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

Region I

Health Physics Appraisal Program

Report No. 80-11

Docket No. 50-220

License No. DPR-63 Priority - Category C

Licensee: Niagara Mohawk Power Corporation
300 Erie Boulevard West
Syracuse, New York 13202

Facility Name: Nine Mile Point, Unit 1 (NMP-1)

Appraisal at: NMP-1, Oswego, New York

Appraisal conducted: October 3 -- 10, 1980

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Region I Form 12
(Rev. April 77)

TABLE OF CONTENTS

1.0 RADIATION PROTECTION ORGANIZATION

1.1 Description

1.1.1 Site Radiation Protection Organization

The radiation protection organizational structure currently in place at Nine Mile Point is as depicted in Figure 1. This organization, implemented about September 15, 1980, is different than the organization represented in the station's Technical Specifications, Figure 6.2-2, Nine Mile Point Nuclear Site Operation Organization (See Figure 2). The most significant change in the structure is that the position of Supervisor-Radiochemical and Radiation Protection, formerly reporting to Superintendent-Results-Nuclear, is now Superintendent-Chemistry and Radiation Management and reporting directly to the General Superintendent-Nuclear Generation.

While this change would seem to advance the influence and visibility of the radiation protection aspects in station operation, it is in conflict with Technical Specification 6.2.2 which states, "The Facility organization shall be as shown on Figure 6.2-2..."

As of October 9, 1980, the licensee had not submitted any proposed amendment to the Technical Specifications describing this reorganization.

1.1.2 Corporate Organization Support

The Niagara Mohawk corporate organization does not provide any functional or technical support that relates directly to the radiation protection activity. While engineering assistance may be provided in some cases, there is no health physics expertise available from the corporate organization.

Niagara Mohawk's entire capability pertaining to health physics is vested in the Superintendent-Chemistry and Radiation Management and his staff. In this regard there is not any back-up capability for the position of Superintendent-Radiochemistry and Radiation Protection (the designated Radiation Protection Manager) having both technical and managerial expertise sufficient to meet the requirements of Regulatory Guide 1.8, "Personnel Selection and Training."

1.2 Scope of Responsibilities

The documents that imply the responsibilities of the radiation protection organization are:

APN-2, Rev. 3, 8/20/80, "Composition and Responsibilities of Site Organization";

APN-2A, Rev. 2, 12/20/79, "Conduct of Operations and Composition and Responsibilities of Station or Unit Organization"; and

APN-12, Rev. 2, 5/15/80, "Administrative Procedure for Maintaining Occupational Exposure to Radiation and Airborne Contamination As Low As Reasonably Achievable".

These documents were generated by the station's staff and approved only at the level of General Superintendent-Nuclear Generation. There are no other documents from corporate management that discuss the responsibility and authority to be vested in the radiation protection program.

APN-2 and APN-2A which are the licensee's prime documentation of assigned responsibility do not discuss programatic responsibility but rather the responsibilities of particular positions in the site

organization. In this regard these APNs are not current or valid particularly in regard to radiation protection since they refer to the former organizational structure and have not be revised to reflect the existing organization.

These APNs as currently written suggest the following responsibilities are assigned to the Radiochemistry and Radiation Protection Group:

- Radiochemistry performance
- Chemistry performance
- Radiation Protection
- Environmental monitoring performance

It is not evident from these documents that this group is also responsible for Emergency Preparation and Planning, operation of the sewage treatment facility and the more specific activities associated with the performance of the chemistry activity such as water treatment and condensate and waste demineralizer performance as collateral duties.

APN-12 provides more specific descriptions of responsibilities of the Radiochemistry and Radiation-Protection Group as pertains to the Respiratory Protection Program (see section 3.2) and ALARA Program (see section 5.0).

Formal Job Descriptions are provided by Niagara Mohawk Company to specify responsibilities and authorities of certain personnel in the Radiochemistry and Radiation Protection Department. Since the reorganization has affected certain positions particularly in this Department, Position Analysis Questionaires were completed by the incumbents for the new position titles as of May 9, 1980 but as of October 8, 1980, new Job Descriptions had not been issued.

The following existing Job Descriptions were reviewed; however, it was noted that they were all subject to revision due to the organizational changes:

- Supervisor-Radiochemistry and Radiation Protection
- Assistant Supervisor-Radiochemistry and Radiation Protection
- Assistant Supervisor-Site Environmental
- Chief Technician
- Technicians (Category A, B, C, and D)

Additionally, the Job Description of the Rad Waste Operations Coordinator was reviewed and is discussed in Section 4.0 of this report.

The review indicated that while the responsibilities assigned to the individuals are specified it is not apparent that authority is identified sufficient to be commensurate with the assigned responsibilities.

For example, APN-2 states the following in regard to Supervisor, Radiochemistry and Radiation Protection: "In the event of radiation hazards, he has the authority to shut down the station if in his opinion a shutdown is required." From discussions with various licensee representatives this statement is more symbolic than an actual articulation of the licensee's policy. The Responsibilities and Authority section of the Supervisor's Job Description does not identify this as an authority. This Job Description rather specifies various duties as follows:

"Within the limits of established Company policies and procedures, the Supervisor Radiochemistry and Radiation Protection has the responsibility and authority to accomplish the following duties:

(a) Reviews all aspects of radiation, radioactive materials and chemical control and management and problems related thereto. Formulates and approves procedures and policies to minimize radiation exposure both in plant and environmentally.

(b) Reviews plant operating trends regarding chemical and radioactive material emission and recommends operating procedures or station modifications to control emission levels.

(c) Continually monitors the work activities, procedural application and safety aspects of the department so that audits of department activities, when performed by various audit groups, will result in continued compliance with applicable licensing requirements, rules and regulations; arranges corrective action, as required.

(d) Serves as a member of the Site Operations Review Committee which reviews all matters affecting nuclear safety and changes in technical specifications, and generally oversees overall station operations.

(e) Reviews the design or modification of Company nuclear facilities as they relate to the function of the department.

(f) Provides training for plant personnel, visitors and contractors in radiation protection techniques.

(g) Prepares and reviews reports relative to radioactive material emissions and radiation exposure levels.

(h) Examines and studies trade, industry and regulatory publications to monitor changes in the state of the art and to maintain personal proficiency.

(i) Prepares capital budgets associated with the procurement of equipment for the chemical laboratory and various radiation protection instruments.

(j) Within the Radiochemistry and Radiation Protection group, exercises the normal supervisory functions of employee selection, assignment, transfer, training, disciplining, evaluation, counseling and termination. Directs and supervises the work activities of employees, establishing clearly defined goals and standards of employee performance.

(k) Performs other associated duties as directed."

As can be seen with the exception of item (j) which specifies the authority of the Supervisor in regard to the Radiochemistry and Radiation Protection staff, most of this job description details duties of an advisory or fact finding nature, rather than implying the ability to command, enforce, take action or make final decisions in the area of radiation protection.

This reluctance to specify real authority is prevalent in the other Job Descriptions reviewed, but most acutely in regard to technicians. The following constitutes the only descriptive job specification including responsibilities and authority available:

- Chief Technician

"Under general supervision, to be responsible for the work performed by a small group of Technicians other than Technicians E, to perform a substantial amount of the higher types of such work."

- Technician "A"

"Under direct supervision to do simple testing, analyses and calculations of a technical nature and maintain operations records, and as proficiency increases, to perform work of progressively increasing variety and complexity."

- Technician "B"

"Under direct supervision, to perform the less important types of investigations, tests and/or calculations of a technical nature, and to prepare simple technical reports, and as proficiency increases, to perform work of progressively increasing variety and complexity."

- Technician "C"

"Under direct supervision, to carry on important types of investigation, to prepare technical reports and maintain technical

records and to perform complex tests; to check, calibrate and maintain various controls and/or instruments, and as proficiency increases, to perform work of progressively increasing variety and complexity."

- Technician "D"

"Under general supervision, to carry on important types of investigations and tests of an analytical nature within the limits of established procedure, to prepare reports and to check, calibrate and maintain a wide variety of intricate controls and/or instruments."

These particular job specifications are generic for all technicians regardless of job assignment. No other more specific identification of duties pertaining to the area of radiation protection apply. This is due to the fact that the technician function is regarded as generic by management; that specialization is not required and in fact is discouraged since management percieves the technician as an all-purpose position thus enabling greater flexibility in regard to personnel resources.

The licensee's representatives contend that while it is unstated, the Radiochemistry and Radiation Protection group have the authority to enforce adherence to procedures and to stop work in progress if

an unreviewed radiological hazard exists. However, the appraiser found no evidence that supports the contention. Previous enforcement history as well as observations on site reveal recurrent examples of failure to adhere to procedures.

1.3 Staffing

The current staff strength to support the function of Radiochemistry and Radiation Protection is as follows:

Position	No. of Positions	Nos. of Personnel
Superintendent, Radio chemistry and Radiation Protection (designated Protection Manager)	1	1
Supervisor, Radiochemistry and Radiation Protection	1	1
Asst. Supervisor, Radiochemistry and Radiation Protection	2	1
Chief Technician	1	1
Technicians, "A" Crew	6	6
Technicians, "B" Crew	11	9
Emergency Planning Coordinator	1	1
Environmental Protection Coordinator	1	1
Dosimetry and ALARA Coordinator	1	1

The appraiser noted the following items which modify the perspective of this staffing plan:

- Technicians, "B" Crew do not have any responsibilities in regard to radiation protection. Their functions are primarily chemistry oriented, and in addition they may be directed to perform duties in Instrument and Control as well as maintenance work at Niagara Mohawk's conventional steam plants.

- The Dosimetry and ALARA Coordinator is responsible for the Dosimetry Program, ALARA Program and Respiratory Protection Program; a span of direct technical responsibility that tends to exceed the capability of a single individual. Discussion relating to the licensee's current technical abilities in these area are contained in Sections 3.0 and 5.0 of this report.

- Due to the inability of the stations own radiation protection staff to provide continuous radiological control for major work activities that involve large numbers of contracted personnel, Niagara Mohawk Power Corporation requires that such contracted groups provide their own health physics support as approved by the Superintendent-Radiochemistry and Radiation Protection. Currently, the following contracted health physics technical support is being provided.

Job	Job Contractor	Contracted Health Physics Service Group	No. of Technicians Contracted
Torus Modification	Chicago Bridge and Iron Company	Bartlett Nuclear	2 Senior; 2 Junior
Dow System Installation	Reactor Controls, Incorporated	Rad Services	1 Senior
Fire Protection Modifications	PAC Construction	Rad Services	1 Senior

Evidence as detailed in other sections of this report indicate that insufficient manpower within the licensee's own Radiochemistry and Radiation Protection staff have led to several instances of procedures not being followed, inadequate surveys, and inadequate job coverage.

This lack of sufficient manpower is compounded by the fact that the licensee's personnel performing as supervisors and technicians in the area of health physics have not been adequately educated, trained or qualified in this area, resulting in a general lack of technical ability in the specialty of radiation protection. In fact, selection and qualification criteria for these personnel is predominantly directed to the individuals ability in chemistry, not health physics; and the subsequent training the individual receives after selection is oriented toward developing abilities in chemistry or radiochemistry. The health physics aspect of the individuals position has not been subject to sufficient attention.

As mentioned in Section 1.1.2 of this report the corporate office is not able to provide any added technical support, consultation, or personnel assistance in the area of health physics. Such support could tend to mitigate the effected of such overall lack of technical depth in the existing organization. Further discussion of this area is contained in Section 2.0 of this report.

According to the Superintendent-Radiochemistry and Radiation Protection, the normal staffing level is augmented by between 10 and 15 additional personnel to support off-normal situations such as outages. At these times, the department provides a supervisor to provide management direction for each shift.

Since it was found that the normal staff composition is not sufficient in number for normal conditions it is suspected by the appraiser that the off-normal staffing arrangement is subject to the name type of inadequacies.

The appraiser noted that with the exception of the three clerks from the plants clerical pool who have been directed to work in Radiation Records (i.e., personnel dosimetry records maintenance) there is no other clerical assistance normally provided to the Radiochemistry and Radiation Protection department. The supervisors and technicians themselves are responsible for the majority of all other administrative support duties associated with this department, a situation that tends to add another responsibility to what are already fragile technical abilities in health physics.

Evaluation

Although the current organizational structure tends to enhance the prominence of the Radiochemistry and Radiation Protection Department by making the designated Radiation Protection Manager (Superintendent, Radiochemistry and Radiation Protection) a superintendent level position reporting to the General Site Superintendent, it does not enhance the radiation protection capabilities of the group. Collateral responsibilities of the department, notably chemistry, sewage treatment plant operation, water treatment system performance, etc. tend to dilute what already appears to be a minimal ability in radiation protection.

Lack of any technical support in health physics from the corporate office as well as lack of any formalized corporate policy regarding the radiation protection program may have contributed to the general unsoundness of the existing program. This is further reflected by the licensee's reluctance to develop Job Descriptions that designate commensurate authority in clear terms for the responsibilities identified for both supervisors and technicians.

The extent of the existing program is based on the abilities of the supervisors and technicians. In this regard personnel are selected and qualified in deference to their abilities in chemistry. Subsequent training does little to alter, this predominant attitude

since the radiation protection aspects of the job have not been highlighted or developed by any formalized training system, nor or personnel encouraged to develop themselves in this area. This has resulted in a radiation protection staff that does not have the necessary technical abilities to establish, implement and maintain an adequate radiation protection program.

Compounding this dilemma is the licensee's discouragement of specialization in the area of radiation protection. This is particularly true of technicians whose generic job descriptions as written allow the greatest flexibility in the use of personnel resources but do little to promote technical proficiency in any particular area.

In addition to technical depth, it appears that there is an overall shortage in personnel resources that are available to perform in the area of radiation protection, notably supervisors and technicians for both normal and off-normal (outage) conditions. The effect of making more personnel available however will tend to be mitigated if they are selected solely for their abilities as chemists.

The reorganization established by the licensee appeared to be implement without sufficient planning or preparation in that:

-- As of October 9, 1980, no action was initiated to amend Technical Specification 6.2.2;

-- Associated administrative procedures (APN-2 and APN-2A) were not revised to reflect the new organizational structure reporting chains, responsibilities and authorities;

-- Personnel Job Descriptions were not developed to reflect any new, added, or revised responsibilities and authorities.

