

U. S. NUCLEAR REGULATORY COMMISSION

REGION III

Performance Appraisal for the NRC/State of Ohio Environmental
Monitoring Cooperative Agreement

Report No. 999-90003/94022(DRSS)

Cooperative Agreement No. NRC-83-646 (Modification No. 17)

Docket No. 999-90003

Facility: State of Ohio Department of Health

Location: Columbus, Ohio

Appraisal Conducted: March 3-4, 1994

Team Members:

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4/12/94
Date

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Appraisal Summary

Appraisal Conducted on March 3 and 4, 1994 (Report No. 9999-0003/94022(DRSS))

Areas Appraised: Adherence to the requirements of the cooperative agreement; organizational structure and management support; technical staffing and training; facilities, analytical equipment and counting instrumentation; sampling and analytical procedures and laboratory performance; quality assurance/quality control; data storage; reports. (IP 80721).

Results: The program has improved significantly during the previous year. Management has provided direction and stability to the program which was previously lacking. Overall performance was improved and appeared to satisfy the general requirements of the cooperative agreement for sample collection and analysis, and report preparation. The radiochemistry facilities were adequate, however, radiochemistry expertise remained a weakness. Based on the overall program improvements noted, it is recommended that 1993 funding be released and that the cooperative agreement be continued.

DETAILS

1. Persons Contacted

- *C. Eddy, Supervisor, Organic Chemistry
- *J. Green, Laboratory Supervisor
- #*C. Heller, Health Physicist
- *R. Hemmen, Quality Assurance Chemist
- +*M. Howard, Supervisor Radioactive Materials Program
- *K. Meckstroth, Chief, Bureau of Public Health Laboratory
- *B. Nowroozi, Chemist II
- *R. Owen, Chief, Bureau of Radiological Health
- *N. Tidwell, Chemistry Laboratory Coordinator
- *J. Zorich, Laboratory Administrator

*Present at the exit meeting, March 4, 1994

#Present at the telephone discussion, March 29, 1994

+Present at the telephone discussion, April 1, 1994

2. General

This appraisal was conducted to review the performance of the Ohio Department of Health in the environmental monitoring program as defined by Modification No. 17 to the Cooperative Agreement NRC-30-83-646. The State performs environmental monitoring and exchanges the NRC thermoluminescent detectors (TLDs) around the David-Besse Nuclear Power Station and Perry Nuclear Power Plant. This program provides an independent comparison with the licensee programs.

This appraisal consisted of interviews with staff members of the Ohio Department of Health (ODH) Bureau of Environmental Health and the ODH Laboratories in Columbus, Ohio. A review and assessment of current procedures, data and an evaluation of laboratory equipment and technical expertise were also included in this appraisal.

3. Summary and Recommendations

Based on this review, the appraisal team recommends continuation of the existing cooperative agreement between the NRC and the State of Ohio. Program management improved significantly, was more aggressive, and has become goal oriented. Previous deficiencies were being addressed and the corrective actions being taken were generally successful. Areas needing attention included additional laboratory personnel with radiochemistry expertise and new counting instrumentation.

4. Organization and Staffing

The Cooperative Agreement is managed by the Radiological Materials Program Health Physics Supervisor who reports to the Radiological Health Bureau Chief, who reports to the Director of the Department of Health. Although the current Radiological Materials Program Supervisor has been

in the position less than one year, the appraisers noted that there were significant improvements in management of the program. A health physicist reports to the program supervisor and is responsible, in part, for data analysis, report preparation and the sample collection program. Staffing in this area appeared adequate. A Memorandum of Understanding (MOU) between the ODH Bureau of Radiological Health and the Bureau of Public Health Laboratories is under development and should improve the interaction between these ODH entities.

