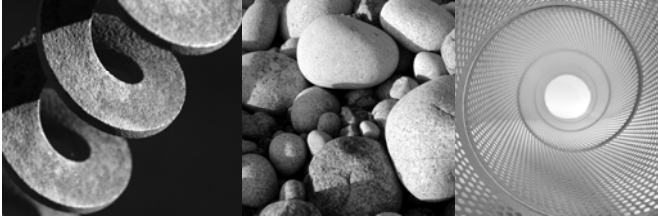


US EPA ARCHIVE DOCUMENT



Geotechnical
Environmental and
Water Resources
Engineering

Comments On:
**Coal Ash Impoundment –
Specific Site Assessment
Report**

PPL Montana, Colstrip Power Plant

- Units 1 & 2 Bottom Ash Ponds
- Units 1 & 2 “A” Fly Ash Pond
- Units 1 & 2 Stage Two Evaporation Pond (STEP)
- Units 3 & 4 Effluent Holding Ponds

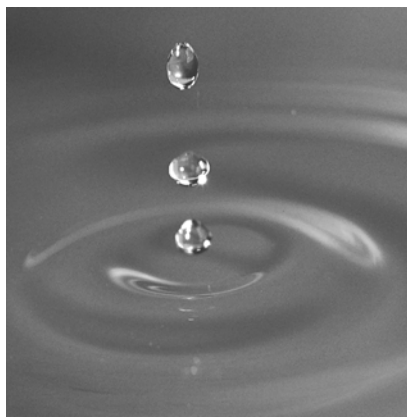
Submitted to:

Lockheed-Martin Corporation
2890 Wood Bridge Avenue
Building 209 BAYF
Edison, NJ 08837

Submitted by:

GEI Consultants, Inc.
6950 South Potomac Street, Suite 300
Centennial, CO 80112

July 2009
Project 091330



Stephen G. Brown, P.E.
Senior Project Manager

EPA's Comments

From: "Killeen, Deborah A" <deborah.a.killeen@lmco.com>
To: "Stephen G. Brown" <sbrown@geiconsultants.com>
CC: "Miller, Dennis A" <dennis.a.miller@lmco.com>, <Hoffman.Stephen@epamail...>
Date: 7/10/2009 12:29 PM
Subject: FW: Comments on GEI's Draft Assessment Report for: PPL Montana, Colstrip Power Plant Impoundments

Steve,

Here are EPA's comments on GEI's Draft Assessment Report for: PPL Montana, Colstrip Power Plant Impoundments:

- 1) "Exhibit 6" (referenced on Page 6) is not present in the "Figures" tab. Also: Exhibits 6 - 8 referenced on Page iv of the Table of Contents are not present either.
- 2) Page 11: Mistaken reference to "Jeffrey Energy Center" in 4th paragraph?
- 3) Should Photo 1 caption read "West Cell" instead of "East Cell" per page 16?
- 4) EPA Checklists in Appendix B for Units 1 & 2 "A" Pond and Units 1 & 2 STEP are only partially visible.

These comments are to be incorporated into the draft final report. Please follow the instructions outlined in my e-mail of 7/10/09 titled "Draft Final Report Instructions for Task 3". Thank you in advance for your prompt attention to this request.

Deborah A Killeen
Quality Assurance Officer
Lockheed Martin/REAC
732-321-4245 (office)
609-865-9308 (cell)
732-494-4021 (fax)

State's Comments

From: "Miller, Dennis A" <dennis.a.miller@lmco.com>
To: "Stephen G. Brown" <sbrown@geiconsultants.com>, "Killeen, Deborah A" <de...>
CC: "Hoffman.Stephen@epa.gov" <Hoffman.Stephen@epa.gov>, "Kohler.James@epama...>
Date: 8/27/2009 9:42 AM
Subject: FW: State Comments on PPL Montana Colstrip ash pond report

Steve: Please review the State comments for the draft PPL Colstrip, MT CCW impoundment assessment report and make the appropriate revisions.