Based on the above findings, this portion of the licensee's program appears to be unacceptable, in that:

-- The organizational structure as currently implemented is not in agreement with the description provided in the licensee's Technical Specification 6.2.2. As of October 9, 1980 the licensee had not initiated any action to amend the existing technical specification. In addition supporting administrative procedures such as APN-2 and APN-2A were not subject to any revision necessary to reflect the reorganization; and personnel job descriptions were not revised to recognize new or added responsibilities or authorities as a result of the reorganization. Although the organization exists, it has not been normally established within the licensee's own administrative system nor in accordance with the normal regulatory process.

-- There is no professional level health physics support available to the designated RPM from either the corporate organization or within the site organization. In addition there is no individual

within the Niagara Mohawk having the necessary capabilities (managerial and technical expertise) sufficient to meet the requirements of Regulatory Guide 1.8, "Personnel Selection and Training" to provide back-up support to the RPM.

-- There is an overall lack of technical depth in regards to the ability of the current staff to perform sufficient to assure an adequate radiation protection program is established, implemented and maintained. Insufficient technical depth appears to be the result of:

. Inordinate deference to select and qualify individuals based on ability to perform in the area of chemistry;

. Lack of any substantial education or training programs provided to upgrade individuals in the area of health physics;

. The discouragement of tendencies to develop personnel as specialist in the area of health physics, particularly in the case of technicians who are regarded as a generic all-purpose work force capable of performing in any need capacity.

-- There are insufficient numbers of qualified personnel, particularly supervisors and technicians to assure that adequate radiological control are established and implemented for normal operations.

-- Reluctance on the part of licensee management to develop Job Description for individuals associated with the area of radiation protection that specify authority commensurate with responsibilities, particularly in the position of Superintendent, Radiochemistry and Radiation Protection, supervisors, technical coordinators and technicians.

In addition, the following are certain portions of the licensee's program in this area that should be considered for improvement:

-- While there has been no direct observation concerning the adequacy of staffing for off-normal situations (outages), it is suspected that manpower may be deficient in this condition. A re-evaluation of the outage condition should be made to assure that adequate numbers of personnel are selected to augment the normal station staff.

-- Currently there is no written formalized statement conveying the licensee's attitude toward the radiation protection program in terms of policy, position or commitment. All aspects of the program are formulated at the station level with no apparent endorsement from the corporate organization. The tendency is created that the authority for the radiation protection program is dependent on individual personalities and is not a real reflection of the corporate managements commitment or policy regarding the radiation protection of personnel and environment.

Such a formalized statement should be established to assure that the ability of the radiation protection program is not inadvertently compromised by individual personalities or personnel changes in the organization.

2.0 Personnel Selection, Qualification, and Training Program

Documents Reviewed

- Procedure No. APN 10; "Training Procedures;" Revision No. 1; June 19, 1978
- Procedure No. APN 10-C; "Training of Non-licensed Personnel;" Revision No. 1; January 23, 1980.
- Procedure No. APN 10-D; "General Employee Training;" Revision No. 1; January 23, 1980
- Procedure No. APN 10-F; "Emergency Preparedness Training;" Revision No. 1; January 23, 1980
- "Nine Mile Point Nuclear Site Training File Record Guide (Audit Procedure)"
- Self-Monitoring Course Text

2.1 Selection Program

The selection criteria for licensee radiation protection personnel are outlined in the formal "Job Specification" for technicians and "Job Description" for management. Contractor radiation protection personnel selection criteria have not been formally addressed.

Evaluation

The appraiser evaluated the selection criteria used in the hiring process by reviewing the personnel files (resumes) of all licensee health physics staff members and by interviewing various health physics technicians. It was observed that a formal written hiring procedure did not exist and that the only selection criteria was contained in the "Job Specifications" and "Job Descriptions" for Health Physics technicians and management, respectively. Listed below are the criteria as outlined in these documents.

Technician "A"

"Must have satisfactorily completed courses in mathematics through trigonometry and basic high school courses in physics or chemistry."

Assistant Supervisor, Radiochemistry and Radiation Protection (Previous Title)

"Requires a formal educational background in the professional field of chemistry or chemical engineering plus job related experience. Equivalent to knowledge acquired through a complete college education leading to a Bachelor of Science Degree with an additional two to three years of qualifying experience."

Supervisor, Radiochemistry and Radiation Protection (Previous Title)

"Requires a formal educational background in the professional field of chemistry or chemical engineering plus related job experience. Equivalent to knowledge acquired through a complete college education leading to a Bachelor of Science Degree plus five years qualifying experience."

The appraiser compared this RPM selection criteria against the following current guidance in the area:

ANSI/ANS-3.1-1978, Section 4.4.4, "Radiation Protection Supervisor" states:

"The individual shall have the technical competence to establish radiation protection programs and the supervisory capability to direct the work of the technicians, and journeymen required to implement the radiation protection programs. The individual shall have a Bachelor's Degree or the equivalent in a science or engineering subject, including some formal training in radiation protection."

NRC Regulatory Guide - 1.8, "Personnel Selection and Training" and the proposed revision indcates that the selection criteria for the designated radiation protection manager should include two years of training with emphasis on directing the radiation protection and monitoring program and three years of professional experience directing the activities of radiation protection technicians, as well as a Bachelor of Science degree."

The appraiser noted that the selection criteria used by the licensee were based on chemistry background and experience. Health physics background or experience was not specified in any of the formal "Job Descriptions" or "Job Specifications" as required above. The appraiser noted that the technical specification for this facility specified only ANSI 18.1-1971 as the criteria, in which Section 4.4.4 (radiation protection manager) stated:

"The responsible person shall have a minimum of five years experience in radiation protection at a nuclear reactor facility. A minimum of two years of this five years experience should be related technical training. A maximum of four years of this five years experience may be fulfilled by related technical or academic training."

In the case of the incumbent Radiation Protection Manager, the appraiser noted that sufficient experience had been accumulated due to length of service in that position. However, it was substantiated that health physics background or experience is not normally emphasized during the hiring or placement of personnel in the licensee's Health Physics positions. As an example, the Health Physics staff members had no substantial academic training in Health Physics prior to employment as shown below:

Position	Academic Training Prior to Employment
RPM	M.S. in Chemistry
1 Assistant Supervisor	2 years of College Chemistry
2 Assistant Supervisor	Forestry curriculum in college
"C" Technician	1 year of College Chemistry
"A" Technician	B.S. in Chemistry
"A" Technician	B.S. in Chemistry

The licensee's technicians and management personnel met the selection guidance of ANSI/ANS-3.1 and Regulatory Guide - 1.8 for duration and type of experience. However, even though most academic training was on a college level, formal training or education in health physics is lacking.

The appraiser observed that a written procedure did not exist for the review and selection of contractor health physics technicians. The Superintendent, Radiochemistry and Radiation Protection (current title) stated that all contractor resumes were reviewed and compared against exposure history to verify experience. In addition, the results of written tests for "radiation protection orientation" and "self-monitoring" courses were reviewed, and in some cases individual interviews were held.

The appraiser noted that a "Job Description" for the radiation exposure records clerk did not exist. Licensee policy was to rotate staff members from a central pool of clerks through this position as necessary. A provision had not been made for a dedicated exposure records clerk.

2.2 Qualification Program

The qualification criteria for radiation protection technicians are outlined in the formal "Job Specification." The "Job Specification"

identify duties, qualification, and advancement criteria for each technician grade. The technicians are divided into five grades depending upon experience, company service time, and education, e.g., Technician "A" is equivalent to a Junior Technician and Technician "D" is equivalent to a Senior Technician.

The qualification criteria for radiation protection management personnel are also identified in the "Job Description" document. The current "Job Description" document containes a Job Summary, Responsibilities/Authority, and Education/Qualifying Experience for three management positions within the Radiochemistry and Radiation Protection Department designated as Supervisor, Radiochemistry and Radiation Protection Assistant Supervisor, Radiochemistry and Radiation Protection; and Assistant Supervisor, Site Environmental Protection. As noted in Section 1 of this report, such designations no longer exist in the current organizational structure. Although "Position Analysis Questionaires" were submitted by the incumbents in the new organization as of May 9, 1980, no action had been taken to revise the "Job Descriptions" as of October 8, 1980.

The qualification criteria as observed by the appraiser were based on guidelines set forth in the "Job Specifications" and "Job Descriptions" for the Health Phsycis technicians and management personnel respectively. The appraiser reviewed these documents and interviewed both management personnel and technicians to verify the adequacy of the Health Physics qualification criteria used by the licensee.

The technician's qualification criteria as outlined in the "Job Specification" are listed below:

Technician "A"

"Must meet the selection criteria for hire; ability to follow prescribed standards and procedures."

Technician "B"

"Must have one year as a technician "A"; must have satisfactorily completed an approved course in electricity, including magnetism and AC/DC theory.

Technician "C"

"Must have eighteen months as Technician "B"; must have satisfactorily completed one approved course in either electronics, advanced chemistry, engineering principles of mechanics or control print reading."

Technician "D"

"Must have two years as a Technician "C"; must have satisfactorily completed one additional approved course in either electronics, advanced chemistry, engineering principles of mechanics or control print reading."

These general qualification criteria apply to all licensee technicians. However, the Radiochemistry and Radiation Protection Department use these criteria solely to determine the adequacy of the technician's qualifications to perform in the area of health physics. It was observed that health physics was not emphasized at all within the technician's qualification criteria and that chemistry was one of the choices for outside technical training, but was not a requirement. No further documentation or procedures existed that defined the qualification criteria for health physics technicians.

The qualifications criteria for health physics management personnel were contained in the "Job Description." The "Assistant Supervisor, Radiochemistry and Radiation Protection" and the "Supervisor, Radiochemistry and Radiation Protection" (previous titles) qualification criteria were the same as the selection criteria outlined previously. Again, it was observed that health physics was not emphasized within the management's qualification criteria as follows:

Position	Experience
Superintendent, Radiochemistry and Radiation Protection	. M.S. in Chemistry . 6 years in Nuclear Navy . 3 years of Teaching College Chemistry . 2 years as Reactor Operator
Supervisor, Radiochemistry and	. 5 years as Chemist . 4 years as Radiochemist/Health Physics Technician
Radiation Protection	. 2 years of College Chemistry

As with the technicians, no further documentation or procedures existed that defined the qualification criteria for management.

Advancement to Grade	Advancement Criteria
"B"	. Satisfactory completion of one year as Technician "A" . Satisfactory completion of Technician "B" school
"C"	. Satisifactory completion of eighteen months as Technician "B" . Satisfactory completion of Technician "C" school
"D"	. Satisfactory completion of two years as Technician "C" . Satisfactory completion of Telchnician "D" school

The technician schools were not job specific but applied to technicians throughout the corporation (including oil/coal plants). It was observed that a technician school for health physics did not exist. A Chemistry Technician School did exist, however, it did not relate to radiochemistry but rather general chemistry. The qualification criteria relating to health physics personnel did not require health physics training from either an outside or in-house source.

The appraiser observed that the authority given to Health Physics technicians to ensure safety was not documented. Further, the specific duties relating to health physics and other related matters also were not addressed. The only general documentation of the health physics technician's duties or authority was in the "Job Specification" for a technician "D", which stated:

"Under general supervision, to carry on important types of investigations and tests of an analytical nature within the limits of established procedures, to prepare reports and to check, calibrate and maintain a wide variety of intricade controls and/or instruments."

In discussions with health physics management personnel, the appraiser was informed that a statement in the union contract to the effect that health physics procedures shall be followed gave the technician the authority. However, the appraiser noted that this simple statement did not address what authority health physics technicians had to ensure the safety of workers, and in fact was not regarded as a real statement of authority.

In the selection and qualification criteria, the appraiser observed that the guidelines of the "Job Specification" and "Job Description" were the only formal documents used. The weaknesses of these documents relating to health physics are:

- Health physics is not addressed;
- Educational criteria are not specific;
- Duties outlined are general to all plant technicians; and
- Formal authority is not assigned.

2.3 Training Program

The training program for radiation protection personnel consisted of four categories: General Radiation Protection Orientation (with requalification yearly); a annual Health Physics/Radiochemistry training by Health Physics management; an initial, one-time course, which qualified certain licensee personnel, in the use of survey instrumentation for personal and area surveys sufficiently to provide self-monitoring, and a nuclear power plant steam and mechanical fundamentals course.

The general radiation protection orientation was provided by the Training Department staff to all personnel expected to enter a restricted area. This training generally consisted of 50% lecture by the instructor and 50% contractor-produced videotape. The videotape portion was based on the following outline:

I. Introduction
II. Terminology
III. Nuclear Radiation and Shielding
IV. Biological Effects of Radiation
V. Radiation Exposure Limits and Guides, 10 CFR 20
VI. ALARA
VII. Area Designations
VIII. Dosimetry

IX. RWPs

X. Station Alarms

XI. 10 CFR 19

XII. Written Text

The same format was used on all initial and annual requalifications for all licensee personnel. The course duration was approximately one and one half days.

The annual training of Radiochemistry and Health Physics technicians by radiation protection management personnel consists of several topics each year which were covered within an approximate four-hour time period. Topics that were discussed were not repeated fron one year to the next in the majority of the cases.

Professional level Health Physics training for radiation protection management personnel does not exist on an annual or routine basis.

The Self-monitoring course covered material similar to that discussed in the general radiation protection orientation, but in more detail. It is given on a one-time basis for Health Physics personnel and every two years for operations personnel. In addition, the self-monitoring course is given on a one-time basis to those plant personnel whom the Radiation Protection Department had determined would be required to perform self-monitoring. The course duration is approximately one and one half days and is based on the following course outline:

I. Types of Radiation

II. Limits and Guides

III. Protection against Radiation

IV. Protection against Contamination

V. Self-Monitoring Procedure

VI. Radiation Detection and Measurement

VII. Dose Rate Problems

VIII. Personnel Decontamination Techniques

IX. Written Text

X. Practical Test

A study guide containing an in-depth coverage of the Health Physics material was also given to the students in this course.

Health Physics technicians also attend the nuclear power plant steam and mechanical fundamentals course. However, it was noted that radiation protection management personnel and the Chief Health Physics Technician had never attended this course. This training is provided on a one-time basis for each designated plant staff member. The course duration is approximately two weeks.

Documentation of the training discussed above is kept in the central training records office training records for each staff member and contain exam results, instructor signoff record sheets (for various

types of training), medical examination records, education/experience records (resume), and audit records. An audit was performed twice a year by the training records clerk to verify that the required training had been performed are similarily maintained.

