2014 PERIODIC ENGINEER'S INSPECTION UNITS 1 & 2 STAGE II EVAPORATION POND (STEP) MAIN DAM COLSTRIP, MONTANA

Prepared For:

PPL MONTANA, LLC
Colstrip, Montana

Hydrometrics, Inc.
Consulting Scientists and Engineers

SEPTEMBER 2014

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UNITS 1 & 2 STAGE II EVAPORATION
POND (STEP) MAIN DAM
COLSTRIP, MONTANA

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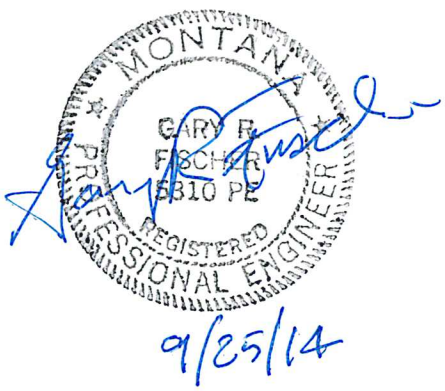

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September 2014

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UNITS 1 & 2 STAGE II EVAPORATION
POND (STEP) MAIN DAM
COLSTRIP, MONTANA

1.0 PURPOSE AND SCOPE OF STUDY

This report presents the results of a Periodic Engineer's Inspection of the Units 1 & 2 Stage II Evaporation Pond (STEP) Main Dam near Colstrip, Montana. The dams at Colstrip fall under the regulation of the Major Facilities Siting Act (MCA, 2007). Although they are exempt from the Montana Dam Safety Rules, PPL Montana has agreed to have them inspected in accordance with these rules (ARM, 1988).

This report has been prepared in accordance with Montana Dam Safety Rules. In general terms, a Periodic Inspection includes:

(a) Review and analysis of previous inspection reports and available data on the design, construction, operation, and maintenance of the dam and its appurtenances.

(b) Visual inspection of the dam, its appurtenances, the downstream area, and all other areas affected by the structure.

(c) Evaluation or plan for a full evaluation over no more than a 5-year period of the general conditions of the dam, spillways, and other appurtenances, including an assessment of the hydrologic and hydraulic capabilities, structural stability, and any other conditions that constitute or could constitute a hazard to the integrity of the structure.

(d) Evaluation of operation, maintenance, emergency, and inspection procedures employed by the owner.

(e) Analysis of piezometric levels or other data from any instrumentation or monitoring of the dam.

(f) Review and analysis of the rate and volume of seepage and condition and maximum flow capability of any seepage collection system.

(g) Review and documentation of the condition of surfaces and vegetation on the crest and slopes of the dam and area beyond the downstream toe of the dam.

(h) Review of maximum operating water surface elevation and amount of freeboard.

(i) Review and documentation of the condition of spillways and water level control structures, including all conduits exiting the dams.

(j) Other items the engineer determines are necessary to document and determine the safety of the dam. (ARM Rule 36.14.602).

The purpose of the Periodic Engineer's Inspection is to identify current and physical operational conditions of the dam and appurtenances and to determine if emergency measures and/or additional studies, investigations and analyses are needed, so that corrections can be made by the owner in a timely manner.

The following tasks were completed by Hydrometrics, Inc.:

1. Review of previous engineering, design and construction data to verify completeness of information in characterizing the general safety of Units 1 and 2 Stage II Evaporation Pond Main Dam (*Section 5*).

2. Engineering analysis of seepage and piezometer data to determine if internal seepage affects the integrity of the dam (*Section 5*).

3. Visual observations of the dam, appurtenant structures, and downstream areas for evidence of seepage, unstable slopes and erosion characteristics *(Section 6).*

4. Review of the previous inspection reports and comparison of existing conditions with conditions and recommendations noted in those reports *(Section 7).*

5. A summary of conclusions and recommendations (*Section 8*).

2.0 PROJECT DESCRIPTION

2.1 PROJECT OVERVIEW

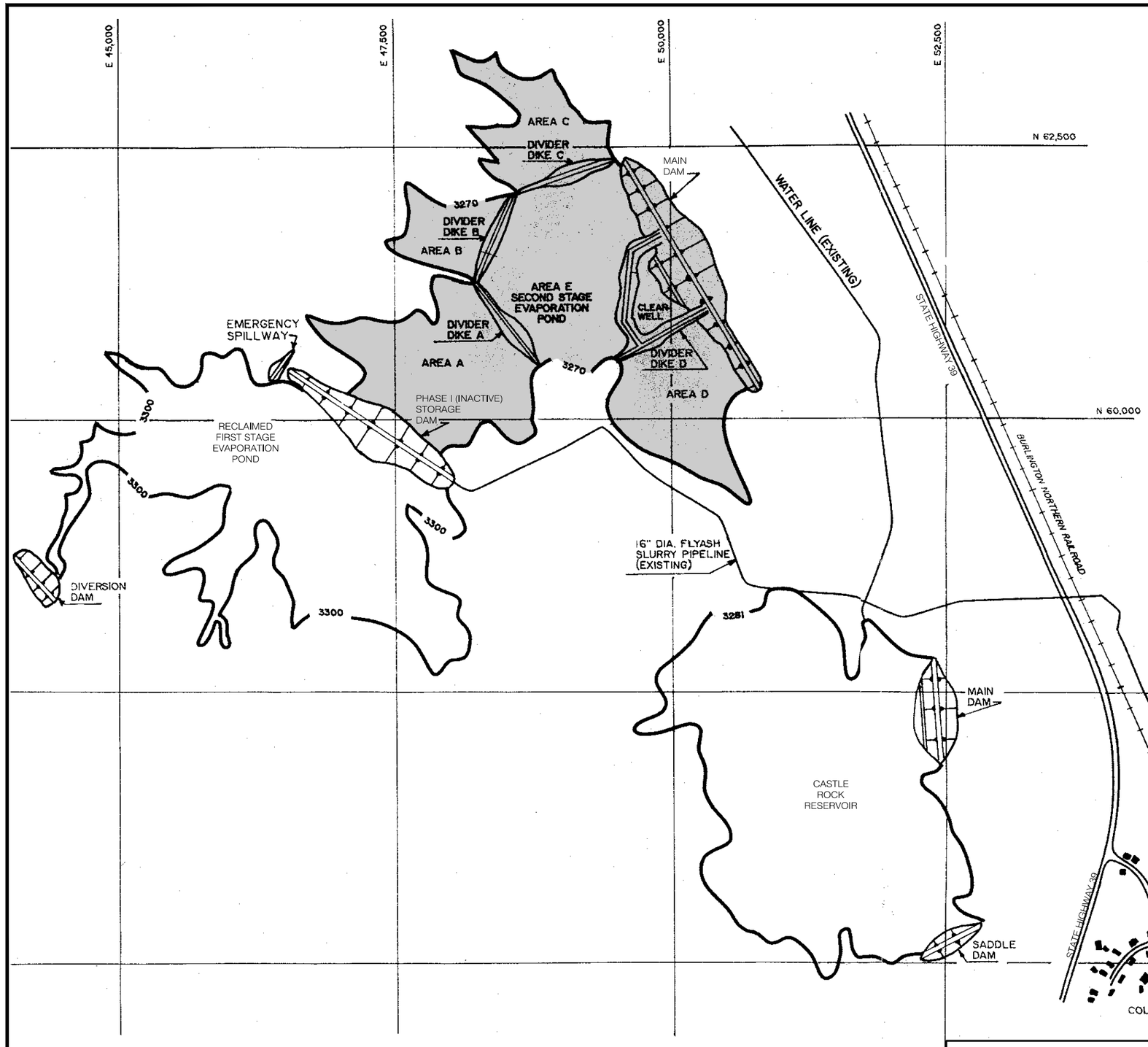
The Units 1 & 2 STEP is intended for permanent storage of fly ash from the Colstrip Power Plant Units 1 & 2. Fly ash is pumped to the pond as slurry via pipeline. Water is decanted from the slurry and pumped back to the plant.

