

# 2008 Annual Inspection and Status Report for the Hallam, Nebraska, Decommissioned Reactor Site

## Summary

The former Hallam Nuclear Power Facility (HNPF) was inspected on April 30, 2008.

The Intermediate Heat Exchanger (IHX) structure is in good shape. The roof was replaced last year, and is in excellent condition. The sides of the structure are scheduled to be painted in 2008. Some minor maintenance is required around the perimeter of the structure. For the majority of the perimeter, soil is graded toward the foundation. This could lead to foundation issues in the future if not addressed. It is recommended that some topsoil be placed around the base of the structure to reverse the grading.

The grass-covered mound located over the old reactor foundation is in good condition. Turf on the mound is healthy and no erosion is present. In 2007 a water line was installed along the eastern edge of the mound, just east of the mound toe slope. The area will be re-seeded this year.

The nineteen groundwater monitor wells at the site were all secured with locks, but need to have well numbers posted on the outside of the protective casings for ease of identification in the field. The locks on most of the wells have un-used chains hanging down from them. When blown in the wind, these chains rub the paint off the protective casing. These un-used chains need to be removed from the well locks. Flush mount work is needed at wells OBS-1A, OBS-1B, OBS-6A, and OBS-6B. The flush mount work is planned for 2008. Two well clusters (OBS-2 and OBS-7) are in high traffic areas. Bollard maintenance and use of jersey barriers are recommended.

It is recommended that next year the inspection JSA should also cover the use of stairs, and the inspection should be conducted later in the year, after the sprinkler system has been activated, so that its operability can be verified. There is no requirement for a follow-up inspection this year.

## 1.0 Introduction

This report presents the findings of the annual U.S. Department of Energy (DOE) inspection of the Hallam, Nebraska, Decommissioned Reactor Site.

M. Miller (Inspector), R.C. Ransbottom and K. Broberg (Assistant Inspectors) all of S.M. Stoller Corporation, the DOE Office of Legacy Management (LM) Contractor, conducted the inspection on April 30, 2008. Todd Chinn of the Nebraska Public Power District (NPPD) acted as an escort on NPPD property. J. Defrain of the Office of Radiological Health, State of Nebraska Department of Health and Human Services also participated in the inspection.

The inspection was conducted in accordance with the *Long-Term Surveillance Plan [LTSP] for the Hallam Nuclear Power Facility, Hallam, Nebraska* (DOE Grand Junction, Colorado, September 1998), and procedures established by DOE for site inspections. The purposes of the inspection were to confirm the integrity of the IHX structure and the grass cover on the foundation of the former reactor building, examine the condition of DOE monitor wells, and meet with owner representatives.

## **2.0 Inspection Results**

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

The Hallam Decommissioned Reactor Site consists of:

1. The IHX cells, entombed in a waterproofed above-grade concrete structure.
2. A massive, below-grade, reinforced concrete structure, once the foundation of the reactor and now covered with a waterproof membrane, soil, and grass. Fixed radioactive materials remain at three principal locations within this structure.
3. Nineteen groundwater monitor wells.

Both structures and all wells are at the Sheldon Power Station, an active coal-fired power plant owned and operated by NPPD.

The facility is located in an area where tornados are possible. A large tornado occurred just west of the facility in 2004 that caused extensive damage to the town of Hallam. No damage to the facility resulted from the 2004 tornado, though.

During this year's inspection it was noted that the inspection involves the use of stairs. Use of stairs needs to be included in the hazards analysis for future inspections and added to the field management changes section of the inspection JSA.

### **2.1 Intermediate Heat Exchanger**

The IHX is a massive concrete sarcophagus, about 40 feet by 80 feet on a side, at the north end of the former HNPF. On the south side, it is two stories (about 25- to 30-feet) high. On the north side, the structure is one-story high. The roof on the two-story part is slightly crowned; the roof on the one-story part is sloped to drain.

Grading around the IHX structure needs to be reversed. For the majority of the IHX structure perimeter, soil is graded toward the foundation. This could lead to foundation issues in the future if not addressed. Soils should always grade away from foundations.

