	1,178.5	103.5	98.4	1,171.4	5.65%		70,164.6	9,927.8	80,092.2	35.4	5		
1989	4,928.0	0.767	82.0%	1,088.4	7,505.7	1,191.9	96.7	80.8	1,129.8	5.23%		62,657.0	8,863.3	71,520.3	42.6	6		
1990	4,880.0	0.791	81.7%	1,024.5	6,860.8	1,089.9	78.5	81.1	1,072.5	5.50%		61,660.2	8,848.1	70,508.3	49.5	7		
1991	3,970.0	0.733	83.2%	864.8	6,425.0	1,001.3	75.8	80.0	986.4	5.30%		54,832.3	7,841.9	62,674.2	58.6	8		
1992	4,174.0	0.789	82.3%	912.9	6,367.1	1,013.7	52.9	39.9	1,000.7	5.54%		57,662.4	8,315.5	65,977.9	63.7	9		
1993	5,725.0	0.857	82.6%	1,104.6	7,865.5	1,212.9	72.5	69.5	1,208.8	5.35%		68,607.5	9,708.9	78,316.4	70.8	10		
1994	4,578.0	0.803	82.0%	886.9	5,923.8	1,085.8	199.7	179.5	1,075.3	5.21%		58,120.7	8,403.3	66,524.0	77.8	11		
1995	3,961.8	0.885	81.7%	713.8	4,780.1	1,055.5	71.4	83.8	1,047.9	5.11%		54,257.5	8,032.2	62,289.8	84.9	12		
1996	4,337.6	0.853	82.7%	746.3	5,368.2	1,205.0	58.3	37.9	1,184.7	5.18%		61,668.8	9,189.6	70,858.4	92.0	13		
1997	4,214.1	0.835	81.7%	783.4	5,246.2	1,103.8	40.2	30.6	1,094.0	5.31%		58,838.0	8,713.7	67,551.8	98.1	14		
1998	5,122.1	1.021	82.2%	848.7	5,878.9	1,043.9	85.8	71.9	1,043.9	5.35%		58,472.4	8,377.3	66,849.7	108.2	15		
1999	5,599.7	1.003	81.9%	960.4	6,518.5	1,316.8	120.1	43.0	1,263.6	5.40%		70,115.3	10,234.6	80,350.1	113.2	16		
2000	4,086.6	0.927	82.5%	735.3	5,198.0	1,187.7	57.5	40.6	1,171.8	4.58%		54,911.1	8,050.0	62,961.1	120.3	17		
2001	5,736.1	1.053	83.9%	834.5	6,513.4	1,312.0	151.7	105.9	1,290.6	5.13%		68,528.4	9,830.9	78,459.2	127.4	18		
2002	5,381.4	0.988	83.8%	834.5	6,513.1	1,217.8	121.8	77.1	1,184.8	5.29%		65,178.7	9,402.7	74,581.4	134.5	19		
2003	5,482.4	0.938	84.8%	874.4	6,898.2	1,294.2	94.3	78.3	1,296.3	5.29%		70,595.5	10,287.7	80,883.2	141.5	20		
2004	4,878.4	0.854	83.8%	882.3	6,807.6	1,313.2	94.3	77.4	1,324.3	5.38%		72,293.7	10,695.3	82,989.0	148.6	21		
2005	4,296.5	1.004	82.1%	728.3	5,007.1	1,289.3	211.8	118.3	1,127.4	5.32%		60,282.7	8,982.4	69,265.1	155.7	22		
2006	4,814.7	0.879	83.8%	833.6	6,528.3	1,214.2	94.7	84.7	1,241.1	5.49%	884.8	69,283.0	10,224.7	79,507.7	162.8	23		
2007	5,177.6	0.847	84.4%	898.2	7,347.4	1,394.1	121.8	98.5	1,296.3	5.44%	1,227.8	72,482.3	10,580.7	83,063.1	189.9	24		
2008	4,388.6	0.825	83.9%	795.8	6,234.1	1,168.8	162.3	118.4	1,147.8	5.34%	1,478.1	62,593.9	9,188.9	71,782.8	178.9	25		
2009	5,825.8	0.755	84.8%	948.9	8,044.3	1,429.4	84.8	64.7	1,348.9	5.29%	12,228.5	73,032.6	10,581.8	83,614.4	184.0	26		
2010	4,768.5	0.782	83.8%	887.4	7,254.2	1,374.3	88.8	38.1	1,281.6	5.33%	5,843.2	72,323.0	8,688.7	81,011.7	181.1	27		
2011	4,748.9	0.772	84.4%	988.4	7,400.3	1,318.8	84.3	42.9	1,281.3	5.21%	11,886.4	72,177.5	8,670.1	80,847.6	188.2	28		
2012	4,337.8	0.774	84.1%	828.8	6,590.0	1,162.8	88.2	88.5	1,177.9	5.22%	9,874.2	68,126.1	8,147.6	76,273.7	205.2	29		
2013	4,848.5	0.807	83.4%	891.2	6,892.3	1,258.8	43.9	183.9	1,326.1	5.18%	17,783.8	72,370.1	8,792.2	81,162.3	212.3	30		
2014	4,842.8	0.865	83.8%	875.7	6,629.9	1,318.9	177.3	184.4	1,238.9	5.91%	8,884.3	73,228.8	8,628.5	81,857.3	219.4	31		
2015	4,681.7	0.954	83.4%	772.6	5,903.1	1,371.7	238.8	82.1	1,187.8	5.89%	9,295.5	68,200.7	8,182.9	76,383.6	226.5	32		
2016	4,552.1	0.935	83.4%	788.3	5,782.3	1,257.9	261.1	64.3	1,082.8	5.94%	8,295.5	64,464.1	6,014.4	70,478.5	233.6	33		

