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

REGION III

Report No. 50-331/80-21

Docket No. 50-331 License No. DPR-49

Licensee: Iowa Electric Light and Power Company
P. O. Box 351
Cedar Rapids, IA 52406

Facility Name: Duane Arnold Energy Center

Inspection At: Duane Arnold Site, Palo, Iowa

Inspection Conducted: November 10-21, 1980

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Inspection Summary

Inspection on November 10-21, 1980 (Report No. 50-331/80-21)
Areas Inspected: Special, announced appraisal of health physics program, including organization, management, training and qualifications, exposure controls, surveillance, instrumentation, facilities and equipment, radioactive waste management, ALARA, and accident response capabilities. The inspection involved about 450 inspector-hours onsite by five NRC inspectors.
Results: Significant health physics program weaknesses were identified in the areas of radiation protection department staffing levels (Section 2), interim emergency response capabilities (Section 10), availability of operable portable survey instruments (Section 6), ALARA program (Section 7), radiation work permit system (Section 5), high radiation area surveillance and access controls (Section 5), surveillance and posting of radiation and contaminated areas (Section 5),

control of contaminated tools and equipment (Section 5), and lack of laundered protective clothing contamination limits (Section 5). Two apparent items of noncompliance were found (Severity Level IV - inadequate high radiation area access controls - Section 5); (Severity Level V - failure to follow procedures - Section 5; 6).

DETAILS

1. General

The Duane Arnold Energy Center health physics program was evaluated during a special appraisal that began at approximately 8:00 a.m. on November 10 and ended November 21, 1980. The Health Physics Appraisal Team consisted of three radiation specialists from the NRC Region III office and two DOE contractor health physicists.

Upon arrival, the team met with senior plant management to discuss the purpose and scope of the appraisal. Training required for unescorted access was obtained by team members during the first day. Thereafter, the team had free access to the entire plant, subject only to the licensee's normal controls for posted and/or locked areas. Throughout the appraisal, the team emphasized direct interaction with workers and direct observation of work and work areas. Considerable effort was spent on radiation and contamination surveys to independently ascertain plant radiological status and to make comparisons with licensee measurements. The appraisal extended to evening and weekend shifts as well as normal day shifts.

The scope of the appraisal included management controls, radiation protection department organization, qualifications and training of the radiation protection staff, general orientation training, radiological protection program, radiological effluent controls, solid radwaste packaging and shipping, and facilities and equipment. The licensee's past and anticipated future performance under both normal and abnormal plant conditions were evaluated.

Significant weaknesses were found in several areas, including: radiation protection department staffing levels, interim emergency response capabilities, availability of operable portable survey instruments, ALARA program, radiation work permit system, high radiation area surveillance and access controls, surveillance and posting of radiation and contaminated areas, control of contaminated tools and equipment, and lack of laundered protective clothing contamination limits. Additional weaknesses are described in their respective report sections.

The program weaknesses identified affect the licensee's ability to perform routine functions as well as those that may be encountered during and after significant abnormal situations. These weaknesses are partially the result of being insufficiently staffed. When the assemblage of findings is viewed, it appears that there is a lack of management support for the radiation protection program.

Housekeeping during the appraisal was poor. The licensee is proceeding with much needed improvements in laundry, decontamination, and contaminated equipment storage facilities, and plans to institute a much needed contaminated equipment handling plan.

2. Organization, Management, and Qualifications

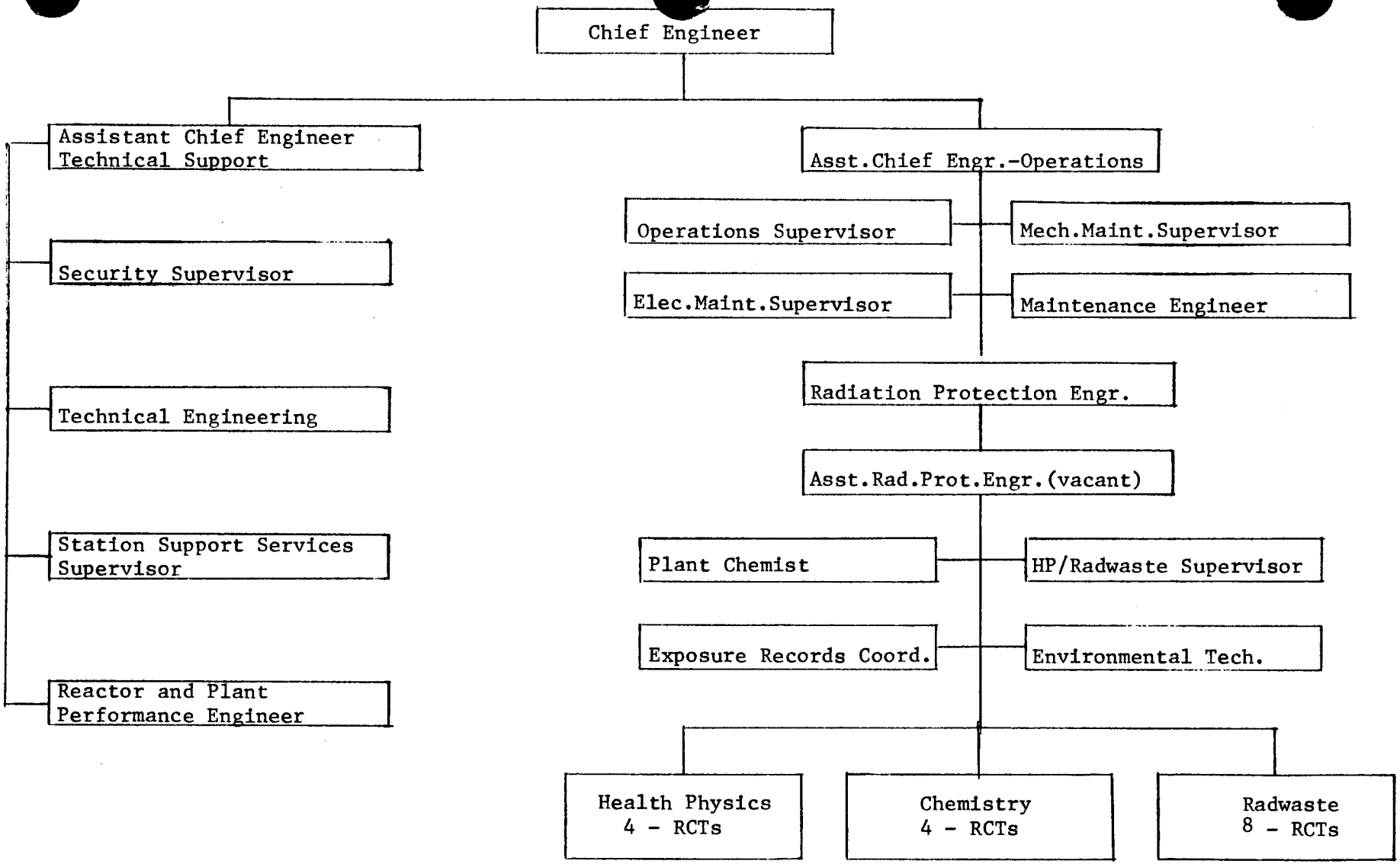
There is evidence that although the licensee's radiation protection department has performed adequately in the past, certain problems apparently have caused a decline in current performance and cast doubts concerning ability to function adequately during abnormal situations. Foremost among these problem areas is insufficient staffing levels of the radiation protection department and the resulting shortcomings in the operational health physics program.

