

2017 Annual Inspection and Status Report for the Hallam, Nebraska, Decommissioned Reactor Site

June 2017



U.S. DEPARTMENT OF
ENERGY

Legacy
Management

This page intentionally left blank

Contents

Summary	iii
1.0 Introduction	1
2.0 Inspection Results	1
2.1 IHX Building	1
2.2 Buried Concrete Structure (Former Reactor Foundation)	2
2.3 Groundwater Monitoring Wells	3
2.4 Groundwater Monitoring Results	3
3.0 Minor Maintenance Actions	4
4.0 Photographs	4
5.0 References	11

Appendix

Appendix A Site Drawing

This page intentionally left blank

Summary

The former Hallam Nuclear Power Facility (now the Hallam, Nebraska, Decommissioned Reactor Site) was inspected on April 11, 2017. The Intermediate Heat Exchanger (IHX) Building was found to be in good condition, as were the grass-covered entombment mound and groundwater monitoring wells. No cause for a follow-up inspection was identified. However, minor damage to the metal gutter system was discovered in one spot on the south side of the IHX Building, though the cause of damage was not determined. The roof appears to remain functional and protective of the IHX Building. Repairs will be scheduled before next year's inspection.

This page intentionally left blank

1.0 Introduction

This report presents the findings of the annual U.S. Department of Energy (DOE) Office of Legacy Management (LM) April 11, 2017, inspection of the Hallam, Nebraska, Decommissioned Reactor Site.

Navarro, (the DOE Legacy Management Support contractor) conducted the inspection. The DOE site manager and two representatives from the Nebraska Department of Health and Human Services (Nebraska DHHS) accompanied the inspection. A representative of the Nebraska Public Power District (NPPD) escorted the inspection team.

The inspection was conducted in accordance with the *Long-Term Surveillance Plan for the Decommissioned Hallam Nuclear Power Facility, Hallam, Nebraska* (DOE 2008) and DOE procedures for site inspections. The inspection was conducted to confirm the integrity of the Intermediate Heat Exchanger (IHX) Building and the grass cover on the foundation of the former reactor building, examine the condition of DOE monitoring wells, discuss any changing conditions at the Sheldon Power Plant with owner representatives.

2.0 Inspection Results

Features discussed in this report are shown in Appendix A. Photographs to support specific observations are identified in the text and on the drawing by photograph location (PL) numbers.

The Hallam site has the following features:

- IHX cells, entombed in a waterproofed, above-grade, concrete building (the IHX Building).
- A massive, below-grade, reinforced concrete structure (once the reactor foundation now covered with a waterproof membrane, soil, and grass and called the grass-covered mound). Fixed radioactive materials remain at three principal locations inside this structure.
- Nineteen groundwater monitoring wells (OBS-1A, OBS-1B, OBS-2A, OBS-2B, OBS-2B2, OBS-2C2, OBS-3A, OBS-3B, OBS-4A, OBS-4B, OBS-4C, OBS-5A, OBS-5B, OBS-7B, OBS-6A, OBS-6B, OBS-7C, OBS-8B, and OBS-8C).

The IHX Building, the below-grade concrete structure, and the groundwater monitoring wells are at Sheldon Station, an active coal-fired power plant owned and operated by NPPD.

2.1 IHX Building

The IHX Building is a massive, 40 × 80-foot-long concrete sarcophagus at the north end of the former Hallam Nuclear Power Facility. The south side of the building is two stories (about 25 to 30 feet high) with a slightly crowned roof, and the north side of the building is one story with a roof that is sloped to drain. Inspectors viewed the roof of the IHX Building from the roof of Sheldon Station to the north.

The roof of the IHX Building was replaced in 2007. The entire roof is capped with a layer of rock material that protects the underlying roofing fabric. Inspectors noted in 2008 that roof rock was missing in the northwest and southwest corners of the crowned roof, exposing the underlying fabric. Strong winds are believed to be the cause of the missing stones. Paver stones were placed in all corners of the roof in 2009 to correct the problem. The roof was in good condition during the 2017 inspection. No bare spots were observed (PL-1 through PL-3).