The appraiser reviewed training records for all radiation protection and training staff members plus selected records of maintenance, operations, and site management personnel. In addition, various members of the Health Physics staff were interviewed to determine the adequacy of the licensee's Health Physics Training Program. It was observed that training was performed initially and on a routine basis for plant personnel by the Training Department and for health physics personnel by health physics management. However, this training program did not provide for physical demonstration of proficiency, or provide sufficient technical depth in the area of health physics.

Documentation verifying actual demonstration of radiation protection practices did not exist. The appraiser was informed during interviews with eight Health Physics technicians, a Supervisor of Radiochemistry and Radiation Protection, and the Assistant Supervisor of Training that such training was not performed to any degree. For example, during the general radiation protection orientation, given to all personnel entering restricted areas, the use of protective clothing, step-off pads (SOP), pencil dosimeters, and respirators are discussed. Video tapes depicting various radiation protection activities are

used for this orientation, e.g., a person does demonstrate donning and removing protective clothing. However, students are not required to perform or demonstrate any of these functions. The use of step-off pads, self-surveys, charging/rezeroing pencil dosimeters, and the donning and removing of respirators is mentioned by the instructor but students are not shown how to perform these functions or required to demonstrate them physically.

The appraiser noted this to be a deficiency in the training program since staff members qualified as radiation workers (but not as self-monitors) were required to rezero their own pencil dosimeters and survey themselves out of the restricted areas. This allowed for the potential loss of personnel exposure control and contamination control. The appraiser noted during the interviews with staff members that the licensee's policy was not to require demonstration of the above items but to let the workers find out how to perform the needed functions on their own. However, the self-monitoring course given to designated staff members of the licensee did provide for the physical demonstraton of proficiency in the above items as well as other areas such as instrumentation, decontaminaton and survey techniques. The disadvantage observed was that this training was not given to the majority of the staff members entering restricted areas; and it was a one-time training session provided during the employment of the staff members. The training was normally attended only once as shown by the following examples:

Maintenance Worker

Radiation Protection	3-22-76
Orientation Renewal	2-15-77
	2-21-78
	1-2-79
	1-17-80
Self-monitoring	9-30-69

Electrician

Radiation Protection	4-27-76
Orientation Renewal	2-15-77
	3-21-78
	1-18-79
	1-17-80
Self-Monitoring	5-27-76

The appraiser noted that health physics technicians were given the self-monitoring course once during their employment whereas the nuclear operators received a self-monitoring requalification every two years. The mechanism for health physics retraining and proficiency demonstration was available through this course to health physics personnel but was not utilized by the Radiochemistry and Radiation Protection Department.

On-the-job training for health physics staff members did not formally exist for counting room equipment, portable survey instruments, survey techniques, the use of Health Physics Procedures, etc. All training of this type was based on classroom sessions or on assistance from other health physics technicians who were familiar with the equipment or techniques. From interviews with several health physics technicians, the appraiser was told that a health physics staff member was expected to know how to perform one of the above functions even if they had never performed it before. In reviewing the training records and lesson plans back to 1977, the appraiser observed very little classroom health physics training by the Radiochemistry and Radiation Protection Department, and no indication of proficiency demonstration or on-the-job training. Evidence was available that senior Health Physics technicians gave guidance to junior technicians. However, a formalized sign-off sheet for verifying technician's Health Physics competence to perform selected functions did not exist.

In addition to demonstration of proficiency and on-the-job training, a lack of Health Physics technical depth within the technician grades of the Health Physics group was observed. This was seen as due to the inadequacy of the annual training performed by Health Physics management personnel. Training was performed annually by the Supervisor Radiochemistry and Radiation Proection. However, not only did the training lack technical depth but it did not emphasize

basic health physics subjects such as shielding calculations, curie content versus dose rate, dose rate calculations, biological models, unusual or emergency conditions, survey techniques for high contamination or radiation levels, etc.

As previously stated, training on Health Physics instrumentation was performed within the content of the self-monitoring course. Instrumentation training was not performed by the health physics group and since self-monitoring was given, only once to health physics personnel, training on any new instrumentation is not performed. As an example, two E-520 portable survey instruments were purchased by the licensee and put into service without any training on their use. This did not meet the philosophy of ANSI-3.1-1978, Section 5.1, which states:

> "Training programs shall be kept up-to-date to reflect plant modifications and changes in procedures. A continuing program shall be used after plant startup for training of replacement personnel and for requalification training necessary to ensure that personnel remain proficient."

The appraiser observed that cross training of personnel was not always performed. For example, only one Health Physics technician is capable of performing a quality assurance test on the vendor's film badge. This entailed the "spiking" of several film badges for various known exposures and then sending them in with the normal film badges to be processed by the vendor.

The lack of adequate health physics training for the technicians was also found to be the case for radiation protection management personnel. In discussions with members of management and reviews of training documentation, it was observed that Health Physics training was not provided to Health Physics supervision. The exception to this was the annual radiation protection recertification (orientation) and, as applicable, the one-time self-monitoring course.

It was also observed that Health Physics reference material was not made available nor made known to most of the radiation protection staff members and was not required reading material for the technicians.

The training program was observed by the appraiser to be lacking a good health physics foundation both in theory and practice.

Conclusions

Based on the above findings, improvements in the following areas are required to achieve an acceptable personnel selection, qualification, and training program:

- The selection and qualification criteria for positions pertaining to radiation protection do not have any attributes specified regarding the health physics.

- The training given to radiation protection personnel does not provide sufficient technical depth; it is not formalized; and is not sufficient to maintain technical proficiency. In addition, the training program does not provide any type of performance evaluation of the personnel subjected to the training.

In addition, the following portions of the licensee's program should be considered for improvement:

- The general employee training program as well as the training provided the radiation protection personnel should include actual demonstration of personnel proficiency in the topics provided by the training program.

3.0 Exposure Control

3.1. External Exposure Control Program

3.1.1 Documents Reviewed

. Procedure No. APN 12, "Administrative Procedure for Maintenance Occupational Radiation Exposure, ALARA," Revision No. 2, May 15, 1980.

. Procedure No. RP 1, "Access and Radiological Control," Revision No. 0, January 7, 1979.

- Procedure No. SRTP 7, "Issuing and Collecting Film Badges," Revision No. 3, August 23, 1979

- Procedure No. SRTP 8, "Operation and Calibration of the TLD System," Revision No. 2, June 12, 1979

- Procedure No. SRTP 9, "Radiation Exposure Monitoring System Operation," Revision No. 2, May 17, 1978

- Procedure No. SRTP 13, "Use of Condenser R Meter", Revision No. 0, December 30, 1974

- Procedure No. SRTP 14, "Well Calibration," Revision No. 0, December 30, 1974

- Procedure No. SRTP 41, "Operation and Calibration of Portable Ion Chamber," Revision No. 0, July 3, 1975

- Procedure No. SRTP 46, "Operation and Calibration of Vamp Area Monitor," Revision No. 0, April 10, 1978

- Procedure No. SRTP 50, "Calibration of Self-Reading Pocket Dosimeters", Revision No. 0, July 21, 1977

- Procedure No. NRTP 4, "Radiation Measurements and Shield Integrity Check," Revision No. 0, June 5, 1975

. Procedure No. NRTP 31, "Routine Calibration of Area Radiation Monitor," Revision No. 0, October 27, 1974

3.1.2 General

The external exposure control program for the licensee consisted of the dosimetry program, the exposure limitations program, and quality assurance as related to external exposure control.

The control of personnel external exposure within the dosimetry program is accomplished by the use of exposure measuring devices and a records system for documenting these expsoures. The external exposure measuring devices used by the licensee is a vendor-processed film badge, licensee-processed thermoluminescent dosimeters (TLD) both for whole body and extremity measurements, and pocket ionization chambers (pencil dosimeters). The system of records used to control personnel external exposure consisted of individual exposure history files, a continuously updated computer file for all film badge wearers, radiation work permit (RWP) exposure log sheets, and the supervisor's log book which contained non-RWP exposures.

3.2 Program Description

3.2.1 Film Badges

The film badge used by the licensee is supplied and processed by a vendor on a semi-monthly exposure period rotation. The film is designed to measure gamma, X-ray, and beta radiation. An additional film package supplied by the vendor is used when neutron dose rates exceeded 2 mrem/hr or the total dose was expected to be greater than 5 mrem. The vendor specifications for the film-badges used are:

Energy Range

Gamma/X-Ray	18 keV - 20 MeV
Beta	Greater than 1.5 MeV
Neutron	1-10 MeV

Minimum Detectable Dose

Gamma/X-Ray	10 mrem
Hard Beta	40 mrem
Fast Neutron	20 mrem
Thermal Neutron	10 mrem

The licensee's policy is to provide beta-gamma film badges for all personnel entering the restricted areas, and to provide neutron film badges for all health physics personnel and other personnel as needed when neutron radiation is present.

The appraiser observed that the vendor's film badge was the sole source of beta and neutron exposure data. The licensee's TLD, as previously discussed, had the capability to be used for more than gamma measurements but it was not utilized. In addition, there was no evidence that neutron or beta measurements made with portable survey instruments were used to augment the vendor film badge. The "Radiation Exposure Report (termed REM)" generated routinely was based solely on whole body gamma exposures and did not provide for skin or neutron exposures in its format. As an example, it was observed that work in the torus (during the time period of the appraisal) had neutron levels up to 3.5 mrem/hr as measured with a portable neutron survey meter. In discussions with the Dosimetry and ALARA Coordinator, it was found that not all workers were wearing neutron dosimetry in that area but only ten workers per shift. The licensee's justification was that the neutron badges had always come back with negligible results and that the

survey meter read high so there was no need to badge everyone on the torus job or calculate neutron exposures from instrument readings. NRC Regulatory Guide 8.14-1973, sections 1b, c state:

"b. Calculated neutron dose equivalent to supplement neutron dosimeter. A licensee may use a personnel neutron dosimeter but many substitute a calculated neutron dose equivalent for the measured dose equivalent if the measured dose equivalent cannot be reliably determined because of the lack of sensitivity of the dosimeter. Calculated dose equivalents may be based on measured neutron/gamma ratios or on neutron dose equivalents measured with portable or fixed monitoring instruments and known personnel occupancy times.

c. Calculated neutron dose equivalent in place of neutron dosimeter. If the individual is not likely to receive a neutron dose equivalent in excess of 100 mrem in a quarter but would have to have some sort of monitoring under 20.202 (e.g., gamma monitoring), a personnel neutron dosimeter may be omitted. The neutron dose equivalent should then be estimated by the methods in regulatory position C.1.b above."

In the appraiser's view, this showed a lack of confidence in the neutron instrument as backup capability and unjustified reliance on the vendor's film badge, which was not evaluated to determine its sensitivity to the neutron spectrum involved.

3.2.2 TLD Badges

The licensee's TLDs consisted of a clip on holder with three positions for TLD chips, one of which had a thin window for beta measurement. Two chips were used in each holder with the beta position vacant. Processing and recording of TLD data are performed by health physics technicians. Two TLD readers and two annealing ovens are set up in the Health Physics Counting room for this purpose. It is the policy to use the TLD as a backup device to the film badge; the latter is used as the legal record. TLD's were required to be worn in high radiation areas or as required by the Radiochemistry and Radiation Protection Department. In addition, TLD's were required to be worn when personnel exceed the following whole body doses: 2000 mrem/qtr, and 4,000 mrem/year. This provides a mechanism for rapid process turnover in evaluation personnel exposure.

3.2.3 Pencil Dosimeters

Self-reading pocket (pencil) dosimeters are also used in conjunction with the film badge and TLD. It is the policy to require the wearing of pencil dosimeters for entires into restricted areas. The pencil dosimeter served as backup mechanism when TLD's are not used. If both TLD's and pencil dosimeters are used, the higher reading is recorded for the person's exposure file until the film badge can be processed. The responsiblity for reading, rezeroing, and recording pencil dosimeter results was left up to each staff member.

3.2.4 Extremity Exposure

Extermity exposure measurement is by the use of a finger ring containing two TLD chips. As stated previously, the processing, recording, and annealing were performed by Health Physics technicians. Extremity dosimetry requirements are defined by radiation protection personnel or when the exposure rate to the extremity is six times that of the whole body. Records of extremity exposures were kept on file in a log book in the radiation records office but not in each personnel exposure file.

The appraiser observed that the extremity exposure control program relied entirely on the licensee's TLD. The use of the vendor's film badge, pencil dosimeters, and portable survey instrument readings were not utilized as an extremity backup mechanism for the TLD. In interviews with various technicians, this was found to be case for gamma, beta, and neutron exposures. The exposures records for the extremities were also found not to be up-to-date. (See Section 3.2.5) As an example, various workers received exposure on their finger rings for the periods listed below with the data recorded in a log book but not in their exposure history file.

Exposure	Period
136 mrem	7-19-80 to 7-19-80
204 mrem	6-17-80 to 6-17-80
64 mrem	9-19-80 to 9-21-80

In talking to the Exposure Records Clerk, it was found that extremity exposure was not typically entered in the individual exposure files.

3.2.5 Dosimetry Records

There is a record maintained for each staff member containing:

- NRC-5 Forms (vendor equipment form)
- NRC-4 Forms
- Record of Lost or Damaged Film Badges
- Record of Exposure Requests by Personnel or Companies
- Authorization to Exceed Exposure Guides
- Exposure Audit Forms
- Whole Body Count Records
- Skin Decontamination Records

In addition to the exposure records in the above files, a routine (minimum of twice a week), computer printout of exposure history is generated and distributed to the licensee staff. This radiation exposure report (Termed REM) for whole body external exposure containes:

. Film badge results from the last two week exposure period

. Quarterly update of exposure by film badge

. Yearly update of exposure by film badge

. Quarterly update of exposure records by film badge and by TLD or pocket dosimeter, whichever was greater (the TLD/DOS value).

. Authorized exposure guides

The film badge data for this exposure report are supplied by the vendor every two weeks. The pencil dosimeter data is updated each day from RWP log sheets and the supervisor's log books. These log books are maintained by various supervisors within the licensee's organization and all staff members were required to log non-RWP exposures daily. TLD exposure data are obtained by the exposure records clerk from the Health Physics technicians and the larger of the TLD and pencil dosimeter results is fed to the computer program as the TLD/DOS value.

The exposure history of each individual staff member was kept in the exposure records office and contained both external and internal exposure records. The appraiser observed that there is no organization of the individuals' files. In interviewing the Exposure Records Clerk and the Dosimetry and ALARA Coordinator, it was determined that as records are received or produced, they are just added to the history file. The appraiser learned that the clerk did not have the time available to organize the records and that they were in this condition when the clerk assumed the position five years earlier. As an example, forms of the same type such as NRC-4's and NRC-5's were randomly mixed in with whole body data, skin decontamination forms, exposure audit forms, etc. Data were not organized into sections for each type nor was it compiled onto a single history form for quick reference.