Sample analysis was performed by the Bureau of Public Health Laboratories, which was in the Division of Preventive Medicine. The Radiation Chemistry Section consisted of a Laboratory Coordinator and a Chemist II who were responsible for sample preparation and analysis. The appraisers noted that this staff was small and that additional expertise in radiochemistry was needed, especially given the additional workload that the Radiation Chemistry Section is expecting from additional contract work for the United States Department of Energy. The proposed organizational chart for the radiation chemistry laboratory showed several vacant positions. Health Department managers stated that they were attempting to increase the laboratory staff, especially in the area of radiochemistry. A quality assurance chemist, who reported to the laboratory supervisor, had been added to support the three chemistry sections (Organic, Inorganic and Radiation Chemistry). The appraisers noted that this was a positive step and strengthened the laboratory quality assurance (QA) program.

5. Management Support

Department of Health management support for this program appeared to have improved as evidenced by the addition of a well qualified supervisor to oversee the Cooperative Agreement. Additional personnel were planned for the Bureau of Radiological Health and the Bureau of Public Health Laboratories due to an anticipated increase in radiological environmental monitoring workload along with commensurate funding from another federal agency.

6. Facilities and Equipment

The appraisal team toured the radiochemistry laboratories at the ODH Laboratories. The facilities had not changed significantly since the last inspection. The appraisers noted to ODH Laboratory managers that some of the equipment, such as the liquid scintillation counters and gamma counting system, were aging and replacement should be seriously considered. Laboratory personnel showed the appraisers a purchase order for a new gamma spectroscopy analysis system including a computer, software, and initial training on the operation of the system. This system would enable the laboratory to operate both of their germanium detectors simultaneously and thus increase the sample throughput. This new gamma spectroscopy system is expected to be operational within the calendar year. The laboratory was adequately equipped for sample preparation and storage, and for the preparation and storage of calibration standards.

The NRC appraisers observed that the quench standards for tritium analysis were near the expiration date. A review of the EPA standards that the ODH lab receives indicated that traceability to the National Institute for Standards and Technology (NIST) was not adequately documented. At present, the ODH laboratory makes its own calibration standards from the standards provided by the EPA. The appraisers suggested that both new quench and calibration standards be purchased from commercial vendors that provide NIST traceability.

7. Training

The appraisal team reviewed continuing training for laboratory personnel. ODH representatives stated that laboratory personnel could be sent to in-state training programs, but training conducted out-of-state was difficult to attend due to financial constraints. From a review of education, experience, and the problems encountered with sample results in the annual report, the appraisers determined that the laboratories needed additional radiochemistry expertise. ODH representatives stated that salary limits on laboratory positions made it very difficult to attract and hold an experienced radiochemist. The appraisers discussed several alternatives with ODH representatives for acquiring the needed expertise including hiring a consultant or using a management position for a radiochemist.

8. Required Sample Collection and Analyses

The NRC appraisers reviewed the sample collection and analyses for the 1993 calendar year to determine agreement with Attachment 1 of the cooperative agreement. State personnel, along with local health department staff, performed all sample collection, preparation, and radiochemical analyses. The appraisers noted to ODH representatives that, for some samples, not all of the isotopes identified in the cooperative agreement were listed in the draft of the 1993 Report. The representatives stated that these isotopes had not been identified in those samples or were below the lower limit of detection (LLD) required by the cooperative agreement. The ODH representatives stated that the isotopes in question would be listed in the 1993 Report as below the lower limit of detection (LLD). State personnel also exchanged the TLDs associated with the NRC TLD monitoring network and returned them for processing for direct radiation measurements which is performed by NRC Region I personnel.

