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

REGION III

Report No. 50-255/80-14

Docket No. 50-255 Licensee No. DPR-20

Licensee: Consumers Power Company
212 West Michigan Avenue
Jackson, MI 49201

Facility Name: Palisades Nuclear Generating Plant

Appraisal At: Palisades Site, Covert, MI

Appraisal Conducted: August 4-15, 1980

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Fuel Facility Projects and
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Appraisal Summary:

Appraisal on August 4-15, 1980 (Report No. 50-255/80-14)

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 approximately 400 man-hours onsite by four inspectors. Results: Several significant weaknesses in the health physics program were identified in the areas of qualifications (Section 3), training (Sections 4 and 13), quality assurance (Section 5), procedures (Section 6), instrumentation (Section 9), ALARA (Section 10), and radwaste (Section 11). Two apparent items of noncompliance were found (infraction - inadequate evaluation of airborne release - Section 11; infraction - failure to follow procedures - Section 6).

DETAILS

1. Persons Contacted

D. Andrews, Acting Environmental Supervisor
J. Beer, General Health Physicist (CPCo)
*D. Bowman, Chemical Engineer
D. Campuzano, Acting Radiation Protection Supervisor - Maintenance
*R. DeWitt, Vice President for Nuclear Operations (CPCo)
M. Dickson, Associate Health Physicist (CPCo)
*R. English, Staff Health Physicist (CPCo)
C. Francisco, Training Instructor
C. Gilmore, Maintenance Superintendent
E. Hart, General Health Physicist (CPCo)
N. Hough, Training Engineer
*A. Kowalczuk, Chemistry and Radiation Protection Superintendent
L. Kenaga, Radiation Protection Supervisor
*D. Kozin, Plant Laboratory Supervisor
*J. Lewis, Nuclear Services Director, (CCPCo)
L. Martin, Electrical Maintenance Supervisor
R. McCaleb, Quality Assurance Superintendent
*R. Montross, Plant General Manager
T. Neal, Senior Technical Analyst - Radwaste (CPCo)
*G. Petitjean, Technical Engineer
*S. Pierce, Radioactive Materials Control Supervisor
*R. Roselius, Staff Health Physicist (Midland Plant)
B. Schaner, Operations Supervisor
R. Sinderman, Corporate Health Physicist (CPCo)
*P. Stoner, General Health Physicist
C. Thomas, Mechanical Maintenance Supervisor

*B. Jorgensen, NRC Senior Resident Inspector
*J. Heller, NRC 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 August 4, 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 contractor individuals. General tours and examinations of licensee facilities were conducted on August 4 and 5, 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 radiation 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 several areas of the licensee's health physics program, including: qualification and training/retraining programs for C&RP personnel, certain quality assurance activities, procedure coverage and adherence, certain instrumentation practices and capabilities, ALARA program, and airborne effluent quantification. Additional weaknesses are described in the report. Certain of the identified weaknesses are expected to have a greater effect upon the licensee's ability to cope with radiation conditions encountered during and after significant reactor accidents than those occurring during routine operations. Because significant problems may not have been encountered in the past does not ensure that problems would not be encountered in significant off normal situations.

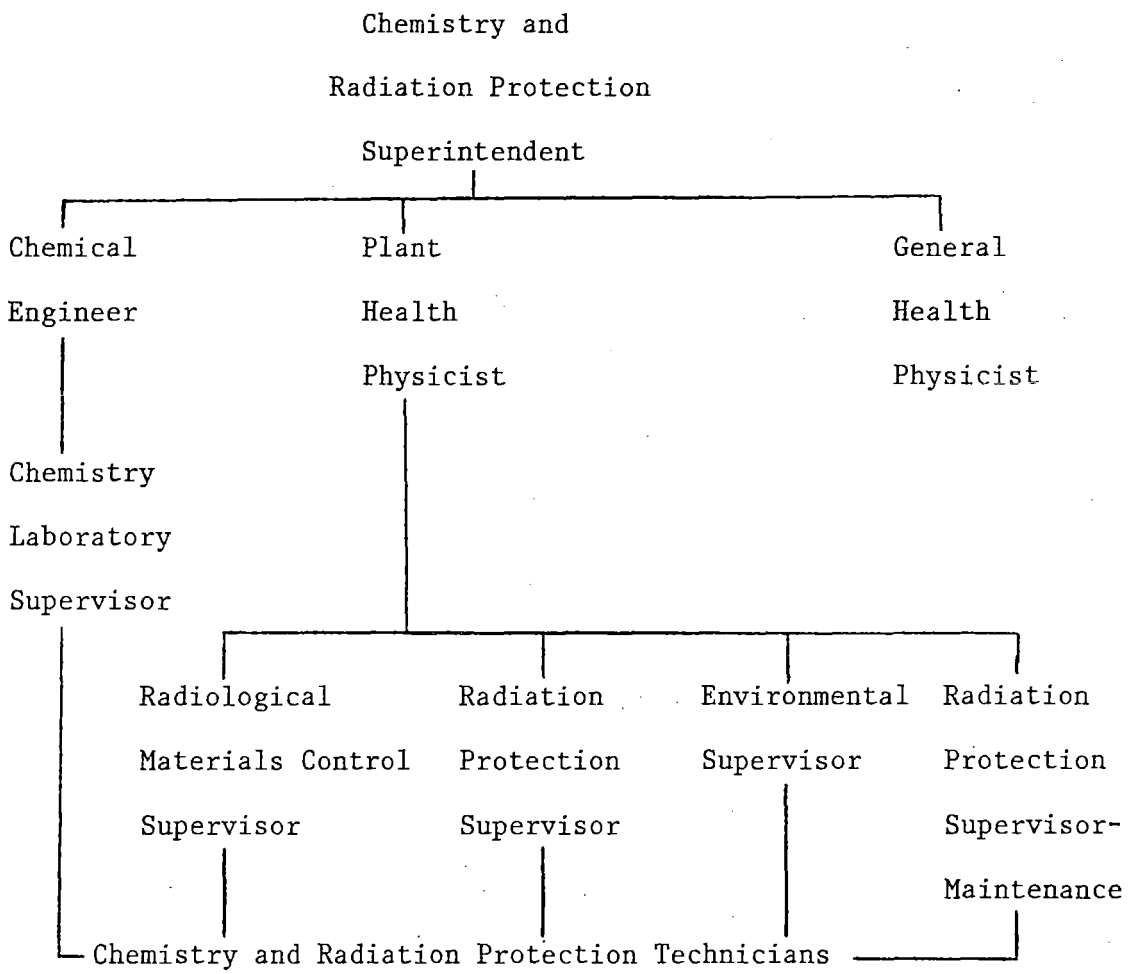
The licensee's performance in the health physics area was noted to have improved in recent years. Additional improvements, in the areas noted in this report, are considered essential to the continued upgrading of radiation protection activities.

3. Organization, Management, and Qualifications

The licensee's Chemistry and Radiation Protection organization has experienced significant personnel changes both managerial and technical, over the last year or two. While many of these changes appear to have been positive, the inherent instability introduced by the influx of new personnel was noticeable. The principal improvement needed in this area is development of a formalized qualification program.

a. Organizational Structure

The licensee's health physics organization is directed by the Chemistry and Radiation Protection Superintendent, who reports directly to the Plant Manager. The Chemistry and Radiation Protection Department structure is depicted below.



The Radiation Protection Supervisor-Maintenance, a recently created position which has not yet been made permanent, provides coordination between the C&RP and maintenance groups for radiological evaluation of maintenance jobs and completion of prejob radiation surveys and radiation work permit paperwork. This position appears to have promoted more effective working relations between the two groups.

The number and reporting arrangement of management positions in the health physics organization appear adequate. However, the Plant Health Physicist position has been vacant since early March 1980. This position should be filled as soon as possible since general experience levels in other C&RP management positions and among C&RP technicians are somewhat weak (See Section 3.b for further details).

An additional plant management position with overall responsibility and authority over radwaste activities appears desirable. Currently, these activities are split between radiation protection, operations, and maintenance personnel. Responsibilities for various activities are defined, but coordination problems (e.g., solidification and shipping) are somewhat complicated and would benefit from centralization of management attention for all radwaste related activities by a single individual.

The C&RP technicians specialize in chemistry or radiation protection although some chemistry technicians assist in radiation protection duties during outages. Technician losses due to promotions and terminations over the last few years have had a significant effect on the overall technician experience level. Temporary technicians (about one quarter of the C&RP technician work force) are utilized to supplement the permanent technician staff pending hiring of additional technicians. The temporary technicians are either rotated onsite from a licensee facility under construction or are contract radiation protection technicians. Additional contract technicians are hired during major outages. The unfilled C&RP technician positions should be filled as soon as possible in order to minimize reliance upon contract technicians. (See Section 3.b for further details.)