Mean	4,737.6	0.871	81.8%	827.0	6,404.6	1,191.8	110.5	79.5	1,154.0	5.27%	7,839.9	63,603.2	8,450.1	70,433.7		
Maximum	6,008.0	1.053	85.0%	1,912.5	8,108.1	1,329.4	262.1	190.8	1,334.0	5.65%	17,783.8	73,228.8	10,695.3	82,989.0	233.6	
Lowest/PTE	3,400.0		80.0%	1,832.5	N/A	2,500.0	1,500.0	1,500.0	1,500.0	11.57%		148,650	24,750	173,400		
Change Lines											88,239	2,098,908	278,853	2,281,530		

Note: Flyash/Slurb Waste = (Coal Burned x % Flyash) + Live Used + (Mass SO2 Emission x 1.5 SO4 Factor) / (1 - SO2 % Removed) / (SO2 % Removed)
 Bottom Ash Waste = (Coal Burned x % Bottom Ash)
 Above Assumes 85% Flyash and 15% Bottom Ash - This changed to 90:10 split in 2010
¹ SO2 (tons) are calculated from CEMS Port 60 emissions rate and total coal consumption
² Assumes 1.9125 tons per cubic yard (Engineering Report and Operational Plan for the Solid Waste Disposal Facility) Black & Veatch 12/80
³ Electrostatic Area CaO (tons)/SO2 Removed (tons) assumes time a 95% CaO
⁴ The estimated at capacity date is calculated using the maximum annual total coal ash waste rate
⁵ The estimated at capacity date is calculated using the average annual total coal ash waste rate

Current Surface Area Estimator	Updated	
Width (ft)	Length (ft)	Nov-07
1200	2700	3,240,000 ft ²
Landfill Surface Acres	74.31 acres	
	359,870 yds ³	
Top Soil Estimate	148.82 acre ft	
@ 2 ft thick	239,780 yds ³	
Volume of Wastes	2,283,228 yds ³	
Volume plus Top Soil Cover, yds ³	2,503,008	
Volume plus Top Soil Cover, acre ft	1.551	

2004 Survey Results - MIKON Corp.	
Width (ft)	Length (ft) (estimated from survey)
775	2200
	1,705,000 ft ²
Landfill Surface Acres	39.11 acres
	188,271 yds ³
Top Soil Estimate	78.21 acre ft
@ 2 ft thick	126,180 yds ³
2004 Volume of Wastes	1,439,251 yds ³
2004 Survey - Raw Fill Volume, yds ³	1,827,033
Volume plus Top Soil Cover, yds ³	1,585,431

Waste Management Plan	
Footprint Estimate, acre ft	1,025
As-filled to Design Factor	1,369
Extended Capacity, acre-ft	2,286
Landfill Percent Used	61.4%
Estimated at Capacity Date ⁴	2017
Estimated at Capacity Date ⁵	2023
Landfill life expectancy, Min	33
Landfill life expectancy, Avg	39