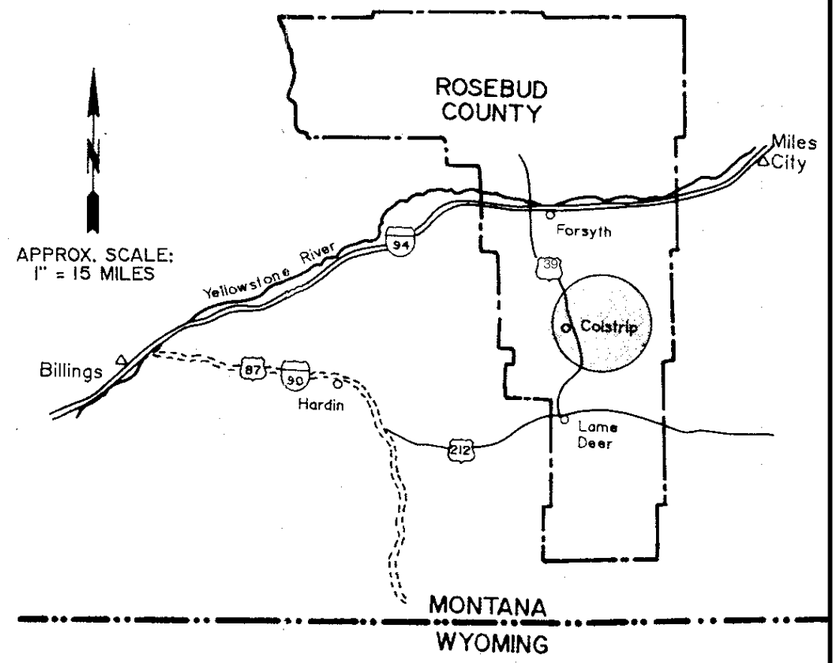
The Units 1 & 2 STEP is located in Section 21, Township 2 North, Range 41 East, in Rosebud County, Montana. The project location is shown on Figure 2-1.

2.2 DESIGN AND CONSTRUCTION – UNITS 1 & 2 STEP

The main dam consists of a zoned earth embankment with a design height of 88 feet, and a fly ash storage volume of about 4730 acre feet. The volume of raw slurry and decant water in the pond is small in comparison to the pond's reported storage capacity, which is mostly occupied by fly ash. An unlined emergency spillway is excavated through a hillside, north of the left abutment. The dam is designed with a core trench penetrating into bedrock and a grout curtain penetrating about 80 to 120 feet deeper than the core trench. The ponds are lined with synthetic liners to prevent or minimize seepage of pond water.

The pond is divided into six areas (Areas A through E and a clear well) by internal divider dikes. The design crest elevation of the divider dikes corresponds to the maximum operating elevation of 3270 feet (about 8 feet lower than the dam crest). Performance of the internal dikes likely does not affect the safety of the facility. Internal divider dikes C and D were inspected by Hydrometrics in 2009 at the request of PPL Montana because of several noted safety deficiencies (Hydrometrics, 2009b). Corrective action recommended in the 2009 Hydrometrics report included repair of a seepage area on divider dike C and rodent control on divider dikes C and D. An Environmental Protection Agency study (GEI, 2009) identified similar safety deficiencies with the STEP divider dikes and PPL Montana responded with a corrective plan (PPL Montana, 2009). PPL Montana reports that deficiencies on the internal divider dikes and have been addressed and corrected. The divider dikes were not inspected in 2014.





VICINITY MAP

Note:
Reproduced from construction drawings by Bechtel Power Co.

PPL MONTANA
COLSTRIP DAM SAFETY INSPECTION
COLSTRIP, MONTANA

PROJECT LOCATION MAP

FIGURE
2-1

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The B cell is lined with reinforced polypropylene and the A and E cells are lined with a high density polyethylene (HDPE) liner. Since 2009, Cell D on the south side of the STEP complex has been completed and is lined with reinforced polypropylene. Excess excavation material from Cell D has been placed on the downstream side of the south portion of the STEP Main Dam. Cell C does not store water and remains unlined.

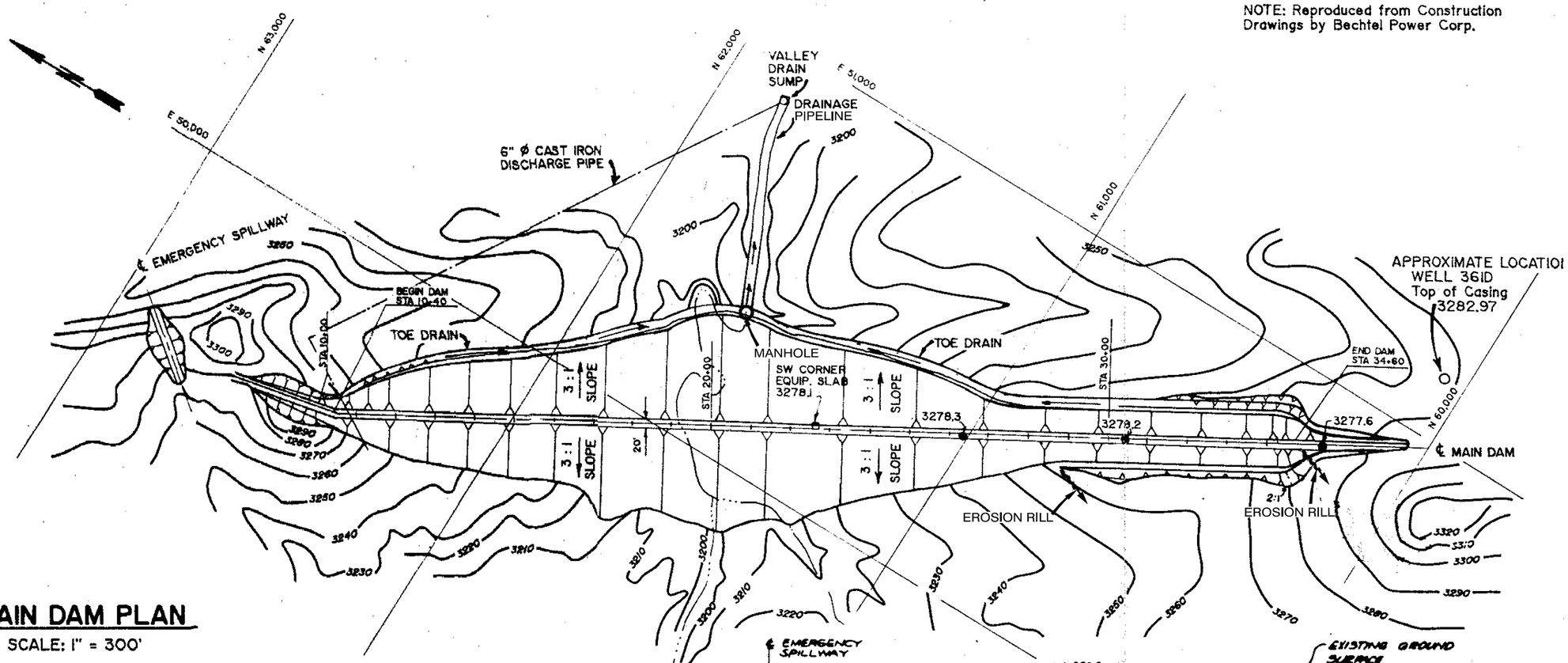
The design of Units 1 &2 STEP Main Dam includes chimney, trench and toe drains that are connected to a perforated trench drain extending out about 540 feet down the valley to a concrete sump for pumping back into the pond. The trench drain and sump are referred to as a valley drain. The upstream slopes of the Main Dam are lined with either reinforced polypropylene or high density polyethylene (HDPE) for seepage control.

