



**SMUD**

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AN ELECTRIC SYSTEM SERVING THE HEART OF CALIFORNIA

MPC&D 98-032

March 5, 1998

U. S. Nuclear Regulatory Commission  
Attention: Document Control Desk  
Washington, DC 20555

Docket No. 50-312  
Rancho Seco Nuclear Station  
License No. DPR-54

**RESPONSE TO NOTICE OF VIOLATION 98-01**

Attention: Document Control Desk

In NRC Inspection Report 50-312/98-01, the Sacramento Municipal Utility District (the District) received a Notice of Violation related to activities conducted at the Rancho Seco Nuclear Station. In accordance with 10 CFR 2.201, the District provides the enclosed response to Notice of Violation 50-312/98001-01.

Members of your staff requiring additional information or clarification may contact Jerry Delezenski at (916) 452-3211, extension 4914.

Sincerely,

Steve J. Redeker  
Manager  
Plant Closure & Decommissioning

cc w/Encl: E. W. Merschoff, NRC, Arlington, Texas  
S. Weiss, NRC, Rockville

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**NRC Statement of Violation:**

Rancho Seco Technical Specification D6.11 states, "Procedures for personnel radiation protection shall be prepared consistent with the requirements of 10 CFR 19 and 10 CFR 20, and shall be approved, maintained and adhered to for all operations involving personnel radiation exposure." 10 CFR 20.1501(a) states, "Each licensee shall make or cause to be made, surveys that (1) may be necessary for the licensee to comply with the regulations in this part; and (2) are reasonable under the circumstances to evaluate (i) the extent of radiation levels; and (ii) concentrations or quantities of radioactive material; and (iii) the potential radiological hazards that could be present.

Contrary to the above, on December 22, 1997, a shipment of scrap metal, in the form of an auxiliary boiler, was released from the Rancho Seco site without having been surveyed. Low levels of contamination were discovered on the boiler at a local scrap yard by a truck monitoring system at the entrance to the facility. The boiler was subsequently returned to the Rancho Seco site.

This is a Severity Level IV violation (Supplement IV).

**District Response**

**Admission or Denial of Violation**

The District acknowledges that the violation occurred as stated, with two minor clarifications.

First, the NRC Statement of Violation, as written, could lead one to believe that the entire auxiliary boiler scrap metal shipment was not surveyed. Actually, only one piece of scrap metal, composing a small portion of the shipment, was not properly surveyed for free release. Workers had cut up the auxiliary boiler into several segments in preparation for its disposal. Each segment was properly surveyed and free released for disposal, except for the auxiliary boiler end bell segment. Radiation Protection Technicians (RP Techs) had performed a preliminary survey on this segment during auxiliary boiler disassembly. This cursory survey was designed to identify any significant contamination on the end bell segment and was not intended to be the basis for free release of this segment. A survey of the end bell segment on December 23, 1997, after it was returned to Rancho Seco, identified one small area (about two square inches) of low level radioactive contamination (2,000 counts per minute (cpm) at 1/2 inch) on a pipe nipple.

## **Response to NRC Notice of Violation 50-312/98001-01**

### **Admission or Denial of Violation (Continued)**

Second, use of the word 'contamination' in the NRC Statement of Violation could lead one to believe that the truck monitor at the recycle facility alarmed because of contamination of plant origin. Actually, the likely cause of the truck monitor alarming is the presence of refractory material on the auxiliary boiler tubes, which was part of the shipment. This refractory material contains naturally occurring isotopes of radium and actinium, which are not licensed materials.

### **Reason for Violation**

The reasons the violation occurred are:

- (1) Inadequate communication between RP Techs;
- (2) Inadequate communication between RP Techs and RP Supervision;  
and
- (3) Insufficient detail in RP procedures used to free release surveyed material.

### **Discussion of Violation**

At about 8:00 am, on December 22, 1997, a shipment of scrap metal on a flat bed trailer left the Rancho Seco site for transport to a local scrap metal recycle facility. The shipment consisted of the large auxiliary boiler cut up into several segments that were loaded onto a flat bed trailer. RP Techs performed an *Aggregate Quantity* survey prior to the shipment leaving the site. The *Aggregate Quantity* survey indicated no detectable radiation level above background (6  $\mu$ R/hr).

