

Coal Combustion Residual Surface Impoundment Annual Inspection

**Basin Electric Power Cooperative
Laramie River Station**

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Background and Purpose

Laramie River Station (LRS) is owned by Missouri Basin Power Project (MBPP) and operated by Basin Electric Power Cooperative (Basin Electric). LRS consists of three 570 megawatt (MW) units located approximately five miles northeast of Wheatland in Platte County, Wyoming. Unit 1 went online in 1980, Unit 2 went online in 1981, and Unit 3 went online in 1982. The operation of the three coal-fired boilers results in the production of Coal Combustion Residuals (CCRs). CCRs generated at LRS and thus regulated under 40 CFR Part 257 (CCR Rule) include bottom ash, flue gas desulfurization (FGD) materials and fly ash.

The Bottom Ash Pond complex is comprised of three cells (1, 2, and 3) and the Emergency Holding Pond complex is comprised of two cells (East and West). For the purposes of this report, the CCR surface impoundments at LRS will be referred to as Bottom Ash Pond 1, Bottom Ash Pond 2, Bottom Ash Pond 3, East Emergency Holding Pond and West Emergency Holding Pond.

Bottom Ash Pond 3 contains bottom ash and boiler slag whereas Bottom Ash Ponds 1 and 2 contain mostly decanted water. The bottom ash and boiler slag are sluiced into Bottom Ash Pond 3; water from Bottom Ash Pond 3 is then decanted into Bottom Ash Ponds 1 and 2. FGD material and spent water treatment plant lime slurry are sluiced into the West Emergency Holding Pond. Water from the West Emergency Holding Pond is then decanted into the East Emergency Holding Pond.

In accordance with 40 CFR § 257.83(b), the purpose of this document is to fulfill the requirement for an Annual Inspection Report prepared by a Qualified Professional Engineer (QPE) to ensure the design, construction, operation, and maintenance of the Basin Electric LRS surface impoundments are consistent with recognized and generally accepted good engineering standards.

Records Review

Existing information regarding the status and condition of the LRS surface impoundments was reviewed as part of the QPE annual inspection effort. The evaluation included reviews of the facility CCR Rule operating record, files associated with previous state permitting, and past

inspection reports. No indications of structural instability have been observed to date for any of the CCR units at LRS. The results from structural stability and factors of safety assessments for each of the CCR surface impoundments at LRS are presented in documents prepared by Basin Electric's third-party engineer (AECOM) and are included in the operating record. The documents demonstrate the LRS surface impoundments meet the requirements set forth in 40 CFR § 257.73(d).

Bottom Ash Ponds 1 and 2 have surface areas of approximately 15.5 and 30.9 acres, respectively, and are separated by a north-south oriented divider dike. The crests of the impoundment dikes for Bottom Ash Ponds 1 and 2 are at elevation +4565 feet and the toe is at elevation +4540 feet, resulting in an approximate 25-foot structural height. Bottom Ash Pond 3 is located directly south of Bottom Ash Ponds 1 and 2 and has a surface area of approximately 59.9 acres. The crest of the impoundment dike for Bottom Ash Pond 3 is at elevation +4590 feet and the toe is at elevation +4565 feet. The maximum height of the Bottom Ash 3 impoundment dikes is 50 feet, as measured from the crest of the north dike to the toe of the adjacent south dike for Bottom Ash Ponds 1 and 2. The total storage of Bottom Ash Ponds 1, 2 and 3 is approximately 2,100 acre-feet. The interior (i.e., pond side) and exterior (i.e., land side) slopes of the Bottom Ash Pond impoundment dikes were constructed at an approximately 3 Horizontal to 1 Vertical (3H:1V) inclination.

The five CCR impoundments were constructed about 1980 during original construction of LRS. The impoundment dikes were largely constructed by excavating out the impoundment basins and placing the excavated material directly along the perimeter of the basins to form the impoundment dikes.