2006 Survey Results - MIKON Corp.	
Width (ft)	Length (ft) (estimated from survey)
1200	2600
	3,120,000 ft ²
Landfill Surface Acres	71.56 acres
	348,348 yds ³
Top Soil Estimate	143.12 acre ft
@ 2 ft thick	230,698 yds ³
2006 Volume of Wastes	1,575,250 yds ³
2006 Survey - Raw Fill Volume, yds ³	2,038,541
Volume plus Top Soil Cover, yds ³	1,808,148

**Attachment 6
Federal CCR Annual
Inspection Form**

Federal CCR Annual Inspection Form

Rev. 0

Page 1 of 2

Station: PRRA - Rawhide

CCR Unit: Ash Monofill

Date: 3/16/2016

Inspector(s): E. Drumright; E. Underwood

Weather Conditions: Mostly Sunny, 40deg F; very windy

Ground Conditions: Clear

Purpose of Inspection: Per the CCR Rule published by the USEPA and entered into the federal register on April 17, 2015, existing and new CCR landfills are required to be inspected annually by a qualified professional engineer to ensure that the design, construction, operation, and maintenance of the CCR facility is in good condition and conforms to standard engineering practices for this type of facility.

Please refer to the attached figure to mark location of any identified conditions.

CCR UNIT FEATURE	Yes	No	NA	Location ID # or map identifier
CCR Placement				
1) Is waste being handled or placed differently than standard station practices?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Bench Conditions				
2) Any signs of surface cracking?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
3) Any signs of depressions or sunken areas?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Slope Conditions				
4) Any signs of surface cracking?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
5) Any signs of surface movement? If yes, please categorize		<input checked="" type="checkbox"/>	<input type="checkbox"/>	
5a) Sloughing (sliding of materials in sheets)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
5b) Sliding	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
5c) Sinking	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
6) Any signs of erosion rills greater than 3 inches?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
7) Any signs of erosion gullies greater than 6 inches?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
8) Any signs of holes or animal burrows?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Occasional in Cell 2 starter dike.
Haul Road Conditions				
9) Any obstructions?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
10) Any noticeable damage? If yes, please categorize		<input checked="" type="checkbox"/>	<input type="checkbox"/>	
10a) Rutting	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
10b) Sinking	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
10c) Pot holes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Erosion Controls				
11) Any areas of active construction lacking erosion controls (silt fence)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
12) Any signs that existing erosion controls are not properly functioning?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
13) Any evidence of insufficient vegetative cover?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Liner System Conditions (prior to CCR placement or during active liner construction)				
14) Any damage to liner protective cover?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
15) Any damage to liner system observed?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	

Federal CCR Annual Inspection Form - CCR Landfills

Rev. 0

Page 2 of 2

Station: PRRA - Rawhide

CCR Unit: Ash Monofill

Date: 3/16/2016

CCR UNIT FEATURE

Leachate Collection/Detection System

16) Any signs of obstruction to leachate collection/detection pipe outlets?

		X
		X

17) Any signs of obstruction to leachate flow(s) to storage lagoon(s)?

		X
--	--	---

Surface Water Controls (Diversion Channels/Collection Channels/Sedimentation Ponds)

18) Any signs of uncontrolled run-on to the landfill?

	X	
--	---	--

19) Any signs of uncontrolled run-off from the landfill?

	X	
--	---	--

20) Any signs of obstruction in surface water conveyance channels?

	X	
--	---	--

21) Any cracking or separation in surface water conveyance channels?

	X	
--	---	--

22) Any signs of heaving or sinking of surface water conveyance channels?

	X	
--	---	--

23) Any signs of obstruction in culverts, drop boxes, or sumps?

	X	
--	---	--

24) Any signs of sedimentation pond malfunction (excessive sediment buildup)?

		X
--	--	---

25) Any signs of excessive sedimentation pond water loss (leaking)?

		X
--	--	---

26) Any signs of obstruction to sedimentation pond outlet structure (in pond)?

		X
--	--	---

27) Any signs of obstruction to sedimentation pond effluent discharge?

		X
--	--	---

Fugitive Dust Controls

28) Any evidence that fugitive dust controls are not being used?

