Withdrawn

NRC Information Notice 2013-13, “Deficiencies with Effluent Radiation Monitoring System Instrumentation,” dated July 12, 2013 (ADAMS Accession No. ML13098A128), has been withdrawn and superseded by IN 2013-13, Rev. 1 (ADAMS Accession No. ML14253A270).

UNITED STATES
NUCLEAR REGULATORY COMMISSION
OFFICE OF NUCLEAR REACTOR REGULATION
OFFICE OF NEW REACTORS
OFFICE OF FEDERAL AND STATE MATERIALS AND
ENVIRONMENTAL MANAGEMENT PROGRAMS
OFFICE OF NUCLEAR MATERIAL SAFETY AND SAFEGUARDS
WASHINGTON, DC 20555-001

July 12, 2013

NRC INFORMATION NOTICE 2013-13: DEFICIENCIES WITH EFFLUENT RADIATION MONITORING SYSTEM INSTRUMENTATION

ADDRESSEES

All holders of operating licenses or a construction permit for a nuclear power reactor or a non-power reactor under Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, "Domestic Licensing of Production and Utilization Facilities," including those that have permanently ceased operations and have certified that fuel has been permanently removed from the reactor vessel.

All holders of and applicants for a power reactor early site permit, combined license, standard design certification, standard design approval, or manufacturing license under 10 CFR Part 52, "Licenses, Certifications, and Approvals for Nuclear Power Plants."

All holders of a materials license, certificate, approval, or registration, including those holders of and applicants for a specific source material license, under 10 CFR Part 40, "Domestic Licensing of Source Material." Also all holders of and applicants for a uranium recovery operating license or construction permit under 10 CFR Part 40 which includes conventional mills, heap leach facilities, and in situ recovery facilities.

All holders of and applicants for a fuel cycle facility license under 10 CFR Part 70, "Domestic Licensing of Special Nuclear Material."

All holders of and applicants for an independent spent fuel storage installation license under 10 CFR Part 72, "Licensing Requirements for the Independent Storage of Spent Nuclear Fuel, High-Level Radioactive Waste, and Reactor-Related Greater Than Class C Waste."

ML13098A128

All holders of and applicants for a gaseous diffusion plant certificate of compliance or an approved compliance plan under 10 CFR Part 76, "Certification of Gaseous Diffusion Plants."

PURPOSE

The U.S. Nuclear Regulatory Commission (NRC) is issuing this information notice (IN) to inform addressees of recent operating experience involving deficiencies with effluent radiation monitoring systems. These deficiencies affected the radioactive effluent control program and the licensee's ability to implement the emergency plan. Actions in accordance with the Maintenance Rule, 10 CFR 50.65 "Requirements for monitoring the effectiveness of maintenance at nuclear power plants" were not always taken and, in some cases, this has resulted in radiation monitors being out of service for extended periods of time.

The NRC expects recipients to review the information for applicability to their facilities and to consider actions, as appropriate, to avoid similar problems. Suggestions contained in this IN are not NRC requirements; therefore, no specific action or written response is required.

DESCRIPTION OF CIRCUMSTANCES

The NRC staff reviewed industry operating experience for the past 5 years and identified 27 instances at 20 facilities where the effectiveness of an effluent radiation monitoring system (RMS) was degraded enough to warrant an inspection finding. Of particular concern is an apparent increase in the frequency of these instances; 13 have occurred within the past 2 years. The NRC staff evaluated these events and grouped them into several categories based on the program, organization, or process impacted. These categories include:

- design (design changes, modifications, alterations)
- calibrations and checks (primary, secondary, operability tests, etc.)
- representative sampling
- backup RMSs and alternate sampling
- material condition
- quality assurance and quality control
- Maintenance Rule
- emergency planning

Example events from each of these categories are summarized below.