Bottom Ash Ponds 1, 2 and 3 were constructed with a 30 mil polyvinyl chloride (PVC) liner over 6 inches of bedding material covering the base of the ponds. The interior slopes of the impoundment dikes for Bottom Ash Ponds 1, 2 and 3 were generally constructed with a 30 mil PVC liner placed on 6 inches of bedding material; the liner was overlain by 12 inches of cover soil and then 12 inches of rip rap at the surface. Bottom Ash Pond 3 contains bottom ash and boiler slag whereas Bottom Ash Ponds 1 and 2 contain mostly water that has been decanted from Bottom Ash Pond 3.

The East and West Emergency Holding Ponds have surface areas of approximately 27.9 and 30.1 acres, respectively, and are separated by a northwest-southeast oriented divider dike. The crests of the impoundment dikes are at elevation +4540.5 feet for both ponds. The toe elevation of the impoundment dikes is at elevation +4520.5 feet for both ponds resulting in a structural height of approximately 20 feet. The total storage of the East and West Emergency Holding Ponds is approximately 915 acre-feet.

The East and West Emergency Holding Pond impoundment dikes were constructed with a 30 mil Hypalon liner on the base of the ponds. The interior slopes of the impoundment dikes were constructed with a 30 mil Hypalon liner; the liner was overlain by 12 inches of filter gravel and then 12 inches of rip rap at the surface.

In 2016, the East and West Emergency Holding Pond southern impoundment dikes were flattened to a 3H:1V slope versus the previous 2:1 slope. This work was performed utilizing local fill material to strengthen the integrity of the dikes, thus increasing the factor of safety for stability. This work was completed based on recommendations from a third party engineer.

Periodic Inspections

During 2018, qualified individuals (generally the LRS Environmental Coordinator) conducted weekly inspections of the LRS surface impoundments for any appearance of actual or potential structural weakness and other conditions which were disrupting or had the potential to disrupt the operation or safety of the unit(s). The completed inspection checklists are filed in the operating record. Appearances of structural weakness may include, but are not limited to: (1) signs of piping and other internal erosion; (2) transverse, longitudinal, and desiccation cracking; (3) slides, bulges, boils, sloughs, scarps, sinkholes, or depressions; (4) animal burrows; (5) excessive or lacking vegetative cover; and (6) slope erosion. A review of the periodic inspection reports for the LRS CCR surface impoundments indicated no signs of actual or potential structural weakness or other adverse conditions as described above.

Annual Inspections

The LRS surface impoundments are visually inspected by Basin Electric QPEs on a periodic and annual basis. The inspections seek to identify signs of distress or malfunction of the impoundment and appurtenant structures. The hydraulic structures underlying the base of the

impoundment or passing through the dikes are also visually inspected for structural integrity and continued safe and reliable operation.

Based on the inspection of the Bottom Ash Ponds on October 26, 2018 the following points are addressed:

- i. There have been no changes in the geometry of the impounding structures since the previous annual inspection.
- ii. Instrumentation for Bottom Ash Pond 1 consists of a staff gauge mounted on the concrete intake structure on the western side of the pond. The staff gauge level at 5.4' is equivalent to the top of concrete of the intake at 4565.00 msl.
- iii. Instrumentation for Bottom Ash Pond 2 consists of a staff gauge mounted to the west side of the pumphouse. The staff gauge level at 16.5' is equivalent to the top of concrete of the wing wall at 4561.33 msl.
- iv. Instrumentation for Bottom Ash Pond 3 consists of a staff gauge mounted to the concrete inlet structure. The staff gauge level at 19.3' is equivalent to the top of concrete of the inlet structure at 4590.00 msl.
- v. The maximum recorded reading since the previous annual inspection:
 - a. Bottom Ash Pond 1: 2.4' on the staff gauge which equates to 4562.0' msl
 - b. Bottom Ash Pond 2: 11.1' on the staff gauge which equates to 4555.9' msl
 - c. Bottom Ash Pond 3: 14.3' on the staff gauge which equates to 4585.0' msl
- vi. The approximate minimum depth of impounded water and CCR since the previous annual inspection:
 - a. Bottom Ash Pond 1: 2.2' on the staff gauge which equates to 4561.8' msl
 - b. Bottom Ash Pond 2: 8.6' on the staff gauge equating to 4553.4' msl
 - c. Bottom Ash Pond 3: 9.0' on the staff gauge equating to 4579.7' msl
- vii. The approximate maximum depth of impounded water and CCR since the previous annual inspection:
 - a. Bottom Ash Pond 1: 21.9'
 - b. Bottom Ash Pond 2: 15.7'
 - c. Bottom Ash Pond 3: 19.9'
- viii. The present depth and elevation of the impounded water and CCR:
 - a. Bottom Ash Pond 1: Depth of 21.7' with a water elevation of 4561.8' msl
 - b. Bottom Ash Pond 2: Depth of 12.2' with a water elevation of 4553.4' msl
 - c. Bottom Ash Pond 3: Depth of 14.6' with a water elevation of 4579.7' msl.