At the recycle facility, the shipment passed through a whole truck radiation monitor. The monitor alarmed, indicating the potential presence of radioactive material. To confirm this initial monitor response, the truck passed through the monitor two more times, causing the monitor to alarm both times. The recycle facility notified the District of the alarm condition. The District directed that the shipment be returned to Rancho Seco. At about 11:30 am, on December 22, 1997, the truck returned with the entire shipment. The scrap metal material remained on the trailer the whole time the shipment was not at Rancho Seco. Upon return of the truck, plant personnel initiated a re-survey of the entire shipment to investigate the cause of the alarm.

On December 23, 1997, during the re-survey effort, RP Techs found one small area (approximately two square inches) on the outside surface of the auxiliary boiler end bell segment that had fixed contamination of plant origin. The contaminated area was on a pipe



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### Discussion of Violation (Continued)

nipple protruding from the end bell segment. This slightly contaminated end bell segment had been placed on the flat bed trailer with the pipe nipple side facing up. Therefore, the contaminated area was not in contact with other material or the flat bed trailer during the shipment.

A survey of the slightly contaminated end bell pipe nipple indicated a radiation reading of 2000 cpm at 1/2". The shipment re-survey results determined that no other segment on the shipment contained radioactive material of plant origin. But, the re-survey effort did confirm the auxiliary boiler tubes had refractory material that contained naturally occurring isotopes of radium and actinium. Survey results of the refractory material indicated a radiation level range from seven to 11  $\mu\text{R/hr}$  above background. It is likely that the large amount of refractory material contained within the auxiliary boiler shipment caused the recycle facility truck monitor to alarm.

District personnel evaluated the quantity of radioactive material contained within the small contaminated area on the end bell pipe nipple and conservatively estimated the amount to be 0.0042  $\mu\text{Ci}$  of Cs-137. District personnel then calculated the potential exposure impact this quantity of radioactive material could have on a person. The calculations considered the *Direct*, *Inhalation*, and *Ingestion* pathways. The District determined that the potential dose impact to a person exposed to 0.0042  $\mu\text{Ci}$  of Cs-137 via the *Inhalation* and *Ingestion* pathways was less than 1 mrem whole body. Also, the District determined the potential dose impact for the *Direct* exposure pathway was less than 1 mrem, assuming continuous exposure to the contamination for one year.

To put this potential dose impact (less than 1 mrem whole body) into perspective, the average annual dose to an individual in the United States from natural background sources is about 300 mrem whole body. A single chest X-ray exposes an individual to 15 to 30 mrem in a few seconds.

Considering the location of the end bell segment contamination, RP Supervision concluded that the insulation in the area around the end bell pipe nipple could also have slight contamination. RP personnel conducted a search for the insulation and found the bags containing the auxiliary boiler insulation in the auxiliary boiler dismantlement work area. RP personnel conducted a survey of the insulation material and found four pieces that were slightly contaminated. These pieces were approximately 2" x 2" x 3", and the survey results for this material ranged from 500 to 1,000 cpm at 1/2". This material was in bags marked as having been surveyed for free release. District management expanded the incident investigation to include the improperly marked insulation as well as the auxiliary boiler end bell segment.

## **Response to NRC Notice of Violation 50-312/98001-01**

### **Cause of Violation**

As stated above, the violation occurred because there was:

1. Inadequate communication between RP Techs;
2. Inadequate communication between RP Techs and RP Supervision; and
3. Insufficient detail in RP procedures used to free release surveyed material.

First, a lack of communication between two RP Techs caused one technician to mistakenly mark and free release the slightly contaminated auxiliary boiler end bell segment. This segment did not receive a 100% survey of external and accessible surfaces, required by procedure RP.305.09A. The first technician performed only a preliminary survey at the time of the disassembly of the end bell segment from the auxiliary boiler. This cursory survey only looked for obvious contamination on the end bell segment.

Survey activities for the auxiliary boiler were then transferred to a second RP Tech, who thought that the required 100% survey for free release of the end bell segment had been performed. This second technician then did a spot check of the end bell segment, and, finding no contamination, marked the item indicating it was ready to be free released from the site. Thus, a lack of communication between the two RP Techs caused the end bell segment to not receive the required free release survey.