Shearon Harris—Design—Configuration Change Eliminates Isokinetic Sampling

In 2008, the NRC staff identified that the licensee did not adequately survey radioactive materials released through the plant vent stack. Specifically, in 2000, the licensee abandoned a plant vent stack particulate sample line booster pump because of repeated maintenance problems. As a result, sample line isokinetic conditions (i.e., those conditions required to ensure representative sampling of radioactive particulates) were no longer maintained. The licensee proceeded with a modification to abandon the booster pump, assuming the plant vent stack high-efficiency particulate air (HEPA) filtration systems would effectively remove large particulates from the flow path upstream of the particulate sampler in the plant vent stack RMS. The licensee did not recognize that particulates from the spent fuel pool filter backwash system were discharged into the vent path downstream of the HEPA filtration system. With isokinetic conditions no longer maintained in the sample line, the ability to collect a representative sample

of airborne particulates from the backwash system was degraded. This underestimated the dose to a member of the public by up to 40 percent during periods when the spent fuel pool filter backwash system was being operated. Corrective actions included reestablishing sample line isokinetic conditions and entering this issue into the licensee's corrective action program (CAP). Additional information appears in NRC Integrated Inspection Report 05000400/2008005, dated January 29, 2009, Agencywide Documents Access and Management System (ADAMS) Accession No. ML090290280.

Oconee—Design and Material Condition—Moisture in RMS Sample Chamber Impacts RMS Response

In August 2010, the NRC staff identified that the licensee did not evaluate the operability of the condenser off-gas (COG) RMSs when water was found in the sample line flow sight glass. The licensee had initially identified the accumulation of water in the off-gas RMSs shortly after they were installed in the 1990s. The licensee did not recognize the inoperability of the monitors, even though the detectors were requiring replacement at a much higher frequency than expected because of water in the detection chamber that was damaging the detector's Mylar window. Further, the presence of water in the detection chamber shielded the beta radiation detector, reduced the measuring chamber gas volume, and invalidated quantitative measurements. The licensee entered this issue into its CAP, and corrective actions included draining the detection chamber once per shift. It also developed plans to replace the COG monitors with a different type of detector that is less susceptible to moisture accumulation. Additional information appears in NRC Integrated Inspection Report Nos. 05000269/2011016, 05000270/2011016, and 05000287/2011016, dated June 23, 2011, ADAMS Accession No. ML111751823.

Brunswick—Design and Representative Sampling—Sample Line Tees and Bends Can Impact Representative Sampling

In 2010, the NRC staff identified that the reactor building vent effluent RMS contained mechanical tee connections and elbows on the inlet side of the particulate sampler, potentially affecting the ability to collect a representative sample. The NRC inspectors determined that the impact of the configuration had not been evaluated for (1) the particle sizes likely to be encountered, (2) the line loss through the sampling line, or (3) the potential impact on public dose estimates. This degraded the ability to monitor radioactive effluents. The licensee entered this issue into its CAP, and corrective actions included completing a sample line deposition study and developing correction factors to be added to effluent release calculations. Additional information appears in NRC Integrated Inspection Report Nos. 05000325/2010002 and 05000324/2010002, dated April 28, 2010, ADAMS Accession No. ML101180517.

Calvert Cliffs—Design and Representative Sampling—Design of RMS Sampling System Dilutes Sample

In December 2010, the NRC staff identified that a ventilation system did not maintain the design negative pressure in the material processing facility (MPF), which could allow radioactive material to bypass the RMS and escape the MPF. NRC staff review identified that important portions of the system were out of service for 7 years, and the associated effluent RMS was out of service for 4 years. Further NRC staff review identified that both the initial RMS sample design, as well as the backup effluent sampler, did not provide representative samples of the effluent stream because of sample dilution issues (e.g., deadhead flow from the standby or alternate train). CAP actions included immediate stoppage of all work in the building and

completion of the necessary repairs before restarting work in the building. Additional information appears in NRC Integrated Inspection Report Nos. 050000317/2010005 and 05000318/2010005, dated January 28, 2011, ADAMS Accession No. ML110280097.