2.1 Organizational Structure

The plant organization, including the radiation protection department, is shown in Figure 2.1. The radiation protection manager (RPM) role at the center is filled by the radiation protection engineer (RPE), who reports to the assistant chief engineer - operations, who heads operations, electrical and mechanical maintenance, maintenance engineering, and the radiation protection department. The organization chart does not show an alternate direct reporting for the RPE to the chief engineer or a corporate manager for matters of radiological safety, and no direct reporting appears to exist or is encouraged.

Figure 2.1 . .

DAEC ORG[illegible]ZATION (abbreviated)



RCT - Radiation and Chemistry Technician
Radwaste - Performs plant liquid processing and solid waste packaging.

Past experience has shown that managers who are in charge of keeping the machine running and maintained, and also responsible for radiological safety and ALARA, sometimes have difficulty keeping the goals in perspective. A frequent result is that the radiation safety program is relegated to a subservient role. Several of the significant findings of this appraisal indicate such a relegation. The appraisal team believes that the RPE should report to a higher organizational level.

The radiation chemistry technicians (RCTs) assigned to health physics and to chemistry primarily work in those positions. Backshift and weekend coverage is provided by both groups, on a rotating basis, with one RCT normally on duty. The RCT on duty performs both health physics and chemistry functions. The RCTs who rotate to backshifts appear to meet the technical specification requirement that at least one member of each operating shift crew be qualified to implement radiation protection procedures. The team learned, however, that the RCTs who work primarily in chemistry frequently do not feel adequately versed in the health physics responsibilities they must assume when they rotate to backshift. Should the RCT staffing be increased, thought should be given to permanently separating the health physics and chemistry functions.

Based on the above, the appraisal team believes that the RPE should report to a higher organizational level.

2.2 Staffing and Qualifications

As indicated on Figure 2.1, the radiation protection department staffing is currently 21 people, eight of whom are RCTs assigned to radwaste. During the past two years a total of ten people left the department, six terminating employment with Iowa Electric. Currently, three department employees have bids on openings in other departments within Iowa Electric and are being considered. The appraisal team found that the radiation protection department is currently not sufficiently staffed with technically qualified health physics professionals and supervisors. During October 1980, the assistant RPE terminated employement and has not been replaced. The RPE estimates that about 30 percent of his time is spent performing administrative duties. Iowa Electric has no corporate health physicist. The HP/radwaste supervisor must spend a major portion of his time directing radwaste operations. The net effect is that: the operational health physics function of the department is being performed with minimal technical guidance, oversight, and supervision; there is no backup for the RPM; and the department probably could not support a needed ALARA program. The appraisal team believes that the vacated assistant RPE position should be promptly filled with a qualified individual who could act as the RPE during his absence. Also, consideration should be given to increasing the technical and supervisor staffing of the department.

Currently, there are four RCTs assigned to health physics and four assigned to chemistry. These eight RCTs perform the routine station chemistry, radiochemistry, health physics surveillance and job coverage, health physics general orientation training, and on-the-job training of newer technicians. As a result of discussions with RCTs and their supervisors, tours of facilities and work areas, reviews of work assignments and duties and several findings of this appraisal, the team believes that DAEC is insufficiently staffed with RCTs to adequately perform their required functions during normal plant operations. Evidence of this shortage includes: insufficient time to provide training and retraining; inattention to posting, labeling, and surveillance of areas within the controlled area; backlog of work in the chemistry laboratory; need for excessive amounts of overtime work; and frequent periods of time when too few RCTs are available to support routine mechanical work planned in the controlled area. This evidence was apparent even though several contract technicians were onsite to provide job coverage for nonroutine work. Contract technicians have been employed at DAEC almost continuously during the past several years. Considerable difficulty in evaluating the qualifications of contract health physics technicians has been experienced. To aid in determining qualifications, the radiation protection engineer has developed and implemented written and oral testing of incoming contractor technicians. According to the licensee, however, the quality of contract technicians remains generally below that of permanent plant RCTs.

Review of qualifications of current radiation protection department personnel revealed no significant problems.

Based on the above, the appraisal team finds that: (1) the current professional and supervisory health physics staffing is insufficient to provide adequate technical guidance, supervision, and management oversight of the health physics program, and (2) current staffing of RCTs who perform health physics and chemistry duties is insufficient to ensure timely performance of routine and nonroutine tasks.

2.3 Authority

During the appraisal, team members met with groups of people within the radiation protection department, individual plant supervisors, and individual plant workers to discuss their perception of the authority vested in the radiation protection department. Team members also reviewed the licensee's Radiological Occurrence Report (ROR) system and how it is used.

Most RCTs felt that they had authority to stop a job in progress if serious violations of radiation protection rules were involved, and felt that they would be backed by radiation protection department management. Other than this perceived authority, however, all of the individuals and groups contacted said that the radiation protection department at DAEC was a service and support group with no authority

to enforce radiological requirements. Individual supervisors said that the ROR system was used to inform them of instances of failure to follow procedures and that corrective measures are taken by the supervisors. Having noted that the number of RORs written had fallen off significantly over the past years, team members asked individual RCTs why this was so. The RCTs stated that adequate and timely corrective actions are seldom taken by the supervisors, and to continue writing RORs about an individual's failure to follow radiological procedures results only in personal confrontation and poor working relationships. The appraisal team feels that RCTs must have the authority to implement radiological controls. In case of disagreement, RCT instructions should be followed and any conflict resolved later or the worker should leave the area of immediate radiological hazard until the matter is resolved. Station management should provide adequate incentive to ensure that radiological procedures are followed by all station and contractor personnel, and provide consistent, timely, and appropriate corrective actions for those who habitually fail to comply. It appears to the appraisal team that the radiation protection department is responsible for conducting an effective health physics program without being given sufficient implementing authority.

Based on the above, the appraisal team believes that station management should provide adequate incentive to ensure that radiological procedures are followed by all station and contractor personnel.

2.4 Communications/Performance/Oversight

Communications within the radiation protection department, and management oversight of the operational health physics program, appear to have declined. This may be a result of increased workload resulting from TMI-related requirements, short staffing of department professionals and supervisors, and the large administrative burden placed on the radiation protection engineer. Department supervisors involved with operational health physics can spend little time providing direct supervision, judging the performance of the technicians, and giving guidance to the program.

The past and present performance of individuals within the department appears good for matters for which they are trained and given adequate time to perform. General performance appears to be hampered because: (1) the department is short staffed, (2) most members of the department have not received plant systems training, (3) little advantage is taken of experience gained at other operating nuclear power stations, (4) there is no aggressive ALARA program, (5) workloads are frequently too great to provide adequate time to perform routine tasks in a timely manner, and (6) there is no substantive retraining program.

Based on the above findings, the appraisal team believes that the following matters need improvement: (1) supervisors' oversight of the routine and nonroutine health physics program, and (2) the radiation protection department's ability to perform.

2.5 Corporate Support

Corporate support for the radiation protection department appears to be limited to developing the new emergency plan and engineering new facilities and equipment, such as TMI-related requirements. There is no corporate health physics group.

Based on plant staffing level and workload problems previously described in this report, it appears that greater corporate assistance should be supplied to the radiation protection department, and/or the department's capabilities need to be enhanced.

2.6 Quality Assurance

Quality oversight of the health physics program is provided by corporate quality assurance (QA) and the onsite quality control (QC) department, which reports directly to corporate QA. This organization allows QA/QC activities to have a high degree of independence. Oversight activities by the QA/QC organization include administrative audits, reviews, and inspections.