-----Original Message-----

From: Kohler.James@epamail.epa.gov [mailto:Kohler.James@epamail.epa.gov]
Sent: Thursday, August 27, 2009 11:30 AM
To: Miller, Dennis A; Killeen, Deborah A
Cc: Hoffman.Stephen@epamail.epa.gov
Subject: State Comments on PPL Montana Colstrip ash pond report

Dear Dennis and Deb:

See state comments below. The last two comments/paragraphs have already been addressed. The report should be modified to clarify the various regulatory bodies and authority as discussed in the first comment. Please let me know if you have any questions about these directions-

Jim

Jim Kohler, P.E.
Environmental Engineer
LT, U.S. Public Health Service
U.S. Environmental Protection Agency
Office of Resource Conservation and Recovery
Phone: 703-347-8953
Fax: 703-308-8433

----- Forwarded by James Kohler/DC/USEPA/US on 08/27/2009 10:48 AM -----

|----->
| From: |
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>-----|
| "Lemieux, Michele" <mlemieux@mt.gov>
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| To: |
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>-----|
| James Kohler/DC/USEPA/US@EPA
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| Cc: |
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| "Siroky, Laurence" <lsiroky@mt.gov>
|

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| Date: |
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| 08/27/2009 10:37 AM
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| Subject: |
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| Colstrip ash pond report
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>-----|

Hi James,

I reviewed the draft assessment report completed by GEI on the Colstrip ash pond embankments. I only had time to look over the report roughly, and did not get into it in sufficient detail to comment with any depth on the analyses that were completed. I do have the following general comments:

The report is unclear regarding regulatory authority. USACE criteria is referenced for the Inflow design storm, the State of Montana Dam Safety Act is referenced for requiring Emergency Action Planning, FERC requirements are referenced for stability safety factors, EPA definitions for hazard determination. On Page 34, there is a brief notation that the dams at the Colstrip facility are not regulated under the Montana Dam Safety Act, but it would be worth having a section on regulatory authority somewhere in the introduction. Hazard classification needs to be part of this discussion - most of the dams are not high hazard, which has some bearing on the regulations and why the DEQ Major facilities Siting act personnel were not pushing compliance with the Montana Dam Safety Regulations. Note that PPL has voluntarily agreed to try and follow MT Dam Safety Regulations.

The assignment of an assessment condition of "poor" seems a bit harsh. I realize the need for additional data is the reason for

the assignment and the report details what additional investigation is necessary. However, I think the blanket assignment of "poor" will create some problems for PPL and the Dept of Environmental Quality regulators that is not warranted. Perhaps break down the assessment per unit? Or elaborate on reasons for the assessment assignment. We have had problems in the past when several of the state owned dams were deemed "unsafe" as they didn't pass the PMF (even though they came close). The media gets a hold of these words and causes problems.

I assume the owner (PPL) has had the opportunity to review this inspection report and provide feedback and comment? In our administrative rules, the owner has the opportunity to review and comment on all inspection reports before they are finalized.

Sorry about the delay in getting you these comments. Please call if you have any questions.

Kind Regards,

Michele

Michele Lemieux, P.E.
Montana Dam Safety Program Manager
(406) 444-6613

From: "Killeen, Deborah A" <deborah.a.killeen@lmco.com>
To: "Stephen G. Brown" <sbrown@geiconsultants.com>
CC: <Hoffman.Stephen@epamail.epa.gov>, <Kohler.James@epamail.epa.gov>, "Mill...
Date: 8/13/2009 3:05 PM
Subject: FW: Minor State Comment on Montana PPL Draft Report

Stephen,

See the comment from the State below on the PPL Montana, Colstrip draft final report.

