

**Coal Combustion Residual
Surface Impoundment
Annual Inspection
2022**

**Basin Electric Power Cooperative
Laramie River Station**

January 2023

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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 (net) 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.

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).

The five CCR impoundments were constructed in 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 and 2 and the East Emergency Holding Pond were retrofit in accordance with CCR Rule requirements during 2020 and 2021. Because they were considered unlined, Bottom Ash Pond 3 and the West Emergency Holding Pond ceased accepting waste prior to April 11, 2021. Basin Electric completed a partial retrofit of Bottom Ash Pond 3 during the 2022 construction season; AECOM completed the retrofit construction certification in January 2023. The completion of retrofit certification will be placed in the facility operating record and posted on Basin Electric's CCR Rule compliance website.

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, after the recent partial retrofit, has a surface area of approximately 35.4 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 after the recent retrofit activities is approximately 1,746 acre-feet, down from the pre-retrofit 2,200 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.

Bottom Ash Ponds 1, 2 and 3 were originally 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 Ponds 1 and 2 were retrofit in accordance with CCR Rule requirements during 2020 and 2021. Basin Electric completed a partial retrofit Bottom Ash Pond 3 during the 2022 construction season.

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 originally 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 and structural stability. This work was completed based on recommendations from a third-party engineer. The East Emergency Holding Pond was retrofit in accordance with the CCR Rule during 2020.

Retrofit Activities

Basin Electric completed the retrofit (or partial retrofit) of four existing surface impoundments at LRS. Retrofit plans in accordance with 40 CFR § 257.102(k) were prepared by AECOM describing the process, design and schedule for completing retrofit activities. Notifications of Intent to Retrofit in accordance with 40 CFR § 257.102 for the four surface impoundments were also prepared. The above-referenced documents were posted to Basin Electric's CCR Rule Compliance Information website when they became available throughout 2020 and 2021. Retrofit Criteria and Completion of Retrofit certifications were also prepared and posted to Basin Electric's CCR Rule Compliance Information website as required.

Periodic Inspections

During 2022, 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 Inspection

The LRS CCR surface impoundments were inspected by Kevin Solie, Wyoming Professional Engineer PE-15120 on December 12, 2022. The purpose of the inspection is to 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 visual inspection of the Bottom Ash Ponds on December 12, 2022 and a review of facility records the following points are addressed:

- i. With the exception of the Bottom Ash Pond 3, there have been no changes in the geometry of the impounding structures since the 2021 annual inspection. The partial retrofit resulted in the reduction of Bottom Ash Pond 3 from 59.9 acres to 35.4 acres. CCR and CCR impacted materials were removed from a portion of the footprint of Bottom Ash Pond 3 and the exposed subgrade was visually inspected to confirm the removal of CCR materials and other deleterious materials. Once the subgrade had been prepared, a divider berm was constructed in Bottom Ash Pond 3 with a liner installed on both sides of the new berm. CCR and CCR impacted materials from the eastern portion of Bottom Ash Pond 3 were consolidated into the western portion (West Hill) of Bottom Ash Pond 3; excess materials were hauled to and disposed in the onsite CCR landfill. In accordance with the CCR Rule, the West Hill was capped with a cover system consisting of a synthetic membrane, a minimum of 18 inches of soil infiltration layer and a minimum of 6 inches of topsoil. In 2021, Bottom Ash Pond 1 was reconstructed with a lower bottom liner elevation, thereby increasing maximum depth and slightly increasing the capacity of the surface impoundment.
- ii. Instrumentation (staff gauge) for Bottom Ash Pond 1 has been damaged due to retrofit activities. Routine water level measurements were augmented by surveyed elevations during 2022. Basin Electric plans to install and utilize water level transducers during 2023.

