U. S. NUCLEAR REGULATORY COMMISSION
OFFICE OF INSPECTION AND ENFORCEMENT

REGION III

Report No. 50-282/80-08; 50-306/80-09

Docket No. 05000282; 05000306 License No. DPR-42; DPR-60

Licensee: Northern States Power Company
414 Nicollet Mall
Minneapolis, MN 55401

Facility Name: Prairie Island Nuclear Generating Station, Units 1 and 2

Appraisal At: Prairie Island Site, Red Wing, MN

Appraisal Conducted: May 5-15, 1980

Team Members: D. E. Miller for L. R. Greger, NRC 8-11-80

D. E. Miller for E. H. Carbaugh, Battelle Laboratories 8-11-80

A. G. Januska 8-11-80
A. G. Januska, NRC

D. E. Miller for G. Wehmann, Consultant 8-11-80

Approved By: A B Davis for W. L. Fisher, Chief 8/11/80
Fuel Facility Projects and
Radiation Support Section

Appraisal Summary

Appraisal on May 5-15, 1980 (Report No. 50-282/80-08; 50-306/80-09)
Areas Inspected: Special, announced appraisal of health physics program, including organization and management, qualifications, training, internal and external exposure controls, surveys and access controls, instrumentation, ALARA, radioactive waste, facilities and equipment, and accident response. The appraisal involved 345 man-hours onsite by four inspectors.
Results: Two significant weaknesses in the health physics program were identified. These weaknesses are in the areas of offshift staffing (Section 3.a) and survey instrument use practices (Sections 8.a and 9.a). One apparent item of noncompliance was found (infraction - inadequate radiation survey instrument use in high radiation areas - Section 8.a).

DETAILS

1. Persons Contacted

H. Aadahl, Training Instructor
*K. Albrecht, Quality Engineering Superintendent
B. Clark, Administrator, Radiological
K. DeLong, Radiation Protection Specialist
*S. Derleth, Radiation Protection Specialist
L. Finholm, Training Supervisor
*T. Gatten, Radiation Protection Specialist
*A. Hunstad, Staff Engineer
*G. Joachim, Radiation Protection Specialist
*A. Johnson, Health Physics Coordinator
G. Kalle, Radiation Protection Specialist
*D. Larimer, Chemistry Coordinator
J. Lemmerman, Radiation Protection Specialist
*J. Linville, Plant Chemist
D. Ludwig, Radiation Protection Specialist
G. Malinowski, Radiation Protection Specialist
J. Maurer, Jr., Radiation Protection Specialist
J. Oelkers, Radiation Protection Specialist
M. Pfeffer, Radiation Protection Specialist
*D. Schuelke, Radiation Protection Superintendent
*R. Stenroos, Assistant Radiation Protection Superintendent
*F. Tierney, Jr., Plant Manager
E. Ward, Manager, Nuclear Environmental Services
*E. Watzl, Plant Superintendent, PE&RP
*B. Burgess, NRC Resident Inspector
*C. Feierabend, NRC Senior Resident Inspector

The inspectors also contacted other licensee employees, including members of the technical and engineering staffs.

*Denotes those attending the exit interview. In addition, Mr. A. B. Davis from NRC Region III attended the exit interview.

2. General

This special appraisal, which began at 8:00 a.m. on May 5, 1980, was conducted to evaluate the adequacy and effectiveness of the licensee's overall health physics program. The appraisal team consisted of two inspectors from the NRC Region III office and two DOE contractor personnel. General tours and examinations of licensee facilities were conducted on May 5 and 6, 1980. Selected licensee facilities were examined in more detail during the remainder of the appraisal period. The scope of the appraisal included the health physics organization, management controls, qualifications and training of the health physics staff, training of radiation workers, the radiological protection program, radioactive

waste processing, effluent controls, and the chemistry and counting laboratories. The licensee's past and anticipated future performance under both routine and abnormal conditions was examined.

Significant weaknesses were identified in two areas of the licensee's health physics program. These areas are offshift radiation protection coverage and survey instrument use practices. Less significant program weaknesses were identified in several areas; they are described in the respective appraisal report sections.

3. Organization, Management, and Qualifications

The licensee's health physics organization appears competently staffed and effectively managed. Past licensee performance in health physics related activities has been good. However, weaknesses noted below, were identified during the appraisal.

a. Organizational Structure

The licensee's radiation protection organization is directed by the Radiation Protection Superintendent, who reports to the Plant Superintendent, Plant Engineering and Radiation Protection (PE&RP), who reports directly to the Plant Manager. The intervening management layer between the Plant Manager and the Radiation Protection Superintendent does not appear detrimental to the performance of the radiation protection organization. This is attributed to the following: (1) The Plant Superintendent, PE&RP, does not have direct operations or maintenance responsibilities. (2) The present Plant Superintendent, PE&RP has extensive health physics experience. (3) Informal communications between the Radiation Protection Superintendent and the Plant Manager are not discouraged.

Radiological safety and chemistry functions are combined under the Radiation Protection Superintendent and his staff. The present staff includes an Assistant Radiation Protection Superintendent, a Plant Chemist, three Engineers, two foremen (Coordinators) and eleven technicians (Radiation Protection Specialists). The Radiation Protection Specialists are not members of a bargaining unit although operations and maintenance workers are. No significant problems were identified as resulting from this union/nonunion dichotomy. The Radiation Protection Specialists are on a rotating work assignment schedule. Coverage is provided for dayshifts and weekday swingshifts. The rotating work schedule results in technicians cycling through all of the functional chemistry and radiation protection areas approximately every two months. The rotation between work assignments did not appear to adversely affect technician performance. This is attributed at least in part to the continuity provided by the Chemistry Coordinator and the Radiation Protection Coordinator, both of which are permanent

positions; the well defined and proceduralized requirements for the various work assignments; and refresher training given in chemistry activities upon reassignment to the chemistry laboratory.

Offshift radiation protection coverage is normally provided by an onsite Radiation Protection Specialist on the weekday swing shift and by the onsite shift supervisors during the remainder of offshifts. If necessary, radiation protection personnel can be called in; response time is typically 30 minutes to one hour. The shift supervisors have been trained in certain radiation protection procedures and meet the technical specification requirement to have an individual qualified in radiation protection procedures onsite whenever fuel is in the reactor. This arrangement may be adequate for routine operations or minor offnormal situations; however, in a significant offnormal situation such use would detract the shift supervisor(s) from other plant operations requiring their attention. Further, the necessity for sampling and analyzing reactor coolant and containment air samples immediately after certain offnormal situations requires the presence of personnel who have received specialized training and who are not required to perform other tasks in these situations.

Based on the appraisal findings, improved offshift chemistry and radiation protection coverage is required to achieve a fully acceptable program. The individuals providing this coverage should not be assigned other duties which detract from their primary responsibility for chemistry and radiation protection coverage.

b. Staffing and Qualifications

Although the current chemistry and radiation protection technician staffing level (eleven technicians and two foremen) is relatively low for a two unit facility, the staffing appears adequate for the currently assigned responsibilities. Reasons for this include: (1) a minimal turnover rate among technicians; (2) a relatively high competancy level for technicians; (3) effective management; (4) assignment of trash compaction and most area deconning work to other workers, and (5) a general cooperative attitude among section and plant personnel.

An increase in the technician staffing levels would be required if the remaining offshifts (nights and weekend swings) are manned in the future. The stability of the chemistry and radiation protection technician work force appears to be a strong factor in the impressive performance of the organization. Only one Radiation Protection Specialist has left the licensee's radiation protection organization. Although the majority of the current Radiation Protection Specialists joined the organization upon its formation in 1972 and 1973, several additions have been made since to expand the staffing.

The licensee considers the Radiation Protection Coordinator and the Chemistry Coordinator to be the only members of the radiation protection technician staff who are "journeymen level" technicians per ANSI/ANS 3.1-1978. The Appraisal Team does not share this interpretation and recommends that the licensee's qualifications program be revised to apply the technician qualification criteria from ANSI/ANS 3.1-1978 to the Radiation Protection Specialist qualification program. Technicians not designated as "journeymen level" should be restricted to those activities for which specific qualifications have been completed (and documented) with appropriate supervision exercised over their activities. In most cases, present radiation protection technicians met or exceeded the ANSI/ANS 3.1-1978 qualification criteria.

Management staffing appears good from the standpoints of numbers and competancy. In addition to the Radiation Protection Superintendent and the Plant Superintendent, PE&RP, two or three additional individuals either are now or will shortly meet the RPM qualifications per Regulatory Guide 1.8. Additionally, the Radiation Protection Superintendent and the Assistant Radiation Protection Superintendent are both SRO qualified. This qualification is beneficial from the standpoint of system and operational knowledge and also lends additional credibility to their radiation protection activities among plant personnel.