Deborah A Killeen
Quality Assurance Officer
Lockheed Martin/REAC
732-321-4245 (office)
609-865-9308 (cell)
732-494-4021 (fax)

-----Original Message-----

From: Kohler.James@epamail.epa.gov [mailto:Kohler.James@epamail.epa.gov]

Sent: Thursday, August 13, 2009 11:48 AM
To: Miller, Dennis A; Killeen, Deborah A
Cc: Hoffman.Stephen@epamail.epa.gov
Subject: Minor State Comment on Montana PPL Draft Report

Dennis/Deb:

Minor comment from state on Montana PPL Report

(1) Please change "Montana Department of Environmental Protection" to "Montana Department of Environmental Quality."

Please make this correction.

Jim Kohler, P.E.
Environmental Engineer
LT, U.S. Public Health Service
U.S. Environmental Protection Agency
Office of Resource Conservation and Recovery
Phone: 703-347-8953
Fax: 703-308-8433

PPL Montana's Comments

PPL Comments to DRAFT FINAL Version 1.0 Coal Ash Impoundment Report dated August 2009 for PPL Montana's Colstrip Plant and issued by GEI for EPA

PPL provided a redlined version of the August 2009 Draft Final report on September 11, 2009 to GEI and EPA. Below are additional comments which PPL believes are necessary for the Draft Final Report to accurately reflect the condition of the dams at its Colstrip facility.

Page 18, Section 5.3.4 Units 3&4 EHP Saddle Dam

Paragraph 1 indicates that "[l]ocations and inclinometer results were not provided." These data are available in a report that was present during the site inspection. The inclinometer data indicate no movement since 2006 and very minor deflection of 1/2-inch or less during the period 2000 to 2006.

Page 25, Section 6.7.1 Settlement

This section discusses settlement in the Saddle Dam. It should be noted that inclinometers have indicated no movement since 2006.

Page 25, Section 6.7.2 Movement

This section also mentions movement of the Saddle Dam, and the same comment applies here as for 6.7.1. Inclinometers indicate no movement since 2006, and very minor deflection between 2000 and 2006.

Page 45, Section 12.1.1 Recommendations - Units 1 & 2 Bottom Ash Pond Embankments

1. PPL will perform a slope stability analyses for these embankments based on site-specific information by the end of 2009.
2. PPL will modify the 24-inch HDPE carrier pipe in the southwest corner of the west cell by the end of 2009.
3. PPL has removed and backfilled the out-of-service culvert box on the east cell and backfill with engineered fill.
4. PPL's contractor Ecolab had implemented rodent controls in May 2009 prior to the EPA inspection, and Ecolab will implement follow-up controls by end of 2009.
5. PPL has placed engineered fill and regrade the downstream toe of the embankment.
6. PPL has carefully removed and backfilled the out-of-service manhole at the downstream toe of the northwest corner of the west cell.
7. PPL has designed and will install piezometers to monitor water pressures in the embankment and foundation by the end of 2009. PPL will collect and evaluate data at least twice per year.

Page 45, Section 12.1.2 Recommendations - Units 1 & 2 "A" Pond Embankments

1. PPL will perform a slope stability analyses for these embankments based on site-specific information by the end of 2009.
2. PPL's contractor Ecolab had implemented rodent controls in May 2009 prior to the EPA inspection, and Ecolab will implement follow-up controls by end of 2009.
3. PPL has filled and regraded the oversteepened areas at the downstream toe of the embankment.
4. PPL has designed and will install piezometers to monitor water pressures in the embankment and foundation by the end of 2009. PPL will collect and evaluate data at least twice per year.

Page 46, Section 12.1.3 Recommendations - Units 1 & 2 STEP Dam

1. PPL has corrected the low area of the dam crest at the right abutment by placing engineered fill.
2. PPL has repaired the erosion on the upstream slope near the right groin, corrected surface water run-on to eliminate the water source for future erosion, and repaired the minor surface erosion on the upstream and downstream slopes of the STEP Dam.
3. PPL has designed and will install piezometers to monitor water pressures in the embankment and foundation by the end of 2009. PPL will collect and evaluate data at least twice per year.