The roof of the IHX is in excellent condition (PL-1 and PL-2). The roof was replaced in 2007 and cornices noted as being in need of repair during last year's inspection were all repaired. The sides of the structure are scheduled to be re-painted in 2008.

### **2.2 Buried Concrete Structure, Once the Foundation of the Former Reactor**

The old reactor foundation is buried beneath a waterproof membrane, soil, and grass. Today the buried structure appears as a low, flat-topped, grass-covered mound, 1.4 acres in extent, immediately south of the IHX.

The grass is well established, and is in good condition on the grass-covered mound, with the exception of the east edge (PL-3). The east edge of the grass-covered mound, just beyond the toe of the slope, is bare of grass due to waterline work that was conducted in 2007 (PL-4). This work also left sprinkler heads exposed (PL-5). Re-seeding of the area is planned for this year.

No evidence of new erosion was observed on the grass covered mound, but grass has not completely filled in an area just northeast of the IHX structure, where some work had disturbed the grass cover in prior years (PL-6).

DOE replaced the sprinkler system on the grass-covered mound in July 2005. The sprinkler system had not been activated this year so its operability could not be verified. It is recommended that next year the inspection be conducted later in the year, after the system has been activated, so that its operability can be verified.

## **2.3 Groundwater Monitoring Program**

DOE monitors groundwater at this site in response to a request from the Nebraska Department of Health. There are 19 wells in the monitoring network. During the inspection all 19 wells were found to be properly secured with locks. Prior to 2008, DOE sampled the wells annually, measuring water levels and collecting groundwater samples at all wells that produce sufficient water. Beginning in 2008, wells will be sampled every two years. All of the monitor wells need to have their well numbers clearly marked on the outside of the protective casings for ease of identification in the field. Nearly all of the monitor wells also need painting (mainly touch-up). Light duty chains are attached to the well locks. These chains need to be removed. These light duty chains hang down from the lock. They serve no purpose, but they swing back and forth in the wind and rub off paint from the well casing (PL-7). Several bollards installed to protect monitor wells were found to be hollow pipes. These bollards should be filled with concrete to provide more protection for the wells. Specific well maintenance needs are presented below.

Wells OBS1A and OBS1B are located in a high traffic area (PL-8). These wells are installed in a large concrete pad and surrounded by four bollards (PL-9). A statement of work is being prepared to change these two wells to flush mount wells. A heavy-duty vault type design is planned. In Nebraska, a licensed well installer must perform this work.

Wells OBS2A, OBS2B, OBS2B2, and OBS2C2 are located next to a high traffic area. The use of bollards is not considered sufficient to protect these wells from vehicular traffic. It is recommended that jersey barriers (concrete highway dividers) also be placed in front of the bollards as added protection.

Wells OBS6A and OBS6B are flush mounted wells. The wells are usually covered with gravel and difficult to locate. The covers on these wells were not removed from 2002 through 2004 because they are cracked and wedged tight with coal dust. Since 2005, water-sampling personnel have been successful in removing the covers without damaging them. Previous attempts to find replacement covers were unsuccessful. Only one of the wells could be located during the inspection and because the wells are not labeled on the outside it was not known if the well that was found was OBS6A or OBS6B (PL-10). A statement of work is currently being prepared to re-configure these flush mounts to a more substantial design (e.g., vault type design) so they can be located and opened more easily. In Nebraska, a licensed well installer must perform this work. It is recommended that a magnetometer should accompany well samplers during their sampling visit in June 2008 to locate this well.

Wells OBS7B and OBS7C are located in a high traffic area and are protected by bollards (PL-11). The well pad at this location is buried and the bollards protecting the pad are bent due to being hit by heavy equipment operating in the area. There is little that can be done at this location to improve the protection of the wells. Therefore, before repairs are made to this well cluster, DOE will review data collected from this location and make a determination as to whether the data supports keeping or abandoning the monitoring location. If the decision is made to keep the monitoring location, the bollards will need to be re-enforced, perhaps with some jersey barriers, to provide additional protection against the operation of heavy equipment in the area.

