

# 2012 Annual Inspection and Status Report for the Hallam, Nebraska, Decommissioned Reactor Site

## Summary

The former Hallam Nuclear Power Facility (HNPF) was inspected on April 24, 2012. The IHX building and the grass cover on the foundation of the former reactor building, were in good condition.

The IHX building is in excellent condition, however, a minor surface water stain was observed on the east wall of the building where the lower roof meets the wall of the two story portion of the building. The water staining appears to be the result of a heavy rain from the preceding months. No corrective action is recommended at this time. The area will be inspected and re-assessed during the inspection next year.

Groundwater is sampled every two years, and was last sampled in 2010. In 2010, gross alpha and beta were the only parameters that were detected at statistically significant concentrations. The gross alpha and beta activity concentrations observed were consistent with values previously observed and are attributed to naturally occurring radionuclides (e.g., uranium and uranium decay chain products) in the groundwater.

Because groundwater is sampled once every two years, minor well maintenance items observed in 2011 were deferred to be addressed in June of 2012, during the next regularly scheduled sampling event. The minor maintenance items that will be addressed in June 2012 are noted below.

- Monitoring wells 6A and 6B will be re-labeled.
- The replacement hinges on the protective casing lids of monitoring wells OBS-4B, OBS-2A and OBS-2B will be adjusted so the lids cannot be partially opened when locked.
- The protective casing lid of monitoring well OBS-3B will be replaced.

## 1.0 Introduction

This report presents the findings of the annual U.S. Department of Energy (DOE) inspection of the decommissioned Hallam, Nebraska, Reactor Site on April 24, 2012.

M. Miller (Chief Inspector) and K. Broberg (Assistant Inspector), both with S.M. Stoller Corporation (the DOE Office of Legacy Management (LM) Contractor) conducted the inspection. T. Chinn of the Nebraska Public Power District (NPPD) acted as an escort on NPPD property. J. Desormeau, representing DOE LM, and H. Shuman, a Health Physicist with the Nebraska Department of Health and Human Services also participated in the inspection. S. Adkins and T. Maloney, both with JGMS, conducted a federal property inventory assessment during 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,

Revision 1, June 2008), and procedures established by DOE for site inspections. The purposes of the inspection were to confirm the integrity of the IHX building and the grass cover on the foundation of the former reactor building, examine the condition of DOE monitoring 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 building, referred to as the IHX building.
2. A massive, below-grade, reinforced concrete structure, once the foundation of the reactor and now covered with a waterproof membrane, soil, and grass, referred to as the grass covered mound. Fixed radioactive materials remain at three principal locations within this structure.
3. Nineteen groundwater monitoring wells (1A, 1B, 2A, 2B, 2B2, 2C2, 3A, 3B, 4A, 4B, 4C, 5A, 5B, 7B, 6A, 6B, 7C, 8B, and 8C).

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

### **2.1 Intermediate Heat Exchanger (IHX) Building**

The IHX building is a massive 40 feet wide by 80 feet long concrete sarcophagus located at the north end of the former HNPF. The south side of the building is two stories high (about 25- to 30-feet) with a slightly crowned roof, and the north side of the building is one-story high with a roof that is sloped to drain. Inspectors view the roof of the IHX building from the roof of the Sheldon Power Plant, north of the IHX building.

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. It was noted in 2008 that the roof rock was not present in the northwest and southwest corners of the upper roof. It is surmised that strong winds moved the roof rock from the corners of the roof exposing the underlying roofing fabric. Paver stones were placed in all corners of the roof in 2009 to correct the problem. The roof was in good condition. No bare spots were present (PL-1 and PL-2).

In 2009 soil and gravel were placed around the base of the IHX building, in a small narrow depression in the ground surface that trapped water against the base of the building. By filling the depression, water now readily drains away from the base of the building. The perimeter slope around the IHX building was found to be in good condition during the inspection.

A minor surface water stain was observed on the east wall of the IHX building where the lower roof meets the wall of the two story portion of the building (PL-3 and PL-4). The water staining

appears to be the result of a heavy rain from the preceding months. No corrective action is recommended at this time. The area will be inspected and re-assessed during the inspection next year.

## **2.2 Buried Concrete Structure (Former Reactor Foundation)**

The old reactor foundation is buried beneath a waterproof membrane that is overlain by 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 building. Inspectors check that areas of erosion are not developing on the mound, and that the sprinkler system is operating adequately to maintain the grass on the mound.