Approximately 15 contract technicians are normally brought in to assist the radiation protection organization during refueling outages. Technicians are not normally exchanged between the utility's two nuclear plants during outages. As with the licensee's own technicians, there is a great deal of continuity among the contract technicians working at the plant. Although resumes are received for the contract technicians, their qualifications are not specifically compared to the ANSI/ANS 3.1-1978 specifications.

Based on the appraisal findings, this portion of the licensee's program appears to be acceptable but the qualification program for Radiation Protection Specialists should reflect the qualification criteria in ANSI/ANS 3.1-1978. Contract technician job assignments should be made consistent with these criteria also.

c. Communication, Authority and Responsibility

The licensee's health physics program appears to be well managed, staffed with competent technicians, supported by plant management, and overall quite effective. Communications within the chemistry and radiation protection group appears good. Individual technicians were well informed regarding departmental matters and plant radiological conditions. The Radiation Protection Specialists appeared to have an excellent attitude toward their job and to feel a direct

responsibility for the program results. No significant problems were encountered regarding acceptance of the Radiation Protection Specialists' authority over radiological hazards. From review of radiation occurrence reports and discussions with licensee personnel, it appeared that appropriate disciplinary action was applied to violators.

An example of management's efforts to keep the Radiation Protection Specialists informed is evidenced in the use of the radiation occurrence reports. The report form, routinely initiated by Radiation Protection Specialists, requires notification of the originator regarding final actions taken in response to the reported problem.

Responsibilities of chemistry and radiation protection management and technician personnel are clearly defined in writing (SWI-RP-20, "Radiation Protection Section Responsibilities" and SWI-RP-4, "Radiation Protection Specialist Work Assignment").

Based on the appraisal findings, this portion of the licensee's program appears to be acceptable.

d. Corporate Support

The licensee does not have a corporate health physics staff. Some health physics related functions are performed by corporate engineers, although most are handled within the plant radiation protection organization. Outside contractors are used rather extensively to supplement corporate and plant efforts. A recently initiated change transferred responsibility for emergency response offsite contacts and coordination to the corporate office.

Although one typically judges the corporate health physics organization essential for longer range planning, the licensee appears to function adequately without much corporate involvement in the health physics area. Based on the appraisal findings, this portion of the licensee's program appears to be acceptable.

4. Training

The licensee's training program includes initial training and retraining in radiological safety for general workers and specific work groups. With some minor exceptions, the radiological training program appeared adequate. The training program is documented in procedures 5ACD 3.11, SWI-RP-23, and SWI-RP-2.

a. Radiation Protection Specialist Training

In addition to general employee training and retraining, Radiation Protection Specialists must complete an extensive qualification

card to document initial laboratory training. A system for requalification practical factors was instituted for chemistry laboratory activities recently; no such retraining exists for radiation protection activities. A system of self study and practical factors are used to qualify for advancement thru the fifteen pay steps in the program. Monthly safety and weekly section meetings are normally held to provide ongoing training. An existing plant equipment orientation course is utilized on an informal basis for new hirees. Outside training is not normally utilized for radiation protection specialist training.

The radiation protection specialist training/retraining program could be improved by: (1) formalizing plant systems training; (2) expanding the requalification practical factor system to the radiation protection area; and (3) improving lesson plan formalization.

Based on the appraisal findings this area appears acceptable but the items discussed above should be considered for improvement.

b. 10 CFR 19.12 Training

Although no significant problems were identified regarding instructions to workers per 10 CFR 19.12, one item requiring licensee attention is the instruction given to escorted visitors. The licensee allows visitors to enter radiation controlled areas without receiving the radiation protection training if they are under escort by an appropriately trained individual. These visitors should be given certain minimum instructions to apprise them of radiological hazards, their responsibility for complying with the escort's instructions, and the authority and responsibility of the NRC and the plant for radiological safety. This instruction could be in the form of a written handout given the escorted visitor upon arrival at the plant.

Based on the appraisal findings, this portion of the licensee's program appears to be acceptable but additional instructions to unescorted visitors should be considered for improvement.

c. Other Training

In addition to initial general employee training and annual retraining, plant radiation workers receive additional radiation protection training in their initial qualification programs and in safety meetings (pre-outage and annual "radiation controls" topics). Licensed operators receive additional radiation protection training in their requalification program.

Contract technicians are used to supplement the radiation protection specialist staff during outages. The contract technicians

are integrated into the plant's organization rather than assigned responsibility for specific plant areas/jobs. As such, they are subject to the direct supervision of plant radiation protection personnel in the performance of their activities. This point is significant in that although the contract technicians receive general employee training, they are not subjected to a formal training program in their radiation protection specialty. Although a more extensive training program would be desirable, the close supervision exercised by plant radiation protection personnel and limitations on the activities assigned to contract technicians appears to justify the adequacy of the present training efforts.

One training discrepancy noted was the lack of training given shift supervisors and shift technical advisors in quantification of airborne radioactive releases beyond the ranges of the normal effluent monitors. This training was scheduled to be given in the near future (by early summer). Since radiation specialists do not man all shifts, it is necessary that this training be completed soon.

Based on the appraisal findings, this portion of the licensee's program appears to be acceptable, assuming completion of the shift supervisor and shift technical advisor training.

5. Quality Assurance

The participation of the plant quality assurance organization in the health physics program was reviewed. No significant problems were found; however, the relatively short history of QA involvement in the health physics program does not provide an adequate basis for judging the overall effectiveness of the QA effort.

Quality assurance activities at the plant were centralized with the formation of the Quality Assurance Section in January 1980. This is an independent section reporting directly to the Plant Manager with the responsibility to oversee implementation of the Operations Quality Assurance Plan by reviews, audits, and inspections of safety related (Q-Listed) items and activities. The Quality Assurance Superintendent has unqualified stop work authority, per the corporate Operational Quality Assurance Plan and 5ACD 3.1 (Plant Organization), which can be exercised in any area not meeting quality standards. This authority requires resolution to the Quality Assurance Superintendent's satisfaction and cannot be overruled by the Plant Manager, even though he is the Quality Assurance Superintendent's line supervisor. A potential conflict of interest exists with this organization; however, it is minimized by giving the Quality Assurance Superintendent access to the Corporate Vice President-Quality in matters related to stop work orders. The present staff consists of eight technical quality assurance

personnel. This staff is supplemented by specialists or consultants in particular fields for the performance of technical audits. Prior to the January 1980 reorganization, QA audits were primarily document reviews. The licensee has since decided to expand QA activities to include verification measurements and tests. The inspection program implementing this decision is now under development but had not progressed to the point where a meaningful appraisal of the health physics inspection elements could be performed. However, it appeared that additional QA staffing may be required to implement the expanded activities.

Annual audits of radiation protection Administrative Control Directives (ACD) were initiated in 1979. The 1979 audits, covering Control of Radioactivity (5ACD 10.1), Emergency Plans (5ACD 10.2), and Chemical/ Radiochemical Control (5ACD 11.1) were performed by an outside consultant. These audits included implementing procedures in addition to the ACD's. Responses to the audit findings were timely and an acceptable system exists to followup on commitment dates. The licensee expects to perform future audits utilizing plant personnel supplemented by outside expertise as necessary. In addition to performing audits, the QA section also reviews all procedures (SWI, ACD, and SP). This is a format and content review as opposed to a technical review, which is provided within the functional group.

Besides the Quality Assurance Section, audits are conducted by the Safety Audit Committee (SAC). The SAC is a corporate level review committee established per the technical specifications to review plant operations from a nuclear safety standpoint. The SAC audits plant nuclear safety related activities at a two-year frequency. These audits include radiation protection, chemistry, and radiochemistry. Outside consultants have been utilized on a routine basis for these audits.

A formal QA program for instrumentation and analyses is not available, although the Radiation Protection Section does conduct QC checks. Procedure SWI-RP-28 (Revision 2) dated October 25, 1979, establishes procedures and frequencies necessary to ensure instrumentation is correctly functioning in the areas of chemistry, radiological controls, and effluent surveillance.

Based on the appraisal findings, the quality assurance portion of the health physics program at Prairie Island appears acceptable, however, the short history of these QA audits and the early phase of routine QA inspection program development and implementation did not permit a conclusive appraisal of their effectiveness.