Page 46, Section 12.1.4 Recommendations - Units 3 & 4 EHP Main Dam

1. PPL has designed and will install additional instrumentation in the dam and sandstone layer in the dam abutments by the end of 2009. PPL will collect and evaluate data at least twice per year.
2. PPL will perform the recommended seepage and stability analyses by the end of 2009.
3. PPL will continue to monitor water levels in the dam and abutments and the associated seep that surfaces downstream of the Main Dam and the 1999 seep area downstream of the Saddle Dam.
4. PPL will evaluate and document whether the small saddle fill located about 500 feet left of the left abutment functions as part of the Main Dam. This will be completed as part of the analyses and design for raising the dams and this will be implemented in 2010.
5. PPL's contractor Ecolab had implemented rodent controls in May 2009 prior to the EPA inspection, and Ecolab will implement follow-up controls by end of 2009.
6. PPL has and will continue to monitor and repair minor surface erosion rills on the downstream slope of the Main Dam.

7. PPL will maintain the free water level restriction in the Old Clearwell at a maximum of El. 3238 unless the analyses completed in recommendations 1 or 2 indicate otherwise.

Page 47, Section 12.1.5 Recommendations - Units 3 & 4 EHP Saddle Dam

1. PPL has maintained the water level restriction in Cell G since December 1999 and will continue that restriction. The engineering analysis for storing paste in this cell will be completed by the end of 2009.
2. PPL has backfilled the test pit located on the downstream slope of the dam after repairing the damaged toe drain pipe and restoring the granular drain materials.
3. PPL will continue to monitor and repair minor surface erosion rills on the downstream slope of the Saddle Dam.
4. As indicated in 1, above, PPL has since December 1999 and will continue to maintain the free water level restriction in the "G" cell at a maximum of El. 3237.
5. PPL will evaluate by the end of 2009 the high water level readings in two Saddle Dam piezometers that indicate minimal head loss between the reservoir and the piezometers.

Once PPL has completed the actions described above, it will contact EPA to discuss whether an upward adjustment to its assessment rating is appropriate.



*Comments Received from PPL Montana
Sept. 11, 2009 on:*

**Geotechnical
Environmental and
Water Resources
Engineering**

**DRAFT FINAL Version 1.0
Coal Ash Impoundment –
Specific Site Assessment
Report**

PPL Montana, Colstrip Power Plant

- **Units 1 & 2 Bottom Ash Ponds**
- **Units 1 & 2 Pond “A”**
- **Units 1 & 2 Stage Two Evaporation Pond (STEP)**
- **Units 3 & 4 Effluent Holding Ponds**

Submitted to:
Lockheed-Martin Corporation
2890 Wood Bridge Avenue
Building 209 BAYF
Edison, NJ 08837

Submitted by:
GEI Consultants, Inc.
6950 South Potomac Street, Suite 300
Centennial, CO 80112

August 2009
Project 091330



Stephen G. Brown, P.E.
Senior Project Manager

of life in the event of a dam breach because of the close proximity of residences within the flood inundation area. The Units 3 & 4 EHP was classified as Low Hazard based on an inundation study (Maxim, 2005). However, GEI recommends the EHP be reclassified as Significant Hazard based on the likelihood of significant economic/environmental cost associated with a dam breach. As a result, the Units 3 & 4 EHP was included in the specific site assessment. An overall view of all onsite and offsite ponds is shown on the aerial photograph (Figure 2).