### Groundwater Monitoring Results

Monitoring has demonstrated that contaminants have not leaked from the containment and that monitoring could safely be discontinued. A letter was sent to Nebraska Health and Human Services (NE HHS) to request approval to discontinue groundwater monitoring. NE HHS responded that they want to continue groundwater monitoring for at least the 100 years it is expected to take radioactive components to decay to allow release for unrestricted use. However, they did agree to reduce sampling frequency to once every two years. The two-year sampling frequency will begin in 2008. After sampling is conducted in June 2008, sampling will not take place again until June 2010.

Gross alpha, gross beta, tritium, gamma spectrometry, and nickel-63 analyses were completed on groundwater monitoring samples that were taken in June 2007. Gross alpha and gross beta are the only parameters that exceed the minimum detectable concentration (MDC). Gross alpha at locations 2B, 4B, 4C, and 5B slightly exceeded the Uranium Mill Tailing Remedial Action (UMTRA) Maximum Concentration Limit (MCL) of 15 pCi/L. The highest value was reported at location 2B (21.1 pCi/L). The highest value for gross beta was reported at location 4C (15.4 pCi/L). Gross alpha concentrations generally decreased at most locations after increases were noted in June 2006. Monitoring results are posted on the DOE-LM website <http://www.lm.doe.gov/land/sites/ne/hallam/hallam.htm>

## **2.4 Other Long-Term Surveillance and Maintenance Issues**

In 2007 inspectors walked through the former Radioactive Waste Building across the entrance drive from the burial mound. The basement was sealed to prevent access. This building was reported to have been surveyed for contamination and released. Stoller recommended to NPPD that the sign reading "RA Waste Building" be removed from the building. NPPD does not want to change the name of the building, as it is what the building has always been called; therefore the sign remains (PL-11).

## **3.0 Recommendations**

1. Grading around the IHX structure needs to be reversed (page 2).

**Recommendation:** Have about 12 of inches dirt brought in and placed around the perimeter of the IHX structure to reverse the grading.

2. The sides of the IHX structure need to be repainted (page 2).

**Recommendation:** The sides of the IHX structure are scheduled to be re-painted in 2008.

3. The east edge of the grass-covered mound, just beyond the toe of the slope, is bare of grass due to waterline work that was conducted in 2007 (page 2).

**Recommendation:** Re-seeding of the area is planned for 2008.

4. Operability of the sprinkler system could not be verified because it had not been activated yet this year (page 3).

**Recommendation:** Next year conduct the inspection later in the year, after the system has been activated, so its operability can be verified.

5. Monitor wells are not labeled with the well number on the outside surface of the protective casing so that the well can be easily identified in the field (page 3).

**Recommendation:** Post the well number on the outside of the well casing during the next sampling round.

6. An un-used chain is attached to each well lock. When blown in the wind, this chain rubs against the paint on the protective casing (page 3).

**Recommendation:** This un-used chain will be removed from each lock during the June 2008 sampling event.

7. Monitor wells OBS1A and OBS1B are located in high traffic areas. These wells need to be redesigned into flush mounts (page 3).

**Recommendation:** A SOW is being prepared to re-configure these wells in 2008.

8. Monitor Wells OBS2A, OBS2B, OBS2B2, and OBS2C2 are located next to high traffic areas. The use of bollards is not considered sufficient to protect these wells from vehicular traffic (page 3).

**Recommendation:** Jersey barriers (concrete highway dividers) should also be placed in front of the bollards as added protection.

9. Monitor wells OBS6A and OBS6C are flush mount wells that are easily buried with coal dust and are hard to open because the covers are usually wedged tight with coal dust (page 3).

**Recommendation:** A SOW is being prepared to re-configure these wells with a stronger vault design in 2008. Well samplers should carry a magnetometer with them during the June 2008 sampling event to help locate these wells.

10. Monitor Wells OBS7B and OBS7C are located in a high traffic area and are protected by bollards. There is little that can be done at this location to better protect these wells (page 3)

**Recommendation:** DOE will review the data collected from this location and make a determination as to whether the data supports keeping the monitoring location. Bollards should be placed around the location for added protection.

