

2010 Annual Inspection and Status Report for the Hallam, Nebraska, Decommissioned Reactor Site

Summary

The former Hallam Nuclear Power Facility (HNPF) was inspected on April 28, 2010. The Intermediate Heat Exchanger (IHX) building, the grass-covered mound, and the monitoring wells were all in good shape.

The roof of the IHX building was replaced in 2007 and the building was painted in 2008. Dirt and gravel were placed around the base of the IHX building in 2009 to raise the ground surface and eliminate the potential for water to pool near the base of the building. In 2009, inspectors noted that strong winds had moved roof rock from the corners of the upper roof exposing the underlying roofing fabric. In 2009 paver stones were placed in the corners of both the upper and lower roof of the IHX building. The paver stones have corrected the problem.

Turf on the grass-covered mound, located over the old reactor foundation, was healthy, green, and no erosion was present.

Some minor maintenance items were identified at a few of the 19 monitoring wells located at the site, specifically:

- Cracked concrete pads at monitoring wells OBS-8B and 8C, and OBS-2B2 and 2C2,
- The well pad at the OBS-7B and C was covered with coal dust,
- The hinges on the well caps of the protective casing at wells OBS-2B and OBS-2C were broken.
- Concrete barrier is located too close to the concrete pad at monitoring wells OBS-2B2 and OBS-2C2.

Recommendations have been made in this report to address these minor well-maintenance issues.

Groundwater sampling is conducted every two years. The wells are scheduled to be sampled in June 2010.

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 28, 2010.

M. Miller (Inspector) and K. Broberg (Assistant Inspector), 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. H. Shuman, a Health Physicist with the Nebraska Department of Health and Human Services and A. Kleinrath, with DOE-LM, 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,

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-foot-wide by 80-foot-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 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 (PL–1). Inspectors found the roof to be in good shape. No bare spots were present.

In 2009 soil and gravel were placed around the base of the IHX building (PL–2). The soil and gravel were placed 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.

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 to ensure 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.

The grass on the mound was well established, and was in good condition (PL-3 and PL-4), with the exception of an ongoing struggle with grass growth on the northeast corner of the mound (PL-5). No evidence of erosion was observed on any portion of the grass-covered mound. Grass growth on the northeast corner continues to be a struggle, but conditions appear to be about the same as they were in 2009. The struggling grass growth on the northeast corner does not compromise the integrity of the mound. It is recommended that inspectors continue to monitor grass conditions on the northeast corner of the mound but unless conditions get worse and the integrity of the mound is questioned no action is required.

DOE replaced the sprinkler system on the grass-covered mound in July 2005. The sprinkler system had not been activated by plant personnel in 2010 but inspectors were informed that the system was in good working order.

2.3 Groundwater Monitoring Wells

DOE monitors groundwater in response to a request from the Nebraska Department of Health. There are 19 monitoring wells. During the inspection all 19 monitoring wells were properly secured with locks but the hinges on the well caps of the protective casings on monitoring wells OBS-2B and OBS-2C were broken. So, although monitoring wells OBS-2B and OBS-2C were locked, the wells were actually unsecured (PL-6). It is recommended that the hinges on the well caps of the protective casings of monitoring wells OBS-2B and OBS-2C be repaired.

In addition to the broken hinges discussed above, several minor maintenance issues concerning the monitoring wells were noted during the inspection. These minor maintenance issues are discussed below.

During 2008, several of the wells were freshly painted and well identification numbers were applied to the outside of all of the protective casings (PL-7). It is recommended that during the next sampling event the protective casings be re-painted (if deemed necessary) and the well identifications be touched up (if required) to make sure that they remain visible.

In 2008, well cluster 1 (OBS-1A and 1B) was converted to a flush mount installation (PL-8). No visible well identification numbers are present on wells OBS-1A and OBS-1B. It is recommended the well caps of these two flush mount wells be labeled with their well number when they are sampled next. There is a small white triangle present on the cap of each flush mount where a 1A or 1B could be applied. It is also recommended that the concrete well pads be painted a bright color (e.g. fluorescent orange or green) to aid in locating them should coal dust cover them.