Shearon Harris—Calibrations—Secondary Calibration Source Not Traceable to the Primary Calibration

In 2012, the NRC staff identified that a radioactive chlorine-36 source, used for secondary calibration of the plant vent stack monitor, was not traceable to the primary calibration. Specifically, when the original secondary source developed a leak and had to be replaced, an inadequate engineering calculation was performed to evaluate the suitability of the new source. The evaluation compared the sources' activities and Mylar thicknesses, but it did not address geometry differences between the two sources (i.e., point source vs. 2.5-centimeter (1-inch) diameter active area). Thus, traceability of the new chlorine-36 source to the National Institute of Standards and Technology traceable primary calibration was not adequately established. The licensee entered this issue into its corrective action process and evaluated corrective actions and extent of condition. The licensee performed a supplemental evaluation, which showed that the geometry differences between the old source and new source had only minimal effect on detector response. Additional information appears in NRC Inspection Report No. 05000400/2012003, dated July 26, 2012, ADAMS Accession No. ML12208A231.

Kewaunee—Calibration—Sources Not Appropriate for Secondary Calibration

As part of an event follow-up for LER 2006-010-00, in 2009, the NRC staff evaluated and closed an issue involving radioactive sources used for calibration of effluent RMSs. The secondary calibration sources used for the liquid radioactive waste RMS and the steam generator blowdown liquid RMS were not of sufficient strength to meet channel calibration requirements of the Offsite Dose Calculation Manual (ODCM) and technical specifications (TS). Subsequent testing, with sources of sufficient strength, determined that one of the instruments did not perform as predicted in the range in which the alarm was required, thus rendering the instrument inoperable. The licensee entered this into the CAP. The licensee immediately declared the instrument inoperable and began the required compensatory sampling. Additional maintenance corrected the condition, and subsequent secondary calibrations were appropriately completed. Additional information appears in NRC Integrated Inspection Report No. 05000305/2009003, dated August 5, 2009, ADAMS Accession No. ML092180061.

Prairie Island—Maintenance—RMSs Not Scoped in the Maintenance Rule

Regulations in 10 CFR 50.65(b)(2)(i) require, in part, that the scope of the Maintenance Rule Program includes non safety-related structures, systems, and components that are relied upon to mitigate transients or are used in the emergency operating procedures (EOPs). The NRC staff identified on September 30, 2011, that the licensee failed to include all plant RMSs used in the EOPs within the scope of the Maintenance Rule Program. In addition, the licensee was not demonstrating that the performance or the condition of RMSs included within the scope of the Maintenance Rule Program was being effectively controlled through the performance of preventive maintenance. As a result, the performance of some RMSs was not being assessed against licensee-established goals to provide reasonable assurance that the monitors were capable of performing their intended functions. Without the appropriate monitoring and maintenance priority, RMSs may remain out of service for long periods of time. The licensee entered this into its CAP. Corrective actions included scoping the applicable RMSs into the Maintenance Rule Program. Additional information appears in NRC Integrated Inspection

Report Nos. 05000282/2011004 and 05000306/2011004, dated October 23, 2011, ADAMS Accession No. ML112980240.

Peach Bottom—Representative Sampling and Quality Assurance—Procedures Lack Detail To Ensure Representative Sampling

In 2007, the NRC staff identified that the licensee did not establish adequate quality assurance for monitoring radioactive particulates from the main plant stack. Specifically, the procedures for effluent monitoring were inadequate to detect and prevent non-representative sampling of particulates by the main plant stack RMS. Particulates were bypassing the O-ring around the particulate filter, resulting in underreporting of radioactive effluents. The NRC staff determined that a contributing factor was the lack of adequate training of personnel to recognize sample bypass. The licensee entered this issue into its CAP. Corrective actions included reevaluating affected radioactive effluent dose assessments for 2006 and 2007 to ensure no TS dose limits were exceeded, restoring representative sampling by correcting the cause of sample bypass, and evaluating extent-of-condition for both the Unit 2 and Unit 3 plant vent stack 'B' train sampling systems. Additional information appears in NRC Integrated Inspection Report Nos. 05000277/2007002 and 05000278/2007002, dated May 15, 2007, ADAMS Accession No. ML071350471.