X		
---	--	--

Some windblown ash from working face Cell 2

Other

29) Any nontypical operations occurring at facility? If yes, please describe.

	X	
--	---	--

Additional Comments:

Individual Completing Form:

Elliott E. Drumright
Print

Elliott E. Drumright
Signature

**Attachment 7
Sample PRPA Weekly
Inspection Form**



Name of CCR Landfill: <u>Rawhide Ash Monofill</u>	Qualified Inspector: <u>Courtney Stewart</u>
Landfill ID Number: _____	Date: <u>2/1/2016</u> Time: <u>9:00 AM</u>
Owner: <u>Platte River Power Authority</u>	Weather: <u>Actively Snowing,</u>
Operator: <u>Platte River Power Authority</u>	<u>Snow on Ground</u>

I. Perimeter Slope

- How would you describe the vegetation on the crest and side slopes? (Check all that apply)

<input type="checkbox"/> Recently Mowed	Other (describe): _____
<input type="checkbox"/> Overgrown (Greater than 6-in.)	_____
<input checked="" type="checkbox"/> Good Cover	_____
<input type="checkbox"/> Sparse	_____
<input type="checkbox"/> Paved	_____
<input type="checkbox"/> Gravel	_____
- Are there any areas of hydrophilic (lush, water-loving) vegetation? Yes No
If 'Yes', describe (size, location, severity, etc.) _____
- Are there any trees or other undesired vegetation on the slope? Yes No
If 'Yes', describe (type of vegetation, size, location, etc.) Tree located near south edge of landfill and transmission line may be removed. Best management practices are being discussed.
- Is there an access ramp up the side slope or a road around the perimeter slope? Yes No
If 'Yes', describe (good condition, numerous cracks, newly paved, stone uniformly distributed, etc.) Ramp is in good condition and is a dirt road which is free from cracks.
- Are there any depressions, ruts, or holes on the access ramp or road? Yes No
If 'Yes', describe (size, location, etc.) _____
- Are there any cracks, sloughs, bulges, or indications of slope distress? Yes No
If 'Yes', describe (length and width, location and direction of cracking, slough, or distress, etc.) _____
- Do any wet areas indicate seepage through the slope? Yes No
If 'Yes', describe (size, location, etc.) _____
- Are there any active seeps (flowing water) from the slope of the slope? Yes No
If 'Yes', describe (size, location, flow quantity and color, etc.) _____
- Are there any active seeps or wet areas at the toe of the slope? Yes No
If 'Yes', describe (size, location, etc.) _____
- Other observations on the perimeter slope (changes since last inspection, etc.): None.

II. Stormwater Conveyance

- Is stormwater being properly diverted by the existing infrastructure? Yes No

Name of CCR Landfill: Rawhide Ash Monofill Qualified Inspector: Courtney Stewart

Landfill ID Number: _____ Date: 2/1/2016 Time: 9:00 AM

If 'Yes', describe (size, location, etc.) A stormwater diversion ditch runs along the perimeter of the landfill.

2. Is the stormwater infrastructure in good condition? Yes No

If 'No', describe (Is there any erosion in or around the structures, signs of leakage or movement, etc?).

III. Landfill Conditions

1. Describe operations in the landfill (disposal, reclamation, general operational activities):
Landfill operations include the disposal of coal ash residuals, and minimizing dust potential. This includes disposing of moist ash residuals, and berming material to reduce wind erosion.

2. Are any stormwater controls obstructed? Yes No

If 'Yes', describe (type of debris, reason for obstruction, etc.) _____

3. Are there indications of erosion on the landfill slopes? Yes No

If 'Yes', describe what type and its condition (rill, gully, dimensions, etc.) _____

4. Do conditions exist that may require additional dust controls? Yes No

If 'Yes', describe (location, appropriate dust control measures, etc.) _____

5. Other observations around the landfill (changes since last inspection, etc.): _____

IV. Repairs, Maintenance, Action Items

1. Has any routine maintenance been conducted since the last inspection? Yes No

If 'Yes', describe. The consolidation and compaction of residuals allows for better use of space and reduces wind erosion potential.