The following sampling areas were evaluated:

a. Airborne - Particulate and Radioiodine

The state maintains weekly air samples at two sample location near licensee samplers. The state also conducts weekly air sampling at three control sites located at the following locations: (1) Burke Lakefront Airport, Cleveland, Ohio; (2) roof of the ODHL building in Columbus, Ohio and (3) East Liverpool Water Treatment Plant, East Liverpool, Ohio. The results reported by the state in the

1993 draft report met the specific requirements of the agreement, except that the results for Mn-54, Fe-59, Co-58, Co-60, Zn-65, Ba-140, or La-140 were not presented as they were not present or were below the required LLD. An area of concern noted to ODH representatives was missed air samples due to problems with the sampling equipment. The NRC appraisers discussed this with the ODH staff responsible for sample collection and suggested that ODH initiate a program of regular calibration and maintenance of the air samplers. The ODH representatives indicated that such a program would be implemented.

b. Surface Water

The Cooperative Agreement requires two surface water samples be collected monthly: one from an immediate area of plant discharge and one from an upstream control location. These samples were to be split with the licensees for analysis. A gamma isotopic analysis is required on a monthly frequency and a tritium analysis on a quarterly composite by integration of the monthly samples. The state and licensee collected monthly samples from Lake Erie, which the plants discharge flows into, and from three separate control locations near each licensee's facility. The results reported by the state in the draft 1993 report met most of the specific requirements of the cooperative agreement. Isotopes including Mn-54, Fe-59, Co-58, Co-60, Zn-65, Ba-140, and La-140 were not identified or were below their required LLDs and were not listed. In addition, the required LLD for tritium was not met for the first quarter of 1993. An increase in sample volume corrected this deficiency. The NRC appraisers suggested that the ODH laboratory use bio-degradable scintillation cocktail which would allow a greater sample volume addition and would simplify disposal.

c. Milk

The cooperative agreement requires one monthly milk sample from an off-site dairy. There are two milk sample locations for Davis Besse. For Perry, the only source of milk within close proximity to the plant are goats, and collection of milk from these animals is limited compared to dairy cattle. The results of the monthly milk analyses in the 1993 Report draft met most of the requirements of the Cooperative Agreement. La-140 was not identified or was below its LLD and was not reported.

d. Fish

The cooperative agreement requires one sample of a commercially or recreationally important fish species in the vicinity of the plant discharge, semiannually or in season. Gamma isotopic analysis of the edible portions is required. The state collected semiannual fish samples from the lake into which the plant discharge flows. Fish from the catch were split between the licensee and the state

for analysis. The gamma isotopic analysis was performed in the state laboratory. The results reported by the state in the 1993 report met the specific requirements of the cooperative agreement.

e. Food Products

The cooperative agreement requires two food samples at the time of harvest to be split with the licensee of a principal food product grown near a point having the highest X/Q, or grown in an area irrigated by water into which the plant discharges waste, or green leafy vegetables from a private garden or farm in the immediate area of the plant. Gamma isotopic analysis of the edible portions is required. The state and licensees collected and split samples from private gardens and locally grown vegetables. The gamma isotopic analyses were performed in the state laboratory. The results reported by the state in the 1993 report met the specific requirements of the cooperative agreement.

f. Sediment from Shoreline

The cooperative agreement requires one annual sample split with the licensee for gamma isotopic analysis of shoreline sediment along a body of water into which the plant discharge flows. The state and licensees collected a duplicate sample near each facility. Analyses were performed in the state laboratory and results of the 1993 analyses met the requirements with the exception of Zn-65 which was not present or was below the required LLD and was not reported.

g. Direct Radiation Monitoring

The thermoluminescent dosimetry (TLD) network consists of 26 locations around the Perry Plant and 22 locations around the Davis Besse Plant. The TLDs were changed out as required and results reported in the 1993 Report.