An annual administrative audit is performed by corporate QA to verify implementation and documentation of the plant radiation protection program. The 1980 audit was found to address all facts of the program except instrumentation and radioactive waste, which were to be reviewed in later audits. It was noted, however, that a later audit of plant measurement and test equipment did not specifically address health physics instrumentation. Such audits appear needed based on findings discussed in Section 6 (Instrumentation) of this report. The items included in the annual radiation protection program audit appeared to be adequately addressed, with corrective actions completed timely and appropriately.

The annual corporate QA audit is supplemented by audits of specific activities or procedure implementation performed by the site QC department. The subject and frequency of these audits is determined by the QC supervisor. Audits are also performed at the request of the radiation protection engineer. Three of the 1980 QC audits were performed at the request of the radiation protection engineer to evaluate implementation of the revised radiation work permit system.

Based on the number of "failure to follow procedures" findings of this appraisal, the licensee should assess the audit program to determine why these matters were not identified during QA/QC audits. The QA and QC audit system appears adequate, if properly implemented, to provide independent verification of the implementation and documentation of the radiation protection program, but it is not adequate to judge the program's technical merits. Technical audits performed periodically by independent, qualified health physics personnel would improve the existing quality assurance program by evaluating the plant's health physics capabilities.

A vendor QA program audit of the environmental monitoring services contractor has been performed by corporate QA. However, no such audits have been performed on the external dosimetry or internal dosimetry (bioassay) contractors. While audits of such vendors may not be essential, the licensee should be knowledgeable of vendor QA practices.

In addition to audits, the QC department reviews and approves radiation protection administrative control procedures, participates in reviews of radiation protection department procedures through a representative on the plant operations committee and performs task inspections for greater than Type A quantity radioactive waste shipments. No problems were noted with these activities.

Based on the above findings, the QA/QC participation in the radiation protection program appears generally adequate. However, several improvements could be made, including: (1) assuring that all aspects of the radiation protection program are audited, (2) periodically performing a health physics technical audit, and (3) assuring that adequate QA elements are incorporated in vendor-supplied dosimetry and bioassay services.

3. Training

Over the past several years, DAEC has experienced a high turnover rate of professionals and technicians in the radiation protection (RP) department. Radiation chemistry technicians (RCTs), mostly hired from within the Iowa Electric system, usually have no significant previous nuclear experience when hired. This situation places a heavy training burden on the RP department, which remains understaffed. Possible improvements in training are described in the following paragraphs of this section. However, training of RCTs will remain a problem as long as the high turnover rate persists.

3.1 Initial Orientation Training

Initial orientation training, presented as a videotape program supplemented by oral presentation, is given to all new employees, visitors, and contractors who will enter the controlled area unescorted. The six to eight-hour training includes basic radiation protection, security, emergency response, and physical safety. During normal plant operations, training is conducted by one of four authorized RCTs. During outage periods, training is done by contractor personnel. Lesson plans and guidance are supplied by the training coordinator's office. Records are maintained by the training coordinator and the radiation protection department.

The radiation protection portion of the training appears to adequately cover the subjects required by 10 CFR 19.12. The training includes a demonstration of, but not general participation in, respirator mask fitting and the wearing and removal of protective clothing. A written

test is given at the completion of the training, with a required passing score of 70 percent or greater. About ten of the 30 questions pertain to radiation safety. Individuals who fail are allowed to repeat the training and are given a different test.

The taped portion of the training is logically developed and presented. The technicians who provide the live presentation, however, have been given limited guidance and instruction and have varying ability to act as instructors. Also, because of high department turnover, some of the technicians have limited experience and background on which to call. This results in an inconsistent oral presentation during the orientation training.

Based on the appraisal findings, this portion of the licensee's program is acceptable. However, the quality of the oral presentation should be improved.

3.2 Radiation Chemistry Technician (RCT) Training

At DAEC, technicians who perform health physics, chemistry, and radwaste duties are titled Radiation Chemistry Technicians (RCTs). Individual RCTs are classified as a journeyman, apprentice, or trainee. Routine training of RCTs, accomplished within the radiation protection department, consists mainly of on-the-job training by journeyman technicians. The level of competence required for specific jobs is established by the RCT's supervisor and the radiation protection engineer. Until the radiation protection engineer certifies his qualifications, a trainee cannot perform unsupervised work.

In addition to on-the-job training, contractor taught formal training courses have been provided to 14 of the current 16 RCTs. The remaining two are recently hired trainees. The formal training, consisting of basic and advanced health physics, chemistry, respirator fit testing, and respiratory equipment maintenance, has been taught by more than one contractor during the past three years. According to the RCTs interviewed, the quality of the formal training has varied greatly, with some training sessions being more beneficial than others.

Aside from a repeat of the initial orientation training provided to all station personnel, there is no RCT retraining program. There is no formal program or mechanism for providing instruction concerning changes to procedures, equipment, and regulatory requirements, or to update, refresh, and expand upon the formal training subjects.

Reactor systems training has not been provided to RCTs. The appraisal team believes that plant health physicists and health physics technicians need to have an understanding of plant systems in order to make knowledgeable decisions when establishing protective requirements for workers and to evaluate radiological conditions during abnormal operations.

Based on the appraisal findings, this portion of the licensee's program is acceptable. However, RCT training should be improved by standardizing the formal training programs, providing plant systems training, and instituting the needed retraining program.

3.3 Contract Health Physics Technician Training

According to the licensee, the training provided to incoming contract health physics technicians has varied greatly during the past several years. The length of stay of individual contract technicians also varies greatly. The current practice is to provide eight-hours of plant-specific radiation protection procedures training to incoming technicians. During the appraisal, however, the appraisers noted that some incoming contract technicians were put to work before receiving the training, because there was no radiation protection department representative available to provide the training.

Because the radiation protection department is short-staffed, a significant portion of the routine and outage health physics coverage has been performed by contract technicians during the past several years. As previously stated, the licensee has had difficulty in determining the qualifications of incoming contract technicians, most of whom stay only a few weeks. These circumstances, along with the minimal training provided, result in a contract technician work force that in many cases is adequately equipped to perform only menial and repetitive tasks.

According to various supervisors, the use of poorly trained contract technicians has led to many jobsite problems during recent years.

The almost continuous use of minimally trained contract technicians, along with a short-staffed radiation protection department with high turnover, provides little assurance that abnormal radiological conditions could be adequately evaluated and controlled.

Based on the above, the appraisal team believes that training provided to incoming contract technicians needs to be substantially improved.

4. Exposure Controls

The licensee's external and internal exposure control programs appear to be functioning adequately. No significant problems were identified during this appraisal. Several areas which could be improved are described in the following paragraphs.

4.1 External Exposure Controls and Dosimetry

External beta-gamma radiation exposure is monitored by a combination of thermoluminescent and self-reading pocket ion chamber dosimeters. A vendor service provides the official dose determinations using two-chip thermoluminescent dosimeters (TLDs) to provide skin and whole

body dose assessment monthly. Essentially all plant personnel (including contractor, security, and clerical personnel) are assigned TLDs. Exceptions are infrequent visitors (tour groups, vendor service personnel, etc.). Assigned TLDs and a control TLD are stored at the guardhouse. Unassigned TLDs are kept in the radiation protection engineer's office.

It was noted that no control TLD was kept with the unassigned TLDs. Although the office area is a low background area (comparable to the guardhouse), it would be a good health physics practice to include a control TLD with the unassigned TLDs.