Oyster Creek—Material Condition and Representative Sampling—Sample Line Integrity Impacts Representative Sampling

In December 2010, the NRC staff identified that the licensee did not maintain the required continuous representative sampling of the main plant stack effluent. The main plant stack effluent sample line, supplying the main plant stack effluent RMS, was found to be separated at a tube fitting by several inches resulting in a non-representative sample of stack effluents. Subsequent inspection of main stack RMS effluent radioactivity trends showed a long-term decreasing trend from 2006 to 2010. Additionally, some radionuclides that were typically present in main stack samples in 2006 were absent in 2010 analysis results. Further, the NRC staff identified that the licensee did not promptly report the degraded sample capability for impact on the emergency preparedness (EP) program and did not implement timely compensatory sampling for certain functions of the system that supported the EP program. The licensee's ultimate corrective actions included revising site procedures to provide for an alternate sampling plan, initiating compensatory monitoring, repairing the stack sample line, conducting bounding dose calculations, evaluating extent-of-condition, and entering information into the CAP. Additional information appears in NRC Integrated Inspection Report No. 05000219/2010003, dated August 9, 2010, ADAMS Accession No. ML102210111; and NRC Integrated Inspection Report No. 05000219/2010005, dated February 8, 2011, ADAMS Accession No. ML110390509.

Columbia—Emergency Planning—Incorrect RMS Response Factors Used as Part of the Emergency Plan

In 2012, the NRC staff determined that the licensee used inappropriate parameters for the reactor building RMS in the emergency plan's dose projection software. In the event of a real emergency, the use of inaccurate radio-gas calibration and xenon-equivalency factors in dose projection software would affect the assessment of a radiological release. This condition existed between April 2000 and December 2011. The licensee entered this into their CAP. Corrective actions included correcting the erroneous values used in the emergency plan.

Additional information appears in NRC Inspection Report No. 05000397/2012502, dated July 26, 2012, ADAMS Accession No. ML12208A379.

Oyster Creek—Maintenance and Emergency Planning—Loss of RMS Sampling System Can Impact Emergency Planning

In 2009, the NRC staff identified that the licensee did not implement timely corrective or compensatory actions when the main stack effluent monitoring system automatic cartridge sampling system was taken out of service from November 2006 through March 2009. The automatic system provided for collection of high-activity, post-accident cartridge effluent samples. After the automatic sampling system was placed in manual, to allow for manual collection of the cartridges, the chemistry staff did not document the loss of automatic sampling capability in the corrective action program, nor were the concerns forwarded to the EP group for an analysis regarding potential impact on the emergency plan. The licensee did not repair the system in a timely manner, nor evaluate the manual compensatory sampling measures to ensure high activity samples could be handled and analyzed without excessive personnel radiation exposure. Corrective actions included replacing solenoid valves in the automatic sampling system and returning the automatic sampling system to service. Additional information appears in NRC Inspection Report 05000219/2009002, dated May 5, 2009, ADAMS Accession No. ML091250078.

BACKGROUND

The regulatory basis for effluent RMSs includes the following:

A requirement to monitor effluent discharge paths for radioactivity released from nuclear power plants is included in Criterion 64, “Monitoring radioactivity releases,” of Appendix A, “General Design Criteria for Nuclear Power Plants,” to 10 CFR Part 50.

A requirement that instrumentation be provided to monitor variables and systems over their anticipated ranges for accident conditions, as appropriate, to ensure adequate safety is included in Criterion 13, “Instrumentation and control,” of Appendix A to 10 CFR Part 50.