Rotating shift (24 hours per day, 7 days per week) radiation protection coverage is provided. Offshift chemistry technician coverage is provided on weekdays. Emergency chemistry coverage on weekend offshifts is provided by the shift radiation protection technician or by calling someone back to the site. Since specific training/qualification requirements do not exist for cross training radiation protection technicians in chemistry procedures, this arrangement may not ensure timely completion of required chemical analyses in an accident.

Two janitors are assigned to perform routine floor decontamination; laundry facilities are also run by janitors. Maintenance personnel

perform radwaste compacting and radwaste movement duties. The number of radiation protection technician positions appears adequate for the workload. The C&RP technicians are not members of a bargaining unit although operations and maintenance workers are. No significant problems were identified as resulting from the union/nonunion dichotomy.

The licensee's Administrative Procedures require updating to reflect early 1980 changes in the licensee's organization, including the C&RP Superintendent position and the reporting chain for chemistry personnel.

Based on the appraisal findings, this portion of the licensee's program appears generally acceptable. However, the Plant Health Physicist and vacant C&RP technician positions should be filled expeditiously; plant procedures should be revised to reflect the current C&RP organizational structure; and offshift chemistry coverage should be reviewed to ensure that required reactor coolant chemistry sampling and analyses can be conducted expeditiously under accident conditions. Additionally, the creation of a management position with overall responsibility and authority over radwaste activities should be considered.

b. Staffing and Qualifications

As noted in the previous section, the licensee currently has several unfilled C&RP technician positions. These shortages are being compensated for by the use of temporary and contract technicians. Such a practice, although temporarily acceptable, is undesirable for the long term due to the general lack of plant specific experience of these individuals. About half of the contract technicians had been at the site for less than six months, with the remainder onsite between six months and one year. Another limitation of contract technicians is a frequent lack of familiarity with radiation protection characteristics of operating plants, since most of their experience is with refueling outages.

In general, the experience levels of licensee C&RP personnel are relatively low also. Fourteen of the eighteen current C&RP technicians (excluding two temporarily promoted individuals) arrived onsite after January 1, 1978. Four of six C&RP management personnel have been in their current positions for less than one year (three of the four for less than six months). However, the management personnel have an average of about five and a half years in the licensee's C&RP program. The general lack of experience was evidenced by the difficulties encountered in quantifying noble gas releases on August 1 and 12, 1980. (See Section 11.a for further details.) This lack of experience also appears to have been responsible for the licensee's failure to expeditiously resolve the procedural omission regarding use of the high range noble gas monitors. (See Section 9.f for further details.)

The licensee's principal document describing staffing qualifications, Administrative Procedure 2.0 (Organization and Responsibility), contains the following problems: (1) The Plant Health Physicist's qualification requirements do not reflect the Regulatory Guide 1.8 qualifications; less restrictive qualification requirements are specified. (2) The C&RP Superintendent's position is not included in AP 2.0. (3) Senior Radiation Protection Technician and Senior Chemistry Technician positions are defined in AP 2.0, but according to the C&RP Superintendent, no such positions exist. A Senior Chemistry and Radiation Protection Technician position exists but such a position is not described in AP 2.0 nor are the combined qualification requirements for the Senior Radiation Protection Technician and the Senior Chemistry Technician in AP 2.0 applicable to the Senior Chemistry and Radiation Protection Technician position.

According to the C&RP Superintendent, there is no direct relationship between the licensee's technician designations and the ANSI N18.1-1971 "responsible" technician definition. Nor is a qualification program defining "responsible" technicians utilized by the licensee. It is the Appraisal Team's opinion that "responsible" ("journeyman") technicians per ANSI N18.1-1971 (ANS 3.1-1978) should be defined within the licensee's technician force. A formal qualification program should be established to ensure adequate training of such individuals and formal restrictions should be established for non-qualified technicians. Non-qualified technicians should be allowed to perform activities for which specific qualification has been demonstrated without supervision, but other activities should only be performed under the supervision of formally qualified personnel. Non-qualified technicians should not be assigned to work offshifts unless it can be demonstrated that qualifications for all activities required to be performed, including accident related activities, have been completed by the technician. Offshift health physics coverage must be adequate to ensure that in addition to completion of routine activities, necessary measurements can be made and actions taken in accident or other anomalous situations to evaluate radiological hazards and effect appropriate radiological precautions. The offshift coverage must also be able to collect and analyze reactor coolant and containment atmosphere samples under accident conditions. The individuals providing this coverage must not be assigned other duties which detract from their primary responsibility for these radiation protection and chemistry activities.

The technician qualification program should include the criteria contained in the March 15, 1977, letter from NRR which clarified the technical specification requirement to have an individual qualified in radiation protection procedures onsite when fuel is in the reactor. These criteria are not currently a qualification requirement for C&RP technicians.

Based on the appraisal findings, improvements in the following areas are required to achieve a fully acceptable program: (1) A formal C&RP technician qualification program should be developed and work assignments made consistent with this qualification program. The qualification program should incorporate the "responsible" technician concept from ANSI N18.1-1971 (ANS 3.1-1978) and the qualification criteria in the March 15, 1977, NRR letter. Offshift coverage by C&RP personnel should be adequate to ensure that necessary measurements can be made and actions taken in accident or other anomalous situations to evaluate radiological hazards and effect appropriate radiological precautions. (2) Personnel staffing procedures should be revised to reflect ANSI N18.1-1971 (ANS 3.1-1978) and Regulatory Guide 1.8 qualification requirements. In addition, the following item should be considered for improvement in this area: reliance upon contract C&RP technicians should be minimized in non-outage operations.

c. Communications, Authority, and Responsibility

Morale within the plant health physics group and the attitude of other plant workers towards radiation protection personnel and requirements appear to have improved substantially over the past year. This change appears to have resulted from personnel changes and clarification of C&RP group responsibilities and authorities. A recently issued corporate policy statement (7/23/80) explicitly states that C&RP personnel have authority to enforce compliance with radiation protection practices to the point of stopping work if necessary.

Communications within the C&RP organization also appear to have improved significantly over the last year. Further improvement may be desirable, however, based on comments from several technicians. The C&RP Superintendent meets weekly with his professional staff but has had only one meeting with the C&RP technicians this year. The C&RP Supervisor meets informally with some of the technicians during shift turnovers but does not routinely meet with all of the technicians he supervises. Necessary information appears to be adequately disseminated but the teamwork essential to a well functioning organization appeared hindered by the lack of the free flow of information engendered by routine personal contact. The Appraisal Team recommends that routine meetings be conducted between C&RP management and technicians to encourage this information flow. A feedback mechanism (post job evaluations) which is used beneficially at another reactor facility in the licensee's corporate organization, is not used at this facility. Use of a similar feedback device would appear to be beneficial to the performance of the C&RP organization. Communications outside of the C&RP Department are fairly good based upon conversations with maintenance and operations supervisory personnel. The creation of a radiation protection position to coordinate maintenance activities appears to have been quite beneficial.

Responsibility assignments for C&RP management personnel are adequately defined in Administrative Procedure 2.0 except for the Radiation Protection Supervisor-Maintenance and the necessary updating to reflect creation of the C&RP Superintendent position. In particular, the ALARA responsibilities of the Radiation Protection Supervisor-Maintenance require clarification. (See Section 10 for further details.) Responsibility assignments for those C&RP technicians with long term specialty assignments (i.e., respiratory protection, dosimetry, instrumentation, etc.) are not formalized nor are the detailed responsibilities for the specialty assignments documented. Such documentation is desirable to ensure clarity of the assignments and understanding of responsibilities.

Based on the appraisal findings, this area appears acceptable; however, the following items should be considered for improvement: (1) Improve communications between C&RP management and C&RP technicians. Regular meetings and informational devices such as the "post job evaluations" should be considered. (2) Long term C&RP technican assignments should be better documented to ensure understanding of responsibilities. (3) Responsibilities for the Radiation Protection Supervisor-Maintenance and C&RP Superintendent positions should be documented.

d. Corporate Support

The corporate health physics organization staffing appears generally adequate in complement and competency. The staff includes five professional health physics personnel, one public information individual, and several technical support personnel. In addition to the normal long range planning and technical support activities performed by corporate H.P. organizations, an inhouse TLD dosimetry program is conducted. (See Section 7.a for details of the dosimetry program.) The corporate H.P. organization also performs routine effluent report compilation and review. Included in the corporate organization, but not in the health physics organization, are emergency planning and radwaste coordinational activities. Corporate support for the plant C&RP organization appears to have been responsive to plant requests. As noted in Section 10, guidance regarding an ALARA program needs to be developed by the corporate health physics group.

Based on the appraisal findings, this area appears generally acceptable; however, ALARA guidance should be developed as specified in Nuclear Operations Department Policy No. 14 (Health Physics Policy).