2. Have any repairs been made since the last inspection? Yes No

If 'Yes', describe. _____



Name of CCR Landfill: Rawhide Ash Monofill Qualified Inspector: Courtney Stewart
 Landfill ID Number: _____ Date: 2/1/2016 Time: 9:00 AM

3. Are there any areas of potential concern? Yes No
 If 'Yes', describe. _____

4. Has this inspection identified any need for repair or maintenance? Yes No
 If 'Yes', describe and state the urgency of maintenance. "Urgent" for maintenance that should be conducted as soon as possible, "Moderate" for maintenance that should be conducted within three months, and "Not Urgent" for maintenance that can be conducted in a year.
The tree found on the south end of the landfill may be removed for maintenance. This is not urgent, but will be tended to with best management practices.

V. Photographs

Photographs can be taken of notable features. List of photographs:

	<u>Location</u>	<u>Direction of Photo</u>	<u>Description</u>
i.	_____	_____	_____
ii.	_____	_____	_____
iii.	_____	_____	_____
iv.	_____	_____	_____
v.	_____	_____	_____
vi.	_____	_____	_____
vii.	_____	_____	_____
viii.	_____	_____	_____
ix.	_____	_____	_____
x.	_____	_____	_____

**Attachment 8
Photo Log of 2016 Monofill
Inspection**

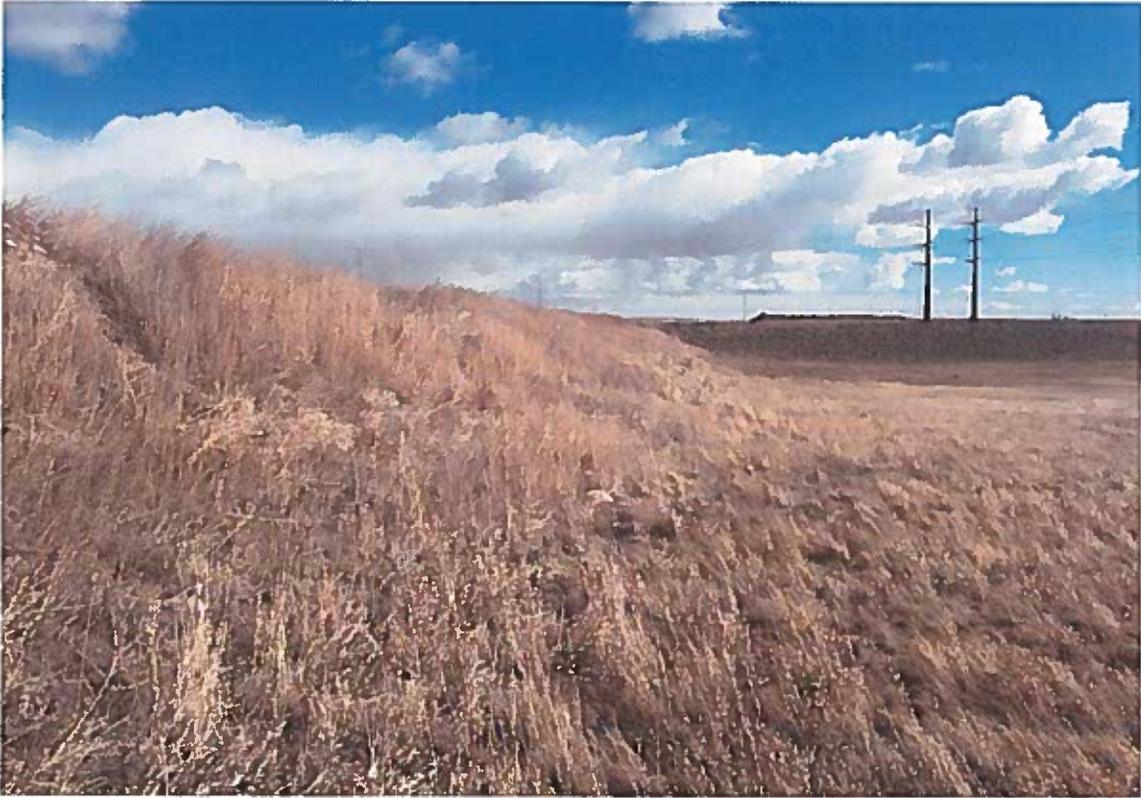


Photo 1. Downstream of Containment Dike at Cell 2.



Photo 2. Shallow animal burrows in south side of Cell 2 starter dike.