Regulations in 10 CFR 50.36a(a) require affected licensees to have TS to keep radioactive materials released to the unrestricted area as low as is reasonably achievable. The licensee’s TS and ODCM require RMSs for radioactive effluents to be maintained through calibration, testing, operational requirements, and maintenance procedures. The alarm and trip setpoints associated with effluent RMSs must be set and adjusted in accordance with the TS and ODCM. Effluent RMS alarm and trip setpoints can provide adequate assurance that the public radiation dose limits of 10 CFR Part 20, “Standards for Protection against Radiation,” and that the design objectives of 10 CFR Part 50, Appendix I, “Numerical Guides for Design Objectives and Limiting Conditions for Operation to Meet the Criterion ‘As Low as is Reasonably Achievable’ for Radioactive Material in Light-Water-Cooled Nuclear Power Reactor Effluents,” are not exceeded. Additional ODCM provisions direct licensees to take compensatory actions whenever effluent RMSs are out of service. Some of these provisions include completing corrective maintenance to return the radiation monitors to service and implementing compensatory sampling of plant systems to monitor potential radioactive effluent release points.

RMSs are used to satisfy some of the surveillance and reporting requirements of 10 CFR 50.36a(a)(2), 10 CFR 40.65, 10 CFR 70.59, and 10 CFR 72.44(d)(3).

Some RMSs may be used by power reactor licensees as part of the steam generator tube integrity program that is contained in their TS and current licensing basis.

Regulations in 10 CFR 20.1501(a) require licensees to "make…surveys" that are necessary and reasonable to evaluate the concentrations and quantities of radioactive materials. Additionally, the regulations in 10 CFR 20.1501(b) require licensees to ensure that instruments used for quantitative radiation measurements (e.g., effluent monitoring) are calibrated periodically for the radiation measured.

Effluent RMSs are sometimes used in the licensee's emergency plan (per 10 CFR 50.47, "Emergency plans"). The regulatory basis for RMSs used as part of the emergency plan is discussed in detail in IN 2013-01, "Emergency Action Level Thresholds outside the Range of Radiation Monitors."

RMSs used in the emergency plan are within the scope of Section (b)(2)(i) of the Maintenance Rule, 10 CFR 50.65, "Requirements for monitoring the effectiveness of maintenance at nuclear power plants."

The regulations in 10 CFR Part 40, "Domestic Licensing of Source Material," requires affected licensees to comply with the requirements of 10 CFR 40.63, "Tests." Paragraph (c) requires tests of radiation detection and monitoring instrumentation. Licensee's involved with uranium milling, uranium hexafluoride production, and enrichment facilities are required to report radioactive effluents in accordance with the regulations in 10 CFR 40.65, "Effluent monitoring reporting requirements."

The regulations in 10 CFR Part 70, "Domestic Licensing of Special Nuclear Material," requires affected licensees to comply with the requirements of 10 CFR 70.56, "Tests." Paragraph (c) requires tests of radiation detection and monitoring instrumentation. Licensee's involved with special nuclear materials are required to report radioactive effluents in accordance with the regulations in 10 CFR 70.59, "Effluent monitoring reporting requirements."

The regulations in 10 CFR Part 72, "Licensing Requirements for the Independent Storage of Spent Nuclear Fuel, High-level Radioactive Waste, and Reactor-related Greater than Class C Waste," requires affected licensees to comply with the requirements of 10 CFR 72.44, "License conditions." These licensees are required to report radioactive effluents in accordance with the regulations in Paragraph 10 CFR 72.44(d)(3). The regulations in 10 CFR 72.126, "Criteria for radiological protection," Paragraph (c), "Effluent and direct radiation monitoring," specify that if necessary, means shall be provided for measuring the amounts of radionuclides in effluents. Paragraph (d), "Effluent control," specifies that independent spent fuel storage installations and monitored retrievable storage installations must be designed to provide means to limit effluents. Additionally, systems designed to monitor the release of radioactive materials must have means for calibration and testing their operability.