Self-reading pocket dosimeters are used for monitoring short-term dose. Pocket dosimeters are issued at access control upon entry to the controlled areas of the plant and are returned at the guardhouse exit. Entry and exit readings are logged both on the access control entry log and on the radiation work permit. In addition, final dosimeter readings for the day are logged when leaving the plant.

Neutron dose is determined by keeping time on individuals entering areas where neutron dose rates have been determined by a rem-meter. A vendor track etch neutron dose measurement system was used by the licensee for a short period, but results reportedly were unsatisfactory and the service was discontinued. Notification of calculated neutron dose is provided to the TLD vendor by the licensee for inclusion in the exposure reports.

Quality assurance elements applied to the external exposure monitoring program include: (1) monthly spiking of vendor TLDs, (2) semiannual performance checks of pocket dosimeters with acceptance criteria consistent with ANSI N13.5-1972 and Regulatory Guide 8.4 recommendations, and (3) TLD/pocket dosimeter intercomparisons with well defined acceptance criteria.

The licensee's personal dose records are maintained manually by a dedicated dosimetry clerk/secretary. Some consideration has been given to computerizing these records, but there are no firm plans to do so. The appraisal team reviewed random and selected personnel files and found them reasonably complete and current. The licensee's administrative exposure controls appear to be functioning adequately.

Based on the above, the external exposure controls program appeared acceptable. The licensee should consider storing a control TLD with the spare badges.

4.2 Internal Exposure Controls

The licensee controls internal exposures through engineering controls, an air sampling and contamination surveillance program, and use of approved respiratory protection equipment, and evaluates program effectiveness by a bioassay program. Although no significant problems

were noted with the overall internal exposure control program, several possible improvements are described in the following paragraphs.

Routine particulate high volume air samples are collected for each posted radiation or contamination area and are supplemented by job specific air samples and routine contamination smear surveys. Respiratory protection equipment is required per plant procedure for air concentrations exceeding 10 percent of maximum permissible concentration (MPC). Although plant procedures discuss the use of an MPC-hour log in lieu of respirator use for certain applications (low MPC-hour accumulations) the licensee has never implemented the system, relying instead on respirator use. Implementation of the MPC-hour log could result in some external exposure saving by improving worker efficiency for certain tasks presently requiring respirators. Lack of personnel to administer the MPC-hour log system apparently has prevented its implementation.

Licensee respiratory protection equipment includes full-face cannister masks, full-face airline masks, and self-contained breathing apparatus (SCBA). Masks and SCBAs are maintained at access control and designated emergency response locations. Quantities of masks, SCBAs, spare canisters, and air bottles appeared adequate, and the equipment observed appeared to be in good condition. Refill capability for SCBA bottles is provided onsite using a cascade charging system. A compressor charging system has been installed but is not operational, due to lack of contractor supplied certifications and operating instructions; consequently, this system was not appraised. Plant instrument air (filtered and monitored by a cart assembly) was formerly utilized to supply systems with breathing air. This practice was terminated two years ago when the intrusion of potentially contaminated moisture was discovered. A design change was requested but has yet to be completed. Present practice is to require outside contractors to furnish their own Grade D (or better) quality air as part of the bid specification for specific jobs. There is apparently no quality assurance provided by the licensee to ensure that contractor supplied air is acceptable.

Qualification for respirator use includes initial training provided by a radiation chemistry technician (RCT), medical certification, and a quantitative fit test. Annual requalification in all three areas is required. As noted in Section 3 (Training), no specific RCT is assigned respiratory protection training responsibilities, resulting in varying training quality. The appraisal team noted that good backup arrangements, including NUREG-0041 recommended facial measurements, were established for use if quantitative fit testing equipment malfunctions.

The licensee's bioassay program includes onsite whole body counting with offsite laboratory urinalysis as backup. Whole body counts are performed quarterly for plant radiation area workers, annually for security and supervision personnel, and on an in/out and as needed

basis for administration and contractor personnel. Urinalysis is used on a nonroutine basis as part of potential internal exposure investigations and for personnel who cannot be whole body counted. Bioassay data are used to back-calculate MPC-hour exposures when specified actions levels are exceeded.

The licensee owns a commercially available chair-type whole body counter. The system includes trunk and thyroid sodium iodide detectors, and, through collimation, can selectively count lungs or GI track. Data collected by a 1024 channel spectrum analyzer are processed through a local computer using commercial software to give total activity and percent of maximum permissible organ or body burdens. Results are based on standard man parameters and, per vendor recommendation, are not corrected for height or weight variances. The system is calibrated quarterly; channel energy and efficiency checks are performed before each use. Calibrations and checks use vendor supplied trunk and thyroid phantoms with NBS traceable quantities of fission product activity. These phantom sources constitute multiple point energy but only single point activity calibration. Calibration could be improved by performing periodic checks with higher activity sources comparable to maximum permissible body or organ burdens.

Procedures for operating the whole body counter are presently limited to the vendor manual. Some improvement could be made by developing a procedure for quarterly calibration and daily checks in accordance with ANSI N343-1978 recommendations. Licensee personnel indicated that such a procedure was being developed. Training provided in the use of the whole body counter appeared adequate. In the event of computer failure, body burden calculation would be performed by the radiation protection engineer. Some RCTs indicated confidence in their ability to perform the calculations, given time for review. The appraisal team noted that no frisker or shower facilities were located convenient to the whole body counter. A frisker at the facility would provide some improvement in detection of suspected external contamination before counting. Because of the remote location of the whole body counter, and the lack of shower facilities at that location, the licensee does not require showering before counting. This results in frequent recounts of individuals when significant activity caused by external contamination is detected on the first count.

Based on the above, the internal exposure controls program appeared acceptable. However, several improvements could be made, including: (1) use of the MPC-hour log instead of respirators for some low MPC-hour jobs, (2) assurance that contractor supplied breathing air meets Grade D or better specification, (3) improved consistency of respiratory protection training, (4) improved whole body counter calibration, through development of an approved procedure and inclusion of higher activity calibration sources, and (5) provision of frisker and shower facilities near the whole body counter.

5. Radiological Control

The licensee's radiological control program was examined, including access control, radiation work permit (RWP) system, routine and job specific radiation/contamination surveys, controlled area postings, and procedures. The controls exercised over the following areas were specifically reviewed: (1) radiation areas, (2) high radiation areas, (3) airborne radioactivity areas, (4) contaminated areas, and (5) radioactive material areas. Although the licensee's radiological control program appears to have been performed adequately in the past, certain problems threaten future performance and cast serious doubts concerning its ability to function adequately in abnormal situations. Principal among these problem areas are shortcomings regarding control of contaminated/radioactive material, control of access into high radiation areas, implementation of the RWP program, special posting programs, and the need for general cleanup of the turbine and reactor buildings.

5.1 Access Control

Routine access to the radiologically restricted areas of the plant is through a constantly manned guardhouse. The guard force is responsible for ensuring that personnel are authorized site access and receive a TLD badge before entering the area. Within the restricted area, the plant has been divided into clean and controlled areas based on the significance of the radiological hazards.

Access to the controlled area of the plant is controlled by the radiation protection department (RPD). A time/signature entry log is maintained at access control for personnel accountability. Before entering the controlled area, each person obtains a pocket dosimeter. All entries are covered by radiation work permit (RWP). A separate log is maintained at access control for the purpose of assigning the dose measured by the pocket dosimeter to a specific RWP. Copies of the RWPs are maintained at the RPD office adjacent to access control. When leaving the controlled area, all personnel are required by procedure to use a hand and foot monitor before passing through a portal monitor. All material being brought out of the controlled area must be surveyed by an RPD representative.