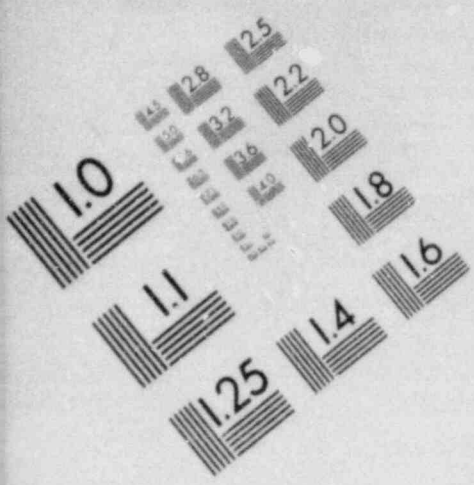
6. Procedures

Radiation protection procedures are contained in a number of different documents including Administrative Control Directives (ACDs), the Plant

Operations Manual (primarily Section F2, Radiation Safety), Section Work Instructions (SWIs), Surveillance Procedures (SPs), the Chemistry Manual, the Counting Room Manual, and the draft Radiation Protection Manual. Individual procedures were reviewed as they pertained to areas examined during this appraisal; specific comments are included in the pertinent sections of this report. The licensee's review and approval system for procedures, including revisions, was also reviewed. No significant problems were noted although some improvements were discussed with the licensee.

All plant procedures are reviewed by the Quality Assurance Section for compliance with format, content, and quality directives, and to determine whether or not the procedure is Q-list related. Q-list related procedures are also reviewed for compliance with the corporate operational QA program requirements. Technical reviews are provided within the section generating the procedure and, for Q-list related procedures, by the Plant Operations Committee. Biennial reviews of all Q-list related procedures are performed by the responsible section with approval by the Plant Operations Committee. Non-Q-list related procedures are accorded the initial QA Section review to assure they are not Q-list related but no subsequent review (including biennial review) is required unless specified by the responsible section. The Appraisal Team suggested that biennial reviews of non Q-listed procedures may be warranted to assure that all procedures accurately reflect work as it is being performed and that outdated procedures are revised or purged from the system. Biennial reviews of Q-listed surveillance tests are tracked by the Surveillance Coordinator to assure they are performed on schedule. Documentation of these reviews and the distribution of revised Q-listed procedures was found to be in order. No significant problems were noted with this system.

The following potential procedure related problems were identified: (1) Although copies of all controlled procedures are located in the control room and the office files (additional controlled copies of various sections of the Plant Operations Manual are assigned to specific individuals), uncontrolled copies of procedures and the Plant Operations Manual do exist and are used by plant personnel, supposedly on an information only basis. (2) Surveillance tests for emergency plan portable radiation survey instrumentation (Eberline PIC-6A's, and mini-scalers) are Q-list items while other portable survey instruments (Teletectors, Eberline RM-14s, Cutie Pies, etc.) are not. This system does not provide assurance that all instruments of potential use in emergency monitoring applications are accorded equivalent reviews and control. Licensee personnel indicated that consideration is being given to Q-listing all portable instrument surveillance tests. (3) Procedures governing many of the details of routine Radiation Protection Section duties are not formalized. This includes procedures for routine instrument use (excluding calibration), details regarding the exposure control system administration and operation, and certain



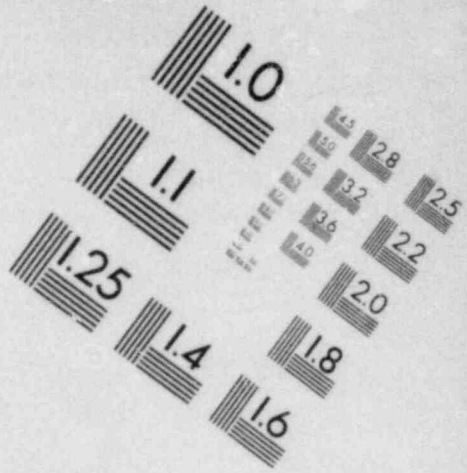


IMAGE EVALUATION
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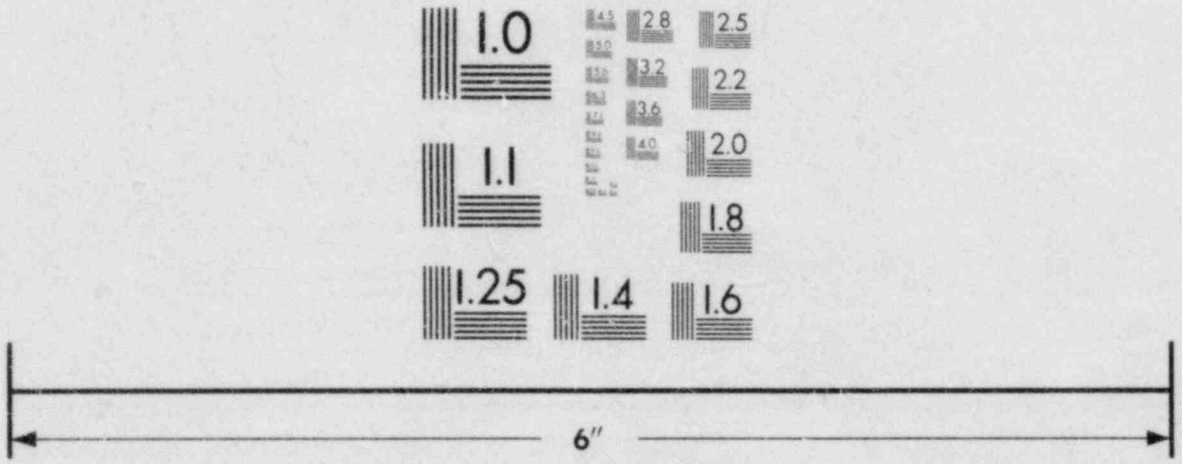

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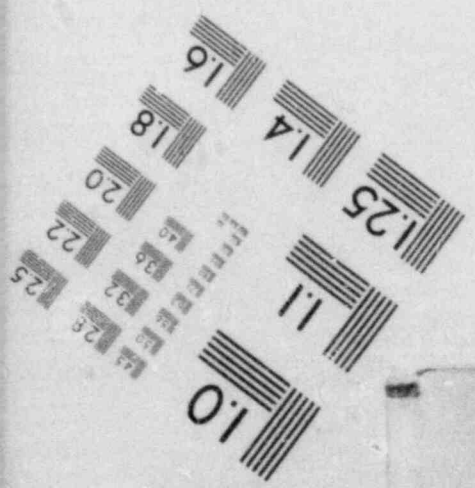

