

**MISSOURI
BASIN
POWER
PROJECT**

PROJECT PARTICIPANTS

Tri-State G & T Association
P.O. Box 33695
Denver, CO 80233-0695
Phone: 303/452-6111

Missouri River
Energy Services
P.O. Box 88920
Sioux Falls, SD 57108-5750
Phone: 605/338-4042

Heartland Consumers
Power District
P.O. Box 248
Madison, SD 57042-0248
Phone: 605/256-6536

Lincoln Electric System
P.O. Box 80869
Lincoln, NE 68501-0869
Phone: 402/475-4211

Wyoming Municipal Power Agency
P.O. Box 900
Lusk, WY 82225-0900
Phone: 307/334-2170

Basin Electric Power Cooperative
1717 East Interstate Avenue
Bismarck, ND 58503-0564
Phone: 701/223-0441

LARAMIE RIVER STATION

**Operating Agent
Basin Electric Power Cooperative**

Phone: 307-322-9601

**P.O. Box 489
Wheatland, Wyoming 82201-0489**

RECEIVED

OCT 22 2009

DNMS

October 20, 2009

United States Nuclear Regulatory Commission
Region V
612 E Lamar Blvd. Suite 400
Arlington, TX 76011

Dear Sirs:

Enclosed is our report of a radiation incident involving SeCoal gauges which occurred during the month of September at the Laramie River Station in Wheatland, WY.

If you have questions regarding this report, please feel free to contact me at Laramie River Station, 307-322-9601, ext. 3146.

Sincerely,

David Cummings
Radiation Safety Officer
Laramie River Station

Enclosure
DC/paj

cc: M. Fluharty w/attachment
B. Larson w/attachment
B. Eriksen, HQ w/attachment
If w/o attachment

Basin Electric Power Cooperative
Laramie River Station
Unit 3 Feeder Deck Incident Report
NRC License #33-18224-01
David Cummings, RSO

October 20, 2009

Background Information

The Laramie River Station (LRS), located in Wheatland, WY, operates 216 industrial gauges for the purpose of operational control measuring flow, level, or density, and use Cs137 as the source. The Radiation Safety Officer is David Cummings. Credentials have been submitted to James Thompson, NRC, under separate cover. Several Instrument Technicians and Laboratory staff are designated as radiation workers at LRS, and given training annually regarding the work they perform related to nuclear gauges. This training typically covers general radiation safety, and includes specific training for leak checks, shutter checks and shutter closures. All other employees are considered to be Members of the Public (MOP) under the LRS Radiation Safety Program.

SeCoal level controls are used to measure the flow of coal from storage bunkers located above the feeder deck to the pulverizers which reduce the size of the coal particles in preparation for their injection into the boiler. The SeCoal consists of two gauges, one mounted near the top and one near the bottom of the feeder chute (Figure 1). They are mounted on a common operational arm, which allows the gauge to be rotated up to 90 degrees from the operational position for two purposes: operators move the arm for local control of the feed, and instrument technicians for the purpose of instrument calibration and maintenance. The lower gauge is located approximately 10 feet above the floor, and the upper gauge about 20 feet above the floor. The SeCoal assembly was installed as a part of the original plant design in the late 1970's. The gauges were replaced in the early 1990's, with an original source of 50 mCi Cs137.



Figure 1. Typical SeCoal Assembly

Incident Summary

Unit 3 experienced an unplanned extended outage beginning August 4, 2009. As a result of the shutdown, the seven coal bunkers that feed Unit 3 had remaining inventory and were nearly full. Normal procedure for an extended Unit shutdown involves the emptying of the bunkers to minimize risk of a coal fire by oxidation.

When it became evident the Unit would be in outage for an extended period of time, Operations began the process of emptying the bunkers. The usual procedure for doing this was found to be too slow and cumbersome given the volume of coal remaining in the bunkers. The decision was made late in August to modify the feed chutes to the pulverizers to allow for easier and more rapid removal of coal from the bunkers. In early September this work was begun, involving the installation and evaluation of a bypass chute in different configurations. The optimal configuration was determined to be at the lower quarter of the chute, at 90 degrees to the SeCoal, with the top quarter of the chute intersecting the plane of the SeCoal on the outside of the feeder chute (Figure 2). Once the decision was made for the optimal location on the first chute, work was begun on the remaining six chutes.

This work was ongoing from the beginning of September, and was nearly completed on September 18 when I became aware of the incident. The possibility of employees doing work in a position of exposure was observed by a Laboratory person, who stopped the work and made the proper notifications. Typically work done on and around the pulverizers is done with the SeCoal in the operational position, where the beam remains inside the chute and does not pose the risk of exposure to employees (Figure 2).

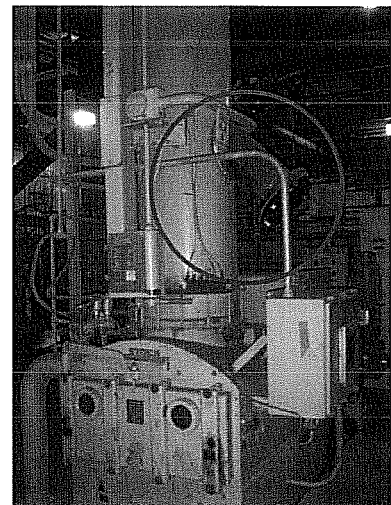
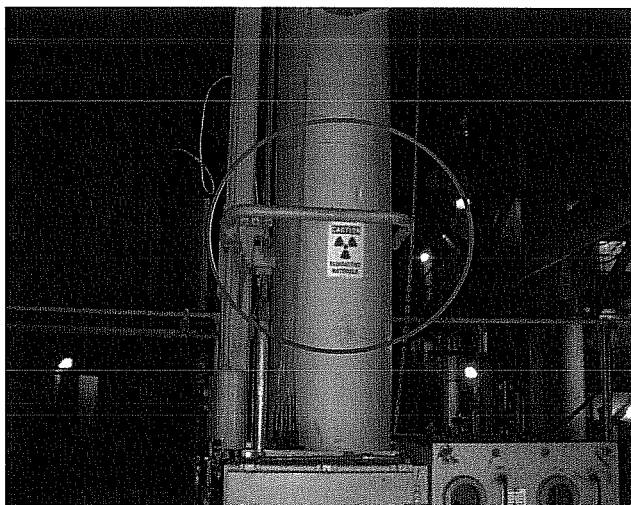