2.2 Dams and Reservoirs

The Colstrip plant includes several large coal combustion waste dams at the two off-site impoundments, as well as smaller embankments associated with the on-site ponds. The dams included in this report are:

- Units 1 & 2 Bottom Ash Ponds – west, north and east embankments
- Units 1 & 2 Pond “A” – west embankment
- Units 1 & 2 STEP Dam
- Units 3 & 4 EHP
 - Main Dam
 - Saddle Dam

The Units 1 & 2 Bottom Ash Ponds and the Units 1 & 2 Pond “A” are surrounded by a continuous embankment. This earth embankment extends along the west side of Pond “A”, and continues north to bound the west, north and east sides of the Bottom Ash Ponds. The configuration of these on-site impoundments is shown in (Figure 3). The embankment has a maximum height of approximately 25 feet, with a 20-foot-wide crest and approximately 2H:1V side slopes. The total length of the embankment is about 4000 feet. Cross-sections of the Bottom Ash Ponds and Pond “A” are shown in Exhibit 1.

The Units 1 & 2 Bottom Ash Ponds are divided into two cells. The east cell stores bottom ash and boiler slag at various stages of clarification, and the water remaining after the ash settles out is transferred to the west clearwell cell. These ponds have a surface area of about 7 acres and a total storage capacity of about 73 acre-feet. The clearwell cell is double-lined with 45 millimeter (mm) reinforced polypropylene (RFP) liners and a leachate collection system. The east cell is clay-lined.

The Units 1 & 2 Pond “A” is currently used to store clean water from stormwater runoff, though the southern portion of the pond contains a small quantity of fly ash/FGD solids on the bottom covered by a geosynthetic clay liner (GCL) and bottom ash. Prior to 2005, Pond “A” was the western portion of a U-shaped pond that also included the “B” fly ash pond to

Comment [s1]: Colstrip does not separately collect fly ash. This material is a combination of fly ash and SO₂ scrubber slurry. Suggest that this is described as fly ash/FGD slurry or solids.

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Field Code Changed

the east. A bottom ash dike was constructed in 2005 to separate the ponds. At this time, an RFP liner was installed in the “B” pond to prepare it for continued fly ash/FGD storage, while the “A” pond remained clay-lined for the purpose of storm water storage. The “A” pond has a surface area of about 14 acres and a storage capacity of about 245 acre-feet.

The Units 1 & 2 STEP has a total surface area of 176 acres and a total storage capacity of about 4370 acre-feet at the normal operating pool of El. 3270. The pond is divided into five cells as shown in the plan on Figure 4. Three of the cells are currently in use. All cells have single high density polyethylene (HDPE) liners with the exception of Cell “B”, which has a double, 45 mil reinforced polyethylene (RFP) liner with leak detection and leachate collection systems. The STEP currently, and in the past, stores fly ash and flue gas desulphurization (FGD) solids. The coal combustion waste is pumped into the pond as a slurry, and the water is decanted and pumped back to the Colstrip plant for reuse. The remaining fly ash/FGD slurry solidifies as evaporation occurs.

The Units 1 & 2 STEP Dam was constructed in 1992 and is 2400 feet long with a maximum height of 88 feet, a 25-foot-wide crest and 3H:1V side slopes. The dam crest is at El. 3278, providing 8 feet of freeboard above the normal pool elevation. The dam is constructed of earth fill and has a zoned cross section with a central core extending to bedrock in a core trench. The dam also features a grout curtain extending up to 80 feet below the core trench for seepage control. An upstream low-permeability soil blanket was constructed on the left abutment area to reduce potential seepage. A chimney drain, blanket drain and toe drain collect and control seepage that moves through the dam. A valley drain system collects surface water, groundwater, and potential seepage and returns it to the ponds. The STEP Dam is located about 3000 feet downstream of the Stage One Evaporation Pond and its associated dam, which was completed in 1977 and has been completely filled with coal combustion waste. The area has since been reclaimed and is currently used as pasture land. A plan and profile of the STEP Dam is shown in Exhibit 2, and typical sections are shown in Exhibit 3.