The other communication deficiency that contributed to not performing a 100% survey on the end bell segment was poor communication between RP Techs and RP Supervision as to the detail of the auxiliary boiler survey documentation. The actual survey documentation for the auxiliary boiler consisted of RP Techs making a single line entry into the Incremental Decommissioning Radiation Monitoring Log. RP Supervision's expectations were that RP Techs should have documented the survey results of each auxiliary boiler segment. Documenting the survey results of each auxiliary boiler segment would have resulted in enhanced RP Tech accountability and an additional administrative barrier that could have prevented this incident.

RP procedures had insufficient detail regarding identification of free released material. Standard RP practice has RP Techs surveying and marking material as free released for only those items the RP Techs personally surveyed. But, RP program procedures did not include specific requirements for RP Techs to survey and then mark for free release only those items they personally surveyed. Plant management has always emphasized strict procedural compliance. Therefore, this procedural deficiency contributed to a breakdown in the standard practice during the auxiliary boiler survey work.



**Cause of Violation (Continued)**

The removal and bagging of four pieces of slightly contaminated auxiliary boiler insulation material occurred due to inadequate communications and procedural deficiencies. Standard practice is to remove insulation with RP Techs present so the RP Techs can survey each piece of insulation before it is placed into bags. A worker, without communicating with supervision and RP Techs, removed and bagged the insulation because the worker thought this was part of his assigned tasks. Later an RP Tech did an *Aggregate Quantity* survey of the bags and marked them as free released. The RP Tech did this because of the standard practice associated with removing insulation (i.e., RP Tech present during removal so the insulation can be properly surveyed prior to being bagged for free release). The RP Tech who marked the bags following performance of an *Aggregate Quantity* survey assumed the material in the bags had been previously surveyed for free release. Therefore, as discussed above, inadequate procedures that did not require RP Techs to survey and mark material for free release for only those items they personally surveyed contributed to an RP Tech marking the bags of insulation for free release.

Since the reasons for the auxiliary boiler insulation contamination incident are the same as the reasons for the slightly contaminated auxiliary boiler end bell segment incident, the corrective action discussion below also applies to the contaminated insulation incident.

**Corrective Actions Taken and Results Achieved**

In compliance with the Rancho Seco Corrective Action Program, the Radiation Protection group wrote a Potential Deviation from Quality (PDQ) 97-0082 in response to this incident and plant management designated this incident a Deviation from Quality (DQ). Plant management assigned the Radiation Protection group an action to determine the cause and extent of the incident and the appropriate remedial and preventive corrective actions necessary to prevent recurrence of this incident.

On December 23, 1997, in response to the detection of the contamination, plant management ceased shipping waste material off-site. Also, on December 24, 1997, plant management stopped free release surveying so they could evaluate the existing program for improvement. Management took these actions to prevent any possibility of improperly surveyed material from leaving the site or leaving a radiological controlled area.

On December 30, 1997, RP Supervision and the Incremental Decommissioning Team Leader conducted training with District and contract Radiation Protection personnel to:

1. Re-enforce the standard RP practice that surveyed material with a measured and reproducible radiation level above background is considered radioactive and is not free releasable;

**Corrective Actions Taken and Results Achieved (Continued)**

2. Clarify that the 100 cpm above background criteria is a minimum required survey equipment sensitivity and is not a free release detection limit;
3. Convey to RP Techs that they must use a survey map or survey log to document surveys performed;
4. Train RP Techs on the appropriate level of survey documentation expected for various survey job examples (e.g., a large component cut up into segments that may be free releasable should have a survey documented for each segment)
5. Instruct RP Techs that they are to mark material for free release only for material that they personally performed the radiation survey.

Following this training, RP personnel began re-surveying material that had been cleared for free release but was still on-site. As of January 28, 1998, RP Techs re-surveyed and verified 100% of the material marked for free release that remained on-site was acceptable for free release. The re-surveyed material included:

1. Approximately 3,000 ft<sup>3</sup> of miscellaneous scrap material that had been placed in dumpsters;
2. Various fans, pumps, valves, and motors;
3. Two 3,000 gallon tanks;
4. Four 6' x 6' x 6' dehumidifiers;
5. Four 4' x 6' control panels;
6. Two 15' long by 2.5' diameter lube oil cooler shells;
7. One 15' x 12' x 10' metal shack; and
8. The returned auxiliary boiler shipment and other auxiliary boiler segments not yet shipped.