In addition to the lack of organization of exposure records, it was observed by the appraiser that the records were not up to date. It was stated by the Exposure Records Clerk that an audit was performed, to ensure that records were up to date, but not on a routine basis. Again, the justification was that the amount of time available to the three Exposure Record Clerks was only sufficient to perform the

functions that were given priority such as issuing dosimetry, running the REM program, etc. As an example, the licensee's "Exposure Audit Form" was found not to be up-to-date. This form was intended to summarize the whole body or skin exposure of individuals during their employment with the licensee. Each calendar quarter's exposure was recorded on the individual's form and then summed for the year with a running total at the end of each year for the lifetime exposure. While reviewing exposure records, the appraiser found that the last entries on the Exposure Audit Forms were typically made in 1978 and in many cases, the form was not in the file at all, for example:

Department	Last Entry on "Exposure Audit Form"
Radiation Protection	
Foreman	Third quarter 1978
Technician	Third quarter 1978
Operations	
Shift Supervisor	Fourth quarter 1977
Shift Supervisor	No Form on File
Training	
Supervisor	No Form on File
Supervisor	Fourth quarter 1979
Maintenance	
Mechanic	No Form on File
Electrician	Fourth quarter 1977

Another example of the exposure records not being kept up to date concerned the Current Occupational Radiation Exposure form. This form as generated each quarter by the vendor and was used by the licensee to replace the NRC-5 form. It was found to be adequate for that purpose in that all the information required by the NRC-5 form was contained on it. Two separte reports were generated for the licensee during the quarter, one with gamma results on it and the other containing beta results. It was observed by the appraiser that these forms for the quarter 4-01-80 to 6-30-80 typically did not have the following columns completed with data as called for by the NRC-5 form:

- Permissible accumulated dose, i.e., 5 (N-18) rem; and

- Unused part of permissible accumulated dose in rem.

The appraiser observed that the Exposure Records Clerk was not aware of this missing data from the vendor three months after being received. However, the clerk did make positive corrective action upon being told of this discrepancy.

3.3 Exposure Limitations

The exposure limitations program consisted of procedures establishing policy for the licensee's exposure guides to meet the concepts of ALARA. These exposure guides, as outlined in Procedure No. RP 1 "Access and Radiological Control," are:

- 100 mrem/week;
- 1000 mrem/calendar quarter; and
- 4000 mrem/calendar year.

However, to meet work demands, there are provisions to allow staff members to exceed the radiation exposure guides with the approval of the:

- Employee's supervisor
- Radiation Protection Supervisor
- Station Superintendent

Only oral approval from the employee's supervisor was required to exceed the weekly guide. The limitation of exposure is also controlled by the use of radiological posting as outlined in Procedure No. RP-1 "Access and Radiological Control."

The appraiser observed that Procedure No. RP 1, "Access and Radiological Control" was acceptable in defining radiation exposure guides and dosimetry requirements. The limits of 1.25 rem/qtr and 5 rem/year as outlined in 10 CFR 20.101 were used as the basis for this procedure. In addition, the licensee's radiation exposure guides were acceptable and conservative as shown below:

- 100 mrem/week
- 1000 mrem/qtr
- 4000 mrem/year

In reviewing exposure controls used in the plant the appraiser that radiological posting within the restricted areas was typically inadequate and that there were only isolated cases where the posting was sufficient. Two types of deficiencies were met prevalent in these observations:

- Posting was not conspicuous sufficient for all avenues or approachs to the area;
- Radiation levels/locations were not indicated on posting, especially high radiation area posting, nor was any other means available at the area to inform personnel of the radiological status.

The appraiser observed that survey information which is readily available information was not typically added to the posting, especially in the case of high radiation areas, and was filed away where it was unavailable to personnel in the field, resulting in insufficient information available for workers entering restricted areas, radiation areas, and high radiation areas.

3.4 Quality Assurance Program

The licensee's quality assurance program for external exposure control consisted of the calibration of portable instruments, counting room equipment, gamma wells, and reliability checks on the vendor's film badge and the licensee's TLD's.

Quality assurance checks on the vendor's film badge results are performed routinely by the licensee. Film badges are exposed to various gamma exposure levels (spiked) and then sent in with the regular film badges of the staff members to be processed. The exposure results of these badges as determined by the vendor are compared to the values as determined by the licensee during spiking. The conclusions of this comparison allow the licensee to either accept the data or require the vendor to adjust its data accordingly. Quality assurance checks by the licensee are not performed for neutron and beta exposures on the vendor's film badge.

The appraiser observed that the quality assurance of the external exposure control program was insufficient for the calibration of Health Physics instrumentation and the reliability checks on the vendor's film badge. Deficiencies in the instrument calibration program can be found within the instrumentation section of the appraisal. However, the inadequacy of the reliability checks (spiking) on the vendor's film badge as performed by the licensee are discussed below.

It was observed that the only procedure developed for performing "spiking" of the vendor's film badge was an informal hand written outline on a piece of notebook paper. In discussions with the Dosimetry and ALARA Coordinator and a Health Physics technician, responsible for the "spiking", it was determined that this procedure was no longer used and that a formal written procedure did not exist. It was also observed that only one technician had been trained by management in the performance of the "spiking" process and that provisions had not been made for cross training another Health Physics technician. The Health Physics technician stated that "spiking" performed routinely semi-monthly at the time of film badge exchange. However, the appraiser noted on October 11, 1980 that it had not been performed routinely as shown below for 1980:

Two Week Periods for Which "Spiking" Had Been Done

1-1-80 to 1-14-80

5-1-80 to 5-14-80

5-15-80 to 5-31-80

6-1-80 to 6-14-80

8-1-80 to 8-14-80

9-1-80 to 9-15-80

The method of "spiking" used by the licensee consisted of exposing one film badge to each exposure level of 300, 600, 900, 1200, 1500 mrem every two weeks. This was accomplished by placing the five film badges together in a 300 mrem/hr field, from a gamma well source, and then removing one film badge each hour. It was observed by the appraiser that this method was unacceptable from several viewpoints. In the first place, only one badge is used at each exposure level which was not statistically valid and does not allow for the possibility of using a defective or contaminated film badge by mistake. Secondly, it was observed that another exposure measuring device was not utilized as a backup mechanism along with time keeping (one hour intervals) to determine the exposure received by the spiked film badges. Though the gamma well used for exposing the badges supposively calibrated, no instrument is used to verify that the dose rate to which the badges are exposed is the same as that which was originally calculated by the calibration.

Another aspect of this process which was found to be unacceptable was the use of a single Co-60 source. This system allowed only for varying the exposure levels and did not consider other types of radiation (beta, neutron) or various energy values of the radiation emitted as outlined in ASNI N13.7-1972 and NRC Regulatory Guide 8.3. In addition, it was observed by the appraiser the the "spiking" of film badges to 1500 mrem did not meet the intent of Regulatory Guide 8.3, since it is apparent that personnel exposures often are greater than this value over the course of a calendar quarter.

While observing a "spiking" process, the appraiser noted that the technician did not take a portable survey instrument reading every time he entered the calibration facility. In discussions with this technician, he stated that he had never detected anything abnormal in the past and therefore, it was not necessary to check the levels before entering each time. The appraiser also observed that a remote area monitor, with an alarm capability, was not set up inside this facility during the "spiking" process. In discussions with the Dosimetry and ALARA Coordinator, it was stated that instruments of this type were not always available, and therefore are not considered.

The Film Badge Quality Control Check Sheet was found by the appraiser not to include sufficient record of the parameters involved in the quality assurance listing of film badges, such as time on or time off of the exposure, the exposure rate at the film badge location

either by caluclation, survey instrument readings, or other dosimetry devices, and did not provide any acceptance criteria such as percentage error data between the vendor's and licensee's data. As observed by the appraiser, this information was not contained in any other documentation.

Conclusions

Based on the above findings, improvements in the following areas are required to achieve an acceptable external exposure control program.

- The film badge is regarded by the licensee as the primary device to estimate personnel exposure to gamma, beta, and neutron radiation without sufficient bases established as the device's ability to accurately measure dose rate due to beta or neutron exposure.

- Neutron exposure control is not in accordance with Regulatory Guide 8.14.

- The personnel exposure system of records of individuals is not kept current and does not provide for the recording of extremity exposure.

- Sufficient information is not provided to augment the posting of high radiation areas; and radiological posting is not usually conspicuous sufficient to provide warning to all approaches to radiological areas.

- The quality assurance program implemented to verify the adequacy of the licensee's film badge is not performed in accordance with written procedures approved by management, is not of sufficient depth to assure adequate technical and statistical reliability and does not provide sufficient record of the tests performed to asuure quality.

3.5 Internal Exposure Control

3.5.1 Dosimetry Program

Document Reviewed:

. Procedure No. N-RTP-45, "Whole Body Counter System," Revision No. 1, March 21, 1979

The only biosurveillance capability routinely used by the licensee is an onsite Helgeson whole body counting system. Procedure No. N-RTP-45, "Whole Body Counter System" is the licensee's only procedure regarding this whole body counter (WBC). Use of the Helgeson WBC requires that the individual

be counted lying down under a NaI (TL) detector which traverses the length of the body. The counting time for each individual is about eight minutes. Literature which the licensee has received from Helgeson indicates that the WBC is sufficiently sensitive to detect and evaluate the radioisotopes of concern. A digital computer in the counting system performs a continuous background count and stores this information.

A dedicated telephone line is used to call Helgeson with the resultant transfer of data to Helgeson for analysis. A return phone call is received from Helgeson if 5% of the maximum permissible body burden (MPBB) is exceeded. Periodically, a written report is received from Helgeson containing the results of the whole body counts.

The licensee's WBC procedure (N-RTP-45) states that site personnel will be scheduled for whole body counts 3 times per year and every effort will be made to the whole body count each site personnwl at least 2 times/year. A check of the whole body count records by the appraiser for the onsite technicians and supervisors in the Radiochemistry and Radiation Protection Department (RRPD) revealed the following:

- Approximately 3/4 of the RRPD personnel had not received a WBC within the past two years.

- Three technicians who joined the RRPD in May and June of 1979 had not been WBC as of October 6, 1980.

- Two technicians who joined the RRPD in October, 1978 and August, 1979 received their first WBC in August and September of 1980.

- One technician had only one WBC count since joining the RRPD in May, 1977.

The appraiser discussed these findings with the Radiation Protection Manager (RPM) and the above RRPD personnel were immediately scheduled for whole body counts.

A review by the appraiser of the WBC reports from Helgeson during the period March through April of 1979 revealed that six individuals had WBCs which were between 10 and 20% of the MPBB of cobalt 60 and no follow-up was done; i.e., showering and recounting, identifying the probable cause, determining whether other individuals were exposed, reviewing air sampling data, or performing additional bioassays. This was also discussed with the RPM and pointed out to him that this is contrary to the requirements of 10 CFR 20.103.c and Regulatory Guide 8.15, Section 4.f. which requires "bioassays . . . to evaluate individual exposures and to assess protection actually provided."

It was also determined by the appraiser that the licensee does not independently check the calibration of the whole body counter. The appraiser indicated that to assure the reliability of the whole body counting system, a quality assurance program should be developed using phanton containing NBS traceable sources.

Presently, the only bioassay procedure developed by the licensee is whole body counting procedure N-RTP-45. The appraiser noted that this procedure did not specify whether or not baseline or termination whole body counts are required for station or nonstation personnel. Furthermore, this procedure or other guidance has not been developed which describes what actions will be taken when whole body counts show that internal deposition has occurred, i.e., when MPBB exceeds 5%, 10%, 50% or 100%. In addition,it was noted that action levels have not been established for the initiation, continuation, and termination of whole body counts and other bioassay techniques that will be used when internal disposition occurs.

ANSI N343-1978, "Internal Dosimetry for Mixed Fission and Activation Products," recommends that an internal dosimetry program include biological models and calculational techniques

for analyzing bioassay results. It was noted by the appraiser that certain supervisory personnel were familiar with some basic models and calculational techniques, but that technicians were not aware of these techniques.

ANSI N343-1978 also recommends that procedures be developed for obtaining, handling, and packaging urinary, fecal and other bioassay samples. Likewise, it was noted by the appraiser that procedures for obtaining, handling and packaging bioassay samples have not been developed.

Based on the above findings, it is recommended that the dosimetry program be thoroughly reviewed and upgraded. Additional procedures should be written to define the program based on appropriate guidance such as ANSI N343-1978, "Internal Dosimetry for Mixed Fission and Activation Products."

The following areas require improvements in order to achieve an acceptable biosurveillance program:

- The current whole body counting procedure does not specify what station and nonstation personnel are to receive baseline and termination whole body counts.

- Procedures currently do not exist which:

  -- state the actions to be taken when internal deposition of radioactive material occurs;

  -- specify the biological models and calculational techniques to be used for analyzing bioassay results; and

  -- specify the methods for obtaining, handling, and packaging bioassay samples.

- A system is not established to assure that personnel are receiving whole body counts as required by procedure N-RTP-45.

- There is no procedure developed specifying followup actions to be implemented when whole body counts exceed the specified levels, i.e., showering and recounting, identifying the probable cause, determining whether other individuals are exposed, reviewing air sampling data, or performing additional bioassay.

3.5.2 Respiratory Protection Program

Documents Reviewed:

- Procedure No. APN-12, "Administrative Procedures for Maintaining Occupational Exposure to Radiation and Airborne Contamination as Low as Reasonably Achievable"; Revision 2; May 13, 1980.

- Procedure No. S-RTP-2, "Procedure for the Fitting of Respirators"; Revision 0; March 6, 1978.

- Procedure No. S-RTP-39, "High Pressure Breathing Air Compressor for Scott Air Pak"; Revision 0; July 18, 1980.

- Procedure No. S-RTP-42, "Operation and Calibration of the MSA Portable Oxygen Indicator (Model E)"; Revision 0; July 14, 1980.

- Procedure No. S-RTP-61, "Procedure for the Selection of Respiratory Equipment"; Revision 0; February 6, 1978.

- Procedure No. S-RTP-62, "Respiratory Equipment - Assembly, Test and Inspection, Storage"; Revision 1; October 10, 1978.

- Procedure No. S-RTP-63, "Laundering of Respiratory Equipment"; Revision 1; December 14, 1978.