The facility has no means for lowering the reservoir, other than by evaporation, or by decanting into the Clearwell and then pumping Clearwell water to the power plant for process reuse.

The impoundment was designed and constructed to route a 24-hour probable maximum flood (PMF), preceded by a 100-year runoff event (Bechtel, 1979). The routed flood would flow through the spillway downstream to the Armells Creek drainage.

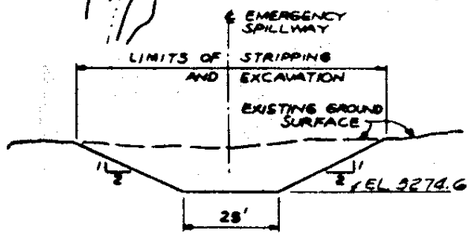
The plan view and typical cross sections of the dam and spillway are presented in Figure 2-2.

NOTE: Reproduced from Construction Drawings by Bechtel Power Corp.



MAIN DAM PLAN

SCALE: 1" = 300'



EMERGENCY SPILLWAY CROSS-SECTION

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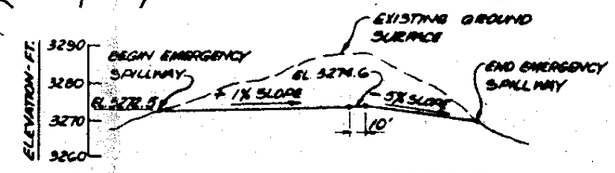

EMERGENCY SPILLWAY PROFILE

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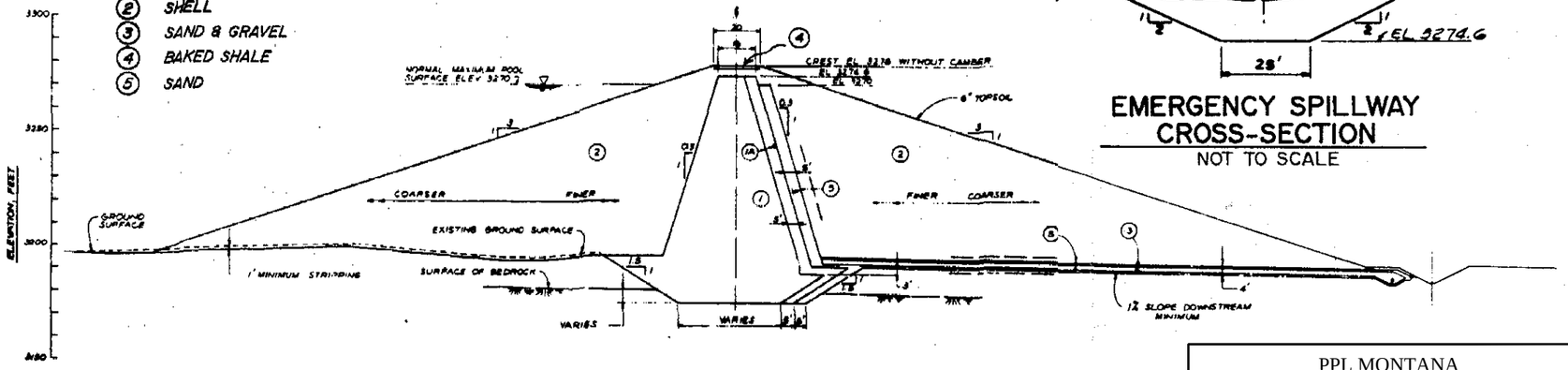
DESCRIPTION OF EMBANKMENT ZONES

1. CORE
1A. TRANSITION
2. SHELL
3. SAND & GRAVEL
4. BAKED SHALE
5. SAND



PPL MONTANA COLSTRIP DAM SAFETY INSPECTION COLSTRIP, MONTANA	**UNITS 1 & 2 STAGE II EVAPORATION POND MAIN DAM PLAN AND CROSS SECTIONS**	FIGURE **2-2**

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The following design information contained in Table 2-1 was obtained from the design report and construction drawings (Bechtel Power Corporation, 1979).

TABLE 2-1. UNITS 1 & 2 STAGE II EVAPORATION POND MAIN DAM DESIGN SUMMARY

GENERAL INFORMATION

- Owner/Operator: PPL Montana (formerly The Montana Power Company)
- Date Constructed: 1987 and 1988
- Purpose: To provide permanent storage of fly ash from Colstrip Units 1 & 2, plus Probable Maximum Flood and 100 year flood.
- Location: Section 21, Township 2 North, Range 41 East, Rosebud County, Montana.
- Watershed: Tributary of Armells Creek, a tributary of the Yellowstone River.
- Drainage Area: 0.58 square miles

RESERVOIR DATA

- Fly Ash Storage at Maximum
  - Operating Elevation (3270 feet NGVD): 4,730 acre feet
- Flood Storage: 872 acre feet
- Total Storage at Emergency
  - Spillway Elevation (3274.6 feet NGVD): 5,602 acre feet
- Normal Freeboard at Maximum
  - Operating Elevation (3270 feet NGVD): 8 feet

TABLE 2-1. UNITS 1 & 2 STAGE II EVAPORATION POND MAIN DAM DESIGN SUMMARY (continued)

EMERGENCY SPILLWAY DATA

- Type: Uncontrolled, unlined earth.
- Crest Elevation: 3274.6 feet NGVD
- Width at Crest Elevation: 25 feet
- Side Slopes 2:1 Horizontal to Vertical

EMBANKMENTS DATA

- Type: Zoned earth fill with cut-off trench, internal drains, grout curtain and upstream blanket.
- Height, feet: 88 feet
- Crest Elevation, feet NGVD: 3278.0 NGVD
- Crest Length, feet: 2420 Feet
- Crest Width, feet: 20 Feet
- Upstream & Downstream Slopes, H:V: 3:1 Horizontal to Vertical
- Wave Protection: HDPE or reinforced polypropylene liner

3.0 HAZARD POTENTIAL

Within a short distance downstream of the dam, development includes residences, businesses, a primary state highway and railroad. Sudden failure of this structure would likely result in extensive property damage and a high potential for loss of lives. This project is therefore assigned a high hazard potential according to State of Montana criteria.

As required by the Dam Safety Program, an emergency action plan (EAP) for the Units 1&2 Stage II Evaporation Pond Main Dam (Hydrometrics, 2009a) was updated in December 2013 and is on file in the Colstrip plant offices.

4.0 REVIEW OF ENGINEERING DATA

Engineering data related to the safety aspects of the dam was reviewed as part of this inspection. This review included reports from previous investigations and inspections and piezometer data that had been previously collected but not analyzed for dam safety reasons.

4.1 PREVIOUS INVESTIGATIONS AND INSPECTIONS

Geotechnical investigations for the dam site were performed by Bechtel Power Company in 1978 and 1979 and presented in a design report (Bechtel, 1979). That report summarizes the investigation activities, presents logs of borings and test pits, results of field and laboratory tests, discussed site characteristics relating to seepage, settlement, flood routing, slope stability and construction materials, and presents a proposed design for the dam.

In 2009, Womack & Associates conducted a geotechnical analysis of the STEP Main Dam (Womack & Associates, 2010) in response to EPA recommendations. The report concluded the factors of safety for slope stability of the Main and Saddle embankments exceeded those required by the Federal Energy Regulatory Commission (FERC). The report also concluded from piezometer data that the internal drainage system in the embankment adequately controlled the embankment phreatic surfaces.

The previous periodic inspection report (Hydrometrics, 2009b) was reviewed as part of this inspection. This report presented a series of recommendations for Units 1 & 2 STEP Main Dam. The status of each of those recommendations is summarized below.

Recommendation 1: Fill and revegetate the vehicle ruts located on the crest of the Main Dam.

Status: Crest was in good condition without wheel ruts.

Recommendation 2: Initiate aggressive control of rodents on downstream slopes of the Main Dam, the upstream slope of the Main Dam adjoining Area D, and Divider Dikes C and D.