- iii. Instrumentation for Bottom Ash Pond 2 consists of a staff gauge mounted on the west side of the pumphouse. The staff gauge has been partially damaged due to retrofit activities and corrosion. Routine water level measurements were augmented by surveyed elevations during 2022. Basin Electric plans to install and utilize water level transducers during 2023.
- 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 4590.0 msl. Routine water level measurements were augmented by surveyed elevations during 2022. The staff gauge is in relatively good condition; however, Basin Electric plans to install and utilize water level transducers during 2023.
- v. The maximum recorded reading since the previous annual inspection:
 - a. Bottom Ash Pond 1: Surveyed measurement of 4562.3' msl.
 - b. Bottom Ash Pond 2: Surveyed measurement of 4560.6' msl.
 - c. Bottom Ash Pond 3: Surveyed measurement of 4583.9' msl.
- vi. The approximate minimum depth of impounded water and CCR since the previous annual inspection:
 - a. Bottom Ash Pond 1: Surveyed measurement of 4560.4' msl.
 - b. Bottom Ash Pond 2: Surveyed measurement of 4545.5' msl.
 - c. Bottom Ash Pond 3: Pond was completely dewatered.
- vii. The approximate maximum depth of impounded water and CCR since the previous annual inspection:
 - a. Bottom Ash Pond 1: 35.3'
 - b. Bottom Ash Pond 2: 20.6'
 - c. Bottom Ash Pond 3: 18.9'
- viii. The depth and elevation of the impounded water and CCR:
 - a. Bottom Ash Pond 1: Depth of 35.3' with a water elevation of 4562.3' msl.
 - b. Bottom Ash Pond 2: Depth of 9.4' with a water elevation of 4549.4' msl.
 - c. Bottom Ash Pond 3: Below staff gauge, (less than 4570.7' msl).
- ix. The remaining storage capacity:
 - a. Bottom Ash Pond 1: approximately 8.0 ac-ft.
 - b. Bottom Ash Pond 2: approximately 94.5 ac-ft.
 - c. Bottom Ash Pond 3: greater than 609 ac-ft.
- x. The approximate volume of the impounded water and CCR:

- a. Bottom Ash Pond 1: approximately 375 ac-ft.
- b. Bottom Ash Pond 2: approximately 539 ac-ft.
- c. Bottom Ash Pond 3: less than 120 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 visual inspection of the Emergency Holding Ponds on December 12, 2022 and a review of facility records the following points are addressed:

- i. There have been no changes in the geometry of the impounding structures since the previous annual inspection. In 2021, however, a divider dike in accordance with the Retrofit Plan was constructed inside of the East Emergency Holding Pond. Exterior slopes have not changed in geometry.
- xiii. There currently is no instrumentation for the Emergency Holding Ponds. The ponds are manually checked by plant personnel and periodically surveyed; all data reported below are surveyed measurements. Basin Electric plans to install and utilize water level transducers during 2023.
- ii. The maximum recorded reading since the previous annual inspection:
 - a. West Emergency Holding Pond: 4537.4' msl.
 - b. East Emergency Holding Pond: 4538.7' msl.
- iii. The minimum recorded reading since the previous annual inspection:
 - a. West Emergency Holding Pond: 4531.9' msl.
 - b. East Emergency Holding Pond: 4535.1' msl.
- iv. The approximate maximum depth of impounded water and CCR since the previous annual inspection:
 - a. West Emergency Holding Pond: 21.4'.
 - b. East Emergency Holding Pond: 23.7'.
- v. The approximate minimum depth of impounded water and CCR since the previous annual inspection:
 - a. West Emergency Holding Pond: 15.9'.
 - b. East Emergency Holding Pond: 20.1'.
- vi. The depth and elevation of the impounded water and CCR:

- a. West Emergency Holding Pond: Depth of 15.9' with a water elevation of 4531.9'
- b. East Emergency Holding Pond: Depth of 20.3' with a water elevation of 4535.1'.
- vii. The storage capacity:
 - a. West Emergency Holding Pond: 180 ac-ft.
 - b. East Emergency Holding Pond: 43 ac-ft.
- viii. The approximate volume of the impounded water and CCR:
 - a. West Emergency Holding Pond: 300 ac-ft.
 - b. East Emergency Holding Pond: 235 ac-ft.
- ix. 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.
- x. 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 for the Disposal of Coal Combustion Residuals in Landfills and Impoundments*.



Kevin L. Solie, WY PE-15120

January 13, 2023