4. Training

The licensee's training program includes initial training and retraining in radiation safety for general workers (10 CFR 19.12) and specific work groups. Initial radiation training provided per 10 CFR 19.12 appeared

adequate. Radiation training provided specific work groups, however, was not fully acceptable in all cases. The principal shortcoming in this area is the lack of an effective training/retraining program for C&RP personnel.

a. C&RP Personnel Training

New C&RP technicians attend general employee training (GET), which includes the radiation protection and respiratory protection training given to all individuals allowed unescorted access within the inner security fence (protected area) and to individuals required to wear respirators, respectively. Some, but not all, new C&RP technicians attend the more detailed limited radiation access authorization (LRAA) training. The decision on attending LRAA training is made subjectively by C&RP management. Additional C&RP technician training requirements are rather vague. Administrative Procedure 13.2.2 discusses departmental training for C&RP personnel, but there is no C&RP Department procedure to implement a training program for C&RP technicians. This shortcoming has been discussed with licensee personnel by NRC inspectors in the past (IE Inspection Report No. 50-255/79-06) and has been the subject of a licensee quality assurance deviation report (QP-78-70B). Although efforts have been made to develop a departmental training program over the last few years, a formal program still has not been implemented. The Appraisal Team believes that an effective technician training program is essential to a successful health physics program. A C&RP technician training program, including refresher training, should be developed and implemented as soon as possible. The initial training and documentation requirements should be sufficient to qualify responsible technicians per ANSI N18.1-1971. Also, they should provide a basis for determining activities that other technicians can perform without supervision.

Additional problems identified with C&RP training were: (1) The only training requirements for contract health physics technicians are those applicable to general plant employees. A documented training/qualification program should be implemented for contract technicians to ensure that plant and job specific knowledge is adequate for the activities in which these personnel are engaged. (2) Plant systems training of C&RP personnel should be improved. Past plant systems training has been virtually nonexistent for C&RP technicians. The training department recently began what appears to be a good effort to provide systems training for non-licensed personnel. This systems training should be included in the C&RP departmental training program. (3) C&RP personnel need better accident response training. According to C&RP technicians, training conducted recently by consultant personnel did not sufficiently define technician response in an accident. Personnel were instructed in their reporting stations but not in subsequent actions. Additionally, emergency response training has not been given to contract technicians, to recently hired plant C&RP technicians, and to

some of the technicians who rotate onsite from another facility in the corporate organization. As noted in Section 13 of this report, training that was given regarding accident response actions did not include physical use of equipment to verify its usability. (4) According to the C&RP Superintendent, there are no plans to establish guidance regarding the portion of C&RP technicians' time which should be devoted to training activities. The Appraisal Team believes, that unless such goals are established, training tends to be subordinated in favor of more immediately productive activities. The establishment of such goals should be included in the departmental training program as regularly scheduled time. A dedication of 5% to 10% of available time for participation in training activities would not be excessive in the opinion of the Appraisal Team. (5) Discussions with the C&RP Superintendent and the Training Engineer indicated disagreement regarding the responsibility for conducting C&RP departmental training activities. Responsibility assignments must be resolved to ensure satisfactory implementation of the training program.

Based on the appraisal findings, development and implementation of a formal training program for C&RP personnel is required in order to achieve a fully acceptable program. The following shortcomings should be resolved: (1) documentation of technician qualifications and use of such information in assigning work; (2) contract health physics technician training; (3) plant systems training; (4) emergency response training; (5) allocation of training time; and (6) responsibility for training activities.

b. 10 CFR 19.12 Training

A cursory review of this area did not reveal significant problems. The training required by 10 CFR 19.12 is provided through general employee training (GET) conducted by the Training Department. GET is required for unescorted access to the plant protected areas. Although no specific problems were noted, the licensee was cautioned to ensure completion of the instructional requirements of 10 CFR 19.12 for individuals entering the radwaste storage facility, which is not located within the protected area fence.

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

c. Other Training

In addition to initial general employee training, plant radiation workers may receive radiation protection training in departmental training, including safety meetings, limited radiation access authorization training, and licensed operator training. As noted earlier, the C&RP departmental training program requires significant improvement. Improvement appears desirable in other departments, also. Radiation protection training specific to these departments' needs should be included in their training programs. Special

training is given to certain plant radiation workers under the limited radiation access authorization (LRAA) program. This program for operators, supervisors, engineers, etc., provides additional radiation protection training (one week initial training and one half to one day biennial retraining) to these individuals to allow access to the plant radiation controlled area without the need for direct C&RP technician coverage or issuance of a radiation work permit. A former C&RP technician (chemistry specialty but with some outage radiation protection experience), recently transferred to the training department, was given responsibility for conduct of LRAA training. While such experience is valuable, the Appraisal Team recommends that current C&RP technicians be utilized to conduct portions of the LRAA training to ensure continuing input by the C&RP group into these workers' training. Such input is important to effectively communicate C&RP concerns regarding radiation safety matters to the workers and to provide feedback to the C&RP group regarding workers' knowledge of and attitudes toward radiation protection practices. An additional observation pertaining to LRAA training concerns testing conducted in conjunction with both the initial and refresher training. There is no bank of test questions; therefore the same tests, one for the initial training and one for refresher training, are used repetitiously. Such a practice could compromise the validity of the tests for determining knowledge levels, especially for the refresher training when large numbers of individuals are tested over a short time period.

Several problems were identified with the training for use of special high range noble gas monitors. Shift supervisors (assisted by shift technical advisors) are responsible for determining offsite hazards associated with radioactive material releases in an accident situation (until appropriate C&RP personnel arrive onsite). In addition to the procedure availability problem discussed in Section 9.f: (1) attendance at the training sessions for use of the high range monitors was not documented; (2) the training was not given to individuals who assumed their jobs subsequent to the training sessions, which were conducted in early summer; and (3) several shift supervisors and shift technical advisors queried during the appraisal did know how to use the monitoring equipment. (One shift supervisor and one shift technical advisor were unaware of the monitoring equipment.) As noted in Section 9.f, the licensee agreed to conduct additional training for shift supervisors and shift technical advisors in use of the high range noble gas monitors. The licensee also should ensure that the problems identified with this training effort are not repeated in other training efforts.

Based on the appraisal findings, correction of the problems noted pertaining to the training in use of the high range noble gas monitors is required to achieve a fully acceptable program. Additionally, the following improvements should be considered: (1) develop departmental radiation protection training programs; (2) involve C&RP personnel in LRAA training and possibly other department training; and (3) improve LRAA testing practices.

5.0 Quality Assurance

Quality assurance is applied to the health physics program by: (1) routine surveillance conducted by the onsite quality assurance organization, (2) technical audits performed by the corporate health physics organization, (3) administrative audits performed by the corporate QA organization, (4) review of data and reports by supervisory and management personnel within the Chemistry and Radiation Protection Department, and (5) a formal deviation report system (Form QA-16).

Involvement of the onsite QA organization in the C&RP program consists of determining adherence to procedures and ensuring that requirements of the Corporate QA Manual are met. Quality requirements for some Q-List related items and activities are established by the corporate QA organization in formal QA program procedures, while quality requirements for other elements are negotiated between the onsite QA manager and the C&RP Superintendent and are included in the C&RP procedures. No problems were noted with this system. Surveillance for adherence to procedures is conducted by the onsite QA organization at a frequency determined by the responsible QA engineer. Followup surveillances may be performed as required to evaluate the effectiveness of corrective actions.

In addition, surveillance may be performed at the request of an in-plant organization. Eleven surveillances of health physics activities were performed during 1979 and 1980 (through August). These surveillance reports contained several "findings" for failure to follow procedures and "observations" related generally to procedural weaknesses. Deviation reports issued with "findings" appeared to be closed out satisfactorily.

The corporate QA organization performs biennial administrative audits of the C&RP Department per technical specification requirements. The most recent audit, conducted in September 1978, was reviewed by the Appraisal Team and appeared to be adequate in scope and conduct. Limited portions of the health physics program are also included as part of a comprehensive QA program audit conducted biennially by an outside consultant under contract to the licensee. The extent of health physics activities covered by this audit is determined by the consultant. This audit report was not reviewed by the Appraisal Team.

Technical audits are performed by the corporate health physics organization to determine compliance with technical specifications, federal regulations, and professional standards. These audits are performed annually with specific topics selected such that the overall HP program is evaluated over a three-year period. The 1979 audit covered liquid, gaseous, and solid radioactive wastes, and environmental monitoring activities. While several procedural inadequacies and lack of compliance with some procedures were noted in the report, the audit identified no significant safety deviations and noted that an improved attitude toward suggestions for improvement appeared to exist on the part of the plant health physics staff.

The recurrence of surveillance and audit report findings for failure to follow procedures and the similar findings noted in this Appraisal Report suggest a possible lack of effective or appropriate corrective action. Specific instances of procedural noncompliance may result from individual actions; however, the extent of recurrence noted may indicate a lack of management emphasis on strict adherence to procedures. This area requires increased licensee attention.