Based on the appraisal findings, this portion of the licensee's program appears generally acceptable. Problems with RWP program implementation are described in Section 5.2.

5.2 Radiation Work Permit

The licensee's radiation work permit (RWP) program, documented in Radiation Protection Procedure (RPP) 5.1, functions to control entries to radiologically posted areas. The present procedure, implemented about two months before the appraisal, represents a significant change from previous practices and appears to be an improvement over the previous RWP program. Three types of RWPs are used: (1) normal RWPs

issued for nonrepetitive jobs are valid only during the time it takes to complete the job; (2) extended RWPs posted for each repetitive or routine job are valid until terminated by the radiation protection department; and, (3) routine plant access RWPs issued for routine access through general radiation areas within the plant. Each RWP identifies the location and description of work allowed, the radiological conditions, general and specific instructions, and protective equipment requirements for entry. During tours of the controlled area, team members noted that radiation and contaminated area postings indicated "RWP Required For Entry." Because of the large number of posted areas, it was extremely difficult in most cases to determine what RWP applied to each posted area or whether an RWP had been written for entry into a specific area. Since plant procedures require that all entries into posted areas be controlled by a current RWP, the appraisal team believes that the applicable RWP number should be designated at the area posting or that instructions should be given to obtain a specific RWP.

Copies of routine RWPs are posted at access control. Persons entering are required by procedure to sign an access log for the RWP being used and to enter dosimeter reading and time in and out, Copies of normal or extended RWPs are maintained at the job site where the same requirements pertain. Initialing by the individual entering signifies that he or she has read the RWP and understands the entry requirements.

The following problems were noted concerning RWP program implementation during the appraisal. In eight out of 40 RWPs reviewed, workers did not initial the RWP access log. On at least five occasions, workers were observed by appraisal team members to be in noncompliance with the protective equipment requirements of their RWP. A worker became contaminated because of failure to adhere to the requirements of an RWP. Contrary to licensee procedure, an unauthorized contract health physics technician was approving the issuance of RWPs. A worker entered a high radiation area without signing the RWP access log.

Based on the above, the appraisal team finds that the revised radiation work permit system needs significant improvement in implementation.

5.3 Routine and Job Specific Surveys

Routine radiation and contamination surveys of all facilities and locations within the radiologically restricted area are made by the radiation protection department (RPD). The purpose is to ensure that contamination or significant radiation fields do not exist in normally uncontrolled areas. The surveys are conducted at scheduled intervals in accordance with approved procedures.

Implementation of the routine contamination survey program, however, does not appear to be adequate to identify all areas containing contaminated material. A survey conducted by the appraisal team found over 25 percent of 100 smears taken in unposted areas of the reactor and turbine buildings exceeded, by at least a factor of two, the

licensee's contamination limit of 2000 dpm/ft^2. This survey identified a number of pieces of contaminated equipment and tools that were not marked or located within identified contaminated areas.

The following additional problems were noted regarding the routine radiation/contamination survey program. The routine radiation survey program had not identified four radiation areas (Section 5.4). Plant procedures have not established formal limits for releasing or rejecting laundered protective clothing. Apparently, routine surveillance of all job sites is not performed by radiation protection technicians for the purpose of ensuring adherence to RWP requirements (Section 5.2).

Based on the above, the appraisal team finds that improvements in the following areas are needed to achieve a fully acceptable program. (1) The radiation/contamination survey program needs to be expanded and intensified to ensure that radiation areas and contaminated equipment, tools, and areas are identified. (2) Limits for acceptable contamination on laundered protective equipment need to be established. (3) A routine work site surveillance program to ensure worker compliance with applicable procedures needs to be instituted.

5.4 Controlled Area Postings

The controls exercised over the following areas were specifically reviewed: radiation areas, high radiation areas, airborne radioactivity areas, contaminated areas, and radioactive material areas. Area control is provided through postings and the radiation work permit (RWP) program. Plant procedure RPP 6.2 Section 3.2.2.1 requires that all areas greater than 2.5 mR/hr be posted as radiation areas and requires an RWP for entry. During the appraisal, the following areas were observed to have radiation levels exceeding 2.5 mR/hr, but were not posted as radiation areas: (1) a portion of the reactor building track alley adjacent to the double doors into the decontamination room, (2) the contaminated area near the end of the railroad track on the 812-foot level of the turbine building, (3) the area adjacent to the pre-filter section of the mobile filter train located on the 780-foot level of the turbine building, and (4) the demineralizer makeup area on the 734-foot level of the turbine building (caused by nine drums of radwaste stored nearby). Failure to post these areas appears to be in noncompliance with Technical Specification 6.9.1, which requires adherence to procedures. For areas that were posted, no indication of the existing radiation level was provided at the entrance to the posted area. The appraisal team believes that this information would be helpful to persons entering the radiation area.

High radiation area control is provided through postings and the RWP program. Plant procedure RPP 6.2, Section 3.2.2.5, requires that all high radiation areas be conspicuously posted. An area in the vicinity of the seal well drain pipe on the 812-foot level of the reactor building was observed not to be posted as a high radiation area, although an exposure rate of about 200 mR/hr was measured at head level. The same

plant procedure requires each door or access point to a high radiation area to be maintained locked or guarded to provide positive control over each individual entry. Contrary to the procedure, the north door to the air ejector room was found propped open and unattended. These occurrences are considered to be in noncompliance with 10 CFR 20.203(c)(2). Also, the TIP cage room door, posted as a high radiation area, was found unlocked and unattended with the key in the lock. The radiation levels inside the TIP cage room at the time were substantially below 100 mR/hr. Although not a high radiation area, it is the appraisal team's opinion that allowing the door to be unlocked, unattended, and with the key in the lock, is a poor health physics practice.

Plant procedure RPP 6.2, Section 3.2.2.2 specifies requirements for posting and control of contaminated areas. The following procedure violations were observed by the appraisal team. No signs existed around a contamination work area on the 780-foot level of the turbine building. (This area was properly barricaded contained a step-off pad, and was covered by a current RWP.) The decontamination area near the electropolisher on the 780-foot level of the turbine building was not posted as a contamination or radioactive material area. The condensate pump area on the 734-foot level of the turbine building was posted as a contaminated area, but no step-off pad was provided. This same problem existed at several other contaminated areas. The area outside the north door to the air ejector room had a double step-off pad, but was not posted as being an entry into a contaminanted area. Entrances to several additional contaminated areas were found not barricaded and/or posted. These occurrences are considered to be in noncompliance with Technical Specification 6.9.1, which requires adherence to radiation protection procedures.

Control of radioactive material areas is maintained through procedures, postings, and RWPs. Plant procedure RPP 6.1, Section 4.2, does not specifically state that areas containing radioactive material must be posted, although Section 5.3 of the same procedure provides requirements for posting areas containing radioactive material. Packaged but unmarked equipment containing radioactive/contaminated material were observed to be stored in a number of unposted areas.

The licensee uses two special radiological postings (special status area and hot spot). Several special status area and hot spot postings were dated over 18 months ago, and hot spot postings did not appear to be used consistently. The appraisal team believe that all special status and hot spot areas should be re-surveyed and updated on a regular frequency. The procedure for hot spot posting does not appear to contain sufficient guidance to allow consistent application. No procedure governs the use of special status area postings.