- Procedure No. S-RTP-64, "Operation and Calibration of the NaCl Quantitative Test System"; Revision 0; March 6, 1978.

- Procedure No. S-RTP-69, "Operation and Calibration of the Scott Go/No Go Tester and Test Panel"; Revision 0; August 7, 1978.

- "Requirements for Physical examinations for Respiratory Protection from Airborne Radioactive Material for Nine Mile Point #1, Niagara Mohawk Power Corporation."

- "Qualification Survey Results" of Helgeson Nuclear Services, Inc., October 9, 1980.

By review of records, observations and discussions with licensee representatives, the appraiser evaluated the respiratory training/retraining program; the respiratory medical examination program; the respiratory fit test program; the cleaning and decontamination of respirators; the inspection, testing and repair of respirators; the storage and inventory of respirators; and the field use of respirators.

The licensee's respiratory protection program is described in the above listed procedures. A formally established program is in place and the licensee is taking credit for protection factors as specified in Regulatory Guide 8.15, "Acceptable Programs for Respiratory Protection" and NUREG-0041, "Manual of Respiratory Protection Against Airborne Radioactive Materials." Clean respiratory protective equipment is stored in unlocked storage cabinets within the restricted area. Individual workers requiring respiratory equipment pick out the required respiratory protective equipment from these cabinets. After using this equipment, they place it in laundry hampers at the job site. Janitorial personnel collect, disinfect and decontaminate the equipment and then turn the equipment over to the Radiochemistry and Radiation Protection Group for contamination surveys prior to reassembling and returning to the storage cabinets.

From discussions with licensee representatives, it was determined that the respiratory training program consists of a lecture of about one and a half hours. This training is part of the general employee training program as discussed in Section 2.0. From discussions with the training instructor,

it was determined that the training does not include all the elements considered necessary in NUREG-0041, Section 8.3 and 8.4. Specifically, the training does not include "Field training to recognize and cope with emergency situations" or "the use of respirators under simulated conditions of exposure so that the wearer will develop a sense of confidence in his ability to use the device properly." It was also determined that the respiratory training and retraining programs do not require any examination (i.e., written or oral) of the workers' understanding of the proper use of respirators.

The licensee's medical examination program for workers who wear respiratory protective devices was reviewed. From discussions with and information provided by the licensee, i.e., document entitled, "Requirements for Physical Examinations for Respiratory Protection from Airborne Radioactive Material for Nine Mile Point #1") it appears that, if done properly, the licensee's medical examinations meet the requirements in Section 7.4 of NUREG-0041. A random review of the medical records of six technicians in the Radiochemistry and Radiation Protection Department (RRPD) revealed, however, that two of the individuals did not receive medical respiratory fitness examinations annually as required by Regulatory Guide 8.15, Section 4.h.

It was observed by the appraiser that the licensee has equipment for doing quantitative fit tests, but that this equipment has not been operationable since at least February, 1980. Thus, all fit tests since February, 1980 have been qualitative tests. NUREG-0041 recommends that quantitative tests be used for selecting the best performing respiratory protective equipment for each individual, and that qualitative tests should be used prior to each entrance into hazardous atmosphere. From reviewing radiation work permits (RWP's) where respiratory equipment was required, and in discussions with licensee personnel, it appears that qualitative tests are not always done when entering hazardous atmospheres.

The appraiser toured the area where the quantitative fit test equipment and respiratory assembly is located. This area is considered unacceptable for these purposes since it is in a restricted possibly contaminated area. These operations should be moved immediately to an unrestricted area. While in this area, the appraiser noted a supply cabinet with several charcoal cannisters whose expiration date had passed indicating that periodic checks to discard outdated cannisters is not being done sufficiently. Also, it was noted that all of the portable breathing air stations were waiting to be serviced at this location.

Section 12.1 of NUREG-0041 outlines the qualifications that the individual is required to have prior to being assigned the responsibility of overseeing the respiratory protection program. It states that this individual must have training and at least 1 year's field experience in the use of respirators. The appraiser noted from discussions with the licensee's individual in charge of respiratory protection that prior to his assignment as the responsible individual, his only training in respiratory protection was the general training given to all employees who might use respiratory equipment. He admitted to having only limited experience with respirators (i.e., wearing a respirator only a couple of times). Assigning an unqualified individual as the responsible supervisor of the respiratory protection program is contrary to the requirements of NUREG-0041 and should be corrected by providing technical and field training for this individual.

The inventory and supply of respiratory devices was reviewed for adequacy. No specific inventory is taken to determine the quantity of respiratory protective devices in normal use. Discussions with licensee representatives indicated that the inventory method is informal, and supply is maintained based upon usage. The licensee's stores department has an automatic order at a preset level for respiratory equipment. A supply of approximately 800 NIOSH approved

air-purifying and atmosphere supplying respirators is available for use. A supply of repair parts for respirators is maintained in the repair area. The supply of respirators and parts appears to be adequate.

NUREG-0041 specified that breathing air shall meet the minimum standard of grade D. An Ingersol-Rand Breathing Air Compressor and Eagle Air Purification System is used for filling the bottles used with the Scott Air Paks. This system has an electronic carbon monoxide moisture indicator/alarm and shutoff. Air quality tests prior to use showed that the air quality was better than grade D.

A separate oil-less breathing air system is used to provide air when airline respirators are used. Procedure S-RTP-62 requires testing of the air for radioactivity and dust. However, no testing of the air quality is performed contrary to the requirements of 10 CFR 20.103(c) and Regulatory Guide 8.15, Section C.8.a. which requires "Respirable air of approved quality be provided" in accordance with "Commodity Specification for Air", G 7.1-1966, which in Section 2.3, requires tests for oxygen, hydrocarbons, carbon monoxide and carbon dioxide.

NUREG-0041 in Section 10.1 states that "a proper and complete QA program must encompass inspection and testing of both new and used (respiratory) devices." "Written procedures must be established to maintain uniformity of the program." From discussions with licensee representatives, no procedures are established and inspection or testing of new equipment is not done.

In Section C.1 of Regulatory Guide 8.15 it states that "a written policy statement on respirator usage is to be issued from a high management level." "Techniques are to be provided and measures taken to ensure that management policy is carried out." From discussions with licensee representatives it was determined that the policy statement is a half page statement in Procedure No. APN-12. This statement is inadequate in that it does not designate the techniques and measures that will be used to ensure that policy is carried out and who is responsible for implementation.

Procedure No. S-RTP-69 entitled "Operation and Calibration of the Scott Go/No Go Tester and Test Panel" was signed by management in October, 1978. Procedure No. S-RTP-62 signed by management in October, 1978 entitled, "Respiratory Equipment - Assembly, Test and Inspection, Storage" states

that all pressure demand regulators and pressure demand exhalation valves shall be tested ... following ... procedure S-RTP-69 ... when implemented." As of October 10, 1980, no regulators or valves had been tested. Failure to test the regulators and valves is contrary to Procedure S-RTP-69.

NUREG-0041 in Section 9.5, "Issuance of Respirators" states that "Procedures for issuance of respiratory equipment are to be established so as to ensure that only the correct respirator is obtained for a job." It was observed by the appraiser that the cabinets containing respirators were not locked and that personnel made their own selection of the type of respirator to use.

Based on the above findings, the following areas were determined to require improvements in order to achieve an acceptable respiratory protection program:

- The respiratory training program does not include field training and examinations to test the workers' understanding of the proper use and fitting of respirators.

- A system is not adequately established to assure that personnel receive annual medical respiratory fitness examinations.

- The quantitative fit equipment is not maintained sufficient to assure its availability when required.

- The quantitative fit test equipment and the respiratory assembly equipment are located in potentially contaminated areas.

- The individual in charge of respiratory protection has not been provided with sufficient field and technical training in respiratory protection.

- The breathing air system is not tested routinely to assure that the air quality is Grade D or better.

- A quality assurance program for new and used respiratory equipment has not been established and implemented.

- Regulators and valves for respiratory devices are not tested as required by Procedure S-RTP-69.

- Procedures are not established to assure that only correct respirators are obtained for each job.

- The respirator policy statement does not provide sufficient guidance, direction and authority sufficient to establish and implement an adequate respiratory protection program.

3.6 Surveillance Program

Documents Reviewed:

a. Procedure, an unnumbered, "Radiation Protection Procedures" (referred to as the "Orange Book"), Revision No. 7, April 21, 1978.

b. Procedure RP-1, "Access and Radiological Control, "Revision No. 1, August 26, 1980.

c. Procedure RP-2, "Radiation Work Permit Procedure," Revision No. 1, February 13, 1979.

d. Procedure S-RTP-11, "Operation and Calibration of the Low Volume Portable Air Sampler," Revision No. 1, July 13, 1977.

e. Procedure S-RTP-13, "Use of Condenser R-Meter," Revision 0, December 30, 1974.

f. Procedure S-RTP-14, "Well Calibration," Revision 0, December 30, 1974.

g. Procedure S-RTP-15, "Operation and Calibration of the Low Range Beta-Gamma Dose-Rate Instrument (Cutie Pie 740A and 740F)," Revision No. 1, June 4, 1979.

h. Procedure S-RTP-16, "Operation and Calibration of the Teletector," Revision No. 0, January 9, 1975.

i. Procedure S-RTP-17, "Calibration and Operation of Beta-Gamma and Alpha Activity Monitor (Thyac III, Model 490)," Revision 0, December 6, 1974.

j. Procedure N-RTP-18, "Calibration of Constant Air Monitors, N-RTP-18," Revision No. 1, March 31, 1980.

k. Procedure N1-RTP-35, "Sealed Source Leakage/Contamination Test," Revision No. 1, April 8, 1980.

l. Procedure S-RTP-46, "Operation and Calibration of the 'VAMP' Area Monitor," Revision 0, April 10, 1978.

m. Procedure S-RTP-47, "Calibration and Operation of Minimonitor 11," Revision 0, April 26, 1978.

n. Procedure S-RTP-48, "Calibration and Operation of Portal Monitor," Revision 0, June 16, 1977.

o. Procedure S-RTP-49, "Operation of the High Range Survey Meter Underwater Model (CPMU)," Revision 0, April 5, 1978.

p. Procedure S-RTP-50, "Calibration of Self-Reading Pocket Dosimeters," Revision 0, July 21, 1977.

q. Procedure S-RTP-66, "Index of Radiochemistry and Radiation Protection Records," Revision 0, November 7, 1979.

r. Procedure N1-RTP-67, "Definition of Radiochemistry and Radiation Protection Instrumentation 'Use Records'," Revision No. 0, October 31, 1978.

s. Procedure S-RTP-70, "Operation and Calibration of Staplex High Volume Air Sampler, " Revision 1, August 9, 1978.

t. Procedure No. V.A.2-N, "Operation and Calibration of the Low Background Proportional Counter," Revision 0, November 22, 1974.

u. Procedure No. V. A. 4, "Operation and Calibration of BC-4 Beta Counter," Revision 1, December 4, 1978.

v. Procedure N1-SP-7, "Stack Sampling, NMP-1," Revision No. 1, February 20, 1980.

w. Procedure N1-SP-8, "Off Gas Sampling," Revision No. 1, March 3, 1980.

x. Procedure N1-CRP-2, "Stack Isotopic and Release Records," Revision No. 2, March 21, 1980.

y. Procedure N1-CRP-3, "Stack Release Sampling and Analysis, NMP-1," Revision No. 3, March 17, 1980.

z. Procedure N1-CRP-5, "Off-Gas Analysis," Revision No. 1, February 29, 1980.

aa. Procedure S-PSP-7, "Radiation Airborne Radwaste Sampling and Analysis," Revision No. 2, March 11, 1980.

bb. Procedure N1-OP-50A," Area Radiation Monitoring System," Revision No. 1, April 8, 1980.

cc. Handwritten Draft of a Procedure for Operation and Calibration of the Ge(Li) System, dated January, 1980.

dd. Selected NMP Quality Control Surveillance Reports and Related Nonconformance Reports for 1979 and 1980.

ee. Notebook Containing Calibration Information on the "Well Counter" from 1969 through August 1980."

ff. Selected, "Radiation Work Permits," for the period of September 30 through October 8, 1980.

gg. Selected, "Radiation Survey Log Sheets," (Includes radiation, contamination and airborne sampling) for the period of August 25 through October 8, 1980.

hh. Selected, "Air Sampling Log" sheets for the period of August 29 through October 3, 1980.

ii. Selected portions of the Nine Mile Point Nuclear Station, Unit 1, "Technical Specifications."

3.6.1 Surveillance Procedures and Basis

The licensee has developed procedures that describe the operation of most of the instrumentation used to detect and measure radiation. The document entitled, "Radiation Protection Procedures" provides general information on the selection and use of the low range GM count rate meters and "Cutie Pie" ionization type survey instruments for radiation and contamination surveys. This procedure also provides for direction of other types of contamination

surveys, and nasal smears. Procedure RP-2 states that, "in most cases" a preliminary survey for radiation, contamination and airborne hazards is required to determine the necessity for a RWP.

Radiation and contamination surveys of immediate work areas are usually made prior to issuing a RWP. A list dated 8/21/80, entitled, "Weekly Floor Area Checks (Suggested)" was being used to make periodic survey assignments. The list also contained daily assignments for checking Step Off Pads, Count Rate Meters, Dosimeters and high radiation area gates.

The licensee's Technical Specification 6.8, "Procedures" states, "Written procedures and administrative policies shall be established, implemented and maintained that meet or exceed the requirements and recommendations of ... Appendix 'A' of USAEC Regulatory Guide 1.33 except as provided by 6.8.2 and 6.8.3 below." (6.8.2 and 6.8.3 refer to the licensee's method of approving procedures and temporary changes.) Regulatory Guide 1.33, Appendix A, "Typical Procedures for Pressurizing Water Reactors and Boiling Water Reactors" identifies "Radiation Surveys" and "Airborne Radioactivity Monitoring" to be included as part of the Radiation Protection Procedures.

Technical Specification 6.11 states that "Procedures for personnel radiation protection shall be prepared consistent with the requirements of 10 CFR Part 20 and shall be approved, maintained and adhered to for all operations involving personnel radiation exposure." 10 CFR 20.201(b) requires that, "Each licensee shall make or cause to be made such surveys as may be necessary for him to comply with the regulations in this part." Regulatory Guides 1.33, "Quality Assurance Program Requirements (operational)" and Regulatory Guide 8.7, "Occupational Radiation Exposure Records Systems" give additional guidance on procedure development. These Regulatory Guides reference ANSI N18.7, "Administrative Controls and Quality Assurance for the Operational Phase of Nuclear Power Plants" and ANSI N13.6, "Practice for Occupational Radiation Exposure Systems" respectively. ANSI N18.7 and ANSI N13.6 also make recommendations for Radiation Control Procedure development and implementation.