A deviation report (DR) system for recording problems and documenting corrective actions is established by Administrative Procedure 3.5 (Corrective Actions). Although the deviation report system appeared to be used relatively frequently, the criteria for issuing DR's apparently are not clearly defined. Site QA personnel indicated that deviation reports were required for deviations from approved procedures, while C&RP personnel stated that DR's are initiated only for "significant" deviations, as subjectively determined by the individual noting the deviation. Some C&RP personnel indicated reluctance to initiate DR's, believing that antagonism and diminished cooperation resulted. The Appraisal Team believes that a system which defines and documents problems both of minor and major significance is essential to the health physics program to identify trends in procedural violations, chronic offenders, or specific problems with procedures or systems. Well defined criteria for initiating DR's and a system for documenting lesser problems are needed to improve the effectiveness of the licensee's health physics program. An additional problem was noted in that five DR's initiated in the last quarter of 1979 took over six months to close out, even though minor action appeared necessary by management to close them. The design and management of the DR system should promote expeditious resolution of identified problems.

Based on the appraisal findings, the following items require correction to achieve a fully acceptable health physics quality assurance program: (1) resolution of the noted weaknesses in the deviation report system and (2) assurance that corrective actions for audit and surveillance findings will reasonably prevent recurrence.

6.0 Procedures

Radiation protection program procedures are contained primarily in Chapter 7 (Health Physics Administration) of the Plant Administrative Procedures and in the Health Physics Manual. Additional procedures related to the radiation protection program can be found in the Operating Procedures Manual, Technical Specifications Surveillance Program Manual, and the Plant Emergency Manual. Individual procedures were reviewed as they pertained to areas examined during this appraisal; comments are included in the respective sections of this report. In addition, the licensee's review and approval system for procedure change and revision was examined. While improvement in procedure content and compliance over the last few years was evident additional improvement is needed.

One problem noted was the lack of formal procedures for certain activities. These activities, which are discussed further in the referenced sections

of this report, include: calibration of portal monitors (Section 9), instructions for beta dose rate surveys (Section 9), and quantification of gaseous releases (Sections 9 and 11). In addition, laundry contamination limits need to be defined and documented.

A second problem noted was the failure to follow existing procedures. Specific examples are discussed under External Exposure Control (Section 7), Instrument Calibration (Section 9), and Surveillance and Access Control (Section 8). Failure to revise inaccurate procedures and enforce adherence to all plant procedures can develop improper attitudes regarding the need to follow procedures. In recognition of this, procedure compliance and revision must be strictly enforced. The failure to follow approved procedures is in noncompliance with the requirements of Technical Specification 6.11.1 which requires adherence to procedures for all operations involving radiation exposure.

The need for minor revisions to procedures to provide clarification and resolve inconsistencies was also identified. For example: (1) procedures HP 2.8, HP 2.19, and HP 2.29 call for performing a low range (mR/hr) calibration with an eight curie cesium-137 source when an eight microcurie source is intended; (2) Section 5.1.1 of HP 2.33 specifies a semiannual calibration frequency for Radector III's in accordance with HP 2.26, while Section 5.2.1 indicates calibrations are required every three months; and (3) Section 5.1.4.g of HP 2.10 specifies an acceptance criterion of 14% for TLD chip exposures, while steps 5.3.2.c and 6.0 specify 10%. Additional needed changes are discussed in Sections 3, 5, 7, 8, and 9 of this report. Accuracy and clarity of procedures are important to ensure uniform interpretation and confidence in procedure use.

A potential problem was noted regarding procedure changes (Administrative Procedure 10.1) in that temporary and permanent revisions to existing HP procedures can be made without C&RP review and concurrence. Although no such occurrences were identified during this appraisal, C&RP management approval should be ensured before revising C&RP procedures.

Procedural problems similar to those described above have been identified in past NRC inspections and also by the licensee's QA program. While improvements have been made over the last few years, further licensee attention is required in this area. Based on the appraisal findings, improvements in the following areas are required to achieve a fully acceptable program: (1) expanded or additional procedures for topics indicated, (2) adherence to approved procedures, and (3) clarification or resolution of procedural inconsistencies. In addition, the following item should be considered for improvement: C&RP approval should be required for all procedure revisions and temporary changes which affect personnel radiation exposure.

7.0 Exposure Control

The licensee's external and internal radiation exposure control programs were found to be generally acceptable. It was noted, however, that improvements are possible in a number of areas. These are discussed below.

7.a External Exposure Control

External radiation exposures are monitored by two independent thermoluminescent dosimeter (TLD) systems and self-reading pocket ion chambers. A corporate TLD program provides official dose information; plant TLD's and pocket dosimeters provide short-term exposure monitoring and control. Adminstrative methods are incorporated in the licensee's program to prevent overexposures and ensure program quality.

Weekly, quarterly, and annual administrative dose limits and an alert list system have been established to ensure that 10 CFR 20 limits are not exceeded. Females are further restricted by licensee policy to implement NCRP 39, NCRP 53, and Regulatory Guide 8.13 recommendations. A discrepancy was noted between the administrative and alert limits given in Procedure HP 1.0 (Table HP 1.2) and those given in Procedure HP 2.25. While not significant from a personal safety standpoint, this discrepancy should be resolved.

The corporate TLD system provides the legal and permanent record of radiation dose. The $CaSO_4$ impregnated teflon wafer TLD used allows primary and secondary readouts for both gamma and beta dose assessments. A LiF impregnated wafer TLD is used instead of $CaSO_4$ when neutron dose measurements are desired. The corporate TLD system is routinely calibrated for gamma radiation. Response to beta and neutron radiation was determined based on participation in the University of Michigan TLD intercomparisons and a licensee performed comparison of TLD's versus neutron rem-meter measurements. Corporate TLD results are submitted to the plant for review. An earlier problem with slow processing turnaround time appears to have been resolved with results now routinely available for site review approximately one month after the quarterly change. Quantities of corporate TLD's onsite appeared adequate for normal operations, outages, and initial emergency response situations; additional TLD's are available from the corporate office on a next day basis.

The corporate TLD system is supplemented by pocket dosimeters and a site administered TLD system. Pocket dosimeters are certified quarterly with acceptance criteria consistent with ANSI N13.5-1972 and Regulatory Guide 8.4 recommendations. The plant TLD system consists of two LiF chips which are processed concurrently with dosimeter rezeroings. Discrepancies between pocket dosimeter and plant TLD results are reviewed but firm criteria for accepting or rejecting intercomparisons are not established. "Significant" discrepancies are resolved by processing the corporate TLD. Specific acceptance/rejection criteria should be developed to ensure consistancy in the intercomparison. Plant TLD finger rings are used for extremity monitoring. Quantities of pocket dosimeters and plant TLD's appeared adequate to support operations, outages, and initial emergency response. Two minor procedure problems were noted. Although Procedure HP 2.28 specifies that personnel will be issued

0-200 mR dosimeters, 0-200 mR or 0-500 mR pocket dosimeters are routinely assigned. Procedure HP 2.9 references issuance of TLD's and pocket dosimeters per Procedure HP 2.10 with no reference to HP 2.28, but Procedure HP 2.10 does not address pocket dosimeter issuance. While these inconsistencies do not adversely affect worker safety, procedures should reflect actual practices. Dosimeters, including a control, are stored after working hours in a rack at the guardhouse. The storage location ensures that appropriate personnel have adequate dosimetry by requiring security guard verification of dosimetry before site entry.

A computerized dose record system is being developed by the corporate health physics group. Until this system is fully operational, permanent dose records are also being maintained by the plant C&RP Department. One problem was noted regarding the dose records: Computer records erroneously indicated that an individual received a four-rem whole body dose for the first quarter of 1980 (an apparent overexposure). Although the error reportedly was identified during licensee review, the corrected information did not get entered in the computer records. An examination of site records during the appraisal confirmed that no overexposure had occurred.

Quality assurance aspects of the licensee's external dosimetry program include: (1) participation in the University of Michigan Personal Dosimetry Performance Testing Study, (2) comparison of routine corporate TLD results with onsite TLD and pocket dosimeter results, (3) comparison of TLD results with plant neutron dose rate measurements, and (4) occasional submittals of spiked TLD's to the corporate office. No significant problems were evidenced by the University of Michigan study. The study has shown greater variation in dosimeter response in mixed fields (gamma and beta or neutron) than in pure gamma fields. Several early, large, conservative errors apparently were traced to an instrumentation malfunction. Spiked TLD's are submitted nonroutinely to the corporate office. Regular submission of spiked TLD's would strengthen the quality assurance aspects of the external exposure control program.

Based on the appraisal findings, the licensee's external exposure control program appears acceptable, but the following actions should be considered for improvement in this area: (1) resolve the discrepancy between Procedure HP 2.28 and actual pocket dosimeter issuance practices; (2) improve followup of reviews and corrections of dosimetry records; (3) resolve the discrepancy between administrative limits stated in HP 2.25 and those listed in Table HP 1.2 of Procedure HP 1.0; (4) define acceptance/rejection criteria for pocket dosimeter and in-house TLD intercomparisons; and (5) implement a formalized procedure for submitting spiked TLD's with each batch of corporate TLD's.

7.b Internal Exposure Control

The licensee controls internal exposures through engineering controls, an air sampling and contamination smear program, approved respiratory

equipment, and whole body counting. Although no significant problems were noted with the internal exposure control program, improvements are desirable in several areas.