Grass on the mound was well established and in good condition with the exception of the south end of the mound. NPPD replaced an 8-inch underground fire main that runs under the south edge of the mound in 2010. The area was reseeded in 2011 but grass has not fully re-established there (PL-5).

DOE replaced the sprinkler system on the grass-covered mound in July 2005. The sprinkler system was being tested at the time of the inspection and appeared to be functioning properly.

## **2.3 Groundwater Monitoring Wells**

There are 19 monitoring wells. During the inspection all 19 monitoring wells were properly secured with locks. Maintenance was conducted on the monitoring wells in the summer of 2010. Concrete pads and bollards were repaired, protective casings were painted and labeled, and hinges on some of the protective casing lids were replaced. The wells were in good condition. A few minor maintenance items have been identified and will be addressed in June 2012 which is the next regularly scheduled sampling event. The maintenance items are listed below.

- The replacement hinges on monitoring wells OBS-4B, OBS-2A, and OBS-2B allow the protective casing lids to be partially opened when locked. During the next sampling event, the protective casing lids will be repaired so they cannot be partially opened when locked.
- The protective casing lid on monitoring well OBS-3B is functional but needs to be replaced (PL-6). During the next sampling event, the protective casing lid will be replaced.
- Flush mount monitoring wells OBS-6A and OBS-6B are not properly labeled (PL-7). During the next sampling event, these two wells will be properly labeled, and the concrete well pads will be painted (e.g. fluorescent orange or green) to aid in locating them.

## **2.4 Groundwater Monitoring Results**

DOE monitors groundwater in response to a request from the Nebraska Department of Health. It was recommended by DOE in 2006 that groundwater monitoring be discontinued because analytical results since 1970 demonstrate that 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 this recommendation, but did agree to a reduction in sampling and analysis from once a year to once every 2 years. The new (once every two years) sampling frequency began in 2008.

Groundwater samples were collected from June 7 to June 10, 2010, in accordance with the *Long-Term Surveillance Plan for the Hallam Nuclear Power Facility, Hallam Nebraska*, September 1998. Seventeen monitoring wells were sampled in 2010 for gross alpha, gross beta, tritium, gamma spectrometry, and nickel-63, and water levels. Monitoring results are posted on the DOE LM website <http://www.lm.doe.gov/land/sites/ne/hallam/hallam.htm> and summarized below.

Gross alpha and gross beta are the only parameters that were detected at statistically significant concentrations. The gross alpha and gross beta activity concentrations observed are consistent with values previously observed and they are attributed to naturally occurring radionuclides (e.g., uranium and uranium decay chain products) in the groundwater.

### 3.0 Recommendations

No recommendations to report.

### 4.0 Photographs

Photograph Location Number	Azimuth	Photograph Description
PL-1	135	Northeast corner of IHX roof.
PL-2	225	West end of IHX roof.
PL-3	45	East side of IHX building.
PL-4	270	Water staining on east side of IHX building.
PL-5	90	Grass, south end of grass covered mound.
PL-6	NA	Monitoring Well OBS-3B.
PL-7	NA	Flush Mount OBS-6B.



HAL 4/2012. PL-1. Northeast corner of IHX roof.



HAL 4/2012. PL-2. West end of IHX roof.



HAL 4/2012. PL-3. East side of IHX building.



HAL 4/2012. PL-4. Water staining on east side of IHX building.





HAL 4/2012. PL-5. Grass, south end of grass covered mound.