The regulations in 10 CFR Part 76, "Certification for Gaseous Diffusion Plants," Section 76.35(g) requires that the periodic application for a certificate of compliance includes environmental and effluent monitoring data as part of the compliance status report. Additionally, these certificate holders must comply with 10 CFR 20.1101, "Radiation protection programs." Paragraph (d) requires that a constraint on air emissions shall be established such that members of the public will not receive in excess of 0.1 millisievert (10 mrem) annually.

While many of the requirements discussed above are not applicable to non-power reactor licensees, these licensees and certificate holders use RMSs that could be affected by the issues described in this IN. For example, although non-power reactor licensees are not required to meet the specific requirements in 10 CFR 50.47, "Emergency plans," they are required to have emergency plans that may use RMSs. Non-power reactor licensees are also required to comply with 10 CFR Part 20. Specific requirements for effluent monitoring programs and effluent RMSs are designed for each non-power reactor to achieve levels that are as low as is reasonably achievable. Factors considered include the design, power level, and types of effluents for each facility.

To implement the regulations listed above, licensees take actions to maintain RMSs in an operable condition. When an effluent RMS fails, licensees are typically required to take actions that ensure effluents are adequately monitored. It is at these times that RMSs can have a significant impact on the radioactive effluent control program.

Although the TS and ODCM for power reactor licensees require effluent RMSs to be operable, inoperability for 30 days or more is allowed, provided corrective actions have begun and the required compensatory actions are implemented. Compensatory actions typically involve sampling effluents from the affected plant systems on some routine interval (e.g., once per 24 hours) or starting backup sampling equipment. If the inoperability extends beyond 30 days, licensees are required to report the inoperability to the NRC in the next annual radioactive effluent release report (in accordance with their licensing basis) and continue any ODCM-required compensatory actions.

An inoperable effluent RMS for power reactor licensees is considered a degraded and non-conforming condition in which the compensatory actions are specified in the ODCM. While the ODCM does not specify an action time (i.e., a period of time allowed to return the RMS to operability), licensee corrective actions to restore safety-related RMSs to their as-designed condition are required to be completed in accordance with 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Actions" (i.e., in a timely manner commensurate with safety).

Sometimes a simple solution is able to correct an RMS problem. For example, if a part is broken, the licensee may replace it. If an incorrect parameter from an RMS is used in the emergency plan, it is replaced with the correct parameter. If a calibration is not completed under the regulatory requirements, the calibration may be repeated.

Although simple solutions can return an RMS to operable status, if the issue becomes repetitive, some licensees conduct a more detailed evaluation to reveal the causal factors. Such evaluations sometimes reveal more permanent solutions, which are not required by regulations. Some of these solutions may include replacing aging RMSs, or prioritizing the equipment's maintenance based on the input from numerous plant RMS users. Other solutions may involve enhanced training or improved interdepartmental coordination—sometimes led by a single project manager—to improve communications and ensure RMS parameters are applied correctly in various applications.

The following NRC generic communications relate to RMSs:

- NRC Generic Letter (GL) 79-003, "Offsite Dose Calculation Manual," 1979. This GL informed the addressees of additional guidance on the content of the ODCMs, including the procedural details of the regulatory requirements for effluent RMSs.

- NRC GL 79-006, "Contents of the Offsite Dose Calculation Manual," 1979. This GL informed the addressees of the importance of the ODCM and technical specifications in implementing 10 CFR 50.36a and other Federal regulations.

- NRC IN 82-49, "Correction for Sample Conditions for Air and Gas Monitoring," 1982. This IN informed the addressees of potential errors in radioactive gaseous effluent monitoring.

- NRC IN 83-52, "Radioactive Waste Gas System Events," 1983. This IN informed the addressees of inadvertent releases due to valve mispositioning and other problems. In some events, plant staff failed to recognize the resulting unusual radiation monitor responses.