During 2008, the surface vaults of flush mount wells OSB-6A and 6B were modified to a more durable design, identical to design used at wells OBS-1A and 1B. Coal dust is prevalent at the location of wells OBS-6A and 6B and these two wells often become buried by coal dust making it hard to locate them. OBS-6B is located approximately 6 feet south of an existing orange pole. A small insert map is provided on the inspection map showing the location of wells OBS-6A and 6B in reference to this pole and to each other. It is recommended that the well caps of wells OBS-6A and 6B be labeled with their well number when the wells are sampled next. It is also recommended that the concrete well pads be painted a bright color (e.g. fluorescent orange or green) to aid in locating them should coal dust cover them.

In 2008 concrete barriers were placed around the well pads for monitoring wells OBS-2A, OBS-2B, OBS-2B2, and OBS-2C2. These wells are located in a high traffic area. Inspectors found that the concrete barrier east of monitoring wells OBS-2B2 and OBS-2C2 was pushed into the well pad and that the corner of the well pad was cracked (PL-9 and PL-10). It is recommended that the concrete barrier be moved east approximately 2 feet and the corner of the well pad be repaired.

The well pad at monitoring wells OBS-7C and 7B was found to be covered in coal dust (PL-11). It is recommended that when the wells are sampled next that the sampling crew shovel the coal dust off the pad.

The southwest and northeast corners of the concrete pad at monitoring wells OBS-8A, B, and C are cracked (PL-12 and PL-13). It is recommended that the corners of the well pad at monitoring wells OBS 8-A, B, and C be repaired.

Prior to 2008, DOE sampled the groundwater monitoring wells annually, measuring water levels and collecting groundwater samples at all wells that produce sufficient water. Sampling is now conducted every two years and is scheduled next for the summer of 2010.

3.0 Recommendations

1. The hinges on the well caps of the protective casings on monitoring wells OBS-2B and OBS-2C were broken, leaving the wells unsecured (page 3).

Recommendation: It is recommended that the hinges on the well caps of the protective casings of monitoring wells OBS-2B and OBS-2C be repaired.

2. During 2008, several wells were freshly painted and well identification numbers were applied to the outside of all of the protective casings (page 3)

Recommendation: It is recommended that during the next sampling event the protective casings be re-painted (if deemed necessary) and well identifications be touched up (if required) to make sure that they remain visible.

3. In 2008, monitoring wells OBS-1A and OBS-1B were converted to flush mount designs. No visible well identification numbers are present on these wells (page 3).

Recommendation: It is recommended that both wells be labeled during the next sampling event. There is a small white triangle on the top of each well cap that could be easily labeled. It is also recommended that the concrete pads themselves be painted a

bright color (e.g. fluorescent orange or green) to aid in locating them should coal dust cover them.

4. In 2008, monitoring wells OBS-6A and OBS-6B were re-installed as flush mounts. No visible well identification numbers are present on these wells (page 4).

Recommendation: It is recommended that both wells be labeled during the next sampling event. There is a small white triangle on the top of each well cap that could be easily labeled. It is also recommended that the concrete pads themselves be painted a bright color (e.g. fluorescent orange or green) to aid in locating them should coal dust cover them.

5. The concrete barrier located east of monitoring wells OBS-2B2 and OBS-2C2 was pushed into the well pad and that the corner of the well pad is cracked (page 4).

Recommendation: It is recommended that the concrete barrier be moved east approximately 2-feet and that the corner of the well pad be repaired.

6. The well pad at monitoring wells OBS-7B and OBS-7C was covered by coal dust (page 4).

Recommendation: It is recommended that the coal dust be removed from the well pad the next time that the wells are sampled.