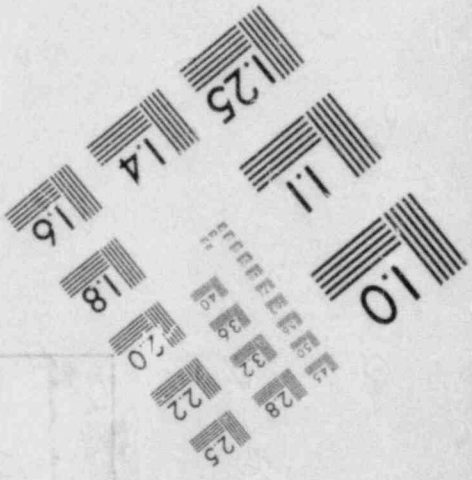

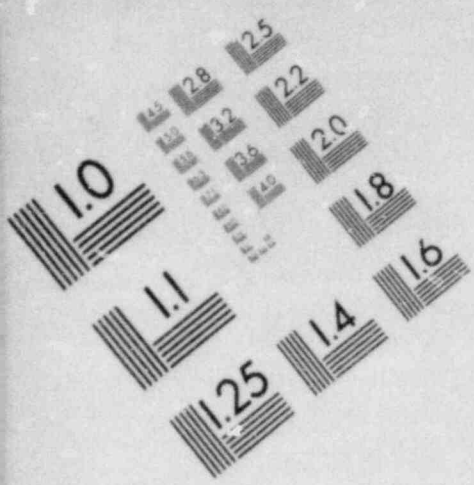

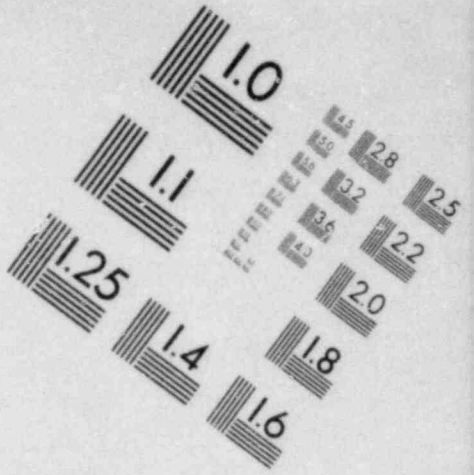

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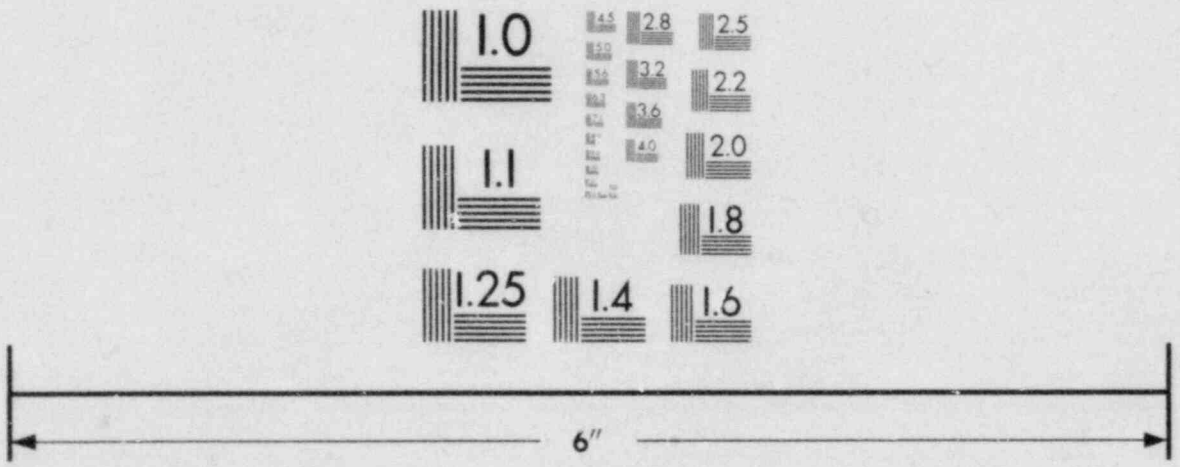

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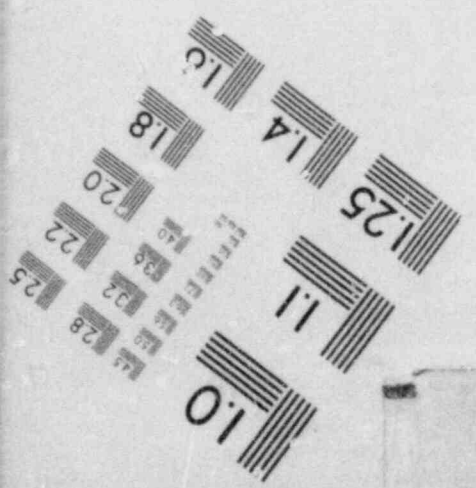

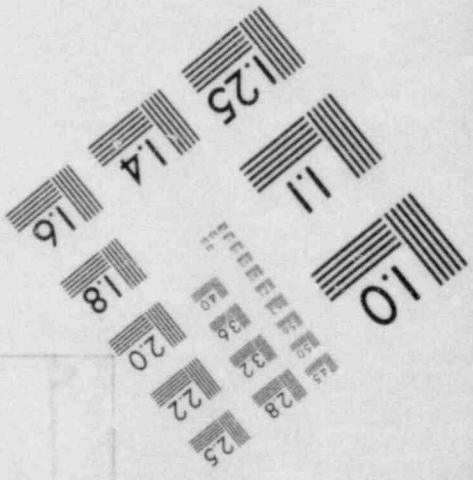

radiation work control practices. Historically. guidance for these tasks came from informal procedures, vendor manuals, verbal instruction, and experience. These procedures are currently contained in a draft Radiation Protection Manual which the licensee plans to issue as a controlled document by September 1, 1980.

Based on the appraisal findings, this portion of the licensee's program appears acceptable, but the items discussed above should be considered for improvement.

7. Exposure Controls

The licensee's internal and external exposure controls appear to have been effectively implemented as evidenced by the lack of exposure problems. However, improvements are desirable in certain areas.

a. External Exposure Controls

External exposure is monitored by a combination of thermoluminescent dosimeters (TLD's) and self-reading pocket ion chamber dosimeters. TLD service is provided by Eberline using TLD-100 lithium fluoride chips. Two chips per badge are routinely used allowing whole body and skin dose assessments. Selected personnel including permanent plant staff receive a third chip which is routinely processed at the plant to provide rapid dose assessment. A second TLD badge using TLD-100 chips is issued by the Radiation Protection Section prior to entry into potential neutron exposure areas. TLD finger rings are available for monitoring extremity exposures. These are processed by the licensee and results transmitted to Eberline for inclusion in the permanent records. Quantities of TLD's and pocket dosimeters appeared adequate. Approximately 200 TLD's are assigned to permanent plant personnel and an additional 200 were on hand for temporary assignment. TLD badges are issued at the guardhouse for permanent plant personnel and at Access Control for temporary personnel. Control dosimeter are located at both locations.

Spiked TLD chips are submitted routinely to the dosimetry contractor. The licensee has exposed the spiked TLD's onsite in the past but more recently has used a service provided by the National Bureau of Standards. The spiked chips are also used to calibrate the licensee's TLD reader. The licensee is considering participation in the University of Michigan comparison studies but is not presently a participant. No problems were identified with the spiking program or the comparative results.

Self-reading pocket ion chamber dosimeters are used to monitor exposures on a per entry basis. Access control cards are issued to all individuals requiring entry to the controlled area. These

cards administratively authorize entry to the controlled area and are used to record daily exposure information. Cards are held by a security guard stationed at Access Control while workers are in the controlled area, thus providing a means of personnel accountability. Pocket dosimeters are calibrated and leak checked semi-annually per procedure. The acceptance criteria of ±15% accuracy and 5% drift in 24 hours is less restrictive than the recommendations (10% and 2%) of Regulatory Guide 8.4 and ANSI N13.5-1972. This discrepancy was not judged significant since pocket dosimeters are not the official dose recorders. Routinely issued pocket dosimeters have 0-200 mR range. High range pocket chambers (0-1 R and 0-5 R) are issued and read by radiation protection personnel when used.

The official exposure records are those provided by the TLD contractor. Working exposure records are maintained in a licensee computer data base and are updated daily by review of all access control cards. Data entered into the system is filed both by name/badge number and by RWP (to accumulate man-rem exposures for reporting purposes). Daily printouts of all personal exposures are provided to the Operations and Maintenance Superintendents. The computer records are updated upon receipt of the contractor TLD results after comparing the computer doses (based on pocket dosimeter exposures) with the contractor TLD doses. Variances outside ±20% of the pocket dosimeter doses are rejected by the computer and are resolved by documented radiation occurrence reports and notification to the TLD contractor. A review of these reports indicated that variances were resolved in a conservative direction unless specific evidence existed to indicate the higher exposure reading was erroneous. A potential problem noted was that unauthorized modifications to the computer dose file could be made with no indication that a change had been entered. A mandatory line out feature or data flag with reference to a note file would allow explanations and detection of changes to the working dose information. Access to the computer is restricted by the use of computer passwords, however, and no known problems have been encountered with the computer dose files to date. In case of computer problems, a backup system utilizing the most recent computer dose printout and manual updating is available.

Dose limits of 300 millirems per quarter for completion of NRC-4 forms, and 2250 millirems per quarter, for removal from radiation related work or special authorization to continue, are signalled by the computer. The approval to exceed 2250 mrems requires completion of an exposure authorization form and includes a review of all exposure received to date. In addition, the computer flags the names of individuals at 70% of their authorized quarterly exposure limit. Dose records and NRC Forms were reviewed; no significant problems were noted.

The plant Quality Assurance Section audited the exposure controls portion of the radiation protection program in 1979. (Annual audits are required by plant administrative control directives). No audit of the TLD contractor's quality assurance program had been performed; however, such a QA audit is scheduled for summer 1980.

Based on the appraisal findings, the external exposure control portion of the licensee's health physics program appears acceptable, but the licensee should consider modification of the computer dose information system to reduce the possibility for insertion of unintentional or unauthorized dose information.

b. Internal Exposure Controls

The licensee controls internal exposures through the use of (1) engineering controls to minimize airborne radioactivity in occupiable areas, (2) an extensive housekeeping program designed to maintain contamination levels in most plant areas less than 2000 dpm/100 cm^2 beta-gamma activity, (3) an air sampling program to evaluate airborne radioactivity levels before start of work in potential airborne areas, (4) approved respiratory equipment to limit the intake of airborne radioactivity if required by airborne concentrations, (5) whole body counting to evaluate the effectiveness of the overall program for limiting the intake of radioactivity, and (6) tritium urinalysis for workers routinely accessing the controlled areas. The licensee's controls have been effective as evidenced by the whole body counting and bioassay results.