- ix. The remaining storage capacity at the time of inspection:
 - a. Bottom Ash Pond 1: approximately 33 ac-ft.
 - b. Bottom Ash Pond 2: approximately 315 ac-ft.
 - c. Bottom Ash Pond 3: approximately 427 ac-ft.
- x. The approximate volume of the impounded water and CCR at the time of inspection:
 - a. Bottom Ash Pond 1: approximately 250 ac-ft
 - b. Bottom Ash Pond 2: approximately 287 ac-ft
 - c. Bottom Ash Pond 3: approximately 800 ac-ft.
- xi. There are no appearances of an actual or potential structural weakness of the impoundments, nor are there any existing conditions that are disrupting or have the potential to disrupt the operation and safety of the Ponds and appurtenant structures.
- xii. There are no other changes that may affect the stability or operation of the impounding structure since the previous annual inspection.

Based on the inspection of the Emergency Holding Ponds on October 26, 2018 the following points are addressed:

- i. There have been no changes in the geometry of the impounding structures since the previous annual inspection. The northern and part of the western slopes have not changed in geometry.
- ii. There currently is no instrumentation for the Emergency Holding Ponds. The ponds are manually checked daily by plant personnel.
- iii. The maximum recorded reading since the previous annual inspection:
 - a. West Emergency Holding Pond: 30" below the top of the dike or 4537.5' msl
 - b. East Emergency Holding Pond: 30" below the top of the dike or 4537.5' msl
- iv. The minimum recorded reading since the previous annual inspection:
 - a. West Emergency Holding Pond: 36" below the top of the dike or 4536.9' msl
 - b. East Emergency Holding Pond. 54" below the top of the dike or 4535.4' msl
- v. The approximate maximum depth of impounded water and CCR since the previous annual inspection:
 - a. West Emergency Holding Pond: 17.0'
 - b. East Emergency Holding Pond: 17.5'
- vi. The approximate minimum depth of impounded water and CCR since the previous annual inspection:
 - a. West Emergency Holding Pond: 16.4'

- b. East Emergency Holding Pond: 15.4'
- vii. The present depth and elevation of the impounded water and CCR:
 - a. West Emergency Holding Pond: present elevation is 4537.5', or 17.0' deep
 - b. East Emergency Holding Pond: present elevation is 4537.5', or 17.0' deep
- viii. The storage capacity at the time of inspection:
 - a. West Emergency Holding Pond: 30.8 ac-ft.
 - b. East Emergency Holding Pond: 10.1 ac-ft.
- ix. The approximate volume of the impounded water and CCR at the time of inspection:
 - a. West Emergency Holding Pond: 450 ac-ft.
 - b. East Emergency Holding Pond: 425 ac-ft.
- x. There are no appearances of an actual or potential structural weakness of the impoundment, nor are there any existing conditions that are disrupting or have the potential to disrupt the operation and safety of the Emergency Holding Ponds and appurtenant structures.
- xi. There are no other changes which may affect the stability or operation of the impounding structure since the previous annual inspection.

Certification Statement

I certify this document has been prepared in accordance with 40 CFR § 257.83(b) which requires a written Annual Inspection Report by a Qualified Professional Engineer as set forth in the *Standards of the Disposal of Coal Combustion Residuals in Landfills and Impoundments*.



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