Status: Rodent holes were still present on the Main Dam but it is unknown if rodents are present. Recommend that rodent holes be backfilled and monitored to determine if rodents return. If rodents are present, re-instate the rodent control program that was initiated in 2009.

Recommendation 3: Erosion control, e.g. riprap or other erosion prevention product, should be established in the erosion channel along the right (south) downstream toe of the Main Dam.

Status: Erosion in the toe area has been repaired and vegetation has established. The area should be monitored for erosion.

Recommendation 4: Monitor the small rills located on the side slopes of the spillway to determine if further erosion is taking place that requires repair.

Status: Side slopes have established vegetation and appear to be in good condition.

Recommendation 5: Vehicle use should be avoided in the spillway area, especially during the wet season.

Status: The road in the spillway area appeared in good condition with no signs of ruts or erosion.

Recommendation 6: Install two piezometers on the Units 1 & 2 Main Dam, one upstream of the dam's core, and one downstream to monitor the phreatic surface and to evaluate if the core and foundation cut off are working properly.

Status: Piezometers have been installed (Womack & Associates, 2010) and are being monitored on a regular basis.

Recommendation 7: Monitor seepage rate and volume from the main dam that is being picked up by the pump-back system.

Status: Capture flow is being monitored on a regular basis by PPL Montana.

Recommendation 8: Have seepage data analyzed annually by a qualified engineer and expand the analysis to include the divider dikes.

Status: Seepage piezometer data is analyzed by Womack & Associates annually.

4.2 SEEPAGE

The facility has lined impoundments, which recirculates water decanted from the slurry back to the power plant. The initial design incorporated six features to reduce, accommodate and/or monitor seepage:

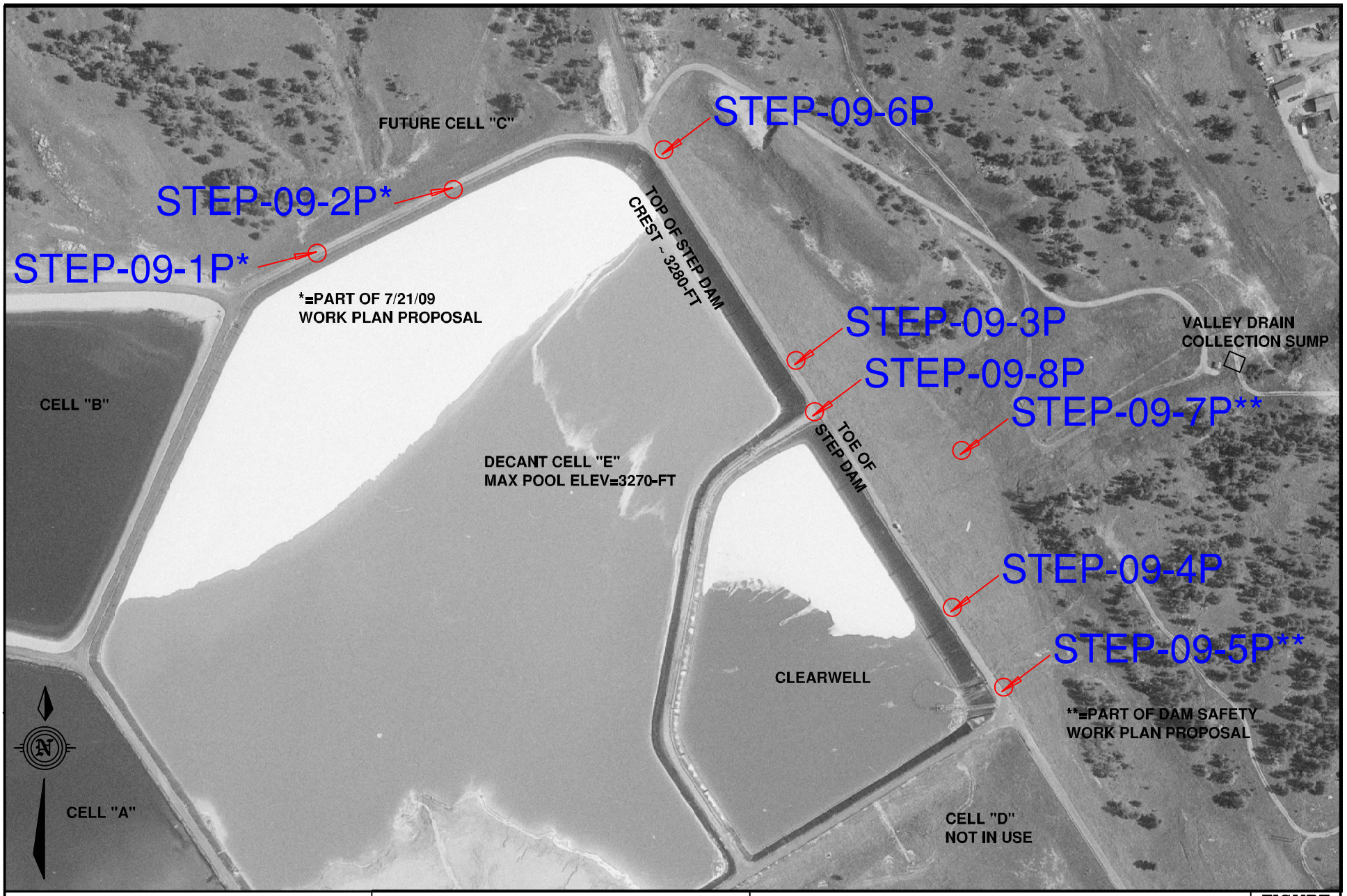
1. A core trench in the Main Dam extending between 2 and 5 feet into bedrock.

2. A grout curtain extending between 80 to 120 feet below the core trench.

3. A drainage system at the Main Dam, consisting of chimney, inclined core, blanket and valley drain, all draining to a sump for pumping back to the pond.

4. An upstream blanket of "core" material, 500 feet wide and 5 feet thick, plus synthetic liners.

Previous inspections have noted no concerns with seepage from the Units 1&2 Ponds. Since the ponds are lined, seepage concerns are greatly reduced. An engineering seepage analysis was conducted as part of the 2009 inspection, and an updated analysis is also part of this report. A map of the groundwater monitoring wells and sample collection wells near the Units 1 & 2 Main Dam are shown on Figure 4-1. Monitoring wells near the Main Dam that appeared likely to be influenced by the STEP and were analyzed for this report include 358D, 964D and 965D (which were also analyzed in 2009). As shown in Figures 4-2, 4-3 and 4-4, monitoring wells 358D, 964D and 965D show no correlation to pond levels, and the data exhibits a considerable amount of scatter. This is not unexpected for lined ponds and is



Scale: 1" = N.T.S	EPA Mandated Groundwater Monitoring PPL Colstrip Steam Electric Station Units 1 & 2 STEP Dam Colstrip, Montana	Piezometer Location Map	FIGURE 4-1

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WOMACK & ASSOCIATES, INC.