The licensee provides NIOSH approved respiratory protection equipment and training for its proper use as a means of limiting internal exposure. Respiratory protection equipment is used in areas of gross surface contamination (greater than 100,000 dpm/100 cm^2), in airborne radioactivity areas, and in areas with a significant potential for high airborne radioactivity. Determination of respiratory protection requirements is the responsibility of the Radiation Protection Section. An MPC-hours log is maintained; no problems were identified with this log. Nasal smears are required of all individuals using respiratory protection equipment or exposed to breathing air greater than MPC limits. high nasal smear results requires a whole body count. Training and medical certification is required before issuance of respiratory protection equipment. An effective system for verification of training and medical qualification was established. Mask fits are checked quantitatively using a NaCl system. Recertification in all three areas (training, medical, mask fit) is required annually.

Respiratory equipment is maintained at access control. Approximately 70 full face masks of various makes and models, including air purifying and airline, were ready for issue with an additional 20 in the

decontamination/cleaning process. All masks appeared well maintained, were uniquely identified with traceable log numbers, and had adequate supplies of spare parts and filter canisters. The storage and maintenance facilities appeared adequate. Protection factors assigned for respiratory protection equipment usage are consistent with Regulatory Guide 8.15. In addition to the masks, the plant has approximately ten BioPak-45's and ten Scott AirPak IIA's. Extra air and oxygen tanks (approximately 30 Scott AirPak bottles and 20 BioPak bottles) were available at access control.

Whole body counts (WBC) are conducted annually for controlled area workers and more frequently for individuals with heavy respirator use. Additional whole body counts are conducted for suspected exposures and high nasal smears (1000 dpm). A Helgeson Nuclear Services, Inc. whole body counting system is installed onsite. An immediate notification action level of 4% MPBB has been established with Helgeson. Channel counts for iodine-131, silver-110M, and cobalt-60 are outputed locally. These can be compared with posted action limits in the event that remote computer analysis capability is lost. Review of whole body count data showed no problems. Calibration of the counter is performed by Helgeson; source checks are performed by the licensee. Procedures covering use of the whole body counter were acceptable.

The whole body counter is located in the service building and should be available for use under most accident conditions. Backup facilities can be provided by the vendor or the whole body counter at the licensee's Monticello Plant can be utilized.

Internal exposure from tritium is evaluated by quarterly urinalysis; personnel working in the refueling area are on a more frequent collection schedule. Sample results typically range from 1E-5 to 1E-4 uCi/ml (action limit of 1E-3 uCi/ml). Based on licensee records, no individuals exceeded the action limit in 1979 or 1980 through April. Some problems have apparently been experienced with submission of urinalysis samples. The majority (80%) of the sample bottles are reportedly submitted. However, the urinalysis records were not adequate to determine the actual submittal percentage. Urinalysis submittal is not required of all personnel, only those frequenting the controlled area with special emphasis on those working in the refueling area. Section F-2 of the Plant Operations Manual calls for quarterly submittal of samples by permanent plant personnel. The procedure wording is not clear as to whether sample submittal is required of all or selected plant personnel. Although no significant tritium exposure problems appear to have been experienced, the licensee should clarify the urinalysis program requirements and ensure that procedures and records adequately document conduct of the program.

Based on the appraisal findings, this portion of the licensee's program appeared to be acceptable although improvement in the organization of the urinalysis program should be considered.

8. Surveillance and Access Control

The licensee's radiological control program was examined, including: (a) access controls, (b) radiation work permit usage, and (c) routine and job specific radiation/contamination surveys. Controls exercised over the following areas were specifically reviewed: (1) radiation areas; (2) high radiation areas; (3) airborne radioactivity areas; (4) contaminated areas; and (5) radioactive material areas. The licensee's radiological control program appears to have performed its function adequately as evidenced by the relatively low personal exposures and personal contamination incidents experienced. Minor improvements in the licensee's program should help to assure the continuation of this performance.

a. Access Control

Routine access to the radiologically restricted portion of the site is through a continuously manned guardhouse. The guard force is responsible for ensuring that personnel are authorized site access and that the portal radiation monitor is used upon exit. Within the restricted area, the plant has been divided into "clean" and "controlled areas" based on the significance of radiological hazards.

Control of access to the controlled areas of the plant is provided by plant security personnel (procedures are documented in a Special Work Instruction). Access control cards, monitored by security personnel, are utilized for accountability and dose recording. Issuance and revocation of access control cards are controlled by the Radiation Protection Section based upon training, dose, and other requirements. Entry into posted areas within the controlled area is governed by a Radiation Work Permit (RWP). Copies of the RWP's are maintained at Access Control and also at the entry to the posted areas. Posted areas were well delineated. Upon exiting the controlled area, workers are required to use a hand and foot monitor and a portal monitor. Both monitors are under the continuous surveillance of the security guards at Access Control. No problems were identified with the controlled area access controls.

Radiation area control is provided through area postings and RWP requirements. The entire portion of the Auxiliary Building within the controlled area has been designated a radiation area. In addition, there are local areas within the Auxiliary Building that are also posted as radiation areas. However, the appraisal team noted several local areas within the controlled area that met the requirements for being posted (2.5 mR/hr) but were not. For

example, a significant portion of the south west stairway (track alley) between the ground, mezzanine, and operating floors exceeded 2.5 mR/hr (5-10 mR/hr). On May 4, 1980, a hot spot on a radwaste box located on the ground floor in this same area measured 20 mR/hr at eighteen inches. In the walkway near the safety injection pumps for both Unit 1 and 2, measurements of 5-10 mR/hr were noted at 18 inches from a partially shielded pipe. In this instance a sign noting a radiation area was parially obscured by a temporary partition. The appraisal team believes that this practice is not consistent with good health physics practices in that workers may not be aware of the relative exposure rates in various areas within the Auxiliary Building and therefore may not minimize unnecessary exposures.

It was further noted that the licensee normally does not post radiation and contamination levels at the entrance to posted areas. This information is available on a large display board located at Access Control. The appraisal team believes that sufficient radiation and contamination information should be displayed at the entry to posted areas to define the general degree of radiological hazards existent with the areas.

High radiation area access is controlled through special RWP's, area postings, barricades, and, for radiation levels exceeding 1000 mR/hr, locking. These controls appeared adequate. However, Technical Specification 6.5.B.1 requires that any individual or group of individuals permitted to enter a high radiation area shall be provided with a radiation monitoring device which continually indicates the radiation dose rate in the area. Procedure SWI-RP-3, Radiation Work Permit, states that this dose rate instrument requirement may be satisfied by a chirper, portable dose meter, an installed dose meter, or by installing a portable alarming area monitor. In practice, the chirper (Dosimeter Corp. RAW-1) is used. This instrument emits an audible sound, the intensity being proportional to the dose rate. Generally, one chirp represents one mR/hr. The instrument does not visually display dose rate, nor is the audible indication sufficient to accurately indicate high dose rates. In the opinion of the appraisal team, the chirper is not the instrument of choice for a high radiation area because of these limitations. The appraisal team further recommends the use of two different type dose rate indicating instruments when entering areas containing radiation levels exceeding 1000 mR/hr. Several licensee employees indicated that they did not routinely take a chirper or a visual survey instrument into high radiation areas when entry is made fully suited (protective clothing) for a work activity. The individuals (operators) reported that a survey with a Rad-Tad (chirper) may precede the work activity entry. Failure to have a dose rate indicating instrument at all times when in a high radiation area is considered to be in noncompliance with Technical Specification 6.5.B.1.a.

Contaminated area access is controlled through area postings and special access requirements. A copy of the RWP at the entrance to posted areas specifies the protective equipment requirements. The majority of the protective equipment is maintained at Access Control. Gloves and plastic bags are conveniently located in the Controlled Area. Plastic bags are used as shoe covers. Generally, one or two lab coats were hung at the entrance to posted areas. If rubber shoe covers were required, several pair were usually kept in the posted area. It was common practice to reuse lab coats and rubbers. The appraisal team observed that the plastic bags being used as shoe covers were easily torn, or holes quickly wore in them, even when used for brief periods of time. Approximately 10% to 20% of the used plastic shoe covers examined had developed minor holes or tears on the bottoms. A combination of plastic shoe covers and rubbers afford protection for the bottom of the pants and make it easier to slip into and out of the rubbers. This combination is required in certain areas.

On two separate occasions workmen were observed inappropriately dressed. In one instance, a worker was observed inspecting the drum compactor without wearing gloves. In the second instance, a worker entered a boric acid evaporator room without a surgeons cap. It was also noted that lab coats were commonly worn open at the front.

Another problem noted was the use of a 55-gallon drum, marked as containing radioactive material, for storage of nonradioactive material (clean mop heads). Such misuse of radiological labeling could lead to inadvertent exposures due to worker confusion over the validity of labeling.