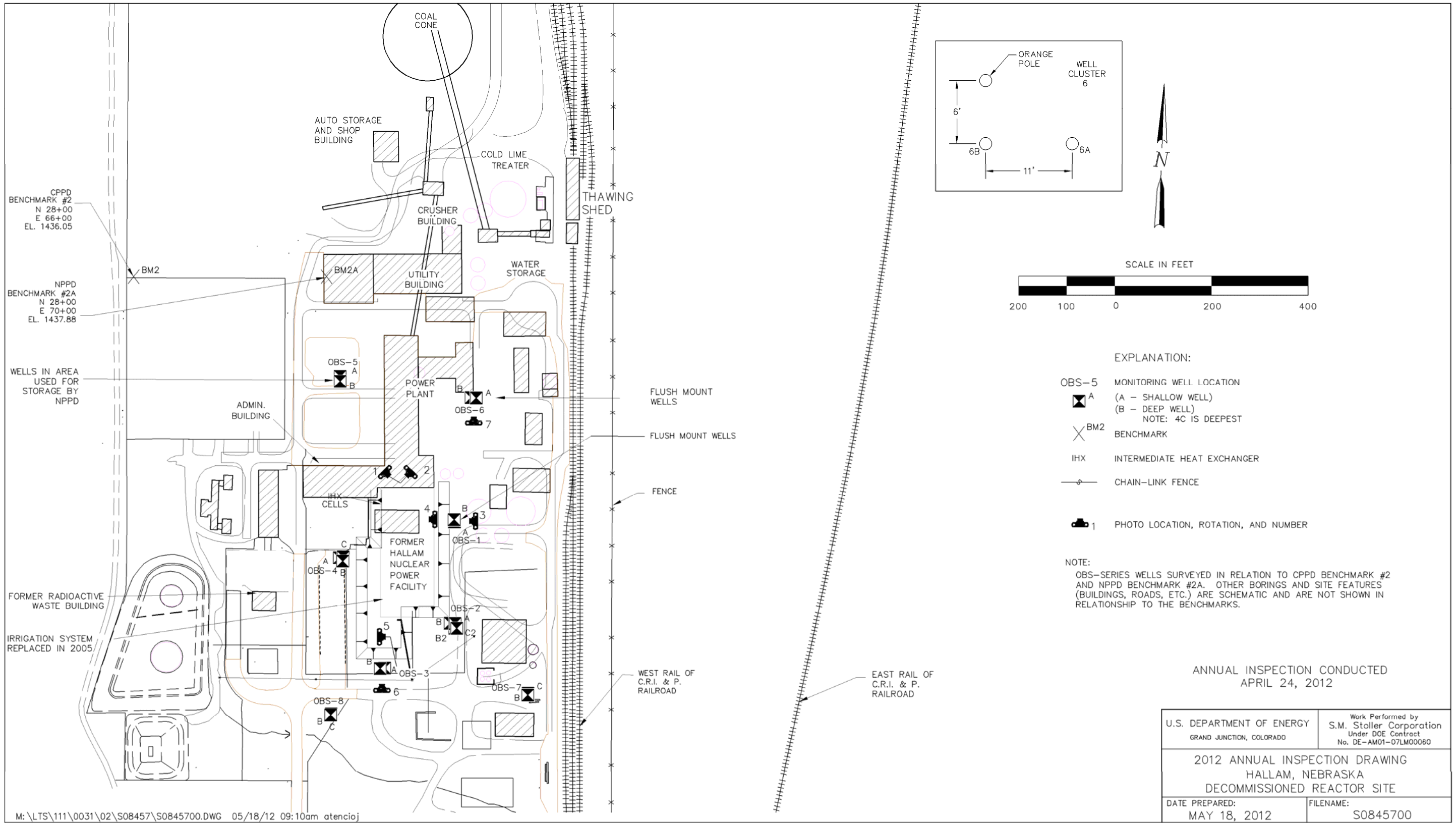
HAL 4/2012. PL-6. Monitoring Well OBS-3B.





HAL 4/2012. PL-7. Flush Mount OBS-6B.





CPPD  
BENCHMARK #2  
N 28+00  
E 66+00  
EL. 1436.05

NPPD  
BENCHMARK #2A  
N 28+00  
E 70+00  
EL. 1437.88

WELLS IN AREA  
USED FOR  
STORAGE BY  
NPPD

FORMER RADIOACTIVE  
WASTE BUILDING

IRRIGATION SYSTEM  
REPLACED IN 2005

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- EXPLANATION:
- OBS-5 MONITORING WELL LOCATION  
 A (A - SHALLOW WELL)  
 B (B - DEEP WELL)  
 NOTE: 4C IS DEEPEST
  - BM2 BENCHMARK
  - IHX INTERMEDIATE HEAT EXCHANGER
  - CHAIN-LINK FENCE
  - 1 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 24, 2012

U.S. DEPARTMENT OF ENERGY GRAND JUNCTION, COLORADO	Work Performed by S.M. Stoller Corporation Under DOE Contract No. DE-AM01-07LM00060
2012 ANNUAL INSPECTION DRAWING HALLAM, NEBRASKA DECOMMISSIONED REACTOR SITE	
DATE PREPARED: MAY 18, 2012	FILENAME: S0845700