The Units 3 & 4 EHP has a planned total surface area of 367 acres and a storage capacity of about 17,000 acre-feet at the normal operating pool of El. 3280. The pond is divided into eight cells storing plant coal combustion waste including fly ash, bottom ash, boiler slag, flue gas desulfurization (FGD) residuals, mill residuals, and boiler water-side cleaning chemicals. The general plan for the Units 3 & 4 EHP is shown in Figure 5. Since ~~1988,2004~~, the fly ash/FGD slurry stored in the Units 3 & 4 EHP is mostly deposited in a concentrated form, termed “paste”, which has 68 percent solids, and is made by an on-site paste plant. Prior to construction of the paste plant, the fly ash/FGD was deposited in a traditional slurry form that has about 10 to 15 percent solids. Cells “B” and “F” have a lining with a leachate collection system. PPL describes the Areas “B” and “F” lining as being double-contained with a 45 mil

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2.8 Standard Operational Procedures

The Colstrip facility is a coal-fired steam generating power plant that provides electric power to millions of customers. The power plant includes two 307 MW units (1 & 2) and two 740 MW units (3 & 4), with a total generating capacity of 2,094 MW. Coal is delivered to the power plant by conveyor systems, where it is then combusted to power the steam turbines. The burning of coal produces several gases which are vented from the boiler, and bottom ash, which is made of coarse fragments, falls to the bottom of the boiler, and is removed along with boiler slag.

The bottom ash ~~and fly ash~~ from Units 1 and 2 are pumped as slurries to the on-site ponds just south of the plant. The fly ash/FGD slurry from steam generation Units 1 & 2 is slurried and pumped directly to the Stage 2 pond northwest of the plant where it is either deposited as slurry or will soon be concentrated at the paste plant and deposited as a paste material.

Partial settling of particulates occurs in these ponds and the remaining clearwater is returned to the plant. Some of the bottom ash is reclaimed from the on-site ponds and used for construction of roads and dikes on site. According to PPL, approximately 20,000 tons of bottom ash per year is sold for commercial off-site use. The remaining ~~fly-bottom~~ ash is pumped-trucked to the Units ~~1 & 2 STEP Pond~~3&4 EHP northwest-southeast of the site for final ~~settlement and~~ storage.

The bottom ash from steam generation Units 3 & 4 is pumped to the on-site bottom ash ponds that are located east of the plant for temporary storage, and ultimately trucked to the Units 3 & 4 EHP to the southeast of the plant for final ~~settlement and~~ storage. The fly ash/FGD slurry from steam generation Units 3 & 4 is slurried and pumped directly to the Units 3 & 4 EHP where it is either deposited as slurry or concentrated at the paste plant and deposited as a paste material.

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3.0 Summary of Construction History and Operation

The power plant is composed of four units with a total generating capacity of 2,094 MW. Units 1 and 2 began operation in 1975 and 1976 and have capacities of 307 MW each. Units 3 and 4 began operating in 1984 and 1986 and have capacities of 740 MW each.

The on-site ponds, including the Units 1 & 2 Bottom Ash Ponds and Pond "A", were designed and constructed at the same time as the coal-fired steam-generation Units 1 & 2 were constructed, in the mid-1970s. Original design and construction reports for these ponds and their embankments are not available. Based on the construction timing, coal combustion waste materials had not yet been produced and the Units 1 & 2 Bottom Ash Ponds and Pond "A" embankments could not have been constructed on coal combustion waste materials. Evidence of prior releases, failures or patchwork construction were not observed during the site visit or disclosed by plant personnel during the site visit. Construction reports were not available for review.

In 2005, the "A" pond was divided by completing constructing of the existing partial dike to form an adjacent "B" pond to the east. The dike was designed by HKM Engineers, and its design and construction is documented in the design report (HKM, 2005). Historically, the Units 1 & 2 "A" pond was used to store fly ash/FGD slurry, with slurry from the plant entering the hydraulically connected "B" pond at the northeast corner. The water flowed south through the "B" pond to flow around the partial dividing dike and then flow north through the "A" pond as the fly ash/FGD solids settled out, depositing some fly ash/FGD solids at the southern end of the "A" pond but the north end relatively clear. When the ponds were separated by the dividing dike in 2005, the fly ash/FGD solids at the bottom of the southern end of the "A" pond was covered with a GCL and compacted bottom ash for permanent storage. The "A" pond is currently used for stormwater storage.