Figure 2. Lower SeCoal Assembly In Operational Position, Showing the area of the chute modification circled in RED, before and after modification. The gauge beam in this configuration is internal to the chute and this is the configuration in which work has been typically performed.

Over the two weeks of work on the chute modification, the following was discovered:

1. Work began with the SeCoal arm in the operational position; presenting no risk of exposure to employees (this has been the typical procedure at LRS throughout its history).
2. An operations employee showed the welder/mechanics how to rotate the arm for the purpose of moving it out of the way to make it easier for them to do their work.
3. The welder/mechanics would move the arm around during the course of the work as necessary to facilitate the needs of the moment.
4. The gauge shutter was not closed even though it was not in the operational position. It was believed by the employees at the time that rotating the arm automatically closed the shutters on the gauges.
5. Fourteen employees had time charged to the work orders related to the chute modification. Based on interviews of each employee, three had no exposure, five had a probable exposure at a level below MOP, and six had probable exposures exceeding MOP. See Appendix I for specific dose information.
6. The individual with the highest exposure was found to have been exposed to maximum of 621 mR, as calculated when using the highest survey results of the two surveys conducted, at one foot. The dose for the same person when calculated using the average of the two surveys was found to be 561 mR at one foot. Exposures for each employee involved were calculated based on the following:
 - a. Given the fact that the employees were exposed to several different gauges and the difficulty in obtaining survey results for each individual gauge, the results of two surveys with the SeCoal arm in different positions were averaged to obtain an mR/hr. The two gauges surveyed are typical of all involved in the incident;
 - b. Employee interview to determine exposure time with the arm in each position;
 - c. A properly calibrated survey meter at a distance of 1 foot from the gauge for all arm positions was used for exposure calculations as this is where the employees most likely were at during the course of the work.

See Appendix I for a Summary of Exposure Calculations.

Root Cause

Three root causes of the incident have been identified:

1. Labels: Gauge labeling was insufficient to inform employees of the presence of radioactive material and subsequent possibility of exposure.
2. Lockout/Tagout: The clearance procedure was inadequate in that it failed to identify the need to shutter and lock the gauge for the purpose of preventing an exposure;

3. Training: The belief that shutter "automatically" closed, when combined with the unauthorized moving of the SeCoal arm for a function other than what the employee had been trained indicate that employee training contributed to this incident.

Incident Resolution

The following actions have been taken to prevent this type of incident from occurring again:

1. Labels: Labels have been installed on all SeCoal arms. This label is a 6"x9" yellow poly sign which displays the radiation symbol and the words "Caution Radioactive Materials" (see Appendix II for a reproduction of the signage installed). Additionally, labeling has been reviewed for all other gauges at LRS, and these signs have been installed in these locations as well.
2. Lockout/Tagout: The clearance procedure has been modified to require SeCoal gauge shutters be closed, locked and tagged when ANY work is performed relative to the coal chutes or SeCoals (see Appendix II for copy of revised procedures).
3. Training: Additional training has been provided to the Mechanic/Welder, Instrument, Laboratory and Electrical shops regarding work around nuclear gauges. The concepts of 'automatic' shutters and how to determine if a gauge shutter is closed for lockout/tagout were specifically addressed. Training has also been provided with Operations personnel and the Instrument Technicians / Laboratory staff regarding specific procedures for shutter closure and subsequent clearance, as follows:
 - a. When a clearance is requested involving a gauge, Operations will notify Instrument Lead.
 - b. A trained Instrument Technician will close the shutter, verify it is closed either by visual inspection or through the use of a survey meter, and apply a lock to the shutter.
 - c. The Operator who hangs the clearance will then apply the clearance directly to the lock. If there is not a lock present, the operator has been trained NOT to hang the clearance until a lock has been applied to the shutter.
 - d. When the work is completed and the equipment is ready to be returned to service, Operations will pull the tag and notify the Instrument Department that the clearance has been lifted.
 - e. A trained Instrument Technician will remove the lock and open the shutter, restoring it to service.

Actions Yet to Be Taken

The following work remains or is in the process of being completed:

1. Region IV of the Nuclear Regulatory Commission is investigating this incident. LRS will implement any additional changes as required by the NRC.

2. Wyoming OSHA is also investigating the incident. Additional changes may be implemented as required by WY OSHA.
3. Training: Annual Radiation Safety training will be conducted on October 29 with all plant personnel. This was scheduled in January 2009 by the Safety Training Coordinator and while this incident will be used as the basis for this training, it is not in response to the incident.
4. Employee dose assessment reports: Each employee potentially affected by the incident will have a letter placed in their permanent file defining the dose received as a result of this incident as determined by myself and/or the NRC.
5. Procedural Review: LRS will be evaluating the clearance procedures for other equipment where a nuclear gauge is in use, to determine the effectiveness of the procedure for isolating the gauge. Deficiencies will be noted and corrected as appropriate.