FIGURE 4-2. PIEZOMETER 358D LEVELS VS POND LEVELS

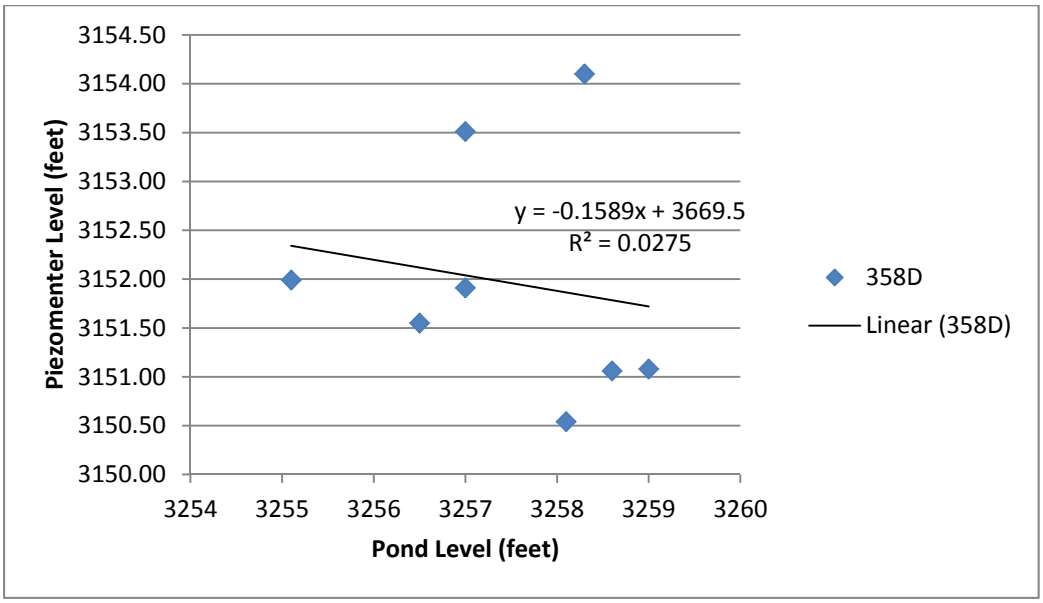


FIGURE 4-3. PIEZOMETER 694D LEVELS VS POND LEVELS

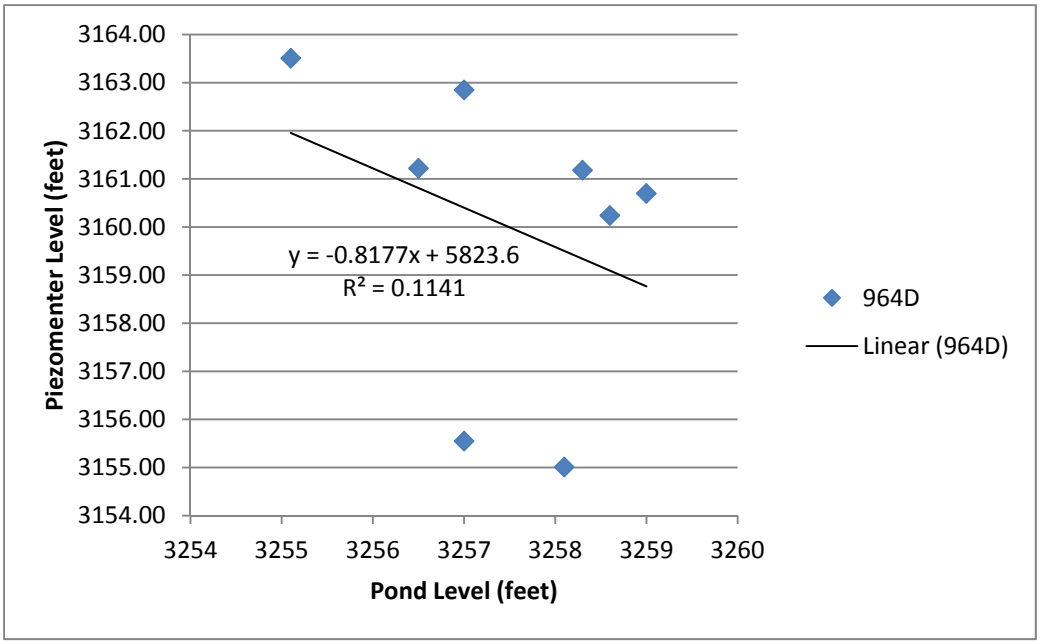
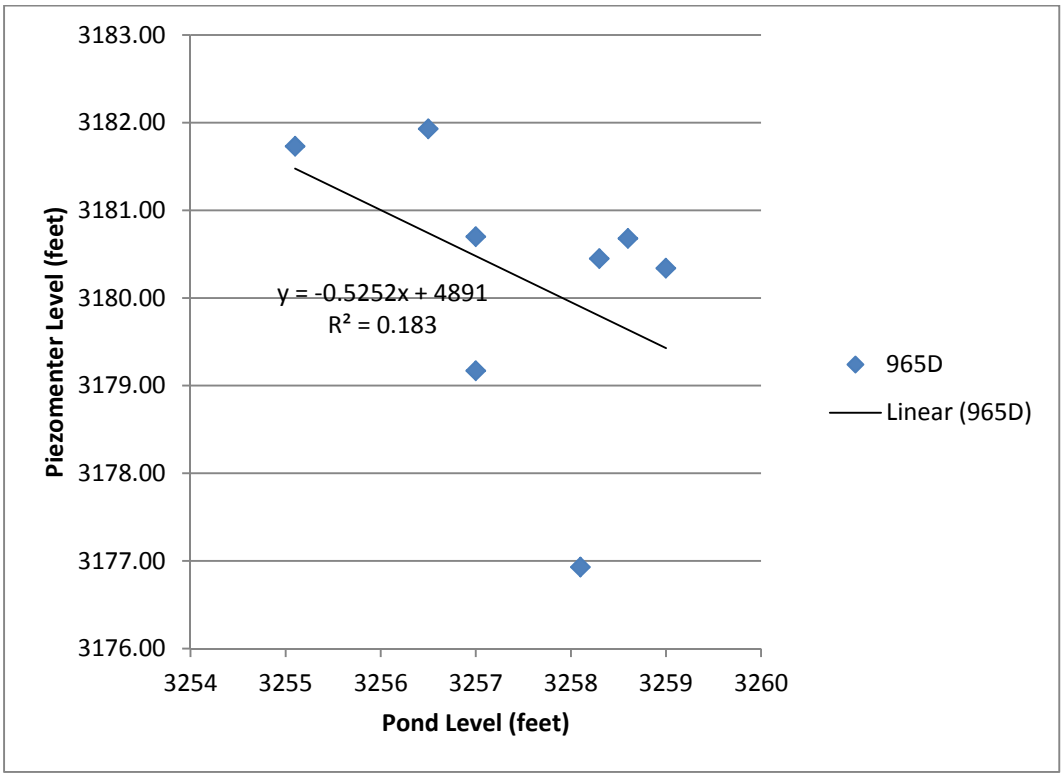