The Units 1 & 2 STEP Dam was designed and constructed by Bechtel Engineering in the late 1970s to early 1980s. The embankment is zoned earth fill, with a silt and clay core extending into the sandstone and siltstone bedrock, and a shell consisting of weathered sandstone, siltstone, shale and non-plastic silt. The STEP is located downstream of the Stage One Evaporation Pond (SOEP), which was completely filled with coal combustion waste and reclaimed in the early 1980s.

Our assessment of the pre-construction conditions at the STEP Dam included review of information on the design drawings. The SOEP was constructed at the same time as the

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Colstrip Power Plant in the mid-1970's. The SOEP was receiving coal combustion waste at the time the STEP was being constructed downstream a few years later. The STEP embankment was constructed on undisturbed land. Foundation preparation for the STEP included removal of a minimum of 1 foot soil depth beneath the entire dam and construction of a key trench through the native soil and into the underlying bedrock. In addition, boreholes drilled prior to construction do not indicate the presence of coal combustion waste materials within the dam alignments. Evidence of prior releases, failures or patchwork construction were not observed during the site visit or disclosed by plant personnel during the site visit. Construction reports were not available for review.

A paste plant is being constructed at the STEP, with expected completion in 2009.

Following completion of the paste plant, the plan is to dispose of all fly ash/FGD slurry- as paste in the STEP.

The Units 3 & 4 EHP Main Dam and Saddle Dam were designed and constructed by Bechtel Engineering in the early- to mid-1980s. The embankments are zoned earth fill, with low- to medium plasticity silt and clay cores and shells consisting of weathered sandstone, siltstone, shale and non-plastic silt.

Our assessment of the pre-construction conditions at the Units 3 & 4 EHP Main and Saddle Dams included review of information on the design drawings. The Units 3 & 4 EHP dams were constructed on undisturbed land. Boreholes drilled prior to construction do not indicate the presence of coal combustion waste materials within the dam alignments. The design drawings show the dams are to be constructed on native soil/rock materials and that foundation preparation requirements include removal of at least the upper 1 foot of soil beneath the entire dam prior to constructing the dams. Foundation preparation also included construction of a key trench through the native soil and into the underlying bedrock. With exception of the 1999 seepage event through the Saddle Dam, which has been addressed administratively by restricting the water level in the pond, evidence of prior releases, failures or patchwork construction were not observed during the site visit or disclosed by plant personnel during the site visit. Construction reports were not available for review.

The EHP Main and Saddle Dams currently have crests at El. 3262, but plans include raising the dams 28 feet to the final design height at El. 3290 and constructing an emergency spillway. A paste plant was constructed at the EHP in 2008-2004 and currently fly ash and FGD is disposed of as paste in the EHP cells. Occasional disposal of fly ash and FGD slurry may occur if the paste plant is out of service for maintenance.

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6.0 Field Assessment

6.1 General

Site visits to assess the condition of the Units 1 & 2 Bottom Ash Ponds, Pond "A", and STEP, and the Units 3 & 4 EHP at the Colstrip Power Plant were performed on June 2 and 3, 2009 by Stephen G. Brown, P.E., and Mary C. Nodine, P.E., of GEI. Joe Byron of the Environmental Protection Agency, Gordon Criswell and Mike Holzwarth of PPL Montana and Ray Womack, P.E. of Womack Associates (Geotechnical consultant for PPL Montana) assisted in the assessment. Also present was Iver Johnson of the Montana Department of Environmental Quality.