Based on the appraisal findings, improvements in dose rate survey instrument practices in high radiation areas are needed to achieve a fully acceptable program. In addition, the following matters should be considered for improvement: (1) resolve radiation area posting inconsistencies within the Auxiliary Building; (2) provide local information on radiation and contamination levels; (3) re-evaluate the use of plastic bags as the sole protective covering for shoes; (4) improve adherence to protective clothing requirements; (5) provide supplies of clean protective clothing at several locations within the controlled area; (6) eliminate the use of improperly marked containers for storage of materials.

b. Radiation Work Permit Usage

The licensee's radiation work permit (RWP) program, documented in Section F2.4 of the Plant Operations Manual and in Section Work Instruction RP-3, functions to control entries to radiologically posted plant areas. Extended RWP's (115 as of the date of the

appraisal) cover entries into posted areas on a repetitive basis and special RWP's (70 currently outstanding) cover short term jobs or single entries. Each RWP identifies the location and description of work allowed, the radiation conditions, general and specific instructions, and protective equipment requirements for entry. A good system exists for identification of protective equipment for different entry missions within a single posted area. Generally, lab coats, booties, and gloves can be used for minimal activities if the contamination levels are under 5,000 dpm/100 cm^2.

The RWP program is keyed into the personal exposure program. Thus, it is relatively simple to record and extract personal exposure information by RWP. This system is beneficial for job (and dose) planning. It was noted, however, that such usage requires the issuance of more extended RWP's than would otherwise be required and thereby complicates the RWP program somewhat.

Prior to issuing an RWP, an ALARA review is required of the Radiation Protection Section per SWI-RP-3. As noted in Section 10 specific guidance for the performance of these reviews is not available in plant procedures.

Based on the appraisal findings, this portion of the licensee's program appears acceptable, but the following matters should be considered for improvement of the program: (1) guidance for the conduct of ALARA reviews of RWP's should be provided, and (2) methods of writing RWP's should be examined in an attempt to reduce the number of effective RWP's.

c. Routine and Job Specific Surveys

Routine radiation/contamination surveys are conducted at scheduled intervals (daily, weekly, monthly) in accordance with surveillance procedures. Adequate job specific surveys are performed.

Routine radiation and contamination surveys are performed five times per week in at least ten representative areas throughout the plant. Typically, 150-200 radiation measurements and 50-100 smears are taken during a survey. Where appropriate, beta radiation rates are recorded in addition to the gamma radiation rates. Procedures require that alpha or beta contamination levels exceeding 10dpm/100cm^2 for alpha and 100dpm/100cm^2 for beta-gamma activity, respectively, must be isolated and reported to management. The weekly radiation and contamination survey includes the Turbine Building, Service Building, and outside areas used for radioactive material and waste storage. The monthly contamination survey includes the administration building and the survey instruments and dosimeters used in the controlled area. Survey results are posted on a status board located at Access Control.

Nine constant air monitors (CAM's) continuously monitor for airborne radioactivity; two of these CAM's are equipped to routinely sample for iodine. (See Section 9 for additional details on the CAM program).

Based on the appraisal findings, this portion of the licensee's program appears to be acceptable.

9. Instrumentation

The licensee's supplies, use, maintenance, and calibration of portable and fixed radiological instruments were reviewed. The licensee's performance in this area is generally good. Improvements, noted below, are possible in several areas.

a. Portable Survey Instruments

Prairie Island uses a variety of portable ion chamber and GM instruments for assessing beta and gamma dose rates. A total of 30 beta-gamma dose rate measurement instruments were found to be calibrated and available for immediate use at Access Control, emergency lockers, and designated storage lockers in the Auxiliary Building. This included four extendible probe instruments. Twenty-nine instruments were observed to be out of service including five new Eberline RO-2's for which calibration and use procedures had not yet been developed and eight units removed from service due to lack of use. The remaining 16 instruments, including five extendible probe instruments, were out of service for maintenance or recalibration. All out of service instruments were segregated in a locked "out of service" cabinet. Recurring problems associated with instruments have been limited mainly to Teletector meter movement problems and erratic readings attributed to humidity effects on the Victoreen 740 Cutie Pies. The Cutie Pie problem has been resolved by storage in heated (120°F) cabinets. Neutron dose rate measurements are performed using Eberline PNR-4 neutron dose rate meters. The licensee has three such instruments, two of which were in service at the time of the appraisal. No problems were noted with these instruments.

Procedures for the use and calibration of portable dose rate measurement instruments were compared to ANSI N323-1978. Check sources ranging from 5 to 25 mR/hr were available in most instrument storage lockers. Check sources for higher ranges were not readily available although ANSI N323 recommends that check sources be provided for all survey instrument ranges routinely used. Additionally, the instrument storage locker at the Access Control health physics area did not have a check source. The nearest check source was inconveniently located outside of the controlled area. Licensee personnel indicated that source checks frequently were not performed

on survey instruments. Documentation of source checks is not required by existing survey procedures; this matter was discussed with the licensee as a possible means to assure performance of the source check.

Formalized instrument use procedures are contained in the draft Radiation Protection Manual which is scheduled to be formally issued later this year. This manual appears to fulfill the requirements of ANSI N323 for instrument use procedures. Instrument calibration procedures were reviewed and found to meet the requirements of ANSI N323. Calibrations are performed semiannually for all portable instrumentation. No significant problems with the calibration performance, frequency, or records were noted.

Eberline RM-14 count rate meters and HP-210 pancake type probes are located at numerous locations within the Auxiliary Building for personnel contamination detection. All instruments observed were in calibration; counting efficiencies were posted on the probes. Extra probes were also labeled with counting efficiencies. Eberline E-120 GM meters with hard wall probes are also used as part of the emergency contamination detection instrumentation. Some Eberline E-120's are calibrated in counts per minute while others are calibrated in mR/hr. These instruments were labeled to indicate the correct usage. Routine contamination smear surveys are performed using laboratory instruments or an RM-14 (shielded HP-210 probe) located at Access Control. Procedures for calibration of these instruments appeared adequate except for an error in the formula for calculation of counting efficiency in procedures SP-1033a and SP-1501h. The calculation as listed in the procedure yields reciprocal efficiency. However, the affected instruments were noted to be labeled with the correct counting efficiencies. This matter was discussed at the exit interview. Routine use procedures for the friskers are contained in the draft Radiation Protection Manual.

Based on the appraisal findings, improvements in the performance of survey instrument response checks before use are required to achieve a fully acceptable program. Additionally, procedural guidance for determining instrument counting efficiencies should be corrected.

b. Survey Instrument Calibration Facility

Portable survey instrument calibration sources onsite (11 mCi cesium-137, 141 mCi cobalt-60, 17 Ci cesium-137) are sufficient for calibrations to approximately 300 R/hr exposure rates. A procedure (SP-1657) was recently developed calling for annual determination of the calibration source strengths, and corresponding exposure rates. Recalculation of source strengths on an

annual basis can introduce errors of up to 12% for cobalt-60 due to decay, and may affect the ability to calibrate some instruments to ANSI N323 recommended tolerances of ±10%. This item was discussed at the exit meeting. The licensee agreed to review the instrument and source calibration program with regard to ANSI N323-1978.

An Eberline RO-3B "cutie pie" ion chamber calibrated by Battelle Pacific Northwest Laboratory (PNL) to a secondary NBS standard was exposed to the licensee's calibration sources during the appraisal. Source distances and exposure rates used were those typically used for licensee calibrations. The exposure rates measured by the PNL instrument between 100 and 5000 mR/hr were approximately 5-10% higher than the licensee's calculated (standard) exposure rate. At lower exposure rates (1 to 20 mR/hr) the measured rate (PNL instrument) was 15-20% higher than the licensee's standard. While not conclusive, this comparison provides some assurance that the licensee's survey instrument calibration measurements are reasonably accurate.

Based on the appraisal findings this portion of the licensee's program appears acceptable, however, a review of the calibration program with regard to ANSI N323-1978 should be conducted.

c. Continuous Air Monitors

The licensee has nine continuous air monitors (CAM's) located in the controlled area and Turbine Building. The seven CAM's located in the controlled area monitor noble gases and particulates. Two CAM's located in the Turbine Building monitor noble gases, particulates, and iodine (silver zeolite). Two portable air monitors utilizing 47 mm fixed filters (Eberline AMS-2) are available for supplemental monitoring. No significant problems were noted with the use or calibration of these monitors. This portion of the licensee's program appears acceptable.

d. Portal Monitors

Two portal monitors are located at the guard house and one at Access Control. Weekly source checks are performed using an 8 uCi strontium-90 source; the units are calibrated semiannually. Alarms are set at nominal levels above background to provide maximum sensitivity without spurious alarms. Count times for the portal monitors are set at 5 seconds, which is somewhat low. Increasing count time to 10 seconds would improve the detection limit without significantly hindering personnel movement. The portal monitors were checked for sensitivity with several sources. A 2000 dpm cesium-137 source placed in contact with the detector housings would not cause an alarm. A similarly placed 26,000 dpm strontium-90 source caused an alarm approximately 60% of the time; it appeared that an additional 2-3 seconds counting time would result in consistent alarming for most detectors.