- NRC IN 86-30, "Design Limitations of Gaseous Effluent Monitoring Systems," 1986. This IN informed the addressees of issues related to the Eberline SPING-4 monitors.

- NRC IN 86-42, "Improper Maintenance of Radiation Monitoring Systems," 1986. This IN informed the addressees that valve tag outs, temporary electrical jumpers, incorrect valve line ups, and procedure noncompliance can affect RMS instrumentation.

- NRC IN 86-43, "Problems with Silver Zeolite Sampling of Airborne Radioiodine," 1986. This IN informed the addressees of the hazards of silver zeolite as an ignition source when hydrogen is present.

- NRC GL 89-01, "Implementation of Programmatic and Procedural Controls for Radiological Effluent Technical Specifications in the Administrative Controls Section of the Technical Specifications and the Relocation of Procedural Details of Radiological Effluent Technical Specifications (RETS) to the Offsite Dose Calculation Manual or to the Process Control Program," 1989. This GL informed the addressees how to keep the radioactive effluent technical specifications in the technical specifications and relocate procedural details of RETS to the ODCM. At the same time, the NRC staff emphasized that its intent is not to reduce the level of radiological effluent controls, including the controls for effluent RMSs.

- NRC IN 2013-01, "Emergency Action Level Thresholds outside the Range of Radiation Monitors," 2013. This IN informed addressees of industry operating experience in which RMSs adversely affected the emergency plan.

The following NRC guidance and information documents are related to RMSs:

- Regulatory Guide (RG) 1.21, "Measuring, Evaluating, and Reporting Radioactive Material in Liquid and Gaseous Effluents and Solid Waste," Revision 1, 1974, and Revision 2, 2009. This guidance document contains details about reporting RMS failures in annual reports to the NRC.

- RG 4.15, "Quality Assurance for Radiological Monitoring Programs (Inception through Normal Operations to License Termination)—Effluent Streams and the Environment," Revision 1, 1979, and Revision 2, 2007. This guidance document outlines basic but important programmatic controls that form a basis for reliable operation of RMSs. Many

licensees have committed to at least parts of this regulatory guide in their licensing basis documents.

- NUREG-0737, "Clarification of TMI Action Plan Requirements," 1980. The information in this NUREG contains insights about the performance of RMSs in high radiation fields and emergency situations.

- RG 1.97, "Criteria for Accident Monitoring Instrumentation for Nuclear Power Plants," Revision 3, 1983, and Revision 4, 2006. This guidance document discusses the performance of RMSs in high radiation fields and emergency situations.

- NUREG/CR-4757, "Line-Loss Determination for Air Sampler Systems," 1991. This NUREG describes how analysis results may be biased by plate-out of particulates and iodine on sample lines.

- NUREG-1301, "Offsite Dose Calculation Manual Guidance: Standard Radiological Effluent Controls for Pressurized Water Reactors," 1991. This NUREG outlines the default, minimum-acceptable effluent control and environmental monitoring programs for pressurized-water reactors.

- NUREG-1302, "Offsite Dose Calculation Manual Guidance: Standard Radiological Effluent Controls for Boiling Water Reactors," 1991. This NUREG outlines the default, minimum-acceptable effluent control and environmental monitoring programs for boiling-water reactors.

DISCUSSION

Effluent RMSs can serve multiple purposes, such as monitoring radioactive effluents, monitoring for primary-to-secondary leakage, or establishing emergency action levels in the emergency plan. Each purpose not only adds an additional layer of regulatory compliance, but typically involves more personnel throughout the licensee's organization who may not be familiar with, or are organizationally separated from, the technical aspects associated with the daily operation and use of the RMS. For example, maintaining an operable RMS may involve personnel in the following departments: maintenance, work control, operations, chemistry, health physics, emergency planning, system engineering, design engineering, and instrumentation and control.