Photo 3. Stormwater runoff area on the west side of Containment Dike at Cell 2.



Photo 4. Seeded area south of working face of Cell 2.



Photo 5. Transition between newly seeded and established ground cover grasses on Cell 2.



Photo 6. View between Cell 1 (left) and 2 (right) looking south toward cooling pond with Cell 2 cap material staged along access road.



Photo 7. View of working face of Cell 2 with borrow excavation in native soil for cap material.

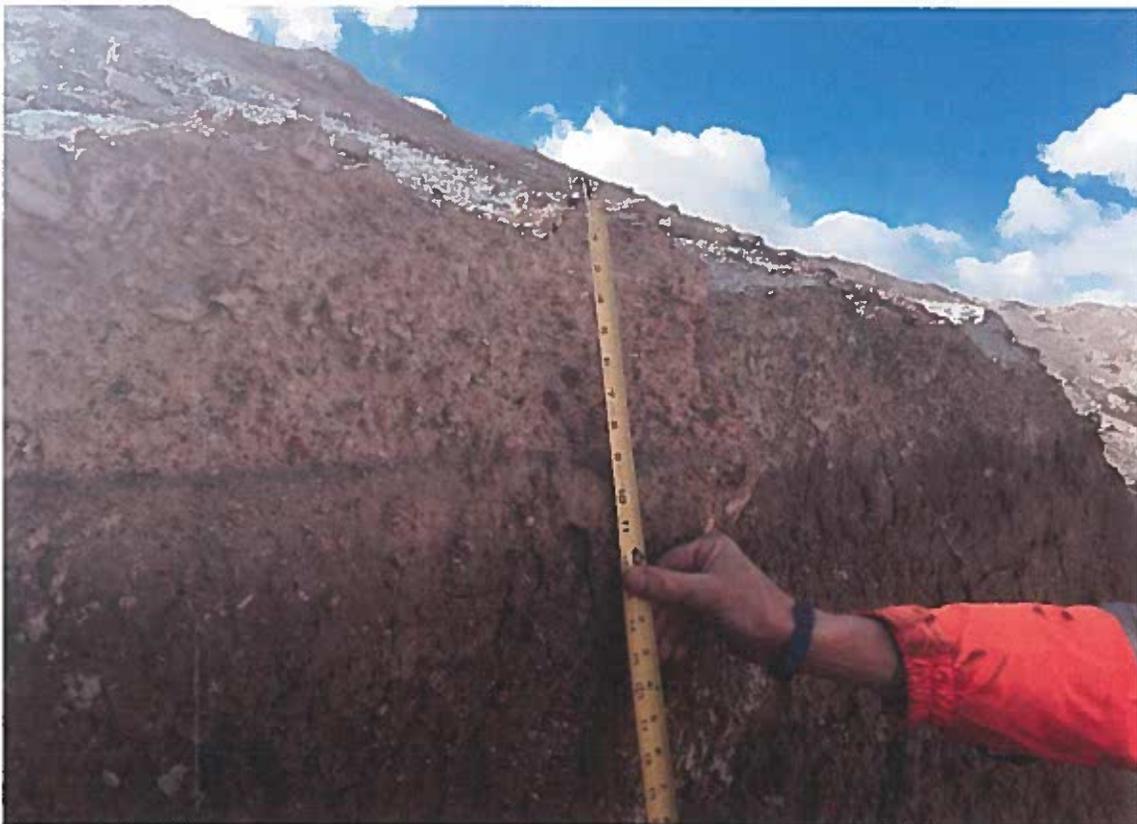


Photo 8. View of contact between CCR above and native soils in the Cell 2 working face.



Photo 9. View looking west with minor amounts of construction debris to right.



Photo 10. Transition zone between Cells 1 & 2. Moist soils and salts leaching from CCR in the foreground.



Photo 11. View looking northwest across vacant area of Cell 2 from the west edge of Cell 1.



Photo 12. View looking to the south over vacant area of Cell 2. Working face of Cell 2 is visible in the far background.



Photo 13. View of working face of Cell 2 from top of Cell 1. Minor amounts of fugitive dust can be seen at top of the working face of CCR.



Photo 14. View of western side of completed Cell 1.



Photo 15. View of eastern finished slope of Cell 1 with Phosphorus sludge ponds and plant buildings in background.