7. The southwest and northeast corners of the concrete pad at monitoring wells OBS-8A, OBS-8B, and OBS-8C are cracked (page 4).

Recommendation: It is recommended that the corners of the well pad at monitoring wells OBS-8A, B, and C be repaired.

4.0 Photographs

Photograph Location Number	Azimuth	Photograph Description
PL-1	180	East corners of the upper roof of the IHX building.
PL-2	90	Gravel along the base of the south side of the IHX building.
PL-3	180	Grass-covered mound east of the IHX building.
PL-4	360	South side of the IHX building. Grassy mound in front, power plant in the background.
PL-5	270	Grass-covered mound east of the IHX building.
PL-6	NA	Broken hinge on the protective casing cap of monitoring well OBS-2C.
PL-7	NA	Monitoring well OBS-4A.
PL-8	NA	Flush mount monitoring well OBS-1B.
PL-9	NA	Concrete barrier east of monitoring wells OBS-2B2 and OBS-2C2. Concrete barrier has been pushed into the well pad. The wells are not damaged.
PL-10	180	Concrete barrier east of monitoring wells OBS-2B2 and OBS-2C2 has been pushed into the well pad. The northeast corner of the well pad is cracked.
PL-11	180	Monitoring wells OBS-7B and OBS-7C. Protected on east and west by concrete barriers. Well pad covered by coal dust.
PL-12	NA	Southwest corner of the concrete pad at wells OBS-8B and OBS-8C is cracked.
PL-13	205	Northeast corner of the concrete pad at Wells OBS-8B and OBS-8C is cracked.



HAL 4/2010. PL-1. East corners of the upper roof of the IHX building.



HAL 4/2010. PL-2. Gravel along the base of the south side of the IHX building.



HAL 4/2010. PL-3. Grass-covered mound east of the IHX building.



HAL 4/2010. PL-4. South side of the IHX building. Grassy mound in front, power plant in the background.



HAL 4/2010. PL-5. Grass-covered mound east of the IHX building.



HAL 4/2010. PL-6. Broken hinge on the protective casing cap of monitoring well OBS-2C.



HAL 4/2010. PL-7. Monitoring well OBS-4A.



HAL 4/2010. PL-8. Flush mount monitoring well OBS-1B.



HAL 4/2010. PL-9. Concrete barrier east of monitoring wells OBS-2B2 and OBS-2C2. Concrete barrier has been pushed into the well pad. The wells are not damaged.



HAL 4/2010. PL-10. Concrete barrier east of monitoring wells OBS-2B2 and OBS-2C2 has been pushed into the well pad. The northeast corner of the well pad is cracked.