Several of the operational experience examples provided in this IN occurred because of challenges to effective coordination between these numerous groups and the lack of sensitivity to, or awareness of, the deficiencies that were reasonably within the licensee's ability to detect and correct. In many instances, once deficiencies were identified, RMSs remained out of service for extended periods of time. In some cases, when the RMS was out of service, the backup or alternate sampling requirements were not always adequately fulfilled or were unreasonably delayed because of no advanced planning. Some operational experience involved poor maintenance of effluent monitor design-basis documents (e.g., primary calibration records, calibration source documentation, and vendor manuals) as part of the overall effluent quality assurance (QA) program.

In the industry examples cited in this information notice, NRC inspectors identified deficiencies associated with RMS instrumentation. A careful evaluation of these examples indicates these deficiencies may be symptomatic rather than causal in nature. Licensee programs established

to service, maintain, and use RMS instrumentation can have a significant impact on the reliable operation of RMS instrumentation.

In summary, deficiencies associated with the following factors can degrade the effectiveness of effluent RMSs:

- Routine and preventive maintenance of RMSs and ventilation systems and the inclusion of RMSs in the scope of the Maintenance Rule.

- Evaluation of the impact of RMS design modifications on representative sampling.

- Appropriate advanced planning to ensure any required backup monitoring or compensatory sampling is promptly initiated when effluent RMSs are out-of-service.

- The appropriate advanced planning to ensure necessary actions are taken in response to RMS alarm conditions, including reporting and controlling releases. This may be particularly applicable when back-out criteria or administrative action levels are used in conjunction with temporary or backup radiation monitors.

- Adequate calibration of effluent monitors using appropriate radioactive sources for primary and secondary calibrations and the failure to use correct factors in various applications, such as emergency planning dose-projection software.

- QA to identify deficiencies in the sampling and measurement process and provide confidence in the results. QA practices may include (1) trending and tracking of RMS performance and maintenance (e.g., by reviewing trends for significant changes in radioactive effluents or observing unexpected changes in sample appearance) (2) verifying representative sampling following RMS maintenance or design modifications, and (3) maintaining and using RMS design-basis documents, such as primary calibration records, calibration source documentation, and vendor manuals.

- Training for plant personnel concerning RMS functions, ODCM requirements, and Maintenance Rule scoping of RMSs.

- Coordination and communication among numerous, different plant groups whose activities may impact RMS functions with respect to radioactive effluent monitoring, the emergency plan, and the Maintenance Rule.

None of the events in this IN resulted in any significant occupational or public dose. NRC regulations and requirements allow RMSs to be inoperable for periods of time as described in each site's licensing basis. Although there are not regulatory requirements to do so, licensees can implement corrective actions, such as those described in this document, to address the factors that are known to degrade the effectiveness of RMSs.

CONTACTS

This IN requires no specific action or written response. Please direct any questions about this matter to the technical contact listed below or to the appropriate Office of Nuclear Reactor Regulation project manager.

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Note: NRC generic communications may be found on the NRC public Web site, http://www.nrc.gov/reading-rm/doc-collections/, under Document Collections.

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NAME	RConatser	RNimitz	ANielsen	CHsu
DATE	5/7/13	* 5/3/13	*5/8/13	*4/10/13
OFFICE	NRR/DRA/AHPB	NRR/DRA	NRR/DPR/PROB	FSME/RDB
NAME	UShoop	JGitter	GBowman	BWatson
DATE	6/4/13	6/5/13	* 6/4/13	* 6/4/13
OFFICE	NMSS/ FCSS	NMSS/SFST	FSME/DWMEP	NRO/DCIP
NAME	JKinneman	MLombard	LCamper	LDudes
DATE	6/19/13	6/19/13	6/12/13	6/19/13
OFFICE	NRR/DPR/PGCB	NRR/PGCB/DPR	NRR/DPR/PGCB	NRR/DPR
NAME	JKlos	CHawes	EBowman	SBahadur
DATE	6/21/13	6/24/13	6/27/13	7/10/13
OFFICE	NRR/DPR			
NAME	LKoKajko			
DATE	7/12/2013			

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