The RP group revised procedures RP.305.08A, "Normal and Radiation Work Permit Surveys," and RP.305.09A, "Release of Materials from the Radiological Controlled Area," to address in RP procedures the December 30, 1997, training information provided to RP personnel.

On January 15, 1998, RP Supervision and the Incremental Decommissioning Team Leader provided additional training to District and contract RP personnel on the initial RP procedure program changes and one significant, subsequent program change. This subsequent program change centered on the new Incremental Decommissioning Package (IDP) Information Worksheet that RP Supervision now prepares for each IDP. This worksheet provides IDP job summary information, historical radiological information on



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### **Corrective Actions Taken and Results Achieved *(Continued)***

the systems involved in the IDP, and survey requirements. The program requires RP personnel involved in IDP work to read and familiarize themselves with the IDP Information Worksheet. This program enhancement provides greater assurance that RP personnel assigned to IDP work will (1) perform and properly document the required surveys, (2) properly identify and dispose of free releasable and contaminated material, and (3) communicate adequately so poor communication will not cause contaminated material to leave the site.

To implement this program change, the RP group revised procedure RP.305.09A to add the RP IDP Information Worksheet. Also, the Technical Services group revised plant administrative procedure RSAP-1900, "Incremental Decommissioning Control," to require RP personnel to review the IDP Information Worksheet for system radiological information and survey requirements.

Based on implementation of the above corrective actions, plant management removed the self imposed restrictions on (1) surveying material for free release and (2) off-site shipment of free release material. Also, based on the re-survey results, interviews with RP Techs and this Notice of Violation investigation, Rancho Seco management concludes the lack of proper surveys on the end bell and associated insulation do not indicate other failures to perform free release surveys.

### **Corrective Actions to be Taken to Avoid Further Violations**

To continue to identify RP program improvements, Rancho Seco management initiated the Incremental Decommissioning Employee Action (IDEA) Team. The IDEA Team is evaluating the effectiveness of, and developing improvements in, radiological material management for dismantlement activities. The IDEA Team includes first line personnel directly involved in identifying, controlling, and handling contaminated and free releasable material. The Team began meeting on February 2, 1998, meets weekly, and is expected to be active for several months. Plant management will form similar action teams on an as needed basis to (1) evaluate the effectiveness of changes to the RP and Incremental Dismantlement programs and (2) develop additional program enhancements.

Also, the RP group is upgrading the initial and refresher General Employee Training (GET) that the District requires for radiation workers at Rancho Seco. Individuals requiring access to radiologically controlled areas will now receive enhanced training. For example, individuals who have not worked at Rancho Seco as a radiation worker will receive a walking tour through the plant coupled with instruction on (1) material removal from systems and (2) the various handling, survey, and disposal requirements associated



**Corrective Actions to be Taken to Avoid Further Violations *(Continued)***

with removed material, including lessons learned from Incremental Decommissioning experiences. The enhanced GET training will improve radiation worker knowledge of dismantlement activities and radiological controls used at Rancho Seco.

Quality Assurance (QA) program improvements include performing periodic surveillances beginning in March 1998, to independently verify material radiation survey results. Other areas of QA program improvement are:

1. QA group involvement in the IDEA Team;
2. Implementation of IDEA Team findings affecting the QA area; and
3. Continued integration of RP program changes into QA surveillance and audit plans.

Plant management began the process to obtain a truck monitor at Rancho Seco to provide additional assurance that radioactive material of plant origin does not inadvertently leave the Rancho Seco site. This monitor will be used as a final check on shipments that contain free released material. The RP group issued a purchase request for a truck monitor on January 28, 1998.

**Date When Full Compliance will be Achieved**

The District completed the necessary actions to achieve full compliance (i.e., perform required survey on auxiliary boiler segment) on December 23, 1997. The District is obtaining a truck monitor on an expedited basis and expects installation during the middle part of 1998. The IDEA Team, upgraded GET training, and QA program improvement items are on-going activities.