Based on the above, the appraisal team finds that the controlled area posting program needs to be significantly improved.

5.5 Procedures

Radiation protection procedures are contained in the Radiation Protection Manual, Plant Chemistry and Counting Room Procedures, Emergency Plan, vendor equipment manuals, and maintenance department instructions. In addition to procedures, internal memos are used to disseminate technical and administrative information. A radiation occurrence report system is used to document significant deviations from radiation protection policies and procedures and the corrective actions taken. Temporary changes can be made to procedures with the approval of the shift supervising engineer and one additional member of plant management. Temporary changes expire after 30 days unless they have been reviewed and approved by the operations committee.

The procedure review, revision, and control system was appraised; no significant problems were found. The appraisal team found one outdated procedure in an emergency response team sampling kit, but this appeared to be an isolated occurrence. It was noted that at least two procedures, RPP 5.1 and RPP 7.1, contained permissive terms such as "may" or "should" when the mandatory "shall" is intended. Procedure adherence appears to be a significant problem and is addressed in several sections of this appraisal report.

Based on the above, this portion of the licensee's program appears to be acceptable; however, as noted in several sections of this report, adherence to radiation protection procedures needs to be given priority attention.

5.6 Housekeeping

Housekeeping within the controlled area during the appraisal was considered poor. This was evidenced by:

(1) Large numbers of barrels of used liquids temporarily stored in various locations.

(2) Large piles of unbagged or poorly bagged equipment awaiting decontamination, and protective clothing awaiting laundering, placed in unposted or zoned, or poorly posted and zoned areas.

(3) Contaminated tools and equipment found in unposted areas.

(4) Items of used protective clothing and respirators found abandoned on the floor or on equipment, frequently near adequate, designated receptacles.

(5) The rooms adjacent to access control, where instruments are calibrated and repaired, were extremely untidy.

It is recognized that the plant has had a series of outages and that recovery was still in progress. However, many of the matters listed

above are contrary to existing plant procedures and indicate inadequate health physics staffing, inadequate training, inadequate facilities, a disregard for procedure compliance, or some combination of these causes.

Based on the above, the appraisal team believes that housekeeping should be substantially improved.

6. Instrumentation

The licensee's supply, use, maintenance, and calibration of fixed and portable health physics instrumentation was reviewed. Specific problems concerning the availability of portable dose rate survey instruments were identified. In addition, possible improvements in procedure adherence, calibration and maintenance practices, and the detection of personal contamination are discussed below.

6.1 Portable Survey Instrumentation

The plant has approximately 35 portable dose rate survey instruments, including six beta-gamma instruments with extendible probes and two neutron rem-meters. In addition, there are approximately 45 contamination detection survey meters. In spite of these quantities, there appeared to be a lack of available functional instruments. At no time during the appraisal were there more than three fully functional beta-gamma dose rate survey instruments available at the access control instrument locker. Also, none of the many portable contamination survey instruments in the locker had probes attached or conveniently available, thus rendering them useless for their intended function. All RCTs interviewed had, at some time, experienced difficulty in locating operable instruments.

This lack of available instruments could constitute inability to meet the emergency response team requirements detailed in emergency procedure PPIP-7, Emergency Assignment Board Tag Duties. This situation resulted in the issuance of an Immediate Action Letter following the exit interview. The following causes appear to contribute to the overall lack of available instruments. Instruments were routinely being kept at work locations rather than being returned to access control. This apparently was done both for convenience and because technicians anticipated a lack of available instruments at access control. Problems have been experienced with lack of respect for equipment. One such incident resulted in removing pancake type probes from spare contamination survey meters stored at access control. There appears to be a slow turnaround time for maintenance, repair, and calibration of health physics instruments.

Slow instrument turnaround time may have several causes, including uneven scheduling of instrument calibrations, lack of a tag-out system to identify problems with nonfunctioning instruments, and an apparent low priority for health physics equipment maintenance and calibration. The appraisal team noted that of 43 health physics instruments scheduled for calibration during October 1980, only 15 were

calibrated on schedule. While October was an exceptional month, it is apparently common for approximately one third of the instruments not to be calibrated on schedule. Such instruments, however, do appear to have been removed from service. Nonfunctional instruments are required by RPP 7.1 (Section 3.1) to be tagged and removed from service. Contrary to this procedure, the appraisal team observed many instruments removed from service untagged, although identified by licensee personnel as nonfunctional. Several technicians indicated that instruments typically are not tagged out. This can lead to poor communication of instrument problems from radiation protection to maintenance department personnel. Plant maintenance personnel, who are responsible for instrument calibration and repair, indicated that one man is assigned full time to health physics instrumentation; however, frequently he is reassigned to higher priority work. The plant has also experienced humidity related problems with some iron chamber survey instruments. The possibility of storing such instruments in a heated cabinet was discussed with licensee personnel.

Procedures detailing use and calibration of survey instruments appeared straightforward and technically accurate; however, adherence to procedures needs improvement. Contrary to Sections 3.1 and 3.3 of RPP 7.1, routine (daily) source checks of portable dose rate instruments were not performed during the appraisal.

There appeared to be two reasons for this. First, several contract technicians were unaware of the procedure requirement for source checking; second, operational check sources were not available at instrument storage locations. Although the licensee has several operational check sources, they were not convenient for use, having been moved to locked storage at access control following an incident of vandalism. The appraisal team believes an operational check source should be located convenient to instrument storage locations.

Calibration of beta-gamma dose rate instruments is performed using a commercially manufactured, multiple-source, gamma calibrator and open air calibrations for low dose rate ranges. Procedures appeared to comply with ANSI N323-1978 recommendations for portable survey instrument calibration.

Based on the above, the appraisal team finds that availability of operable high and intermediate range portable survey instruments needs to be improved to ensure that emergency response requirements can be met. Several related improvements that could be made are: adherence to procedural requirements for performing source checks of instruments; modification of calibration frequencies and schedules; changes in instrument storage and control practices; and higher priority for maintenance and calibration of health physics equipment.

6.2 Personal Contamination Detection Instruments

The licensee uses a combination of friskers, hand and foot monitors, and portal monitors for detecting personal contamination. All personnel

leaving posted contamination areas are required to frisk in accordance with plant procedures. In addition all personnel leaving the controlled area of the plant are required to use the hand and foot monitor and the portal monitor.

Friskers are located at several points throughout the plant, generally convenient to step-off pads. A frisking booth was constructed near the drywell exit to provide a low background. Friskers at most other locations appeared to be placed in areas of low background. However, the frisker located at the refueling floor exit step-off pad required operation on the x10 scale, due to nearby barrels of contaminated protective clothing. Relocating or shielding this frisker could improve its usefulness.

Both alternating current and battery powered friskers are used, all with pancake GM probes. It was noted several times that battery powered portable survey meters were left on for long periods when not in use, causing unnecessary battery drain. Although frisker source and battery checks are part of the daily routines, one frisker was found in use for one day with low batteries even after its status had been described to radiation chemistry personnel. Increased licensee attention appears needed to ensure that equipment in use is functional

Two hand and foot monitors are located at access control. These monitors have no timing circuits, but procedures require individuals to perform five to ten-second counts. Most personnel observed complied with this requirement. Procedure RPP 7.3 (Section 3.3) requires source checking the hand and foot monitors with an 8-microcurie source; this was observed to drive the channels immediately offscale, providing only a qualitative check on response and alarm functions. Source checking could be improved by using a smaller source (about 50,000 dpm) and determining an acceptable detection and alarm capability in the required five to ten-second counting time. Two portal monitors, located at access control, are used as the final step in routine personal contamination detection. These monitors provide an alarming go/no-go indication only, and do not include any count rate readout. The monitors contain side, head, and foot hardwall GM detectors and a photocell activated timer with alarm to ensure a full duration (seven second) count. Source checks are performed daily using an 8-microcurie source.