Damage of unknown origin was discovered in one spot on the metal roof edge on the building's south side (PL-4). The roof gutter system appears to remain serviceable but needs to be checked in a heavy rain. If significant water drains from the roof and down the south wall through the damaged metal edge during a heavy rain, the metal edge will need to be repaired so the base of the building is not undermined.

In 2009, soil and gravel were placed around the base of the IHX building in a shallow, narrow depression in the ground surface that trapped water against the base of the building. With the depression filled, water now drains away from the building base. The perimeter slope around the IHX Building was in good condition during the inspection.

A water stain (noted in previous inspections) remains visible on the outer east wall of the IHX Building where the lower roof meets the wall. The size and intensity of the stain appear to be stable. No corrective action is recommended at this time to address the stain. The area will continue to be inspected each year to determine if staining is progressing.

Several surface cracks were observed this year on the north wall of the IHX building that do not appear to compromise the structure (PL-5 and PL-6). No corrective action is recommended at this time to address the cracks. They will be inspected each year to determine if they are growing.

2.2 Buried Concrete Structure (Former Reactor Foundation)

The old reactor foundation is buried beneath a waterproof membrane covered by soil and grass. The buried structure appears as a low, flat-topped, grass-covered mound, 1.4 acres in area, immediately south of the IHX Building. Inspectors verified that erosion is not developing on the mound, and the sprinkler system is operating adequately to maintain the grass cover. Mound grass was well established and in good condition. The NPPD, which maintains the grass (PL-7), changed mowing subcontractors for the 2017 season. The small patch of dried, matted grass noted in the 2016 inspection was not present during this year's inspection.

A small area of ground erosion was observed in 2016 along the fenced perimeter of the grass-covered mound west of the IHX Building, where a retaining wall separates the mound from a parking lot to the west. This small area was filled in with dirt and is much improved (PL-8 and PL-9). Inspectors requested that Sheldon Station personnel rake dead grass out of the area to mitigate further erosion.

At the time of the inspection, the sprinkler system had not been turned on for the 2017 year because seasonal rain was sufficient to keep the turf healthy. Plant personnel stated that last year the sprinkler system worked well when watering was required.

A land survey of the mound area at the Hallam facility was conducted in 2016. Based on results of this survey, DOE plans to install survey markers in 2017 to better define the area of the grass-covered mound that pertains to DOE long-term care and maintenance.

2.3 Groundwater Monitoring Wells

There are 19 monitoring wells onsite. During the inspection, all 19 monitoring wells were inspected and found to be properly secured.

Four of the 19 monitoring wells are a flush-mount design and are locked using a special tool. The other 15 wells require a padlock. All 15 padlocked wells received a new lock in 2013, except for well OBS-3B. The hasp on well OBS-3B was too small for the shank of the new lock. A new smaller shank lock was installed in 2016 (PL-10). The wells are scheduled to be sampled again in 2021.

In 2016, the OBS-8 well pad was found to be loose, as were some of the protective bollards. When the wells were sampled in June, the sampling crew made repairs. The well pad and protective bollards are once again in good condition (PL-11 and PL-12).

The concrete Jersey barrier on the east side of the OBS-2 well pad protects the well pad from power plant operations. Movement of this barrier continues to be a concern, as the barrier has been nudged west, closer to the well pad, over the past year (PL-13). A request was made to have Sheldon Station personnel nudge the barrier back a few feet to the east to provide a 3-foot spacing.

OBS-1A and OBS-1B are flush-mount monitoring wells. Well IDs were fading and difficult to read, therefore ID markings were replaced by the sampling crew in 2016.

2.4 Groundwater Monitoring Results

DOE monitors groundwater as a best management practice in response to a request from Nebraska DHHS. In 2006, DOE recommended discontinuing groundwater monitoring because analytical results since 1970 demonstrate there has been no impact to shallow perched groundwater and no current or anticipated unacceptable risk to human health and the environment. The State of Nebraska did not concur with the recommendation to stop monitoring but did agree to a reduction in sampling and analysis from once per year to once every 2 years—a schedule that began in 2008.