The weather during the site visits was generally overcast with occasional light rain, with the temperatures around 50-60 degrees Fahrenheit. The ground surface was dry on the first day of the inspections (June 2). Rain occurred overnight prior to the second day (June 3) causing the ground surface to be moist.

Field observations are organized as follows:

- Units 1 & 2 Bottom Ash Ponds – west, north and east embankments
- Units 1 & 2 Pond "A" – west embankment
- Units 1 & 2 STEP Dam
- Units 3 & 4 EHP
 - Main Dam
 - Saddle Dam

A checklist is provided in Appendix B and photographs are provided in Appendix C. Sections 6.2 through 6.5 describe observations made during the assessment relative to key project features. Section 6.6 presents specific observations.

6.2 Units 1 & 2 Bottom Ash Ponds

Field assessment of the Units 1 & 2 Bottom Ash Ponds included walking the embankment crest, upstream slope and downstream slope. We saw no obvious signs of settlement or displacement, but one instance of seepage that should be remedied in order to improve the safety of the impoundment. [A general photos](#) of the Units 1 & 2 Bottom Ash Ponds are shown in Photos 1 (west cell) and 2 (east cell).

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6.7.8 Geologic Conditions

The geology of the project features is as described in the prior reports. There have been no studies or events (landslide, earthquake, etc.) that would result in changes to the description of local geologic conditions.

6.7.9 Foundation Deterioration

No signs of foundation deterioration were observed with exception of the EHP Saddle Dam, which was damaged by the 1999 seepage event and has not been repaired.

6.7.10 Condition of Spillway and Outlet Works

The emergency spillway at the Units 1 & 2 STEP Dam appeared to be in good condition. No flows or releases have occurred through the spillway.

6.7.11 Reservoir Rim Stability

The reservoir rims visible from the dam crests did not show any evidence of landslides or shoreline instability that would threaten the safety of the dams.

6.7.12 Uplift Pressures on Structures, Foundations, and Abutments

No evidence of uplift pressure issues was observed with exception of the EHP Main Dam, which has high water levels in the dam abutment rock. These high water levels contribute to seepage through the sandstone that emerges downstream of the dam (the "552 Seep"). The high water levels are monitored and are controlled by pumping wells in the abutments to reduce the potential seepage flow.

6.7.13 Other Significant Conditions

None.

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9.0 Adequacy of Maintenance and Methods of Operation

9.1 Procedures

There are no written Standard Operating Procedures for the Colstrip impoundments. The operations of the impoundments are largely determined by the water recycle needs of the power plant.

Bottom ash from steam generation Units 1 and 2 is pumped as a slurry to the on-site ponds just south of the plant. Partial settling of particulates occurs in these ponds and the remaining clearwater is returned to the plant. A substantial amount of the bottom ash is reclaimed from the on-site ponds and used for construction of plant facilities including roads and dikes or is sold commercially. The fly ash and FGD is pumped as a slurry to the Units 1 & 2 STEP for final settlement and storage. A new paste plant located at the STEP will process the fly ash/FGD slurry beginning in 2010.

The bottom ash from steam generation Units 3 & 4 is transported to the on-site bottom ash ponds to the east of the plant for temporary storage, and then to the Units 3 & 4 EHP for final settlement and permanent storage. The fly ash/FGD slurry from Units 3 & 4 is pumped directly to the Units 3 & 4 EHP paste plant, where it is thickened and deposited as paste.

9.2 Maintenance of Dams

Maintenance of the dams and embankments at the Colstrip facility is performed or subcontracted by PPL Montana staff. Inspections are made annually by PPL engineers and approximately every five years by outside consulting engineers.

9.3 Surveillance

PPL Montana staff is responsible for the surveillance of the dams and appurtenant facilities. Monitoring of the dams instrumentation currently occurs monthly. The main power plant is manned 24 hours a day and operators can respond to potential emergency situation at the dams. There are no automatic warning systems for the dams.

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Field Code Changed