## 4.0 Photographs

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<b>Photograph Location Number</b>	<b>Azimuth</b>	<b>Photograph Description</b>
PL-1	225	Roof of IHX Building.
PL-2	225	Roof of IHX Building.
PL-3	330	South side of IHX Building.
PL-4	0	Looking north along east side of grass-covered mound.
PL-5	na	Exposed sprinkler head.
PL-6	270	Bare grass areas in northeast corner of grass covered mound.
PL-7	na	Monitor Well OBS-4, free hanging chain on lock.
PL-8	135	Monitor Wells OBS1A and OBS1B.
PL-9	270	Monitor Wells OBS1A and OBS1B.
PL-10	Na	Monitor Well at OBS6 location.
PL-11	90	Monitor Wells OBS7B and OBS7C.
PL-12	270	Entrance to RA Building.

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HAL 4/2008. PL-1. Roof of IHX Building.



HAL 4/2008. PL-2. Roof of IHX Building.



HAL 4/2008. PL-3. South side of IHX Building.



HAL 4/2008. PL-4. Looking north along east side of grass-covered mound.





HAL 4/2008. PL-5. Exposed sprinkler head.



HAL 4/2008. PL-6. Bare grass areas in northeast corner of grass covered mound.



HAL 4/2008. PL-7. Monitor Well OBS-4, free hanging chain on lock.



HAL 4/2008. PL-8. Monitor Wells OBS1A and OBS1B.



HAL 4/2008. PL-9. Monitor Wells OBS1A and OBS1B.