Routine particulate high volume samples are collected for each posted radiation or contamination area. These are supplemented by job specific samples and a daily contamination smear survey program. Respiratory protection equipment use is considered when smearable contamination levels exceed 25,000 dpm/100cm^2 or airborne contamination levels exceed 25% MPC. Licensee personnel indicated that approximately 600 full-face air purifying or air line respirators (most of which were in storage during this appraisal) and approximately 18 SCBA units, with about 45 air bottles, were onsite. Onsite SCBA refill capability consists of cascade bottled air with a capacity for about 70 refills. Protection factors assigned respirators are consistent with Regulatory Guide 8.15. Qualification for respiratory protective equipment use includes formal initial training, medical certification, and a quantitative respirator fit using a DOP aerosol. Annual medical recertification and biennial refits are required. A list of personnel certified for respiratory use, maintained at the Radiation Protection Office and equipment issue point, is consulted prior to issuance of equipment. No significant problems were noted with the licensee's respiratory protective equipment program. Although currently not in use, an MPC-hour log procedure is in draft form. Use of the MPC-hour log may lower external exposures by improving worker efficiency through elimination of respirator use for some tasks.

The licensee utilizes an onsite Helgeson Nuclear Services whole body counter system to evaluate the effectiveness of the internal exposure control program. Routine whole body counts are conducted semiannually for controlled area workers and annually for other plant workers. In addition, arrival and termination counts are normally conducted, and counts are also performed if an uptake is suspected. The counter is calibrated by the contractor; routine background checks are performed by the licensee. A standard man phantom check of the system was performed last in 1976 by the licensee, using NBS traceable standards. The phantom check appeared to have been conducted properly; no calibration problems were identified. Procedures for using the system and evaluating the results appeared adequate. Review of whole body count results did not identify problems with the licensee's airborne exposure control program. Revised administrative procedures and inclusion of a clause in contracts with site subcontractors requiring termination whole body counts appear to have resolved past problems with obtaining these counts.

The licensee's internal dose control program could be improved in the following areas. (1) Although a tritium sampling and bioassay program was in place at one time, it was discontinued after continuous negative results. The Appraisal Team considers a limited tritium bioassay program appropriate for workers involved in refueling operations. (2)

Routine nasal swabs are not required or normally performed following respirator use. Implementation of a nasal swab program can aid in identifying potential inhalation problems. (3) Licensee procedures require frisking or using a portal monitor upon exit from a radiation area but do not specifically address frisking following respirator use. Increased emphasis on frisking of the nasal area appears warranted. Portal monitors do not provide adequate sensitivity for detecting nasal contamination.

Based on the appraisal findings, this portion of the licensee's program appeared to be acceptable, although implementation of the following improvements should be considered: (1) nasal swabs, (2) nasal frisk procedures, and (3) a limited tritium bioassay program.

8. Surveillance and Access Control

The licensee's radiation control program was examined, including: access controls, radiation work permit and limited radiation access authorization usage, and routine and job specific radiation/contamination surveys. The access control review included: restricted areas, controlled areas, radiation areas, high radiation areas, contamination areas, and radioactive material areas.

a. Access Control

The radiation restricted portion of the site is identical to the protected area defined for security purposes. Access to the restricted area requires a security badge, personal dosimetry, and general radiation training for entry. Leaving the restricted area requires passage through a portal monitor or use of a frisker, surrendering the security badge, and storage of personal dosimetry in racks provided in the outer lobby of the security building. The cooling towers and the main radwaste storage area are outside the protected area. Access into the radwaste storage area is controlled by the C&RP Department, which maintains key control of the area and provides radiation surveillance of the area whenever it is occupied.

Primary access to the radiation controlled areas of the plant is adjacent to the radiation protection office. Surveillance, to ensure that personnel entering the controlled area have proper dosimetry and have signed the access log, normally is not exercised by the licensee. Access into the controlled area directly from the turbine building has been restricted to operators and C&RP personnel through the use of key-card coding. Individuals leaving the controlled area are expected to sign out in the access log and either survey themselves using a frisker or pass through a portal monitor. Again, surveillance of personnel leaving the controlled area normally is not exercised by the licensee. The Appraisal Team noted several

instances in which individuals failed to use either the frisker or the portal monitor. A provision for direct surveillance of the two routine exit points may be desirable to encourage better exit monitoring practices.

Radiation area control is provided through area postings, LRAA requirements, and RWP issuance. Direct coverage by the radiation protection group is required for all entries into radiation fields greater than 100 mR/hr. Entry into radiation fields greater than 1000 mR/hr is further controlled by required use of a "High Radiation Area Entry" form. Although this form was being used to administratively authorize entries, the authorizing individual on most of the forms was a licensee or contract technician instead of the Plant Health Physicist or Radiation Protection Supervisor as specified in procedure HP 2.16. Access control for areas containing radiation fields greater than 1000 mR/hr is maintained by locking the entrances. A single key controls all twelve locked areas. This key is maintained in a locked cabinet in the radiation protection office. The key to the cabinet, however, is hung next to the cabinet and therefore not controlled by C&RP personnel when the C&RP office is not occupied (offshifts principally). No actual problems with unauthorized high radiation area key use were noted.

Two radiation level posting problems were noted. The first problem involved the primary system drain pump room, which was posted as a radiation area. Several unposted hot spots exceeding radiation levels requiring posting by procedure HP 2.17 were identified in the room during the appraisal. Subsequent surveys recorded by the licensee on the status sheet and the radiation protection log identified hot spots of 1200, 900, and 300 mR/hr. The identification of localized areas of significantly elevated radiation levels (hot spots) is considered necessary by the Appraisal Team to inform workers so they can minimize radiation exposures. The second problem involved the radwaste storage building, which is posted at the entrances as a radiation area and a high radiation area. Only a relatively small area within the building, however, contained radiation levels greater than 100 mR/hr. In this case the high radiation area posting on the building entrances can be confusing and should be omitted in lieu of local posting of high radiation areas.

Contaminated area access is controlled through postings, status sheets, RWP's, and special access requirements. Areas that have more than 400 dpm/100 cm^2 loose contamination are controlled as contamination areas; double step-off pads are used when general contamination levels exceed 2000 dpm/100 cm^2. One posting problem was noted; clean resin room contamination exceeded 400 dpm/100 cm^2 according to the August 9, 1980, status sheet but the room was not posted as a contaminated area as required by procedure HP 2.17.

The following additional problems were noted regarding radiation controls: (1) Vehicles leaving the radwaste area are not surveyed

until they reach the "outer" gate. Since the road to the outer gate is used by other vehicles, which are not surveyed before leaving the site, this practice could lead to cross contamination and spread offsite. (2) A four-wheeled, canvas-covered trailer is used to transport contaminated trash to the radwaste storage building from the plant. The trailer is normally loaded late in the 8:00 a.m. - 4:00 p.m. shift but is not always surveyed immediately after being loaded. The C&RP technician work schedule specifies that the trailer be surveyed on the 12:00 - 8:00 a.m. shift. The practice of not surveying the trailer, which is located in a generally accessible area outside of the licensee's radiation controlled area, at the time it is loaded can lead to inadequate radiation warning information. On August 13, 1980, radiation levels of approximately 30 mR/hr and 3 mR/hr were measured at contact and 18", respectively, although the trailer was posted at the time as not having radiation fields greater than 1 mR/hr.

Based on the appraisal findings, this portion of the licensee's program appears generally acceptable; however, the following improvements should be considered: (1) improve worker adherence to access control point requirements (i.e., frisking/portal monitor use); (2) improve high radiation area key control and access authorization; (3) improve posting practices, including hot spot identification (primary drain pump room), high radiation area posting (radwaste storage building), and contaminated area posting (clean resin room); (4) review survey requirements for vehicles leaving the radwaste area; and (5) improve survey practices for the radwaste transport trailer.

b. Radiation Work Permit and Limited Radiation Access Authorization Programs

The licensee's radiation work permit (RWP) program, documented in Health Physics Procedure HP 2.11, functions to control entries to posted plant areas in which radiation work is to be performed. Direct supervision by a radiation protection technician can replace an RWP. In addition, limited activities are permitted in posted plant areas under the limited radiation access authorization (LRAA) program.

Two types of RWP's exist: regular and extended. Regular RWP's expire within seven days after issuance while extended RWP's expire on a monthly basis. At the time of the appraisal, there were 13 regular and 10 extended RWP's in effect. Each RWP identifies the location and description of work allowed, the radiation conditions, general and specific radiation instructions, and protective equipment requirements for entry. Copies of current RWP's are posted at access control and the radiation protection office and are filed with the related maintenance order. There were several pertinent observations. (1) RWP's are not posted at the job sites. Such posting would allow workers to verify precautionary information just before entering the work area and also may prove useful to radiation protection technicians

performing surveillance (checks) of the work. (2) Workers do not acknowledge (by initialing, etc.) that they are familiar with the requirements of the RWP's. (3) No system is established to keep C&RP technicians informed of RWP work in progress. This information is useful in conducting radiation protection surveillance activities. (4) Criteria for determining when personal clothing should not be worn with protective clothing are not clear. Various criteria were noted being used by the C&RP technicians.