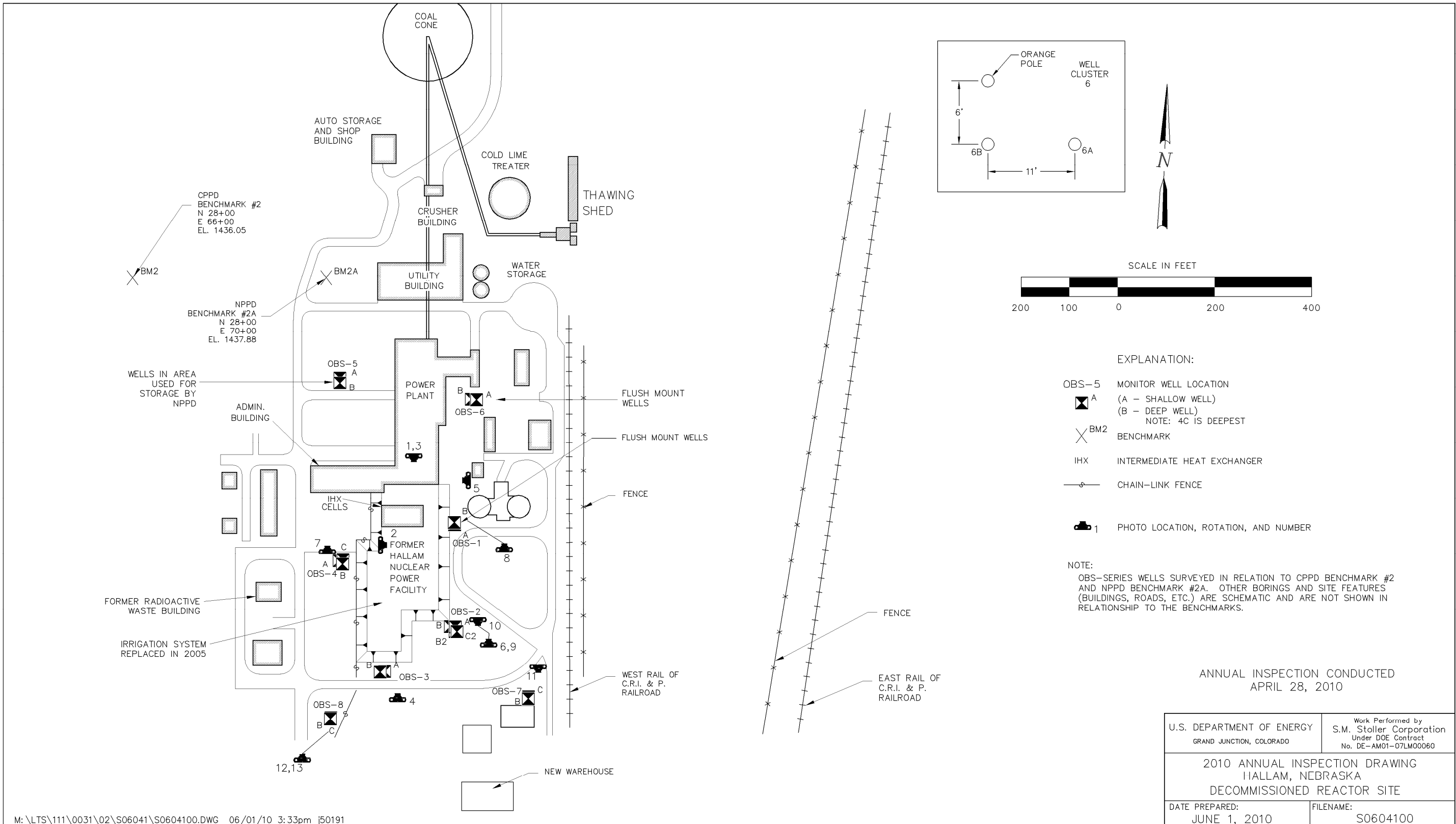
HAL 4/2010. PL-11. Monitoring wells OBS-7B and OBS-7C. Protected on east and west by concrete barriers. Well pad covered by coal dust.



HAL 4/2010. PL-12. Southwest corner of the concrete pad at wells OBS-8B and OBS-8C is cracked.



HAL 4/2010. PL-13. Northeast corner of the concrete pad at Wells OBS-8B and OBS-8C is cracked.



- EXPLANATION:**
- OBS-5 MONITOR WELL LOCATION
 - (A - SHALLOW WELL)
 (B - DEEP WELL)
 NOTE: 4C IS DEEPEST
 - BM2 BENCHMARK
 - IHX INTERMEDIATE HEAT EXCHANGER
 - CHAIN-LINK FENCE
 - 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 28, 2010

U.S. DEPARTMENT OF ENERGY GRAND JUNCTION, COLORADO	Work Performed by S.M. Stoller Corporation Under DOE Contract No. DE-AM01-07LM00060
2010 ANNUAL INSPECTION DRAWING HALLAM, NEBRASKA DECOMMISSIONED REACTOR SITE	
DATE PREPARED: JUNE 1, 2010	FILENAME: S0604100