9. Quality Assurance Program

The NRC appraisers reviewed the ODHL quality control program and the laboratory counting facilities. The state participated in the Environmental Protection Agency (EPA) crosscheck program. The state's performance during 1993 was improved over previous years. The ODH performance was acceptable, however tritium and gross beta in water were consistently low. The tritium results may be due, in part, to the age of the equipment. The radiochemistry laboratory also performed internal quality control program checks. This program consisted mainly of performance checks and calibrations of the counting instruments. The laboratory staff also perform periodic analyses of their own spiked samples. The appraisers reviewed the quality control data and calibration data for the radiochemistry laboratory counting instruments and made several recommendations. These included: (1) to review counting equipment control charts more extensively to detect trends, (2)

to establish acceptance criteria for duplicate analyses, and (3) to establish a system for the Quality Assurance Chemist to retain a separate file for QA analysis records. The appraisers reviewed the ODHL lower limits of detection (LLD) values for all radionuclides required by the cooperative agreement and noted that except for the first quarter tritium in water analyses, all LLDs appeared to agree.

10. Corrective Actions

The NRC review of the 1991 Annual Environmental Monitoring Report disclosed four contractual deviations and several apparent deviations from good laboratory practice. These issues have been addressed recently by the ODH and the corrective actions have been successful in improving the overall quality of the analytical results and the annual report. A summary is presented below:

- In the past, the reports were not being submitted within 120 days of January 1, as the contract requires. During this appraisal, the NRC staff briefly reviewed the draft 1993 annual report and determined that ODH needs only the fourth quarter TLD data from Region I to complete the report. It is believed that ODH will submit the final 1993 Annual Environmental Monitoring Report before the May 1, 1994 deadline.
- In the past, the contractual requirement for an LLD of 1 picocurie per liter (37 millibecquerels per liter) for I-131 in milk was not routinely met. A review of the draft 1993 report indicates that all milk analyses have met this requirement.
- In 1991, required analyses of quarterly composite air particulate samples was not performed. The draft 1993 report indicates that these analyses were completed as required. Several 1993 weekly air samples were not collected due to sampling equipment problems and this issue is addressed in Section 8A.
- The contract requires that the state notify the NRC by telephone and written confirmation after it becomes aware of any observed unusual concentration of radioactive material measured in carrying out the program. The 1991 and 1992 annual reports contained analytical results that should have been, but were not, reported to the NRC. The draft 1993 report did not contain any data with unusual concentrations. The NRC inspectors also discussed this issue with ODH personnel and informed them that detection of ten times the normal levels of radioactivity constituted an unusual concentration that should be called in to the NRC.
- Regarding the issue of unusual concentrations of radioactivity, the inspectors also indicated that a more extensive review of the analytical results was needed to verify unusual concentrations. The NRC discussed with laboratory staff that the data review should include a check of energy calibrations, a count of a background, a check of the electronics, etc. In addition, it was

suggested that any unusual result be verified by an immediate re-analysis of the sample. The NRC appraisers discussed with the laboratory and ODH staff that the absence of K-40 in milk, fish, and sediment samples would also be an indication of a faulty analysis.

- Sample preservation in the past was inadequate to prevent hydrolysis, oxidation, or exchange of radionuclides while the samples were being collected, transported, and stored. The following actions have been incorporated into the ODH procedures: (1) water samples for tritium analysis are collected in glass containers, (2) water samples for gamma spectroscopy analysis are acidified with hydrochloric acid in the field, and (3) milk samples are preserved with formaldehyde and bisulfite.
- Past reports did not include the results of the intra-laboratory QA analyses. The draft 1993 report contains the QA program and the results of the intra-laboratory analyses. Analysis of these QA samples appeared adequate.

11. Exit Meeting

At the conclusion of the appraisal on March 4, 1994, the NRC appraisers discussed the scope and findings of the review with the individuals listed in Section 1 of the report. The appraisers noted that the program had undergone substantial changes and was considerably improved. Areas reviewed were:

- * Program management and organization
- * Memorandum of Understanding
- * Sample collection programs
- * Laboratory quality control
- * Need for additional gamma spectroscopy expertise
- * Draft of 1993 Report

During the exit interview, the appraisers discussed the likely informational content of the inspection report with regard to documents or processes reviewed during the inspection. ODH representatives did not identify any such documents or processes as proprietary.