The limited radiation access authorization (LRAA) program allows access to radiation and contamination areas for most routine and certain nonroutine activities without an RWP. To gain LRAA status an individual normally must attend a 40-hour training course, designed to allow the individual to perform limited radiation surveying and self-monitoring, and pass a written test. Activities of a high radiation hazard, or with a potential for such hazard, cannot be performed under the LRAA program. Examples are high radiation area entry, filter changeout, opening radioactive systems, and resin cask loading.

A potential problem was noted regarding entry to plant areas in which RWP-controlled work is in progress. The radiation protection status sheet for each posted area specifies protective requirements to be followed by LRAA personnel while the RWP specifies protective requirements for workers in an RWP work area. These requirements may be significantly different for the same area, depending upon the nature of the RWP work activity. Cases were noted where a respirator was required by the RWP, but not if entry was made under an LRAA. In these and similar situations, a significant radiation hazard may exist for individuals entering work areas under the LRAA protective requirements.

Based on the appraisal findings, this portion of the licensee's program appears generally acceptable; however, the following matters should be considered for improvement of the program: (1) provide a means for C&RP technicians to be kept informed of RWP work in progress, (2) make RWP radiation protection requirements available at local job sites, (3) ensure that workers are familiar with RWP radiation protection requirements before commencing a job, (4) clarify personal clothing use practices when protective clothing is worn, and (5) provide guidance to be followed when LRAA protective equipment requirements differ from those required by an RWP for the same area.

c. Routine and Job Specific Surveys

Routine radiation and contamination surveys are conducted at scheduled intervals in accordance with approved procedures. Approximately 50 locations are surveyed daily for radiation and contamination. An additional 90 locations throughout the plant site are surveyed monthly. Smear samples are counted routinely for beta activity, and, if warrented, for alpha activity. Additional surveys include job specific

surveys, conducted to support RWP or direct coverage jobs, and posted area surveys, conducted semimonthly with the results reported on the radiation protection status sheets. These surveys include direct radiation, contamination, and air concentration measurements. Areas over 1000 mR/hr general field are not surveyed routinely. Several areas outside of the plant are included in the semimonthly posted area survey but are not included in the daily/monthly program. These areas include the radwaste storage area, the radwaste pole barn, the north storage building, and the former main warehouse building. This omission appears to have been an oversight; daily surveys may be desirable in certain of these areas.

Based on the appraisal findings, this portion of the licensee's program appears generally acceptable; however, the radwaste storage area, radwaste pole barn, north storage building, and former main warehouse should be considered for inclusion in the routine daily/monthly survey program.

9.0 Instrumentation

The licensee's supplies, use, limitations, and maintenance of portable and fixed radiation instrumentation were reviewed. Specific problems, described below, were identified in several areas.

a. Dose Rate Survey Instruments

The licensee's instrument inventory includes approximately 48 portable beta-gamma dose rate instruments, including both ion chamber and G-M detectors. Included in this total are five high range extendible probe instruments. At the time of this appraisal, approximately two thirds of these instruments were operational with the remainder out-of-service for maintenance and/or calibration. Three neutron dose rate instruments are maintained by the plant (two neutron rem meters were operational). Quantities of instruments appeared to be adequate. A problem with instrument availability occurred during the last outage, due to delays in instrument repair; the delay eventually was resolved by department management intervention.

Instrument use and calibration procedures generally were adequate for gamma radiation measurements, but did not adequately address beta radiation measurements. No discussion of beta correction factors or instrument use in beta dose rate surveys is included in the procedures, nor are beta correction factors noted on the instruments. This information should be included in licensee procedures and stressed during technician training. It was also noted that high range survey instruments could not be calibrated beyond 10 R/hr. This is insufficient to ensure operability of the high range scale for instruments such as Teletectors and Radector III's having 1000 R/hr capability.

Another problem noted was the failure to adequately verify instrument operability for each range routinely used, before each use (ANSI N323-1978). Survey instruments with built-in check sources apparently are checked routinely before use. Other instruments may be response checked using a general plant radiation field; however, there are no established acceptance criteria nor are all applicable ranges checked routinely. Calibration Procedure HP 2.8 (Eberline PIC-6A) calls for a routine operational check, before instrument use, with a source mounted on a table at Access Control. The check source is no longer located at Access Control. According to licensee personnel, no routine operational check (other than battery condition) is normally performed before using the PIC-6A survey instruments.

Based on the appraisal findings, improvements in the following areas are required to achieve a fully acceptable program: (1) instrument operability checks before each instrument use, (2) improved instructions covering use of instruments for beta dose rate measurements, and (3) increased calibration range for high range instruments.

b. Contamination Detection Instruments

Contamination survey instrumentation consists principally of pancake type G-M probes. Approximately three fourths of the instrumentation was operational. Ten friskers were located throughout the plant, the remainder being at Access Control or assigned to emergency kits. Alpha scintillation probes were available. Eberline E-520's, primarily used for dose rate assessment, were also available for gross contamination surveys.

Procedures for calibrating and using the Ludlum 177 (HP 2.40) and Eberline RM-14 (HP 2.41) friskers appeared adequate. However, although both calibration procedures require labeling the friskers with the response to a 0.5 microcuries cesium-137 check source, all units were not so labeled. Also, the Eberline E-520 calibration procedure (HP 2.19) calls for dose rate calibration with a cylindrical probe and count rate calibration with a pancake type probe. The instrument is labeled with the pancake probe efficiency (typically 25% for cesium-137); however, it is stored and routinely used with the cylindrical probe. It appeared likely that the labeled efficiency may be erroneously used with the attached cylindrical probe. This could result in nonconservative gross contamination surveys by a factor of five to ten. A better method would be to label each probe with its measured check source efficency.

In addition to friskers, the licensee has four installed portal monitors, two at the controlled area access point and two at the guardhouse exit point. All portal units were observed to alarm consistently with a 600,000 dpm cesium-137 check source placed near the detectors, but none would alarm using a 30,000 dpm cesium-137 check source. Portal monitor detection of personal contamination is substantially less sensitive than friskers

equipped with pancake probes (typically 1000 dpm). All portal monitor channels are checked daily with a 0.5 microcurie (1,000,000 dpm) cesium-137 check source. There is no formal procedure for portal monitor calibrations or alarm set point determinations. Plant practice is to set up the monitors according to the vendor manual and adjust the alarm set point for consistent alarming from the 0.5 microcurie check source. Licensee personnel were unaware of the portal monitor detection limits. As noted in Section 8 of this report, the licensee allows portal monitor use to be substituted for personal frisking. This practice is not always acceptable due to the significant differences in the sensitivities noted above for friskers and portal monitors.

Based on the appraisal findings, improvement in personal contamination detection practices is necessary to achieve a fully acceptable program. Personal contamination monitoring requirements consistent with equipment detection capabilities should be implemented. In addition, portal monitor calibration and alarm set point procedures should be developed.

c. Continuous Air Monitors (CAMS)

Although the licensee has three continuous air monitors (CAM's), only one was operational during the appraisal. Licensee personnel indicated parts were routinely scavenged from two units to keep one unit operational. The operational CAM was located near the spent fuel storage pool. Procedures for using and calibrating the CAM's were adequate, except that the air flow meter was not included in the calibration. Licensee personnel stated that additional CAM's would be purchased in the near future. With the procurement of these additional units, and calibration of the air flow meters, this portion of the licensee's program will be acceptable.

d. Instrument Calibration

The radiation detection instrument calibration facility appeared generally adequate. However, the exterior light which indicates exposure of the ten-curie cesium-137 source was not operating. It was also noted that although procedures HP 2.8 and HP 2.23 require notification of the control room immediately before exposing the ten-curie source and after shielding it, actual practice was to notify the control room upon entering and leaving the facility. These procedures should reflect actual practices. As noted previously, the maximum calibration capability at Palisades is 10 R/hr, which is not sufficient for high range survey instruments.

With the development of improved high range calibration practices, the licensee's calibration program would appear acceptable. Procedures also should be revised to reflect actual practices.

e. Area Monitor

The plant's area monitoring system consists of 37 channels supplemented during refueling operations by two additional channels in the containment fuel handling area. All detectors, ion chambers with ranges of 0.1 mR/hr to 10,000 R/hr, include installed check sources. One containment area monitor check source was noted to be of inadequate strength to provide monitor response. This requires monthly containment entries to expose the monitor to a check source to comply with technical specification surveillance requirements. According to licensee personnel, a stronger installed check source is on order. The licensee plans to implement NUREG-0578 requirements for high range containment monitors by installing one environmentally qualified monitor inside containment and a backup monitor outside containment adjacent to the equipment air lock.