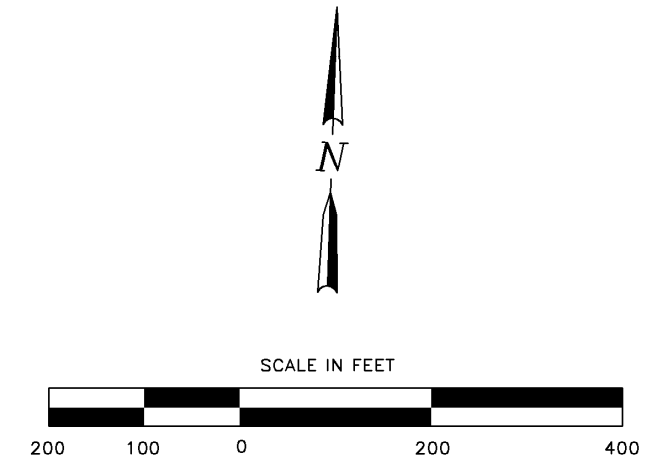
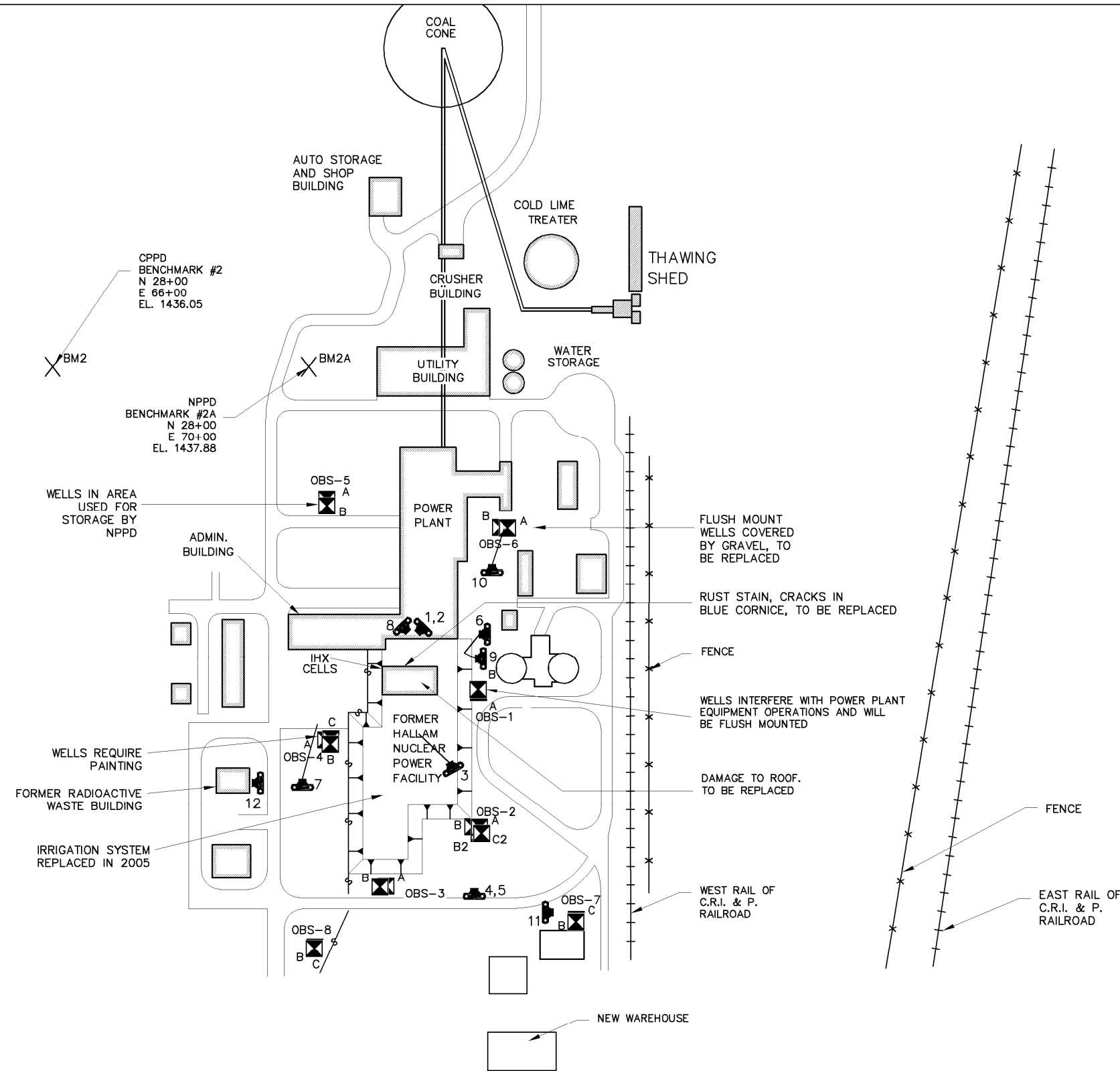
HAL 4/2008. PL-10. Monitor Well at OBS6 location.



HAL 4/2008. PL-11. Monitor Wells OBS7B and OBS7C.



HAL 4/2008. PL-12. Entrance to RA Building.



- EXPLANATION:**
- OBS-5 MONITOR WELL LOCATION
    - ◻<sup>A</sup> (A - SHALLOW WELL)
    - ◻<sup>B</sup> (B - DEEP WELL)
    - NOTE: 4C IS DEEPEST
  - ✕<sup>BM2</sup> BENCHMARK
  - IHX INTERMEDIATE HEAT EXCHANGER
  - CHAIN-LINK FENCE
  - 📷<sub>1</sub> PHOTO LOCATION, ROTATION, AND NUMBER

**NOTE:**  
 OBS-SERIES WELLS SURVEYED IN RELATION TO CPPD BENCHMARK #2 AND NPPD BENCHMARK #2A. OTHER BORINGS AND SITE FEATURES (BUILDINGS, ROADS, ETC.) ARE SCHEMATIC AND ARE NOT SHOWN IN RELATIONSHIP TO THE BENCHMARKS.

ANNUAL INSPECTION CONDUCTED  
 APRIL 30, 2008

U.S. DEPARTMENT OF ENERGY GRAND JUNCTION, COLORADO	Work Performed by S.M. Stoller Corporation Under DOE Contract No. DE-AC01-07LM00060
2008 ANNUAL INSPECTION DRAWING HALLAM, NEBRASKA DECOMMISSIONED REACTOR SITE	
DATE PREPARED: MAY 20, 2008	FILENAME: S0380000