Groundwater samples were last collected in June 2016 in accordance with the June 2008 Long-Term Surveillance Plan. Water levels were measured in 17 monitoring wells, and those wells were sampled for gross alpha, gross beta, tritium, gamma spectrometry, and nickel-63. Results are posted on the LM website (<https://www.lm.doe.gov/land/sites/ne/hallam/hallam.htm>).

Results from the 2016 sampling event were similar to those of previous sampling events. Gross alpha and gross beta are the only parameters that were detected at statistically significant concentrations. The gross alpha and gross beta activity concentrations are consistent with values detected previously and are attributed to naturally occurring radionuclides such as uranium and its decay-chain products in the groundwater.

An updated assessment of the groundwater monitoring effort was issued in 2016 (DOE 2016). The entire body of water quality data continues to demonstrate that there have been no negative impacts to the shallow perched groundwater from radioactive materials entombed at the site 46 years ago. DOE is therefore changing the sampling frequency effective in 2018 as follows: Once every 5 years from 2021 to 2041, and once every 10 years from 2041 to 2071

Uranium is also being added to the analysis in future sampling events so a comparison with the gross alpha can be made and the relationship between the two analyses demonstrated.

3.0 Minor Maintenance Actions

Inspectors requested that NPPD personnel:

- Observe whether significant water is exiting the roof from the damaged metal edge of the IHX Building during heavy rains. If it is, DOE will need to initiate repairs.
- Rake dead grass from the edge of the retaining wall west of the IHX Building to mitigate further erosion in the area.
- Re-locate the concrete Jersey barrier on the east side of the OBS-2 well pad by moving it a few feet to the east to provide 3 feet of clearance.

DOE will install survey markers in 2017 to better define the area of the grass-covered mound that pertains to DOE long-term care and maintenance.

4.0 Photographs

Photograph Location Number	Azimuth	Photograph Description
PL-1	180	IHX Roof
PL-2	135	East End of IHX Roof
PL-3	225	West End of IHX Roof
PL-4	0	Damaged Roof Edge
PL-5	180	Surface Cracks on North Wall of IHX Building
PL-6	180	Surface Cracks on North Wall of IHX Building
PL-7	0	View North from South Edge of Grass-Covered Mound
PL-8	315	Repaired Erosion Around Retaining Wall
PL-9	270	Repaired Erosion Around Retaining Wall
PL-10	45	Well OBS-3B
PL-11	45	Southwest Corner of OBS-8 Well Pad
PL-12	135	Northeast Corner of OBS-8 Well Pad
PL-13	180	Jersey Barrier Too Close to OBS-2 Well Pad



PL-1. IHX Roof



PL-2. East End of IHX Roof



PL-3. West End of IHX Roof



PL-4. Damaged Roof Edge



PL-5. Surface Cracks on North Wall of IHX Building



PL-6. Surface Cracks on North Wall of IHX Building



PL-7. View North from South Edge of Grass-Covered Mound



PL-8. Repaired Erosion Around Retaining Wall



PL-9. Repaired Erosion Around Retaining Wall



PL-10. Well OBS-3B



PL-11. Southwest Corner of OBS-8 Well Pad



PL-12. Northeast Corner of OBS-8 Well Pad



PL-13. Jersey Barrier Too Close to OBS-2 Well Pad

5.0 References

DOE (U.S. Department of Energy), 2008. *Long-Term Surveillance Plan for the Decommissioned Hallam Nuclear Power Facility, Hallam, Nebraska*, LMS/HAL/S03478, Office of Legacy Management, June.