Contrary to the requirements of Technical Specification 6.8 and 6.11 the licensee's procedures did not clearly define the basis for the licensee's surveillance activities. The deficient areas include: radiation and contamination survey frequencies; methodology for conducting surveys; counting procedures for smears and air samples; routine and special air sampling requirements; and guidance or instrument selection.

3.6.2 Radiation Surveillance

Routine radiation surveys were usually conducted by RRPD Personnel in areas of the plant normally accessible to all radiation workers. Areas behind locked gates were not routinely surveyed. Procedure RP-1 allows persons qualified as Self-Monitors to enter any area on an extended RWP whether routinely surveyed or not. Self Monitors are required to conduct their own surveys but these surveys are not recorded. Procedure RP-1 sets the upper limit for Self Monitors at 2500 mrad/hr for beta-gamma radiation and "25,000c/m per sq. ft. or 25,000 dpm/100cm^2" for beta-gamma contamination. RRPD issues individual RWP's for other personnel entries into these areas.

The radiation surveys conducted for RWP consisted of general area dose rates and radiation measurements at about 3" from the identified sources. "General area" surveys consisted of determining the range of radiation levels along the pathway to and in the immediate vicinity of the job site. Other general area readings were recorded as the range of radiation levels found in a room, area or one or more elevations. 3" readings are made by holding the Cutie Pie almost in contact with the items being surveyed.

The reading is recorded as a 3" reading to indicate the distance to the effective center of the chamber. Beta measurements were recorded in mrad/hr. However, the beta measurements were only cap off minus cap on reading, no correction factor was applied for the beta energy response of the detector.

Survey records for the period of August 25 through October 8, 1980 were reviewed. The only neutron surveys noted were for the Torus Containment. The neutron surveys each consisted of a single entry indicating the maximum neutron radiation levels found in the room.

During the review of the survey records it was apparent that each technician developed his own method for conducting radiation surveys. General area survey results did not normally indicate discrete radiation measurements. Only the range of radiation levels in a room, area or one or more elevations was normally recorded. Two technicians had used maps to record radiation levels on routine surveys. One technician recorded radiation levels on the map while the other made an entry on each map stating the range of general area readings found on that elevation.

A special radiation survey (Number N47959) was conducted for the "Condenser Area El. 243' at East & West Condenser Water Boxes." The description of survey was "Surveyed for Syr. Engr. Personnel to Conduct 'hands off' inspection of E&W Condenser Water Boxes." The results of the survey were recorded as follows:

- "400-300mR/hr in walk thru to inspection areas"

- "60-100mR/hr gen. on 243' El. East end and on catwalks"

- "3-10mr/hr gen. on 243' El. West end"

- "To 835d/m/100cm^2 smearable in front of water boxes-on floor El. 243'[illegible]" (a total of 4 smears were taken)

The method of conducting surveys does not provide sufficient information for personnel protection or to allow personnel to maintain their exposures ALARA. The appraiser questioned several RRPD technicians to determine if any other method was used to consolidate or display radiation survey data. The only other method that the technicians were familiar with was the "Caution Radioactive Material" tags hung at various locations in the plant to indicate radiation

and/or contamination levels. The technicians indicated to the appraiser that the technician performing the survey usually discussed the survey results with the Leadman responsible for the RWP.

During the appraisal a contractor was installing additional supports (saddle blocks) on the Torus. Surveys for this work were generally conducted on each of the two shifts. The "Radiation Survey Log sheet" completed for the survey covered from three to four elevations of the Reactor Building in addition to the Torus Containment. Ranges of radiation levels were normally listed for five or six general areas and three to six 3" (contact) readings. The 3" reading often included "beta" dose rate measurements. Descriptions of the radiation survey results were normally vague. For example, survey Number N47177, dated 8-25, 26-80 indicated the following reading in the Torus containment area:

- "10-30 mr/hr - Gen.-Walk Thru"

- "20-40 mr/hr - Gen.-Work area under Torus"

- "to 65 mr/hr - at 3" Containment Floor"

- "to 100 mrad/hr - at 3" Containment Floor"

- "to 100 mr/hr - at 3" Lead Shielded Floor Drains"

- "to 50 mr/hr - at 2' Lead Shielded Floor Drains"

- "to 50 mr/hr - at 3" - Torus Drain Lines"

- "to 3.5 mr/hr - Neutron in Torus Containment"

Special survey number N47929 was conducted on 10/3/80 for a contractor "Roving Fire Watch." The location indicated on the "1 - 10 mr/hr Gen. Walk Thru to Laundry pick-up points" and "to 75 mr/hr Gen. Walk Thru South Hall Rx 298"

The examples of the surveys given above are representative of all radiation surveys taken.

Discussions with licensee representatives indicated that the "suggested" weekly surveys were not always completed because of time and manpower restraints. Routine survey number N47450, taken on 9/11/80, was for loose contamination only and did not include radiation measurements. The

routine surveys reviewed verified that routine surveys are only made in areas normally accessible to general radiation workers. Periodic surveys had not been made for other areas such as the condenser area that qualified "Self Monitors" entered routinely.

Routine radiation surveys when conducted, were only performed in portions of areas of the facility routinely entered. Routine and special radiation surveys did not provide sufficient data on the radiation levels in the facility. Beta radiation measurements were recorded in mrad/hr but were actually "open window" minus "closed window" readings. Self Monitor surveys could not be used by RRPD in evaluating radiation levels because the results were not recorded. The radiation survey methodology used by the licensee is unacceptable and does not meet the requirements of 10 CFR 20.201, "Surveys."

It was apparent to the appraiser that the laborious method used to record survey results plus the numerous RWP surveys required in lieu of adequate routine surveys further compounded the demands on the RRPD technicians time. This situation encouraged brevity in conducting and recording surveys.

3.6.3 Contamination

Contamination surveys are normally made simultaneously with the radiation surveys described above. The document "Radiation Protection Procedures" states that, "Paper towels and atomic wipes are usually used for contamination surveys of large areas and equipment in restricted areas."

The procedure for counting the wipes was to, "Carry the smears to a low background area and survey each smear with the meter" (GM Survey Meter with a 30 mg/cm^2 open window cylindrical probe). The results were to be recorded in units of "c/m per ft^2." The procedure also states, "Disc smears (one-inch circles of Kraft paper) are usually used for contamination surveys on small items or for surveys in unrestricted areas such as the lunch room." During the course of the appraisal it was observed that Kraft disc smears were normally used for routine and special contamination surveys. Disc smears were normally counted for one minute in a shield utilizing a thin window GM detector and counter scaler. A RRPD technician stated that selected smears were counted monthly for alpha on the gas flow proportional counter.

The Kraft smears were advertised by the manufacturer as water resistant and did not appear to be absorbent. The appraiser was concerned about the ability of the Kraft discs to "pick up" loose contamination. On October 9, 1980 the appraiser accompanied a licensee's representative to an area believed to be uniformly contaminated. Three smears were taken in the area by the licensee's representative. Two smears were Kraft discs and the third was a commonly used disc similar to filter paper. The third disc was larger than the Kraft disc but similar surface areas on both types of discs were smeared on the floor. All three smears were counted by the licensee's representative using NMP's normal counting procedure. The gross counts for the two Kraft smears were 228 cpm and 210 cpm. The gross counts on the third smear (filter paper) was 728 cpm. This comparison was only considered a rough check. However, it indicated the possibility that when making relative comparisons of contamination survey results with other organizations that the licensee's survey results could be a factor of two or three lower. If this was the case then the licensee's contamination limits would be a factor of two or three higher than indicated by procedure in relation to limits at other facilities due to the sensitivity of the smear technique.

Following the appraisal, information from other sources indicated that the tests at Savannah River had indicated that the Kraft discs were less sensitive for their applications. Regulatory Guide 1.86, "Termination of Operating Licenses for Nuclear Reactors," 49 CFR 173.397, "Contamination Control," and ANSI N13.13 (Draft), "Control of Radioactive Surface Contamination on Materials, Equipment, and Facilities to be Released for Uncontrolled Use," contain recommendations on smear techniques. The references state that a soft absorbent material such as filter paper should be used with moderate pressure when making smear surveys. The references also stress the necessity for uniformity in the smear methology used. The use of paper towels and atomic wipes for smear surveys does not assure a uniform smear technique. The procedural method of counting the paper towels or atomic wipes with a portable count rate meter with a 30 mg/cm^2 wall thickness did not meet the recommendations of ANSI N13.12 and did not provide the required sensitivity or geometry to detect the licensee's contamination limits. (This is discussed in more detail later in this report.) Unless additional testing demonstrates otherwise, the use of the Kraft discs in lieu of absorbent material as recommended by the above references is not an acceptable practice.

Subparagraph (b) of 10 CFR 20.401, "Records of surveys, radiation monitoring, and disposal," state, "Each licensee shall maintain records in the same units used in this part, showing the results of surveys required by ® 20.201 (b) ..." The units defined in 10 CFR20.5 are Curies, submultiples thereof or disintegration per unit time. In 10 CFR 20.205 units for removable contamination are expressed in either microcuries per 100 square centimeters or disintegrations per square centimeter. The use of counts per minute or counts per minute per square foot not used in 10 CFR 20. In addition to the regulatory requirement of 10 CFR 20.2Q1 the term counts per minute has no meaning unless the detector efficiency is also expressed with the term. The practice of mixing units and using counts per minute per square foot and disintegration per 100 square centimeters is in itself confusing and poor practice. The use of units other than those allowed by 10 CFR 20.201 is unacceptable.

The appraiser, through interviews with a licensee representative and various RRPD technicians, plus reviews of survey records (August 25 through October 8, 1980), determined that smears for routine surveys were normally only taken on floor surfaces. Smears for RWP surveys were taken on the floor of the immediate work area and on the quipment

involved with the job when applicable. Routine contamination surveys were only conducted in areas normally accessible to general radiation workers. Other areas frequently entered by Self Monitors were not routinely surveyed. The RRPD technicians have also developed individual styles for conducting and recording smear survey results. Many, but not all technicians use maps to record locations of routine smears.

For the eighteen routine survey sheets reviewed the number of smears taken per survey ranged from 20 to 65. One exception was survey N47448 dated September 11, 1980, for four elevations of the Reactor Building that did not contain any contamination survey results. The number of smears per elevation ranged from 8 to 60. The areas indicating the highest levels of contamination were the Reactor Building elevation 340 and the Rad Waste Building elevations 261, 247 and 225/229. On routine survey Number 47937, ten to thirteen smears were taken on each elevation of the building. The contamination survey results (dpm/100cm^2) range from: 240 to 3,780 on El. 261; 1,500 to 57,000 on El.247; and 2,090 to 291,800 on El. 225/229. The appraiser did not note any indication that more detailed follow-up surveys were made to better define the more highly contaminated areas or to decontaminate any of the areas.

Routine surveys that included maps to show smear locations would normally indicate step-off pad locations making it possible to evaluate the spread of contamination. Routine survey Number N47312 dated 9/3/80, for the Reactor Building El. 318' indicated that the contamination level at one step-off pad was 525 dpm/100 cm^2 which exceeds the licensee's limit of 400 dpm/100 cm^2. The survey sheet did not indicate that any corrective action was taken or planned. Routine survey N47330 dated 9/4/80, for the Rx Bldg. El. 340' indicated 34,721 dpm/100 cm^2 in a contaminated area. This exceeds the licensee's Self Monitor entry limit. No corrective action was noted on the survey sheet. Other survey records did not state that corrective actions had been taken. Routine survey number N47346 dated 9/5/80, indicated 900 dpm/ 100cm^2 by the Instrument Air Compressors which had been an uncontaminated area. The survey sheet indicated that a Step-Off Pad was set up for the area. Routine survey number N47792 dated 9/26/80, for the Turbine Bldg. El. 261'indicates that decontamination of the two areas had been effective and one of the Step-Off Pads had been removed. The survey sheet also indicated that a Step Off Pad had to be placed at the double door entrance to the Rad Waste Building due to contamination levels of 1,000 dpm/100 cm^2 at the door. Routine survey Number N47905 dated 10/2/80, for the Off Gas Building indicated

problems on two of the three elevations. On El. 229' all three Step-Off Pads were contaminated to levels greater than 400 dpm/100 cm^2 (480, 585 and 804 dpm/100cm^2). A note on the survey map indicated that the Step-Off Pads were deconned, resurveyed and found to be less than the licensee's limit of 400 dpm/100cm^2. On El. 261' the Step-Off Pad was found to be 870 dpm/100 cm^2. A note on the survey sheet indicated that the Step-Off Pad was deconned, resmeared and found to be below the licensee's limit of 400 dpm/100 cm^2.

Routine Survey number N47927 dated 10/3/80, for Elevation 261 of the Turbine Building indicates that decontamination was in progress in two areas and would be surveyed following decontamination. The follow-up survey results were later recorded on the survey sheet. Routine survey Number N47937 dated 10/3/80, indicated that the Step-Off Pad to the Rad Waste Control Room was 950 dpm/100 cm^2 and the floor in the Rad Waste Control Room, normally an uncontaminated area, was 750 dpm/100cm^2. Both of these are above the licensee's limit of 400 dpm/100cm^2. The survey map indicated that the Step Off Pad and Rad. Waste Control Room were subsequently decontaminated to less than 100 dpm/100cm^2.

Special contamination surveys taken prior to issuing RWP's normally consisted of a minimal number of smears. From review of special survey records and a discussion with a RRPD technician the appraiser determined that only two to five smears are normally taken for a RWP survey. The appraiser asked the RRPD technician if he thought two to five smears was adequate to assess the contamination levels for a RWP. The technician stated that he normally performed the routine surveys in the area under discussion and that he could, "get a good indication of what was on the floor by looking to see where leaks had occurred." The use of two to five smears to evaluate a RWP appeared to be the general rule even when the RWP covered several elevations of a building or when the RWP required full protective clothing.

Procedure RP-1 states, "The survey performed by a Self Monitor is intended to satisfy the requirements of 10 CFR 20.201, 'Surveys'." 10 CFR 20.401(b) states, "Each licensee shall maintain records in the same units used in this part, showing the results of surveys required by 1 20.201(b) ..." Contrary to this, records are not maintained for Self Monitor surveys which the licensee's procedure states are to satisfy the 10 CFR 20.201 requirement. The appraiser

discussed this with a licensee's representative and that the licensee had looked into it but had no solution. This is considered and identified this as noncompliance with 10 CFR 20.401(b).