The appraisal team used licensee check sources to determine personal contamination detection equipment capabilities. Neither the hand and foot monitors nor the portal monitors responded to a 22,000 dpm sodium-22 source, but both detected a 377,000 dpm cobalt 60 source in close proximity (1cm) to a detector. The portal monitors did not detect a 600,000 dpm source at chest level but alarmed immediately when an 8-microcurie (18 million dpm) source was held at chest level. Past appraisal team experience indicates that hand and foot monitors should be capable of alarming at 50,000 dpm, but portal monitors are substantially less sensitive. Friskers with pancake type probes are the most sensitive, with minimum detection capability of nominally 1000 dpm for

beta-gamma contamination. The licensee could improve the personal contamination detection program by determining minimum detection capabilities and including such information in the orientation program.

Based on the above, the licensee's personal contamination detection capabilities appear acceptable. However, several improvements could be made, including: (1) relocating the refueling floor exit step-off pad frisker to allow operation on the x1 scale, (2) ensuring that battery powered friskers are turned off after use or that batteries are replaced timely, (3) performing quantitative source checks of the hand and foot monitors, (4) including a timer and external probe on the hand and foot monitors, and (5) determining minimum detection capabilities of hand and foot monitors and portal monitors, and (6) ensuring that undue reliance is not placed on relatively insensitive contamination detection equipment.

6.3 Constant Air Monitors

The plant has four constant iodine and air particulate monitors (CIM-CAMs) utilizing charcoal cartridges and moving filters. In addition, there are two fixed filter particulate CAMs. A vendor contract maintenance service had serviced all CIM-CAMs within the eight months preceding the appraisal. However, none of the CIM-CAMs were operational during the appraisal, due to maintenance related problems. The licensee appeared to adequately compensate for the unavailability of these monitors by providing extensive continuous and grab air sampling of particulates and radioiodines within the plant. The fixed filter CAMs (Eberline AMS-2s) appeared fully operational with one in service and one in standby status at the interim technical support center. The fixed filter CAMs and one CIM-CAM did not appear to be on the licensee's inventory of health physics instrumentation. This was pointed out to the licensee. Procedures covering CAM use, calibration, and interpretation appear adequate, although it was noted that CAM air flow meter calibration checks are not performed. Such calibration checks should be performed as part of the routine calibration.

Based on the above, this portion of the licensee's program appears acceptable. However, CAM air flow meter calibrations should be instituted and all equipment should be included in the licensee's health physics instrumentation inventory.

6.4 Area Monitors

There are 30 installed area radiation monitors (ARMs) located throughout the plant. All ARMs use energy compensated GM detectors and have local and remote (control room) readout and alarm capability. Control room annunicator reflash capability does not exist, but is compensated for by plant operating practices. If a high alarm is initiated due to high radiation levels resulting from special maintenance or process activities, radiation protection provides periodic (e.g. hourly) dose rate

surveys, and the area monitor is placed in a disabled mode allowing annunication of any other area monitor alarm. During the appraisal it was noted that three area monitor channels and the strip chart recorder were inoperative. Maintenance orders had been placed; however, licensee personnel indicated that repair of these units was low in priority and their temporary loss did not appear to inhibit safe plant operation. In addition to the installed ARMs, the plant has several portable ARMs. No significant problems were noted with the location, calibration, or routine function of either the fixed or portable area radiation monitors.

A high range containment accident monitor is scheduled for installation during the next refueling outage (March 1981) as part of the NUREG-0578 requirements.

Based on the above, the licensee's area monitoring program appears acceptable.

7. ALARA

ALARA is a natural but planned extension of a quality radiation protection program. It requires a concerted effort by all plant management and a serious commitment by upper management to limit both individual and total radiation exposures. Guidance concerning ALARA concepts is presented in Regulatory Guide 8.8.

The station has a written management policy statement concerning ALARA, but there is no structure, either formal or informal, to provide for program implementation. Plant upper management does not appear to have a good understanding of the ALARA concept, the methods of implementation, or the benefits that can be derived. The radiation protection department does not actively participate in outage planning, major modifications, design changes, or any other nonroutine plant operation involving significant radiation exposure, nor is the department technically staffed to support such an effort.

The appraisal team found evidence that the radiation protection department, in concert with other plant managers, does some good ALARA related work ad hoc. This work generally has been done for jobs involving high exposure rates where the cost benefit was evident.

Based on the appraisal findings, a formalized ALARA program with strong management support and active radiation protection department participation needs to be developed and implemented.

8. Radioactive Waste

Radioactive airborne and liquid effluents and solid waste management generally have been acceptable over the past several years. No significant problems were identified during the appraisal.

8.1 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.

The licensee has been unable to quantify noble gas effluents from the reactor building, using the installed monitoring system. The effluents, normally of relatively low concentrations, are not active enough to be seen by the insensitive monitors. Instead, the licensee collects a gas grab sample daily and hand calculates the release quantity. This method, however, has been hampered by the frequent unavailability of the GeLi analyzer to identify effluent isotopic content. Planned new equipment to monitor reactor building effluent is to be more sensitive.

Short term lessons learned, high-range, noble gas effluent monitors are in place and operable, and procedures are written and implemented to interpret monitor readings.

Based on a cursory review, this portion of the licensee's program appears to be acceptable.

8.2 Solid Radioactive Waste

Solid radioactive wastes consist primarily of spent resins, dry compactable waste, contaminated equipment, and irradiated components. The radiation protection department (RPD) is responsible for operating the solid radioactive waste program. During the appraisal, two previously packaged drums of contrifuged resins (one drum of powdered resin and one of beaded resins) were inspected for the presence of free liquids. The drums, selected at random by a member of the appraisal team, were turned upside down and allowed to remain in the position for approximately one day. Then, with an appraiser present, both drums were turned upright and the lids removed. No evidence of free liquid was observed.

The average dose received by radwaste operators was 1640 mrem during the first nine months of 1980. The licensee estimates that over 50 percent of this dose was received because of work required to repair mechanically malfunctioning equipment in the radwaste system. For example, the solid waste packaging automatic lidding machine frequently does not function properly. As a result, radwaste operators must crawl over the shielding wall and manually work the lid into place. The licensee has contracted the electrical repair of many inoperable portions of the radwaste processing system. No effort, however, is currently planned to correct mechanical malfunctioning equipment.

Also contributing to dose received by radwaste operators is the inadequacy of the present facilities for loading solid radwaste shipping casks. The facility originally was designed for loading casks which either are no longer certified for use or do not provide

adequate shielding. Loading of the presently used casks in the facility requires that a radwaste operator be near the loaded drum during certain stages of the loading process, resulting in additional dose being received. The licensee had planned to construct a new drum loading facility starting in about two years. This facility has not been funded, because of competition by serious mechanical problems with reactor systems which required extensive repair and a long outage.

The licensee stated that the spent resin storage tanks were sufficient to hold about a two-month supply at the normal generation rate. At the time of the appraisal, shipments of resin wastes were delayed, because the GeLi system was inoperable and package contents could not be quantified.

Consequently, the backlog of resin wastes was nearing the capacity of storage facilities.