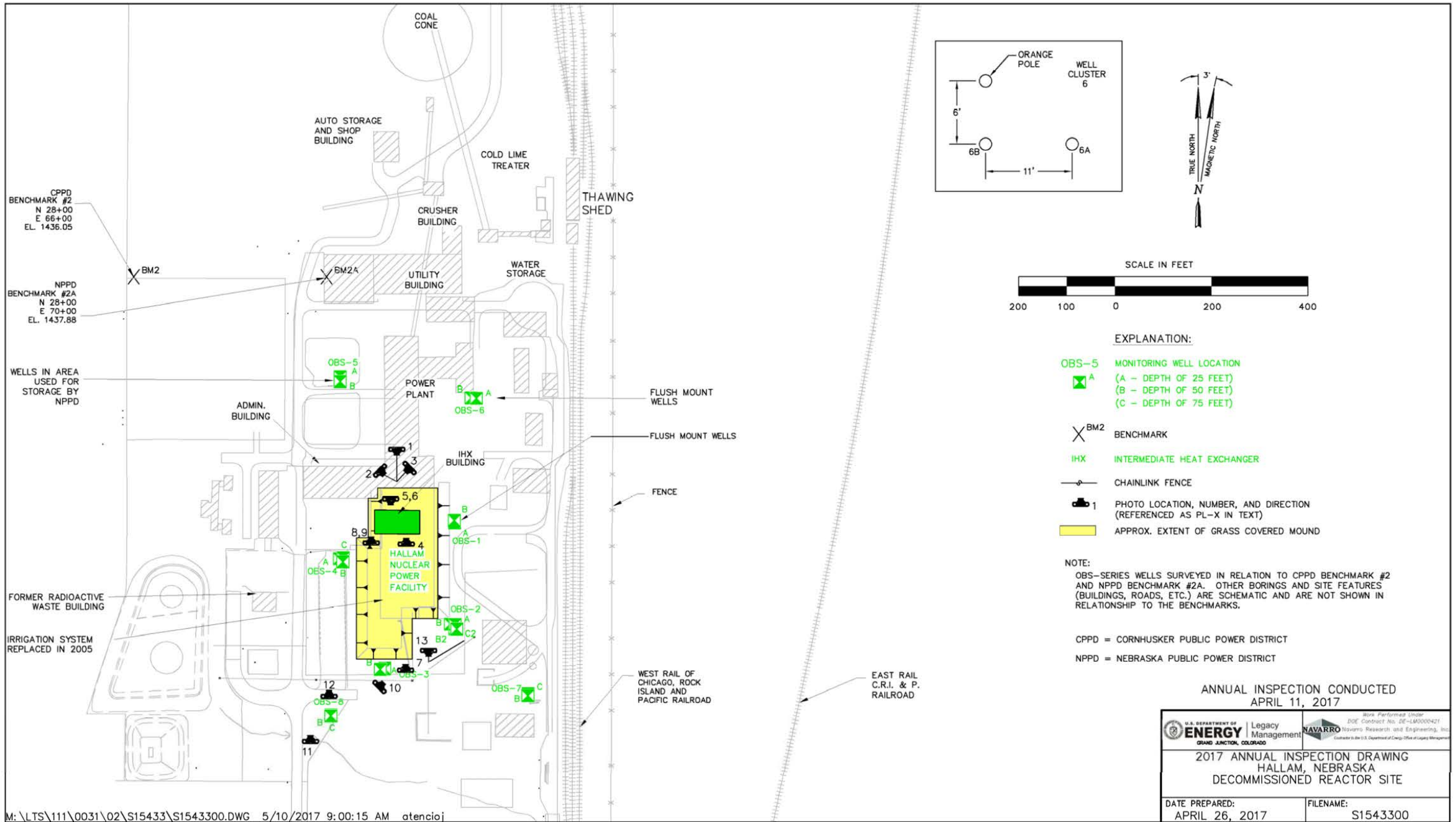
DOE (U.S. Department of Energy), 2016. *Monitoring Assessment Report for the Decommissioned Hallam Nuclear Power Facility*, LMS/HAL/S14752, Office of Legacy Management, December.

This page intentionally left blank

Appendix A

Site Drawing

This page intentionally left blank



M:\LTS\111\0031\02\S15433\S1543300.DWG 5/10/2017 9:00:15 AM atencioj

This page intentionally left blank