Routine contamination surveys, when conducted, were only conducted in portions of the routinely entered areas of the facility. Routine and special contamination surveys did not provide sufficient data on the contamination levels in the facility. Survey records did not always indicate that contamination problems were identified, evaluated or corrected.

Unless resolved by further testing the disc smears used by the licensee are not considered adequate. The procedure of using paper towels or atomic wipes for smears; counting them with the portable rate meter; and recording the results in cpm/ft^2 provides meaningless information.

The contamination survey techniques and methodology used by the licensee are unacceptable and did not meet the requirements of 10 CFR 20. 201, "Surveys."

3.6.4 Airborne

The licensee used six low volume air samplers to collect continuous samples at selected locations in the plant. Four of the samplers were equipped with particulate filters that were changed on a weekly basis. These were located on Elevations 229 and 261 of the Old Rad. Waste Building, Elevation 237 of the reactor Building and Elevation 261 of the Turbine Building. The other two samplers were equipped with particulate filters and charcoal cartridges that were changed biweekly. These samples were located on Elevation 340 of the Reactor Building and Elevation 300 (Operating Floor) of the Turbine Building. The Supervisor, Chemistry and Radiation Protection specified the locations for the low volume air samplers. High volume air samplers equipped with particulate filters and charcoal filter cartridges are used for grab samples in the plant. Due to the licensee's method of maintaining records it was difficult to determine if sufficient air samples were being obtained.

3.6.5 Records

The basic survey sheets used by the licensee is a prenumbered form entitled, "Radiation Survey Log Sheet." Space is provided on the form to list: Routine or special Survey;

Location; Date; Time; RWP No.; Air Sample Log Sheet No.; Serial numbers for the "Cutie Pie," "Teletector," "Thyac" and "Nemo" survey instruments; Type of Smear used (paper towel, Atomic Wipe or Disc); Description of the survey; Surveyors Exposure; and, Name. This form was being used for:. radiation and contamination surveys; nasal smears; items released from containment areas; and, as a log for RRPD technicians to record problems and job progress. Air sample results were also attached to this form.

The "Radiation Survey Log Sheets" are filed numerically in notebooks in the RRPD Office until they are turned over to the plant records section. The numerical filing in the RRPD Office resulted in intermingling of routine surveys, RWP surveys, air sample results, nasal smears, listing of items released, door check records, etc. The filing method makes it extremely difficult and time consuming for the licensee to determine: actual survey frequencies; radiological data for specific areas; changes in the radiological status of an area; or, determination of the radiological status of the plant.

There was a plastic covered map at the entrance to the Turbine Building. The map had apparently been design to display radiological information for plant locations but it was evident that it was not used. When questioning

RRPD technicians about the use of the display they stated that they did not have the time or manpower to keep it current.

The RRPD technicians indicated that they delayed turning survey records over to the plant record system due to poor retrievability. Survey records for at least a two month period were kept on an open bookcase in the RRP Office.

Procedure RP-1 states, "The survey requirements of 10 CFR 20.201 are fulfilled by the radiation survey which forms the basis for the RWP written for a job." 10 CFR 20.401, "Records" requires that, "Each licensee shall maintain records ... showing the results of surveys required by 1 20.201(b) ...." Regulatory Guides 1.33, "Quality Assurance Program Requirements (Operations)," 8.2, "Guide for Administrative Practices in Radiation Monitoring," and 8.7," Occupational Radiation Exposure Records Systems," provide additional guidance and recommendations for survey and monitoring records. These Regulatory Guides reference ANSI N18.7, "Administrative Controls and Quality Assurance for the Operational Phase of Nuclear Power Plants," ANSI N13.2, "Guide for Administrative Practices in Radiation Monitoring," and ANSI N13.6, "Practice for Occupational Radiation Exposure Record Systems," respectively.

ANSI N13.6 recommends that survey records include, "Specific location or object where the radiation measurement was obtained." The licensee's survey records for RWP surveys and routine survey data did not meet this recommendation. As noted in Section 3.3.1.2 of this report neither specific measurements or specific locations were recorded by the licensee.

As recommended by ANSI N13.6 reviews of the procedural controls and radiation exposure measurements program are necessary to determine the adequacy of the radiation protection program. Radiological survey data must be recorded and made available in such a manner that personnel working in the plant are made aware of the radiological status of their work areas. This is essential if personnel are to use proper precautions and maintain their exposures ALARA. During interviews with various RRPD technicians, it was determined that even the technicians could not readily identify the specific location of radiation or contamination measurements made by other technicians. Several of the RRPD technicians gave this as a reason that some of them used maps to record weekly survey data. ANSI N13.6 recommends, "the use of sketches of building, room, or equipment layouts to clearly define the areas surveyed and results observed."

In a number of instances survey data is not even recorded on survey sheets. Instead a note on the survey sheet would indicate that the "levels" or "conditions" were "unchanged" from a previous survey which would be referenced by survey number. Two examples are: Survey Number N47960 dated 10/6/80, that referenced a survey conducted on 10/4/80; and survey Number N47988 for the night shift on 10/7/80, that referenced the day shift survey. Numerous other surveys referred to the radiation and/or contamination results from previous surveys. An indication that a survey was not actually performed but that conditions were assumed to be unchanged without adequate justification.

Regulatory Guide 8.10, "Operating Philosophy for Maintaining Occupational Radiation Exposure as Low as is Reasonably Achievable," and ANSI N13.6 both recommend reviews of the radiation exposure measurement program. The Superintendent, Chemistry and Radiation Management periodically reviewed the survey records and occasionally initialled a survey sheet to indicate his review. A licensee representative also stated that the Supervisor, Chemistry and Radiation Protection periodically reviewed the survey records. The "Radiation Survey Log Sheet" form does not provide space to indicate that individual survey records were reviewed. The licensee apparently did not have procedures or written guidance for conducting reviews of Radiation Protection records as recommended by ANSI N13.6.

It was also noted that the licensee's procedures did not incorporate or provide instructions for the "Radiation Survey Log Sheet" or other forms used to record survey data.

The licensee's record keeping system makes it difficult to review frequencies of surveys or the radiological status of the facility. The practice of keeping records on open bookshelves in the RRPD Office did not provide protection from fire, misfiling nor other loss. The licensee's method of recording survey data was unacceptable and did not meet the requirements of 10 CFR 20.401, "Records." The licensee does not have procedures that describe the method of reviewing survey records or to ensure that survey records are reviewed; and the licensee's procedure did not incorporate the survey forms used or provide information on completing the forms.

The licensee uses several types of air sampling records. An "Air Sample" envelope is used to collect air sample media. The envelope provides for recording: sample location; sample conditions; Date; Sampler Type (High Volume, Planchet or Low Volume); Collector (Filter Paper, stack or charcoal); Sample Serial Number; Monitor Reading: Flow Rate, and Time and Date the sample is started and stopped. After the

Low Volume Air Sample is counted the data is recorded on a prenumbered "Air Sample Log." The upper portion of the "Air Sample Log" contained the same data as the envelope except for the flow rate. The lower portion of the form provided space for counting information and contained the formula and constants used for calculating activities. Printouts from the gamma spectroscopy system were attached to a "Ge(Li) Spectral Analysis Print-outs" form. This form provided for recording: Sample (location implied); counted by; count date; count time; shelf; sample date, time and volume; analyzer count time; gain, and remarks.

The licensee's procedure number S-RTP-11, "Operation and Calibration of the Low Volume Portable Air Sampler" references the use of the "Air Sample Log." When a sample is started, S-RTP-11 required recording the time, location and date on this form. When the sample was stopped S-RTP-11 required recording the time stopped and total hours for the sample. The information required by the procedure was being recorded but all the information required by the form was not completed. Procedure S-RTP-70, "Operation and Calibration of Staplex High Volume Air Sampler" requires recording "samples' time, date, flow rate, duration and technicians initials" and other "appropriate information" on the Air Sample Envelope.

The licensee's procedures did not incorporate the Air Sample Log form, Air Sample Envelope form or the Ge(li) Spectral Analysis Print-out form or provide complete instructions for their use. The Air Sample Log and Air Sample Envelope forms did not have provisions for recording initial and final air flow indications. The Air Sample Log and Ge(Li) Spectral Analysis Print-out forms did not have provisions to indicate that they were reviewed.

The data table at the bottom of the Air Sample Log indicates a collection efficiency of 0.99 for "Filter Paper." The table did not indicate the type of filter paper or if the efficiency applied to the low volume air sampler, high volume air sampler or both. "Charcoal" was also listed but a collection efficiency was not specified but was assumed to be 1.0.

The Air Sample Form had provisions for recording the type of counting equipment used but not the equipment identification or serial number.

The appraiser noted that the information required by the forms in addition to initial and final flow indications are needed to verify the calculations. Identification of the actual counting equipment is needed to verify that it was calibrated and properly operating when air samples were counted.

There was no indication that the printouts for the gamma spectroscopy system were analyzed for errors or unidentified peaks. Several RRPD technicians that have occasion to use the gamma spectroscopy system were interviewed by the appraiser. The technicians stated that they rely on the data for the isotopes and activities that is printed out under "Quantitative Analysis." Further discussion with RRPD technicians indicated that they did not have sufficient knowledge and training to determine if the "Quantitative Analysis" section of the printout was accurate. The licensee's procedures do not provide information on or require that the printouts be analyzed.

Information was available from the vendor that described the gamma spectroscopy programs. However, the appraiser could only find one individual in the RRPD Organization that even had a fundamental understanding of the program functions or meaning of the various data on the printout. The appraiser further noted that the licensee's records did not indicate all isotopes and activities that were identified for air samples.

Pertinent information is not included on the licensee's air sampling forms. Instructions for completing the forms is not contained in the licensee's procedures. The Air Sample Log does not define the filter type and flow rates that pertain to the collection efficiency given. There was no evidence that all significant isotopes and activities were being identified for air samples. The manner in which the licensee's air sampling records were being used maintained does not meet the requirements of 10 CFR 20.401, "Records."

The calibration records were reviewed under the "Facilities and Equipment" portion of the appraisal and are included in that section of the report.

3.6.6 Radiation Work Permit

As described in the "Radiation Protection Procedures," RP-2, "Radiation Work Permit Procedure," and RP-1, "Access and Radiological Control," the licensee utilizes a Radiation Work Permit (RWP) system. RP-2 requires a RWP for work involving: contamination levels greater than 10,000c/m per ft^2; airborne activity that require sthe use of a respirator; neutron radiation exposure; High Radiation Area entries;

unknown conditions in an area to be entered; and maintenance of equipment, controls or instrumentation in Radiation Areas or High Radiation Areas. If these conditions do not exist a RWP is not required for access or work in the Restricted Area of the Plant. The RWP is normally for an eight hour shift but could be issued for a period of 24 hours. After the RRPD technician completes and signs the form the Leadman familiarizes himself with the requirements and signs the RWP. The RWP is then subject to approval of the Station Shift Supervisor. An Extended RWP is issued for "repetitive jobs" in areas requiring a RWP. By procedure an Extended RWP can only be used by qualified Self Monitors in areas where: beta-gamma radiation levels do not exceed 2,500 mrad/hr and beta-gamma contamination levels do not exceed 25,000 cpm/ft^2 or 25,000 dpm/100 cm^2. Procedure RP-1 allows an exception to the 25,000 cpm/ft^2 limit if the requirements for entry have been evaluated and posted by Radiation protection. Extended RWP's require approval of the Station Superintendent, Radiation Protection Supervisor and appropriate supervisor of the group performing the work. The procedures do not specify the length of time an Extended RWP is valid. A Local RWP can be issued at a job site by a technician for "jobs and areas which have been pre-approved by the Operations Supervisor and Radiation Protection Supervisor." Local RWP's are normally used

during outages. The RWP Form, RWP Request Form and Local RWP Approval Form are incorporated into procedure RP-2. An outdated version of the RWP Form is contained in the "Radiation Protection Procedures".

Procedure RP-2 requires that the job category code, description and location, protective clothing, respiratory protection equipment, dosimetry, type of monitoring required, special instructions and radiation exposure rates be listed on the RWP by the RRPD Technician. These items were being completed by the technicians but the procedure do not give clear guidance on the criteria to be used. The procedures do not require or provide guidance for completing other items on the RWP Form such as: when personal outer clothing is not permitted under coveralls; when RRPD personnel are to be present for opening equipment or breaking lines; when protective clothing openings must be taped; or, when pre-planning meetings, timekeepers, or nasal smears, rae required; or when initial, intermittent or continuous RRPD coverage is required. ANSI N 18.7 states, "Each procedure shall be sufficiently detailed for a qualified individual to perform the required function without direct supervision ..." The RRPD technicians complete and issue RWP's without direct supervision. Based

on the lack of procedural guidance, the problems noted in the "Training" section of this report and the inconsistencies discussed below, the Appraisal Team has determined that the RRPD technicians have not been given sufficient guidance and training by management in issuing RWP's.

Pre-plan meetings normally only include the technician issuing the RWP and the Leadman responsible for the job.

On 10/2/80, an appraiser discussed pre-plan meetings for the Torus Containment work with a RRPD technician. The Torus Containment work was a long term job and routinely required a pre-plan meeting. The technician indicated that the pre-plan meetings for the Torus Containment consisted primarily of telling the Leadman to watch the precautions since the requirements did not change very often. These pre-plan meetings had apparently become routine and very brief. On 10/3/80 an appraiser discussed pre-plan meetings with another RRPD technician. The technician stated that he always checked the "pre-plan meeting required" section of the RWP so he could explain the survey results to the Leadman. The use of pre-plan meetings can be effective in assuring mutual understanding of work details and required precautions. However, indiscriminate use of pre-plan meetings can be detrimental to the effectiveness of this tool.

Selected RWP's were reviewed for the period of 9/30/80 through 10/8/80. Inconsistencies were noted in the protective clothing requirements. RWP number 1019 was issued 9/30/80 for work on solenoids in the CRD module area of the Reactor Building. The RWP required a hardhat, cotton glove liners, and coveralls, but not shoe covers. The RWP form and survey number N47841 indicated smearable contamination levels to 6,200 dpm/100cm^2 on the solenoids. The appraiser questioned a RRPD technician to determine why shoe covers were not required. The technician conceded that the floor did become contaminated and that shoe covers were required the following day.