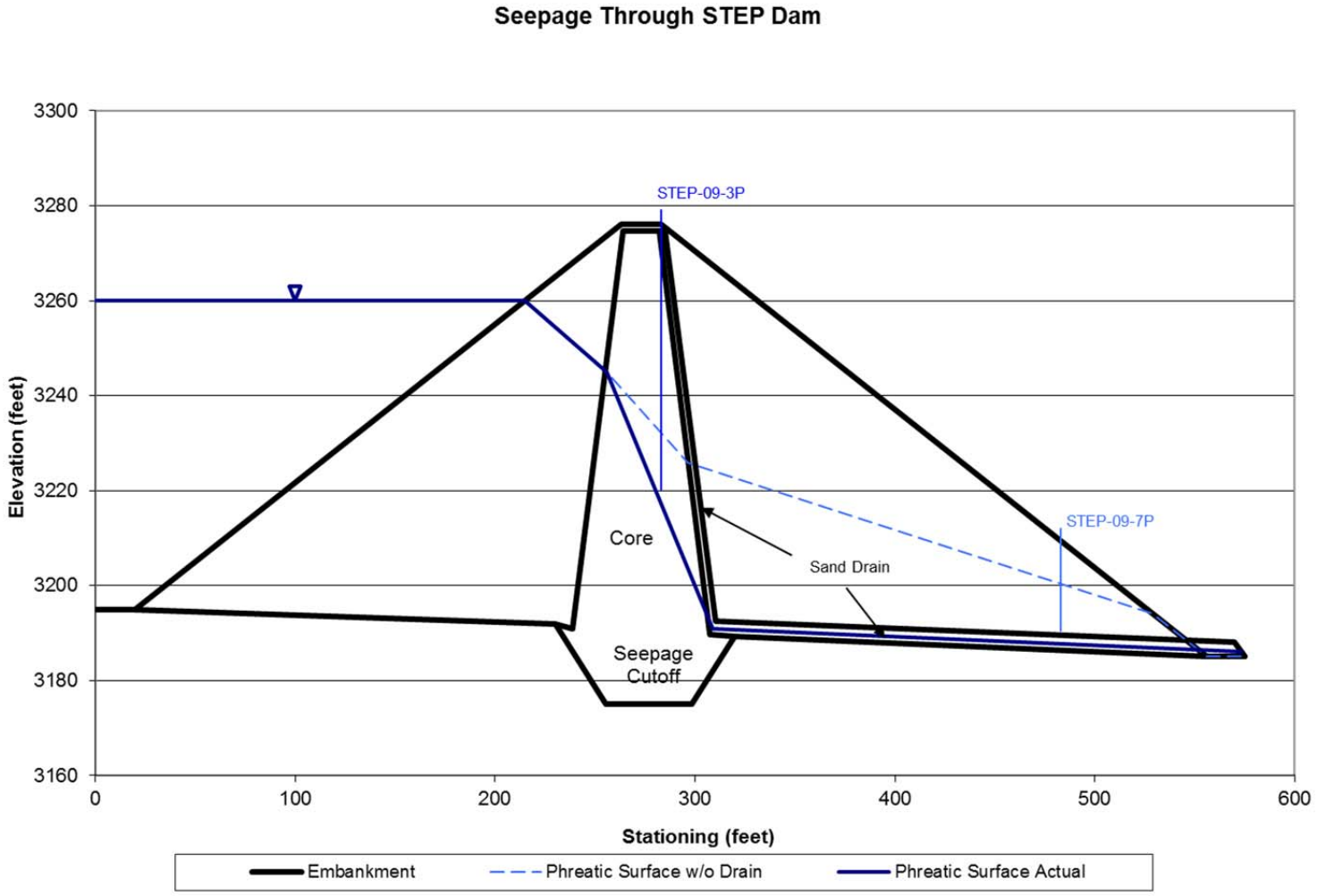
FIGURE 4-4. PIEZOMETER 965D LEVELS VS POND LEVELS



generally viewed as favorable because it suggests that the piezometers are not hydraulically connected to the pond and are not being influenced significantly by leakage or preferential seepage paths.

Piezometers were installed on the Main Dam and divider dikes in 2009 in response to EPA recommendations and recommendations made in past inspection reports (Womack & Associates, 2010). Figure 4-1 shows the piezometers installed on the embankments of the Units 1 & 2 STEP. All piezometers have been monitored since they were installed but have remained dry, with the exception of STEP-09-7P, which recorded a depth of 1.8 feet above the bottom of the piezometer in June 2011, which was an unusually wet year (Womack & Associates, 2013). Vibrating wire piezometers STEP-09-5P and STEP-09-7P are plotted on a cross section of the Main Dam in Figure 4-5. The two piezometers help estimate the actual phreatic surface in the dam, which is influenced significantly by the pond liners, the sand

FIGURE 4-5. CROSS SECTION OF UNITS 1 & 2 PONDS MAIN DAM AND PHREATIC SURFACE



filter in the embankment, and the seepage cutoff in the foundation. Since the piezometers for the most part have not recorded water levels, it is possible that the phreatic surface dips below the internal drain and deep into the foundation of the dam. This would suggest that the foundation is quite permeable and that the seepage cutoff is effective. Without the seepage control measures mentioned above, this permeable foundation could lead to problems over time. Figure 4-5 also shows what the phreatic surface might look like if the embankment had no liner or internal drain and was on an impermeable foundation. All piezometer and monitoring well data indicate seepage is not a dam safety problem in the Units 1 & 2 STEP Main Dam and it appears the measures to control seepage appear to be working well.

4.3 FLOOD ROUTING

At the maximum operating level (3270 feet), the impoundment has 8 feet of freeboard. The spillway design analysis (Bechtel, 1979) determined that a combination of a 100 year flood followed by the PMF would raise the pond elevation about 4.6 feet, to 3274.6 feet, which was the elevation selected for the emergency spillway. This event would overtop the divider dikes but still have 3.4 feet of freeboard on the Main Dam. Therefore, the spillway only provides additional protection for events exceeding the design storm inflow.

An independent check of flood routing was presented in the 1988 Inspection report (Chen-Northern, 1988). That check used a 72-hour PMP event to be compatible with the current guidelines. The flood routing calculations indicated that inflow from the Stage I Pond could exceed previous estimates, but the STEP would still contain most of the PMF and safely route the remaining 501 acre feet through its spillway. In the analysis, the spillway was predicted to have a maximum discharge rate of 111 cubic feet per second and a flow depth of 0.8 feet. Based on the evaluation conducted in 1988, the impoundment meets and likely exceeds the State of Montana requirements for flood routing. The highest spillway standard criteria by State of Montana guidelines require the spillway be able to pass the full PMF routed through the pond. The current pond and spillway capacities exceed State of Montana criteria.

4.4 SLOPE STABILITY

The dam's design (Bechtel, 1979) meets current criteria for embankment stability. The stability reflected in the design was verified in 1988 (Chen-Northern, 1988). Based on the data from the piezometers installed in 2009, the existing phreatic surface is no higher than that assumed in previous stability analyses.

As mentioned in Section 4.1, Womack & Associates conducted a geotechnical analysis in 2009 for the STEP Main Dam for slope stability. The embankment was found to have adequate factors of safety for slope stability. Slope inclinometers were also installed in 2012. Inclinometers have measured embankment movements that are determined as acceptable since being installed, as reported in the latest monitoring effort in 2013 (Womack & Associates, 2013).

The project lies in a Seismic Zone 0 (UBC, 1994), which is characterized by little seismic risk. Seismic analysis is not typically required by design standards for this seismic zone. However, the original design report selected a seismic coefficient of 0.05 g for use in slope stability analysis, which is a conservative value for this seismic zone.

5.0 FIELD INSPECTION

5.1 METHODOLOGY

Gary Fischer, P.E., conducted a detailed field inspection of Units 1 & 2 Stage II Evaporation Pond Main Dam on July 15, 2014. Mr. Fischer was accompanied by Mike Holzwarth of PPL Montana, Charles Freshman of the Montana Department of Environmental Quality, and Sam Johnson of the Montana Department of Natural Resources and Conservation. Observations were made for surface evidence of potential problems relating to settlement, seepage, slope stability, erosion and general condition of appurtenant structures. Inspection photographs document both general conditions and specific items which merit remedial action (Appendix A). Copies of the field inspection forms are contained in Appendix B.

Access to the Units 1 & 2 Main Dam is by roads on PPL property. The road is gated and locked at the entrance to PPL property; access is limited to authorized personnel only.

Notation in the following text is referenced as “right” or “left” looking downstream of the dam.

5.2 UNITS 1 & 2 MAIN DAM INSPECTION

5.2.1 Crest

The crest of the Main Dam is in good condition (Photo 3). The horizontal alignment of the crest appears to be good with no surface cracking. No change in the vertical profile is apparent since it was last surveyed in 1993 (Maxim Technologies, 1993). There are slight low areas near the right abutment with apparent dried puddles in tire ruts that should be filled. Vegetation along the shoulders of the road is in good condition; otherwise the surface is bare and is used as an access road. The Main Dam crest is approximately 8 feet higher than the divider dikes in the evaporation pond.

5.2.2 Upstream Slope

The upstream slope appears to be in good condition. There are no signs of sliding, sloughing, scarps, erosion, or unusual movement. The slope along Area E and the Clearwell

is protected with a high-density polyethylene (HDPE) liner. Along Cell D, the liner is reinforced polypropylene, which was installed since the 2009 inspection. Vegetation on the shoulder above the liner is in good condition. The contact area between the Main Dam embankment and the abutments are in good condition.