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

f. Effluent Monitors

Although the licensee does not routinely use effluent monitors for quantifying radioactive releases, the stack gas monitor may be so used for nonroutine releases. Also, interim high range noble gas monitors, discussed below, are installed for use under certain accident conditions. Calibration of the stack monitor was adequate, although energy response information was not available. This information is needed to interpret gaseous monitor response to different isotopic mixtures. Multipoint xenon-133 gas calibrations have been performed at the technical specification required frequency. The detector calibration curve (μCi/cc vs. cpm) is used per plant procedure HP 6.10 to quantify anomalous noble gas releases. Calibration information for the interim high range noble gas monitors was computer generated by the corporate health physics organization. This conversion calculation was not verified by the Appraisal Team.

Interim methods for monitoring high level noble gas releases per NUREG-0578 were described in a March 4, 1980 letter from the licensee to NRR. NRR acknowledged the acceptability of the licensee's proposed actions in a response dated April 6, 1980. Equipment, procedures, and training necessary for high range noble gas monitoring were to have been implemented before startup in 1980. Although the refueling outage was completed in May 1980 and the plant returned to service, procedures necessary to use the monitors were not completed and in place. This omission was discovered by licensee personnel several weeks before arrival of the appraisal team, but the procedures had not received PRC approval nor had shift personnel been provided the information necessary to use the high range monitors in the interim. The two shift supervisors questioned during the appraisal were unable to calculate offsite doses, utitizing the high range monitor readings. One of the two shifts (shift supervisor, shift technical advisor (STA), and

control room operators) were unaware of the high range monitors. Both shift supervisors supposedly had attended the training session; shift supervisors and STA's who had assumed their jobs after March 1980 had not received the training.

Additional problems were identified with the high range noble gas monitors during the appraisal. (1) The detectors were not calibrated in the geometry in which they were being used. Subsequent calibrations by licensee personnel on August 15, 1980 (at the request of the Appraisal Team) yielded nonconservative corrections of about 4.5 and 1.2, respectively, for the plant stack and steam relief monitors. (2) There was no overlap between the normal noble gas effluent monitor and the high range monitor, an unmonitored gap of one to two orders of magnitude appeared to exist between the ranges of the two monitoring systems. Meaningful release information would not be immediately available to dictate offsite emergency actions for releases within this unmonitored range. The licensee agreed to resolve this matter with NRR. (3) According to licensee shielding and dose rate calculations, the high range monitor readouts were located in an area of high potential radiation levels (to 800 mR/hr), although it appeared possible to move the readout location to an area, adjacent to the control room, having predicted accident radiation levels one to two orders of magnitude lower.

An Immediate Action Letter issued on August 15, 1980, confirmed an agreement reached with licensee management personnel to complete and issue procedures and conduct necessary training to allow use of the high range noble gas monitors by August 16, 1980, and to evaluate and advise NRR of the lack of overlap between the normal and high range noble gas monitors by August 22, 1980. The NRC resident inspector has confirmed that the above actions were completed.

In addition to completing the items specified in the Immediate Action Letter, improvements in the following areas are required to achieve a fully acceptable program: (1) evaluate the location of the high range noble gas monitor readouts for potential personal radiation exposures during use and (2) evaluate the energy response of the stack noble gas monitor (low range).

10. ALARA

Although individual examples of ALARA actions were noted, a coordinated ALARA effort appears lacking. Individual workers and C&RP personnel were noted to implement dose reduction techniques in specific situations, but a formalized ALARA program has not been implemented. The Appraisal Team feels strongly that a significant effort is required by licensee management to improve this area.

A management policy promoting ALARA is evidenced in a corporate policy statement issued in July 1980. This policy statement directs plant management to develop an ALARA program consistent with guidance provided

by the corporate health physics organization. However, no guidance had been issued by the corporate H.P. organization; such guidance is anticipated in the near future, according to licensee personnel. A plant ALARA Committee, formed in June 1979, has met approximately bimonthly since that time. The committee, comprised of management personnel from the radiation protection, maintenance, and operations organizations, has been involved principally in reviewing selected jobs or radiation hazards. The scope of these reviews has been limited by the bimonthly meeting frequency. Further, although the administrative procedure setting up the ALARA Committee specifies that the committee review all activities expected to result in greater than 5 man-rems, man-rem estimates for maintenance activities are not routinely performed.

The following additional problems were noted specifically regarding implementing an effective ALARA program. (1) There is a lack of job specific dose information for use in planning for similar or repeated jobs. The licensee's present dose record system does not facilitate retrieval of dose information for specific jobs (by RWP). Minor modifications to the present system would allow retrieval of such information. (2) There is a lack of formal ALARA review of procedures, design changes, and RWP's. There are no specific instructions providing ALARA review requirements or guidance for new and revised procedures, design changes, and RWP's. Maintenance orders and RWP's are reviewed by the Radiation Protection Supervisor-Maintenance (ALARA Committee Chairman), but the reviews are not documented. (3) There is a lack of specific man-rem goals. The ALARA Committee Chairman was not aware of past man-rem doses nor were man-rem goals established for future activities. (4) No evidence of a systematic review of completed jobs for dose reduction lessons was evident.

Based on the appraisal findings, significant improvement in the licensee's ALARA efforts are required to achieve a fully acceptable program. Improvement efforts should be directed at implementing a more formal ALARA program which remedies the problems noted above.

11. Radioactive Waste

Radioactive airborne and liquid effluents have been generally acceptable over the past several years. A specific problem regarding quantification of airborne radioactive releases is discussed below.

a. Liquid and Airborne effluents

Due to time restrictions, liquid and airborne radioactive waste systems were not reviewed comprehensively during this appraisal. Radioactive effluents from these systems have been reasonably low for several years. Specific problems regarding quantifying airborne noble gas releases and contamination of normally nonradioactive liquid systems are discussed below.

Several airborne radioactive releases occurred during or just preceding this appraisal. The licensee's response to these releases

highlighted several problems. The basic problem which surfaced because of the releases was an apparent unfamiliarity of licensee personnel with interpretation of the stack noble gas monitor. This unfamiliarity prevented rapid assessment of the magnitude of releases. A noble gas release which occurred on August 1,1980, apparently could not be quantified by the shift operators, the shift C&RP technicians, or the on call C&RP Department supervisory representative. The release was quantified approximately two and one half hours after the event by a technician who had quantified releases in the past. A second airborne release, which occurred about 0400 on August 12, 1980, was not quantified until approximately 14 hours after the release occurred. The longer delay in this instance occurred because the C&RP Department member most familiar with such quantifications, the same individual who performed the August 1 quantification, was unavailable. Two additional airborne releases occurred on August 12 and 13, 1980. In none of the releases did control room personnel determine the release magnitude.

The excessive time required to quantify the first August 12 release was due in large part to confusion over the recorder scale for one of two stack monitors (linear versus logarithmic scale). In addition to the general lack of familiarity of personnel with the stack monitors and quantifications using these monitors, the following specific problems were noted: (1) Calibration information was not available in the control room for quantifying noble gas releases from stack monitor data. (2) Information was not available in the control room to relate stack monitor alarms to technical specification limits. (3) The noble gas quantification procedure does not relate released activity to the technical specification limits. (4) The recorder for the stack noble gas monitors is difficult to interpret, due to the number of data printouts on a single chart.

The fourteen hour period required to quantify the first of two airborne releases on August 12, 1980, is excessive and, thus, does not comply with the requirements of 10 CFR 20.201(b) to perform evaluations as may be necessary to ensure compliance with the regulatory limits for airborne releases.

The licensee's actions in response to IE Bulletin 80-10 (nonradioactive system contamination) were reviewed. No significant problems were identified with the licensee's reply. One of three heating boiler systems remains slightly contaminated (about 1E-4 uCi/ml), due to a previous radwaste evaporator tube bundle failure. The contaminated heating system is isolated from the other two heating systems, with its condensate returns directed to the turbine building sump before release. The turbine building sump is a monitored and sampled release path. The secondary side of the plant is slightly contaminated due to steam generator leakage. The new feedwater purity (secondary water cleanup) systems were designed to operate with contaminated secondary water. As a result of the licensee's review, additional sampling has been instituted (or will

be soon) for service air, demineralized water, and domestic water systems. Sampling of the heating boilers, condensate storage, and turbine sumps had previously been instituted and will continue. Operation with the contaminated heating boiler is being evaluated. This matter will be reviewed during a future inspection.

Based on the appraisal findings, improvements in training and procedures to ensure that noble gas releases can be quantified expeditiously are necessary to achieve a fully acceptable program in this area. Shift personnel must be capable of determining the significance of radioactive effluents relative to technical specification limits. Additionally, the clarity of the stack monitor printout should be improved.

b. Solid Radioactive Waste

Solid radioactive wastes consist primarily of spent demineralizer resins (bead and powdered), evaporator bottoms, and general plant wastes (filters, paper, plastic, wood, piping, etc.). The licensee's solid radwaste volume and curie content historically has been relatively low. The decision in 1979 to ship powdered secondary resins to a commercial burial ground has increased the solid waste volume but has not significantly affected the total activity shipped offsite. As a result of past solid radwaste problems (e.g., equipment operability and presence of excessive quantities of free liquid), licensee management has implemented a comprehensive solid radwaste management program.