Based on the appraisal, this portion of the licensee's program appears to be acceptable. However, mechanically inoperable radwaste system equipment that results in unnecessary personal exposure should be repaired or replaced.

9. Facilities and Equipment

Facilities available to the radiation protection department appear to be adequate for both normal and initial accident conditions. Changes could be made which would make the existing facilities more useful.

9.1 Health Physics Facilities

Offices for the radiation protection engineer, his assistant, and the exposure records coordinator are located on the second floor of the administration building. The chemist's office is on the third floor. The HP/radwaste supervisor's office is in a building remote from his duties but within the security fence. As noted in Section 4.2, the whole body counter and mask fitting facilities are also located in a building remote from the main plant facilities. The RCTs assigned to health physics work are housed at access control on the ground floor of the reactor building. This division of facility locations appears to hamper the daily workings of the department but does not seem to be an untenable situation.

Although the size of the area dedicated primarily to access control is adequate, it appears that its usefulness could be improved by relocating the mask cleaning station. The licensee's staff stated that at times contaminated masks can interfere with the nearby hand and foot counter and frisker. Also, it appears that the space provided within access control for surveying equipment being removed from the controlled area is too small, also interfering with the monitoring equipment.

General housekeeping in the access control area, especially in the instrument maintenance and emergency equipment rooms, needs to be improved. Lack of organization was apparent in these rooms. Also, a floor mop, found by an appraiser to measure 1500 cpm, was left standing near the doorway into the emergency equipment room until called to the attention of a radiation protection technician.

Based on the appraisal finding, this portion of the licensee's program appears acceptable, but the following matters should be considered for improvement: (1) relocation of the mask cleaning station to a more isolated area, and (2) providing a larger, more isolated work area to survey materials being removed from the controlled area.

10. Accident/Re-entry

The scope of the appraisal was limited to the radiation protection department's accident and re-entry preparedness capability. The appraisal primarily focused on six areas: instrumentation, analytical capability, re-entry capability, expanded support capability, training, and environmental capability.

A separate NRC evaluative effort is being conducted regarding nuclear reactor emergency planning activities. The emergency planning evaluation for the Duane Arnold Energy Center has been initiated, but is not complete. In light of this effort, the Health Physics Appraisal Team confined its evaluation to those aspects of the licensee's inplant emergency response capabilities in place on January 1, 1980.

Planning for re-entry and recovery operations is included in the plant's Preparedness Plan Implementation Procedures. Immediate and short-term (approximately two hours) emergency response will be provided by designated emergency teams manned by onsite personnel and/or off-duty personnel called in. Long-term support will be provided by contractors. It appears that an adequate inventory of protective equipment exists in the plant for initial accident response. The supply of operable survey instruments was found to be a problem (Section 6).

Short-term, post-accident sampling locations have been established; sampling procedures have been written, approved, and are in place. The procedures appear to contain all the necessary information but are unnecessarily complex and difficult to follow. Formal training on these procedures has been provided to most RCTs. The training did not include a walk-through of the procedure, using the equipment and simulating expected circumstances. The appraisal team believes that simulated sample collections and analyses should be conducted to ensure that the RCTs who would perform the tasks are adequately trained.

Interim procedures for estimating offsite dose from iodine and noble gas airborne effluent releases have been written and approved. These procedures are part of the Preparedness Plan Implementation Procedures. Not all emergency directors, who are responsible for utilizing these procedures, in

particular shift supervision engineers (SSE), have had sufficient training in the procedures to determine offsite doses timely. The procedures are very complex and difficult to follow. The appraisal team believes that the procedures should be simplified and/or computerized or put on a programmable calculator, and that adequate training be provided to those who may be called upon to make offsite dose estimations.

Instrumentation designed to quickly sample and analyze inplant iodine concentrations has been purchased or developed, and implementing procedures written. This equipment should permit timely identification of iodine concentrations in order to access respiratory protection requirements. Training in the operation of this equipment has not been given to all the RCTs who may have to use it, and appraisal team interviews with trained RCTs found a consensus that training in the equipment was minimal and superficial. The appraisal team feels strongly that in-depth training in the use of this equipment should be given. The team believes that samples could be collected and analyzed by following the detailed, lengthy, written procedures in a cook-book approach. This method, however, would be unnecessarily time consuming and difficult in an emergency situation.

According to studies performed for the licensee, the hot chemistry laboratory would be habitable under accident conditions. Counting room instrumentation appears adequate, except for two gamma spectrometers which are older models using NaI and GeLi detectors. The GeLi system was recently inoperable for approximately two weeks, and has had a recent history of frequent malfunction. During routine operations, the GeLi system is used routinely to quantify gaseous releases from the reactor building, assess gamma isotope content of radwaste, quantify activity levels in plant fluids, and provide information for effluent monitor calibration. During many emergency conditions an operable GeLi system is essential for determining of isotopic content of plant effluents and inplant conditions.

Based on the appraisal findigs, improvements in the following areas are required to achieve a fully acceptable program: (1) procedure for offsite dose estimation needs to be simplified or computerized, (2) training in the above procedures need to be given to all emergency directors, (3) adequate training in emergency sampling procedures needs to be given to all personnel who may have to use them, and (4) availability of an operable, reliable pulse height analyzer system needs to be assured or an alternate plan developed to ensure that emergency samples could be analyzed promptly.

11. Exit Interview

The results of the appraisal were discussed with representatives of corporate and station management (Section 12) at the conclusion of the appraisal on November 21, 1980. The findings were classified into three categories.

a. Significant appraisal findings, as described in Appendix A to the letter forwarding this report and summarized at the conclusion of sections of this report. Written responses to these findings are required of the licensee and actions taken will be reviewed during subsequent inspections.

b. Findings of lesser significance, but which are considered important to a quality health physics program, as discussed throughout this report. No written response to these findings is required, but progress in these areas will be observed during subsequent inspections.

c. Apparent noncompliance items identified during the appraisal, as specified in Appendix B to the letter forwarding to this report. Required response to these items will be verified during subsequent inspections.

12. Persons Contacted

Iowa Electric, DAEC

*R. Anderson, Training Coordinator
R. Dye, Plant Chemist
L. Haven, Exposure Records Coordinator
*E. Lange, HP/Radwaste Supervisor
*D. Mineck, Chief Engineer
R. Potts, Shift Supervisor
*D. Sealls, Radiation and Chemistry Technician
J. Sweiger, Electrical Maintenance Supervisor
*D. Teply, Operations Supervisor
*J. VanSickel, Technical Engineer
J. Vinquist, Maintenance Engineer
L. Voss, Assistant Electrical Maintenance Supervisor
*J. West, Q.C. Engineer
D. Wilson, Assistant Chief Engineer, Technical Support
*B. York, Assistant Chief Engineer, Operations
*K. Young, Radiation Protection Engineer

Iowa Electric Offsite

*R. McGaughy, Director, Nuclear Generation
*L. Root, Assistant Vice President, Nuclear Generation
*R. Youngs, Manager, Quality Assurance

Non Iowa Electric

L. Brennaman, Head Foreman, Berry-Muhurin (Contractor)
*W. Christianson, Senior Resident Inspector, lSNRC
*L. Clardy, Resident Inspector, USNRC
*A. Davis, Region III, USNRC
*C. Paperiello, Region III, UNSRC
J. Nielson, Project Supervisor, Bechtel (Contractor)

*Denotes those present at the exit interview on November 21, 1980.

The appraisal team also interviewed other licensee and contractor personnel during the appraisal.