5.2.3 Downstream Slope

The downstream slope does not exhibit signs of sliding, sloughing, erosion, or unusual movement. The vegetative cover is good except for patches of weeds that seem to correspond with rodent holes, and some sagebrush located near the crest at mid-dam (Photos 4 and 24). The contact between the embankment and abutment is in good condition except for some small erosion rills where the embankment meets fill placed during the excavation of Cell D on the right side of the slope. In the right toe groin, areas noted in past inspections as having erosion from surface runoff have been repaired and vegetation has established, leaving the area in good condition.

Seepage is not present on the surface of the slope. A drainage collection and pump-back system exists.

Two old pipe trench channels located south of the electric station on the crest were noted in the 2009 inspection. These channels have been filled and reseeded, showing no erosion.

Numerous rodent holes are on the downstream slope (Photos 8, 9, 24, 26 and 27). The holes should be backfilled and monitored for signs of rodents. If rodents are active, it is recommended that a rodent control program be reinstated, similar to what was done in 2009.

5.2.4 Downstream Area

The downstream area of Units 1 & 2 STEP Main Dam did not have surface seepage from the abutments or foundation. A drainage collection system and pump-back system is in operation. There is no evidence of sliding, sloughing, or escarpments.

5.2.5 Instrumentation

A drainage collection and pump-back system is located below the downstream slope. A pump-back pipeline was being installed at the time of the 2009 inspection and is currently operational. We recommend regular monitoring of the rate and volume of seepage in correlation with the Pond E and Clear Well levels in order to identify unusual seepage flow rates that could indicate internal piping. Piezometer and monitoring well data is discussed in Section 4.0 of this report.

5.2.6 Emergency Spillway

The spillway is an uncontrolled, unlined excavation through baked shale and weakly cemented bedrock. It is located about 200 feet north of the left abutment (Photo 12). A typical cross section of the spillway is shown on Figure 2-2. It has a bottom width of 36 feet and side slopes of 2:1, horizontal to vertical. The spillway would not be used unless Divider Dike C (see Figure 2-1) is overtopped or failed and enough water is stored in Area C (Figure 2-1) to flow into the spillway. Photo 13 is a view from the spillway crest back to Divider Dike C, looking across Area C.

There is no indication of displacement or unusual movement within the spillway channel. Erosion observed in 2009 on the spillway side slopes has been repaired and vegetation is established. The area should be monitored to determine if further erosion is taking place that requires attention. It is recommended to limit vehicle use in this area, especially during the wet season. The access road from the north side of the Main Dam forms the crest of the spillway. The downstream end of the spillway is steep (Photo 14) and the grade break between the spillway crest and the downstream area should be monitored for erosion and repaired if necessary.

6.0 CONCLUSIONS AND RECOMMENDATIONS

Based upon our review of the previous inspection reports and recent field observations, in our opinion, the Units 1 & 2 Stage II Evaporation Pond (STEP) Main Dam presently conform to the Montana Dam Safety guidelines with respect to seepage, slope stability and flood routing. No major deficiencies were identified in this inspection. Several items were identified which merit remedial action and/or monitoring. Those items lead us to provide the following recommendations:

1. Monitor seepage rate and volume from the Main Dam that is being captured by the pump-back system. Correlate readings with Cell E and Clear Well levels.
2. Fill low areas and tire ruts on the Main Dam crest near the right abutment.
3. Backfill rodent holes on the downstream slope and monitor to determine if rodents are present. Reinstate the rodent control program is rodents appear.
4. Remove sagebrush near the crest. Spray weeds evident around rodent holes and other areas.

7.0 REFERENCES

Administrative Rules of Montana (ARM), 1988. Chapter 36, Natural Resources and Conservation, Rule 14, Dam Safety. Enacted 1988.

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APPENDIX A

FIELD INSPECTION PHOTOGRAPHS

Photo 1. Units 1 & 2 STEP Main Dam, July 15, 2014.
New Cell D liner and fill on downstream side of dam.

Photo 2. Units 1 & 2 STEP Main Dam, July 15, 2014.
New Cell D liner on north side.

Photo 3. Units 1 & 2 STEP Main Dam, July 15, 2014.
Crest from right abutment.

Photo 4. Units 1 & 2 STEP Main Dam, July 15, 2014.
Downstream slope, dry, weedy patch typical around rodent holes.

Photo 5. Units 1 & 2 STEP Main Dam, July 15, 2014.
Downstream slope from right side.

Photo 6. Units 1 & 2 STEP Main Dam, July 15, 2014.
Downstream slope and toe area.

Photo 7. Units 1 & 2 STEP Main Dam, July 15, 2014.
Downstream slope and toe area.

Photo 8. Units 1 & 2 STEP Main Dam, July 15, 2014.
Rodent hole, downstream slope.

Photo 9. Units 1 & 2 STEP Main Dam, July 15, 2014.
Rodent hole, downstream slope.

Photo 10. Units 1 & 2 STEP Main Dam, July 15, 2014.
Downstream slope and left abutment.

Photo 11. Units 1 & 2 STEP Main Dam, July 15, 2014.
Downstream slope from left abutment.

Photo 12. Units 1 & 2 STEP Main Dam, July 15, 2014.
Spillway, looking downstream.

Photo 13. Units 1 & 2 STEP Main Dam, July 15, 2014.
Spillway, looking upstream.

Photo 14. Units 1 & 2 STEP Main Dam, July 15, 2014.
Spillway, looking downstream at lower end.

Photo 15. Units 1 & 2 STEP Main Dam, July 15, 2014.
Downstream slope and right abutment.

Photo 16. Units 1 & 2 STEP Main Dam, July 15, 2014.
Downstream toe, right groin area, erosion repaired.

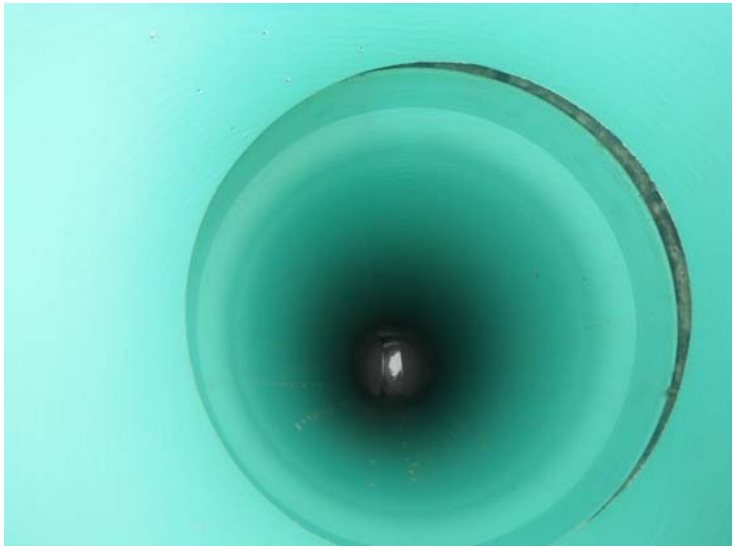

Photo 17. Units 1 & 2 STEP Main Dam, July 15, 2014.
Toe drain access hole, downstream toe.

Photo 18. Units 1 & 2 STEP Main Dam, July 15, 2014.
Downstream slope, left side.

Photo 19. Units 1 & 2 STEP Main Dam, July 15, 2014.
Downstream slope, mid-left side.

Photo 20. Units 1 & 2 STEP Main Dam, July 15, 2014.
Downstream slope, mid-right side.

Photo 21. Units 1 & 2 STEP Main Dam, July 15, 2014.
Downstream slope, right side.

Photo 22. Units 1 & 2 STEP Main Dam, July 15, 2014.
Downstream area.