Bead type resins are sluiced into shipping containers and "dewatered" by a filter mechanism placed on or near the bottom of the container. Evaporator bottoms are presently mixed with cement (Delaware solidification process) in 50-cubic foot containers. Neither the cement process nor the previously used urea formaldehyde (UF) process has consistently reduced free liquids to meet the criteria specified in an NRR letter dated January 29, 1980 (1% liquid by volume). Consequently, the licensee has instituted a program to test each container for free liquid (and to drain if necessary) before shipment. This program has resulted in a backlog of 24 UF, 115 cement, and 18 demineralizer resin containers onsite. The licensee expects to reduce the total number of liners onsite to 30 before the end of 1980. The licensee plans to begin construction of an asphalt solidification system for processing evaporator bottoms and spent resins by the end of 1980. This system is designed to produce solidified wastes that will meet all the requirements specified in the NRR letter dated January 29, 1980.

Compacted radioactive wastes are shipped in 55-gallon drums. Noncompactible radioactive wastes are packaged in drums or plastic lined wooden boxes (7 ft. x 4 ft. x 4 ft.). Plant procedures include box weight and banding restrictions. Problems encountered in 1979 with liquid in a 55-gallon drum have resulted in new detailed procedures

for loading, sealing, and storing these wastes before shipment. All waste containers are stored inside pending shipment.

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

12. Facilities

The facilities available to the C&RP Department generally appear adequate for both normal and initial accident conditions, although the traffic pattern in the access control area should be improved.

a. Chemistry and Counting Laboratory

The licensee has two multichannel gamma spectrometers (calibrated semiannually with a mixed gamma source for one liter, 500 ml, and 50 ml liquid samples and for 25 cc and 13 cc gas samples) plus several alpha and beta-gamma internal proportional counting systems located in a counting room adjacent to the hot chemistry laboratory. Additional analytical equipment is available in the low-level counting room and in the feedwater purity laboratory. An alternate plan for counting in the event of losing the counting room through high background or contamination is to use a mobile measurement van. The van has been secured and is scheduled to be outfitted by late 1980. Emergency counting can be accomplished at the Midland or Big Rock Point plants. Analytical results should be available from these plants within six to eight hours after sample collection.

Palisades' analytical facilities appear small but adequate. The Plant Laboratory Supervisor has a staff of seven technicians. Radiation Protection and Chemistry Technicians provide shift coverage, except for the backshifts on weekends. Chemistry laboratory and counting facility operations are governed by a complete set of procedures in which laboratory personnel have been trained. The Appraisal Team reviewed selected procedures and interviewed selected chemistry personnel regarding their knowledge of these procedures. The only problem noted was with the lack of training in use of emergency sampling procedures. (See Section 13.)

The quality assurance aspect of the laboratory analytical measurements was reviewed by the Appraisal Team. The QA program appeared adequate and in accordance with Regulatory Guide 4.15. Radioactive samples are split routinely with the NRC for comparative analysis. No significant problems have been identified.

Based on the appraisal findings, this portion of the licensee's program will be acceptable upon completion of training in emergency sampling techniques.

b. Radiation Protection Facilities

Radiation protection facilities appear to be generally adequate for the needs of the department staff for both normal and initial accident conditions. However, the primary access control point, because of size and two-way traffic flow, may be overcrowded during periods of above normal usage.

The radiation protection office, located adjacent to the principal access control point, provides a focal point for health physics activities. Conveniently located nearby are offices for the professional and supervisory health physics personnel and the dosimetry and department clerks, the protective equipment storeroom, and the change room. The following additional facilities were examined: personal and small equipment decontamination area, respirator fitting/testing and cleaning area, instrument storage area, and contaminated equipment storage areas.

The principal access control point into the radiation controlled plant area (Auxiliary and Containment Buildings) is adjacent to the radiation protection office. Forty to sixty entries a day are made into the controlled area through the principal access control point during normal operation. This number increases significantly during outages. Present procedures permit exiting and entering through one access control door. This door is at the end of a narrow hall which contains a sign-in log, a portal monitor, a frisker, and RWP, status sheet, and survey postings. Minor congestion was noted during this appraisal under normal operating conditions. The congestion is further complicated by traffic in and out of the radiation protection office, change room, and protective equipment storeroom. Although many activities occur in the access control hallway, it appears that a major contributor to congestion is the two-way traffic flow in the access control area. Some of this congestion results from personnel who leave the restricted area to summon a radiation protection technician to survey equipment before removal from the restricted area. On one occasion during the appraisal, a worker was observed to bring material out of the restricted area and into the radiation protection office to be surveyed, a practice contrary to plant procedures. Individuals wearing protective clothing leave the restricted area through an "exit only" door leading directly into the change room. This room is equipped with clothes lockers, showers, and decontamination supplies, as well as a portal monitor and frisker. Visual observation of the access control and the change room areas from the radiation protection office is limited.

Present laundry facilities consist of two wet washing machines and two dryers. A new laundry facility, utilizing two dry cleaning machines, is near completion. It appears that the work space in the new laundry facility may be somewhat limited.

The room containing the whole body counter appears adequate for that purpose. This room is also designated as the plant's first aid room. Additional first aid facilities include 20 first aid kits, five stretchers, and two backboards located throughout the plant.

Based on the appraisal findings, this portion of the licensee's program appears to be acceptable; however, the primary access control area layout should be reviewed from the standpoint of improving traffic flow.

13. Accident/Reentry

The scope of the appraisal in this area was limited to the Health Physics Department accident and reentry preparedness capability in six areas: instrumentation, analytical laboratory, reentry, expanded support, training, and environmental monitoring. While some work in each of these areas has been undertaken as a result of TMI, additional improvements in certain areas, especially reentry preparedness and training, appear warranted.

Survey and sampling equipment is available for initial response to an accident. The supply and types of instrumentation appear to be adequate. The licensee is continuing to upgrade area and effluent monitoring capabilities in response to NUREG-0578. A contractor has prepared procedures and training manuals to assist in accident recovery and reentry and has conducted some training. The licensee is reviewing these procedures and incorporating them into the plant's emergency plan. On the basis of discussions with the licensee's staff, it appears that additional C&RP departmental training, especially in sample taking and analysis is needed.

The short term post-accident sampling capability has been improved recently as described in Palisades Nuclear Plant Emergency Implementation Procedures E18-7 "Sampling and Analysis of High Activity Containment Atmosphere" and E18-6 "Sampling and Analysis of High Activity Reactor Coolant." The procedures appeared adequate; training lectures on these procedures have been given to most radiation protection and chemistry technicians and supervisors. A test of the procedures utilizing the sampling equipment has not been conducted, however. Problems may be experienced with using remote handling tools in the sample sink area and with handling a shielded sample carrier which weighs about 250 pounds. Simulated sample collections and analyses should be conducted. Routine analyses of reactor coolant are scheduled to be performed in the hot chemistry laboratory and adjacent counting room with the feedwater purity laboratory available as a backup. Procedures (corporate) are written and in place for transporting samples to alternate locations.

The Plant Manual, Volume 12, Site Emergency Plan, briefly addresses recovery and reentry plans. Plant personnel can be augmented by qualified personnel from the corporate office and by the staffs of the Big Rock Point and Midland plants within six hours after receiving

a request. The recent practice of assigning Midland plant health physics personnel to temporary work assignments at Palisades has the advantage of familiarizing them with the plant and its procedures. This familiarization could be enhanced by more standardization of the health physics programs at the three nuclear plants in the utility.

Emergency environmental sampling procedures for air, soil, water, milk, and the airborne plume are written; classroom training has been given to plant personnel. "Hands on" training in the field has not been performed; radiation protection personnel who would perform or supervise the sampling are familiar with the sampling equipment, since it is also used in routine sampling. A special van or other available company vehicle will be used to transport personnel and equipment. Equipment to be used in emergency environmental sampling has been assembled and is maintained in a ready status.

A separate NRC evaluative effort is being conducted regarding reactor emergency planning activities. The emergency planning evaluation for Palisades has been initiated but is not yet complete. In light of this ongoing effort, the Health Physics Appraisal Team did not evaluate the licensee's overall emergency response capability. Additional training, however, appears needed in use of emergency sampling and response equipment and techniques as noted above.

14. Exit Interview

The Appraisal Team met with licensee representatives (denoted in Paragraph 1) at the conclusion of the appraisal on August 15, 1980, and by telephone with Mr. A. Kowalczuk on November 21, 1980. The Appraisal Team summarized the scope and findings of the appraisal during these conversations. The findings can be grouped into four categories:

a. Remedial actions were agreed upon for the more serious shortcomings of the high range noble gas monitors. This agreement was confirmed in an Immediate Action Letter dated August 15, 1980.

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

c. 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.

d. Two noncompliance items are specified in Appendix B to the letter forwarding this report. The licensee's response to these findings, to be submitted in writing, will be reviewed upon receipt.