A hand and foot counter is located at Access Control also. No timer is provided for the hand and foot counter. Instructions specify 5-6 second counts; however, individuals were observed to spend as little as 3 seconds on the counter. The addition of a timer appears necessary to assure that proper count time is observed. A 2000 dpm cesium-137 source placed in contact with the detector housing for 6 seconds would not cause an alarm. However, all channels alarmed within 5 seconds when a 26,000 dpm strontium-90 source was used.

Alarms are set for 100 counts per minute above background. The hand and foot monitor is source checked weekly and calibrated semiannually.

Based on the appraisal findings, this portion of the licensee's program appeared acceptable although improvements could be made by lengthening the portal monitor count times and adding a timer to the hand and foot counter.

e. Area Monitors

The licensee has 18 area monitors (G-M or scintillation detectors) located throughout the controlled area of the plant. Monitors have both local and remote (control room) readouts and alarms. The control room alarm has a reflash capability. A spot check of several monitors indicated reasonable agreement with an NRC calibrated rate meter. No significant problems were noted with the location, calibration, or function of these monitors. It was noted, however, that the licensee has not performed an assessment of possible loss of area monitor data due to off-scale readings in the event of an accident. Based on the appraisal findings, this portion of the licensee's instrumentation program appeared acceptable, however, improvement could be effected through assessment of anticipated losses of area monitor data under accident scenarios.

f. Effluent Monitors

The licensee's radioactive effluent monitoring system meets regulatory requirements. The system appears to be utilized effectively to provide warnings of excessive radioactive releases, initiate necessary actions to control releases, and to quantify releases. Monitor readouts and alarms (with reflash capability) are provided in the control room. Minimal downtime problems have been experienced with the monitors. A problem with excessively weak check sources in several monitors necessitates the use of portable check sources for the monthly operability checks of these monitors; this practice is somewhat inconvenient but acceptable.

The effluent monitors were calibrated with fluid sources initially. Subsequent calibrations have been performed with solid calibration

sources (three points) that were cross calibrated during the fluid calibrations. Although there are no specific plans to repeat the fluid calibrations it would be prudent to do so occasionally. This matter was discussed at the exit interview, the licensee agreed to review the matter. Although energy dependence information is not routinely utilized in calculating gaseous effluents from the monitors, any errors introduced are conservative, and typically minor, since the thin window G-M monitors were initially calibrated with waste gases predominant in Xe-133.

One problem noted involved the recent modification to the shield building ventilation sample line to facilitate installation of a high range monitoring system for use under accident conditions. The new monitor was tied into the existing suction line for the shield building monitor without proper consideration being given to isokinetic properties of the sampling systems. Both systems consist of gaseous monitors and iodine and particulate samplers. This item was discussed at the exit interview, the licensee agreed to review the matter.

Interim methods for monitoring high level airborne releases per NUREG-0578 had been implemented. Equipment and procedures for quantifying high level releases from the shield building vents, the air ejectors, and the main steam safeties and reliefs were reviewed and appeared adequate. The equipment, particulate and iodine samplers and a gas chamber (which is read with portable survey instruments), is located in the turbine building for access considerations. As noted in Section 4.c, training in use of the quantification procedures had not been completed for shift supervisors and shift technical advisors. The matter of sampling isokinetics also requires resolution.

Based on the appraisal findings, this portion of the licensee's program appears acceptable but the following items should be considered for improvement in this area: (1) periodic conduct of fluid calibrations of effluent monitors; (2) resolution of the isokinetic properties of the shield building sampling systems.

10. ALARA

The licensee's ALARA program appears quite effective. Radiation exposures are relatively low and personnel, both radiation protection and plant workers, appear knowledgeable regarding ALARA practices. Additional measures should be taken, however, to strengthen the program.

Radiation doses have averaged approximately 200 manrems per year over the last two and one half years. These doses are indicative of a successful program of radiation exposure minimization. These relatively low exposures have apparently resulted from continuing efforts at

elimination of unnecessary radiation sources, and work practices which minimize exposure to existing radiation sources. The attitude of plant workers and radiation protection personnel was excellent regarding minimization of radiation exposures. Licensee management's commitment to ALARA also appeared excellent. Individual and job specific exposure information is readily available to the Radiation Protection Specialists and such information is routinely used in work activity planning.

The licensee's formalization of the ALARA effort, however, could stand improvement. Although a strong management commitment to ALARA is documented in plant procedures, specific guidance for implementation of ALARA is often not proceduralized. Radiation Protection Specialists, for example, are required by procedure to review work activities to insure ALARA is implemented when writing Radiation Work Permits; but no specific guidance is provided describing how this review is to be performed. Other activities which are not formalized include: (1) review of design changes for ALARA considerations; (2) review of procedures, and changes thereto, for ALARA considerations; and (3) processing of work requests to identify those with ALARA significance.

Although plant radiation and contamination levels are maintained relatively low, additional efforts could be made in the following areas. (These items are discussed in more detail in Section 8). (1) Although the entire auxiliary building was posted as a radiation area, the majority of radiation areas within the buildings were posted also. Several exceptions to this practice were noted such that in certain cases 2 mR/hr radiation levels were posted but 5-10 mR/hr radiation levels were not posted. This inconsistency in posting could lead to unnecessary exposures. (2) Hot spot indicators are not extensively utilized to identify the areas of highest radiation levels within the posted areas. (3) Radiation and contamination levels are not normally indicated at the posted area. A survey map at the controlled area access point contains these levels for the entire plant.

Based on the appraisal findings, this area appears acceptable, however, the shortcomings discussed above should be considered for improvement in this area.

11. Radioactive Waste

Radioactive airborne and liquid effluent activity released from the site has been relatively low for the past several years. Solid radioactive waste volume, typically relatively low also, increased in 1980, to date, apparently as a result of outages during late 1979.

a. Airborne Effluent Control

Airborne radioactivity releases are relatively low. Noble gas releases have been less than 2.5E3 curies per year since startup

and have averaged less than 1E3 curies per year (30 uCi per second). Iodine and particulate releases have averaged less than 5E-3 curies per year (1E-4 uCi/sec). These numbers are upper limits on the airborne releases since minimum detectable activities are frequently used to quantify the releases. Noble gas releases are quantified from weekly vent grab samples supplemented by review of monitor charts for anomalies between grab samples, and grab sampling for calculation of waste gas decay tank and containment purge releases. Iodine and particulate releases are quantified from continuous stack samples which are changed out weekly. No discrepancies were identified with the quantification methods.

The gaseous waste system for holdup (decay) and release of radioactive gases is designed to segregate low activity gases (cover gas, equipment vents and reliefs, gas analyzer, etc.) from higher activity gases (volume control tank). Separate waste gas decay tanks, waste gas compressors, recombiners, etc., exist for the two systems. At present, the licensee is using only the low level waste gas system due to the low activity levels within the volume control tank.

Due to unresolved questions regarding certification of the closure ability of the containment purge valves, containment purges are not conducted with the reactor at power. A system was implemented to continuously vent the containment through existing containment sample lines to compensate for instrument air inleakage into containment. Releases from this venting flow through particulate and charcoal filters to the auxiliary building atmosphere and are released via the auxiliary building vent.

Based on the appraisal findings, this portion of the licensee's program appears acceptable.

Liquid Effluent Control

Effective treatment (evaporation, filtration, and demineralization) of liquid radioactive wastes has resulted in significantly lower than average releases, except for tritium. Annual liquid activity (less tritium) discharges have been less than one curie since startup and have averaged less than 0.1 curie. Minimal reuse of liquid radwaste has resulted in higher than average release volumes (and tritium). The only significant reuse of processed liquid radwaste is for spent fuel pool makeup. This policy of water management, which is pursued to minimize introduction and buildup of radioactive and nonradioactive contaminants within plant systems, is achievable due to effective controls exercised over generation of waste liquids and effective treatment of the wastes.

Radioactive liquid releases are made on a batch basis and quantified based upon prerelease and postrelease analyses. Liquid release

permits are used to provide management control over the releases, including determination of allowable release rate and expected liquid effluent monitor response. Selected release records were reviewed. No significant discrepancies were identified. Liquid releases have been within the technical specification design objectives.

A turbine building sump composite sampler is scheduled to be installed during 1980; grab samples are presently collected weekly. Although turbine building sump discharges are monitored, the composite sampler will provide greater sensitivity for detecting radioactivity.