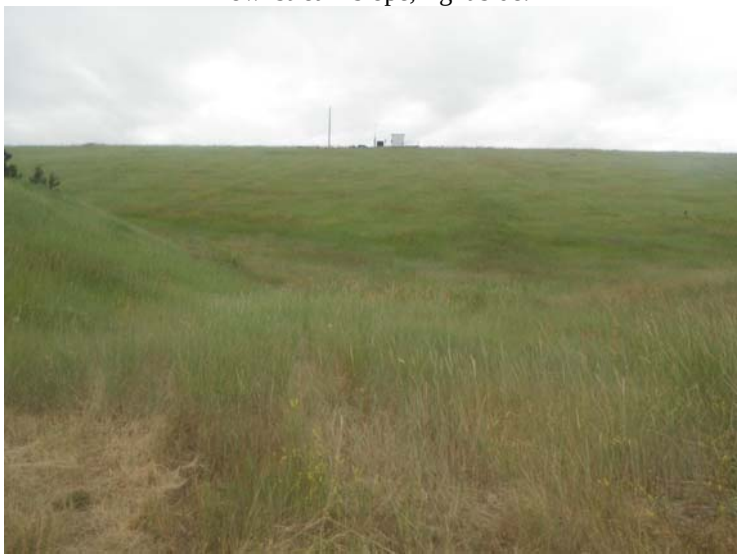

Photo 23. Units 1 & 2 STEP Main Dam, July 15, 2014.
Downstream slope.

Photo 24. Units 1 & 2 STEP Main Dam, July 15, 2014.
Rodent hole, dead grass on downstream slope.

Photo 25. Units 1 & 2 STEP Main Dam, July 15, 2014.
Downstream slope, near mid-dam.

Photo 26. Units 1 & 2 STEP Main Dam, July 15, 2014.
Rodent hole, downstream slope.

Photo 27. Units 1 & 2 STEP Main Dam, July 15, 2014.
Rodent hole, downstream slope.

APPENDIX B

FIELD INSPECTION NOTES

NAME OF DAM: Units 1 & 2 STEP Main Dam

INSPECTION DATE: 7/15/2014

EMBANKMENT
1 of 2

AREA INSPECTED	ITEM NO.	CONDITION	OBSERVATIONS	CHECK ( ) ACTION NEEDED: MONITOR	INVESTIGATE	REPAIR
CREST	1	SURFACE CRACKING	none			
	2	CAVE IN, ANIMAL BURROW	none			
	3	LOW AREA(S)	slight low areas on road	✓		
	4	HORIZONTAL ALIGNMENT	OK			
	5	RUTS AND/OR PUDDLES	some puddles in tire ruts	✓		✓
	6	VEGETATION CONDITION	bare - used as road			
	7					
	8					
UPSTREAM SLOPE	9	SLIDE, SLOUGH, SCARP	none			
	10	SLOPE PROTECTION	lined w/ HDPE liner			
	11	SINKHOLE, ANIMAL BURROW	none			
	12	EMB.-ABUT. CONTACT	OK			
	13	EROSION	none			
	14	VEGETATION CONDITION	N/A - some grass/weeds near crest but OK cond.			
	15					
	16					

ADDITIONAL COMMENTS: REFER TO ITEM NO. IF APPLICABLE.

NAME OF DAM: Units 1 & 2 STEP Main Dam

INSPECTION DATE: 7/15/2014

EMBANKMENT
2 of 2

AREA INSPECTED	ITEM NO.	CONDITION	OBSERVATION	CHECK ( ) ACTION NEEDED: MONITOR	INVESTIGATE	REPAIR
DOWNSTREAM SLOPE	17	WET AREA(S) (NO FLOW)	none			
	18	SEEPAGE	none			
	19	SLIDE, SLOUGH, SCARP	none			
	20	EMB.-ABUT. CONTACT	OK - erosion that was in toe abutment has been repaired			
	21	CAVE IN, ANIMAL BURROW	rodent holes on slope - needs repair		✓	✓
	22	EROSION	none except for some erosion rills at right			
	23	UNUSUAL MOVEMENT	none			
	24	VEGETATION CONTROL	OK - patches of dry/weedy areas around rodent holes;			✓
	25					
	26					
INSTRUMENTATION	27	PIEZOMETERS/OBSERV. WELLS	read by PPL or Womack			
	28	STAFF GAUGE AND RECORDER	pond levels read by PPL or contractor			
	29	WEIRS	NA			
	30	SURVEY MONUMENTS	↓			
	31	DRAINS	very low flows			
	32	FREQUENCY OF READINGS	monthly or quarterly			
	33	LOCATION OF RECORDS	PPL offices			
	34					
	35					

ADDITIONAL COMMENTS: REFER TO ITEM NO. IF APPLICABLE.

24. Some sagebrush near the crest mid-dam
22. abutment near new fill.

NAME OF DAM: Units 1&2 STEP Main Dam INSPECTION DATE: 7/15/2014

OUTLET WORKS
1 of 1

AREA INSPECTED	ITEM NO.	CONDITION	OBSERVATIONS	CHECK ( ) ACTION NEEDED: MONITOR	INVESTI-GATE	REPAIR
OUTLET WORKS	70	INTAKE STRUCTURE	NA			
	71	TRASHRACK	↓			
	72	STILLING BASIN	↓			
	73	PRIMARY CLOSURE	↓			
	74	SECONDARY CLOSURE	↓			
	75	CONTROL MECHANISM	↓			
	76	OUTLET PIPE	Closed pipe that flows return water to plant - not inspected			
	77	OUTLET TOWER	NA			
	78	EROSION ALONG DAM TOE	↓			
	79	SEEPAGE	↓			
	80	UNUSUAL MOVEMENT	↓			
	81					
	82					
	83					

ADDITIONAL COMMENTS: REFER TO ITEM NO. IF APPLICABLE.

NAME OF DAM: Units 1 & 2 STEP Main Dam

INSPECTION DATE: 7/15/2014

SPILLWAYS

1 of 1

AREA INSPECTED	ITEM NO.	CONDITION	OBSERVATIONS	CHECK ( ) ACTION NEEDED: MONITOR	INVESTI-GATE	REPAIR
ERODIBLE CHANNEL	51	SLIDE, SLOUGH, SCARP	NA			
	52	EROSION				
	53	VEGETATION CONDITION				
	54	DEBRIS				
	55					
	56					
NON-ERODIBLE CHANNEL	57	SIDEWALLS				
	58	CHANNEL FLOOR				
	59	UNUSUAL MOVEMENT				
	60	APPROACH AREA				
	61	WEIR OR CONTROL				
	62	DISCHARGE AREA				
	63					
	64					
DROP INLET	65	INTAKE STRUCTURE				
	66	TRASHRACK				
	67	STILLING BASIN				
	68					
	69					

ADDITIONAL COMMENTS: REFER TO ITEM NO. IF APPLICABLE.

NAME OF DAM: Units 1 & 2 STEP Main Dam

INSPECTION DATE: 7/15/2014

DOWNSTREAM AREA AND MISC.

1 of 1

AREA INSPECTED	ITEM NO.	CONDITION	OBSERVATIONS	CHECK ( ) ACTION NEEDED: MONITOR	INVESTIGATE	REPAIR
DOWNSTREAM AREA	36	ABUTMENT LEAKAGE	none			
	37	FOUNDATION SEEPAGE	none			
	38	SLIDE, SLOUGH, SCARP	none			
	39	DRAINAGE SYSTEM	in place - little flow			
	40					
	41					
	42	DOWNSTREAM HAZARD DESCRIPTION	see latest EAP			
	43	DATE OF LAST UPDATE OF EMERGENCY ACTION PLAN	2013			
MISCELLANEOUS	44	RESERVOIR SLOPES	OK			
	45	ACCESS ROADS	locked gate at night			
	46	SECURITY DEVICES	gate - locked			
	47					
	48					
	49					
	50					

ADDITIONAL COMMENTS: REFER TO ITEM NO. IF APPLICABLE.