Based on the appraisal findings, this portion of the licensee's program appears acceptable.

c. Solid Radioactive Waste

Solid radioactive wastes consist of general plant trash, filters, evaporator concentrates, and spent resins. The licensee's solid radwaste volume prior to 1980 has been relatively low (six year average of 220 cubic meters and 100 curies per year). An increase in radwaste volume in 1980, to date, resulted from outages in late 1979 and early 1980 (steam generator tube failure). The extensive use of a compactor, the use of dewatering rather than solidification for resins, and segregation of contaminated and non-contaminated wastes are primarily responsible for keeping the volume relatively low. The specific activity of spent resins normally does not exceed one microcurie per cubic centimeter (for radionuclides having half lives greater than five years). The licensee therefore does not expect to be affected by the requirement to either solidify burial consigned resins or package them in high integrity containers after June 1981.

Detailed operating instructions exist for solidification of evaporator concentrates and use of the trash compactor. Detailed instructions also exist for the shipment of radioactive material, including radwaste.

Drums utilized for compacted or cemented wastes are new when purchased and contain a neoprene seal. Filled drums, boxes, and resin liners are stored outside while awaiting shipment. A six foot high concrete block wall surrounds the storage yard. Radiation areas surrounding the storage yard are denoted by a rope barrier supported by temporary stanchions. The rope barrier was observed to be lying partially on the ground, presumably as a result of winds on one occasion during the appraisal. The licensee should examine the storage facility to ensure that radiation levels are minimized and radiation postings are adequate to warn of potential hazards. The potential for inleakage of rainwater in filled and empty radwaste containers should also be examined.

The licensee had on file current copies of the appropriate burial ground operators' licenses. However, the licenses for two other companies that routinely receive radioactive material from the licensee had expired recently. The two licensees were operating under a timely renewal status. The licensee had no provisions to ensure that these licensees were still authorized to receive radioactive material.

Based on the appraisal findings, this portion of the licensee's program appears to be acceptable. However, the following items should be considered to improve the program: (1) the licensee should develop procedures to confirm that licensees operating under timely license renewals remain authorized to receive transferred radioactive material, and (2) radioactive waste storage yard practices should be reviewed for shielding, posting, and water inleakage considerations.

12. Facilities and Equipment

The facilities available to the Radiation Protection Section generally appear to be adequate for both normal and potential accident conditions. Some exceptions to this general finding are noted below and in Section 13.

a. Chemistry and Counting Laboratory

The hot chemistry laboratory, sample collection room, and counting room have adequate capabilities for performing alpha, beta, and gamma spectral analyses. Adequate engineering features for the reduction of direct and airborne radioactivity exposures are incorporated in the facility designs. Filtered hoods, shielded sink traps, and portable shields are available where necessary. During normal operation, samples may be collected, prepared, and counted within a small controlled area under conditions favorable for keeping exposure of personnel to a minimum. Based on the appraisal findings, this portion of the licensee's program appears acceptable.

b. Health Physics Facilities

In addition to the chemistry and counting facilities, the following facilities were examined: HP offices, personnel and equipment decontamination areas, respirator fitting/testing/cleaning area, accident sample and analysis area, mobile analysis trailer, controlled area access facilities, and contaminated tool and equipment storage areas. No significant problems were identified with these facilities. The arrangement of the radiation protection facilities and the access control area appeared to be functional for both normal and accident conditions.

A segment of the Access Control area is dedicated to use by the Radiation Protection Section to perform minor equipment and personnel decontamination, respirator fit-testing and personnel decontamination. These facilities appear to be adequate for routine and initial accident response. It appears that supplemental facilities may be required for longer term recovery from accident conditions. The Access Control area contains a large display board that depicts the current radiation (contact and general area) and contamination levels within the controlled area. These data are updated at least five times a week. Copies of all current RWP's are maintained at Access Control. Supplies of protective equipment and emergency supplies are available at Access Control. Although there is no designated medical treatment area at Prairie Island, a registered nurse is available one day a week. Her duties are limited to administering respirator tests under procedures developed by a physician and attending to minor medical problems. A Nuclear Accident Carrier is stationed within the controlled area.

Based on the appraisal findings in this area, this portion of the licensee's program appears to be acceptable.

c. Other Support Facilities

The calibration of survey instruments is performed in room 122, one of two control room water chiller rooms. Preparation for calibration of instruments includes posting the room and notifying the control room. The door to the room is equipped with audible alarms (local and remote). When not in use, sources are stored in lead shields within a properly posted section of the room. The licensee maintains four calibration sources. (Refer to Section 9.b. for information pertaining to use of the calibration facility). The facility appeared adequate.

Two laundries, one wet and one dry, are operated by the licensee. The wet laundry is used for rubber and plastic anti-contamination articles. The dry cleaning system is used for all cloth protective equipment. A Special Work Instruction provides the procedures used by the plant helpers in the operation of the laundry. The special laundry monitor is set to alarm at 2,000 cpm. Should this monitor alarm, an HP-210 is used to locate the contamination.

If a reading of greater than 3,000 cpm is observed, the article is returned for re-wash. If, after several washes, a dose rate of more than 2 mR/hr is noted the article is placed in the radioactive trash.

Based on the appraisal findings in this area, this portion of the licensee's program appears acceptable.

13. Accident/Re-entry

The scope of reivew in this area was limited to the Radiation Protection Section's accident and re-entry preparedness capability. The appraisal primarily focused on six areas: instrumentation, analytical capability, re-entry capability, expanded support capability, and training and environmental capability. While work in each of these areas has been undertaken as a result of TMI, additional improvement in certain areas, especially re-entry preparedness and training, is still needed.

Numerous survey and sampling instruments are immediately available for initial response to an accident. The licensee also maintains a significant number of survey instruments out of regular service. These instruments can be returned to service, following insertion of new batteries and calibration.

Temporary and/or permanent measures which have been taken to minimize personnel exposure when collecting and analyzing high activity primary coolant and containment gas samples include: shielding of sampling system components, portable personnel shielding, remote handling tools, shielded hot cell and manipulators for performing analyses, protective clothing and equipment specifications, line flushing procedures, and sample shielding. In addition, a trailer based computerized gamma spectroscopy system with a three foot geometry is available for use if the routine counting facility is inaccessible. Future measures which are in various stages of planning/completion include: additional shielding of sample system components, a shielded platform utilizing master-slave manipulators for sample collection, a remote monitor for the analysis of primary coolant gas constituents, improved hot cell with hood ventilation and contamination control, a redundant offsite hot cell and equipment, and establishment of a relocation area for the trailer analysis system which would not be subject to shine from the containment buildings. These corrective measures should provide adequate analytical capabilities to assure that post-accident samples can be collected and analyzed in accordance with NUREG-0578.

The Plant Operations Manual Section F-3 Emergency Plan, only briefly addresses re-entry requirements. It appears that additional planning and training for re-entry would be beneficial. Radiation Protection Section participation on re-entry teams would undoubtedly benefit from the fact that a majority of section personnel have worked at the plant since start-up and are very familiar with plant layout. Initial expanded support, both personnel and equipment, is available from the licensee's other nuclear power plant located about two hours driving time away. An adequate inventory of protective clothing exists in the plant for initial accident response.

Environmental samples are routinely collected by the licensee's Environmental Regulatory Activities Department and analyzed by the licensee's

environmental contractor located in Northbrook, Illinois. The contractor has, by formal agreement, made arrangements to have their personnel and laboratory facilities available on a twenty-four hour basis and provide a team, if requested, to supply additional sampling manpower and equipment during an emergency at the licensee's facility. Adequate procedures exist for the collection and analysis of environmental samples.

A separate NRC evaluative effort is being conducted regarding nuclear reactor emergency planning activities. The emergency planning evaluation for the Prairie Island plant has been initiated but is not yet complete. In light of this ongoing effort, the Health Physics Appraisal Team will refrain from evaluation of the licensee's overall emergency response capability. No major problems were identified during the appraisal which would be expected to significantly limit the licensee's capability to respond to accident situations. However, it is the appraisal teams opinion that increased planning and training of re-entry personnel would benefit the licensee's emergency capability.

14. Exit Interview

The Appraisal Team met with licensee representatives (denoted in Paragraph 1) at the conclusion of the appraisal on May 15, 1980, and by telephone with Mr. E. Watzl on July 31, 1980. The Appraisal Team summarized the scope and findings of the appraisal during these conversations. The findings can be grouped into three categories:

a. Significant appraisal findings are specified in Appendix A to the letter forwarding this report. The licensee's response to these findings are to be submitted in writing and will be reviewed upon receipt.

b. Findings of lesser significance but which are considered instrumental to improvement of the licensee's health physics program are summarized at the conclusion of applicable subsections of this report. The licensee's actions in response to these items will be reviewed during subsequent inspections.

c. One noncompliance item is specified in Appendix B to the letter forwarding this report. The licensee's response to this finding is to be submitted in writing and will be reviewed upon receipt.