RWP numbered 1005 was issued 9/30/80 to "Pick up soiled RWP clothing for washing" and included, "Rx Bldg. 237'-340', Turb Bldg. 261'-333", Rad Waste 261'." The RWP requirements were, "Hard hat as req'd." and "shoe covers plastic- as Req'd." The laundry personnel were removing contaminated clothing from containers in their street clothing. The only protective clothing used was shoe covers. An appraiser pointed out the contamination problems to laundry personnel and to Radiation Protection personnel. The protective clothing requirements were increased on subsequent RWP's for laundry personnel.

On 10/2/80 an appraiser toured the Reactor Building Spent Fuel Area. Maintenance personnel working in the area and contractor personnel involved in cutting up Low Power Range Monitors (LPRM) were required to wear full sets of protective clothing. Three persons in the area, two of which were wearing visitor badges, were touring "all elevations of the Reactor Building" on RWP number 1046. These individuals were only wearing rubber shoe covers. A RRPD technician was in the area conducting routine radiation and contamination surveys and was only wearing rubber shoe covers. The requirement placed at the entrance to the area only required "Rubbers" for "Self Monitors--Hands Off Inspection." A Security Guard entered the area and was only wearing rubbers. The Guard had responded to an alarm on the card reader for the door which was apparently caused by one of the visitors. The Security Guard was not qualified as a Self Monitor and did not enter on a RWP.

The previous routine survey for the Reactor Building Spent Fuel area was dated 9/22/80. The two highest smears indicated 30,797 and 48,582 dpm/100cm^2 which exceeded the limit for Self Monitors. Other smears on that survey indicated contamination levels generally lower than 4,000 dpm/100cm^2 for the locations smeared. The area of higher contamination

was not posted in the room. Some decontamination of the area had been done but surveys to verify the effectiveness had not been made. There was no evidence that the contamination levels had been reduced below the limits for Self Monitors. There was also no evidence that RRPD had posted the area to alert Self Monitors to the higher levels or specified entrance requirements for Self Monitors based on the higher contamination levels as provided in the exemption in procedure RP-1. The Security Guard entry without a RWP violated the licensee's procedures and is considered an item of noncompliance against Technical Specification 6.11. In later discusssion with a licensee representative he stated that the licensee was aware of the problem associated with Guards entering areas without a RWP but had not reached a solution to the problem. The entry into an area exceeding 25,000 dpm/100cm^2 by a Self Monitor on an Extended RWP violates the licensee's procedures and is considered an item of noncompliance against Technical Specification 6.11.

The appraiser recognizes recognizes that protective clothing requirements for an area will differ in relation to the nature of the individual's task. (i.e., actual work in the area versus a walk-through of the area.) However, the practice of only requiring shoe covers, especially in highly contaminated areas, even for "hands off" inspections

is an unacceptable practice. This is particularly true when contamination surveys are normally made only on floor surfaces (see "Types of Surveillance-Contamination") and the method of recording contamination survey results makes it difficult to assess the plant status (see "Survey Records"). In addition, protective clothing requirements are not consistent as seen in the above examples. (i.e., Coveralls and gloves without shoe covers; coveralls and shoe covers without gloves; personnel handling contaminated protective clothing with only shoe covers; and, shoe covers only in areas otherwise requiring double sets of coveralls.) The Appraiser found the methods of specifying protective clothing inconsistent and unacceptable.

On 10/2/80, RWP number 1041 was issued for personnel to decontaminate the Fuel Handling Floor on elevation 340 of the Reactor Building. A complete set of protective clothing was required as well as taping coverall openings, intermittent RRPD coverage and a pre-plan meeting. The Special Instructions required keeping out of the "High Rad. Storage Area." Radiation levels were listed on the RWP for seven areas or locations. The survey information on the RWP did not reflect contamination levels in the area. The RWP referenced survey Number N47887. That survey indicated that six smears were taken and that the contamination levels were, "To 9,210 dpm/100cm^2 smearable

on the Floor and Refueling Bridge." The previous routine survey was dated 9/22/80 and indicated the need for the decontamination. RWP number 1007 had been issued on 9/30/80 to decontaminate the floors and Vandenberg Cask equipment in this same area. RWP 1007 did not indicate contamination either and referenced survey number N47845. Survey N47845 indicated six smears were taken and the contamination levels, "To 3,048 dpm/100cm^2 smearable on floor North Side where Deconning is being done" and, "To 14,953 dpm/100cm^2 smearable on Refueling Bridge." The amount of information available on contamination levels in the area was not sufficient or current enough to ensure proper protection of the decon personnel. The information was also insufficient to allow decon personnel to assure that they used effective decon techniques, allowing them to minimize their time in the area and maintain exposures ALARA. Other RWP's for decontamination of areas and the supporting surveys indicated similar problems.

RWP number 1039 was issued on 10/2/80 for a "Roving Fire Watch" for "Turb 250' north, Rx 261', Rx 237', Rx 237'}198'NW, and Screen House El. 250'." A complete set of protective clothing was required for "'Hands-on' or climbing, otherwise shoe covers as req'd." The survey data on the RWP form showed four 3" reading on specific components and four general area radiation levels. The highest radiation

level recorded for a specific component was, "To 700 mr/hr @ 3"- Tag'd O.H.1"c.u. Filt. Sludge Line T. 250'."

The radiation survey data was not sufficient to allow a "Roving Fire Watch" to properly provide for his protection or to maintain exposures ALARA. As discussed later the individual was not required to have and did not use a radiation monitoring device which continuously indicates the radiation dose rate even in high radiation areas. The requirements specified in Technical Specification 6.13 were not specified on RWP's. This is discussed in more detail in the "Access Control" section of this report. Other RWP's reflected similar problems.

The "Radiation Protection Procedures" contains an outdated RWP form. The licensee's procedural guidance and training is not sufficient to give RRPD technicians proper guidance for specifying RWP requirements. Protective clothing requirements are inconsistent and in may cases inadequate. Radiation and contamination surveys do not provide sufficient information for issuing RWP's and the survey data on the RWP forms provides inadequate data to personnel working under the RWP. The use of pre-plan meetings, in some cases, has become routine and ineffective and in some instances are used as a substitute for properly displaying survey data. Required precautions for high radiation

areas are not specified on RWP's. The appraiser has determined that these aspects of the licensee's RWP program are unacceptable.

3.6.7 Access Control, Posting, and Labeling

Personnel must successfully complete an indoctrination program before they are allowed unescorted access into the portion of the facility posted as a Restricted Area. Certain activities inside the licensee's Restricted Area required the use of a RWP. Upon exiting potentially contaminated areas procedure RP-1 requires that personnel check themselves for contamination. The procedure for using a count rate meter for self monitoring is contained in 'Radiation Protection Procedures." At the time of the appraisal personnel were required to pass through a portal monitor prior to exiting the site through the guard house. The licensee's procedures require that tools and equipment be released by RRPD before being removed from Restricted Area Control Points.

The "Radiation Protection Procedures" hereafter referred to as the RPP procedure in this section, states, in Section III.C.1, "A count rate meter (a instrument which is sensitive to low levels of contamination) is used by personnel when they exit from contamination areas..." In the next paragraph

the procedure states, "The count rate meters are installed in locations in the Station where monitoring for personnel contamination is deemed necessary." The licensee's procedure contradicts itself concerning the requirements for when or if count rate meters will be located at exits from contamination areas. In one paragraph it stated personnel would use monitors when exiting contaminated areas but in the next paragraph it stated that count rate meters were installed where deemed necessary. Contrary to the licensee's procedure, count rate meters were not used or available for use at exits to contaminated areas. During tours of the licensee's facilities count rate meters were only observed at a few Step Off Pads for contamination areas. On 9/30/80 a count rate meter was located at the exit from the Torus Containment Area but the background was in excess of 1,000 cpm. On 10/1/80 and 10/3/80 a count rate meter was not located at the Torus Containment Step Off Pad. Personnel exited the Torus Containment, removed their protective clothing (full sets of protective clothing were required) and went up at least two elevations of the Reactor building to put on their street clothes. Contractor personnel then normally exited through the north Reactor Building door to their lunch room and office area. Other personnel normally left the dressing area and went through the Turbine Building to the

exit by the RRPD Office. However, personnel could also exit through the Screen House and at times through equipment doors on the west side of the Turbine Building. Other possible exit routes existed on other occasions. Personnel leaving the Torus Containment would not normally encounter a count rate meter set up for self frisking until they exited through one of the areas mentioned. An Eberline RM-3 was the instrument most commonly used for personnel frisking during the appraisal period. The licensee had a quantity of new Eberline RM-14 count rate meters available. On at least one occasion a Victoreen Thyac III was used to temporarily replace an Eberline RM-3.

The RPP procedure also state,s "The monitors" (referring to the count rate meters used for personnel frisking.) "are set up, calibrated and the alarm point set by the Radiation Protection group." The licensee does not have procedures for calibrating or setting the alarm points on the Eberline RM-3 or RM-14. The factory calibration for the RM-14's was still used. The Eberline RM-3's have licensee calibration stickers affixed to them to indicate that they are in current calibration. When asked about a calibration procedure for the RM-3 a licensee representative stated that they used the calibration procedure

for the Thyac III to calibrate the RM-3. Procedure number S-RTP-17 for the Thyac III makes no provisions for or reference to calibration of the RM-3. The RPP procedure in describing the method used for personnel self-frisking stated, "If no increase in the clicking rate is heard, no significant contamination is present. If clicking rate increases, survey that area even more carefully. If the alarm does not sound, no significant contamination is present." The RRPD technicians do not appear to have any clear guidance on where to set the alarm point. The alarm on the count rate meter at the exit area by the RP office when checked was set at the high end of the scale. On 9/30/80 one of the two RM-3 instruments at the Control Point near the RRPD office had been replaced with a Thyac III. The Thyac III is not equipped with an aural device and does not have an alarm capability. On 10/2/80 a RM-3 was set up for personnel exiting through a west Turbine Building equipment door. Due to the background noise in the area the aural device output could not be heard. The alarm point was also set at full scale for this monitor. As discussed later in this report the count rate meters in use had 30 mg/cm^2 detectors and could not detect the licensee's contamination release limits. The RPP procedure does not state which count rate meter or type of detector is to be used.

On several occasions the appraiser observed personnel frisking themselves as they exited the licensee's control points from the Turbine or Reactor Buildings. The RPP procedure, in describing self-frisking, stated, "Survey the rest of the body by passing the probe slowly over the body. Make an extra thorough survey of the bottom of shoes." Less than 10% of the personnel observed followed the procedure and frisked "the rest of the body." The remaining personnel observed only surveyed their shoes or their shoes and hands and occasionally their head or other selected portions of their body. Personnel frisking their hands and/or shoes moved the probe rapidly over the area checked in many cases. These frisking techniques were used even when it was obvious that a member of the appraisal team was observing. Only one of the Control Points is located such that it is in view of RRPD personnel or other licensee personnel. The same frisking techniques are used at the Control Point which are in full view of the RRPD Office. At no time during the appraisal did the appraiser observe RRPD personnel or other licensee personnel correct anyone's frisking technique or explain the proper technique. It was obvious to the appraiser that the licensee was not exercising any positive management control over personnel frisking themselves as they exited contamination areas or Restricted Area Control Points. The only positive personnel contamination control was the use of portal monitors at

the Guard House. The USNRC Resident Inspector stated that, until he questioned the practice a few weeks prior to the Appraisal, personnel were bypassing the portal monitors when they exited the facility. Procedure N1-RTP-48 provides information on the calibration and use of portal monitors but the licensee's procedures do not require the use of portal monitors. The licensee had issued a memorandum requiring the use of the portal monitors in the Guard House but the requirement has not been incorporated into the licensee's procedures. Further evidence of the lack of contamination control can be seen by the number of Step Off Pads found to be contaminated during routine surveys as discussed in the "Survey Records" section of this report.

Procedure RP-1 in Section 9.0, "Restricted Area Rules" states, "all tools and equipment must be checked for contamination by the Radiation Protection Group before removal from a restricted area." Items that the appraiser observed being removed from Restricted Area Control Points were smeared or smeared and frisked prior to being released. On a number of occasions the appraiser was in the RRPD office when workers came in to request release surveys on tools or equipment.

On several of the occasions the worker requesting the release survey became angry and abruptly left the RRPD Office when they could not get items surveyed promptly. At least two exits through Restricted Area Control Points are such that the individual is totally responsible for frisking themselves and notifying Radiation Protection prior to removing tools and equipment. When personnel encounter delays or problems in getting items released it can tempt them to remove items without the required surveys. It does not appear to the appraiser that the licensee is maintaining positive control over tools, equipment or other items being released through Restricted Area Control Points. It does appear that most items are being checked prior to release. However, the licensee does not have any method of ensuring items are not being carried out without being checked by Radiation Protection. In light of recent problems at other plants concerning the lack of control over the release of contaminated items this is an area of concern for the appraiser.

During the initial indoctrination the appraiser asked a licensee representative how personnel got tools checked prior to removing them from a contaminated area. The licensee representative stated that there were usually no controls at the Step Off Pads and that personnel were not required to have tools monitored prior to taking them across the Step Off Pad. A RRPD technician questioned

about the tool control indicated that tools do not have to be checked prior to being removed from contaminated areas. The technician indicated that RRPD would require workers to bag tools if they were working in highly contaminated areas. Another technician indicated that if tools are used on jobs where they might become highly contaminated that the workers bagged the tools and took them to the Decontamination Room. The technician indicated that RRPD would check the tools in the Decontamination Room before workers are allowed to decontaminate them. The RPP procedure does require that RRPD provide guidance for the removal of items from contaminated areas. On 10/3/80 an appraiser checked an upright cabinet in the Reactor Building on the clean side of the Step Off Pad for the Torus Containment area. A "Caution Radioactive Material" tag hanging on the cabinet handle stated that gloves were required for handling items inside the cabinet. The tag did not provide radiological information. The results of the smear on a pipe nipple in the cabinet was 17,451 dpm/smear (less than 100cm^2). Based on the survey results of the cabinet checked, the uncertainty of some personnel concerning the requirements for checking tools and the nature of the licensee's routine survey program (see "Types of Surveillance" Section) the appraiser believes that the tool control needs to be improved. The RPP procedure also addresses "Restricted Area Tools" which are to be "conspicuously

marked with orange paint." No "Restricted Area Tools" were observed by the appraiser and the use and control of those tools were not reviewed during the appraisal.

The RPP procedure provided general guidance for removing protective clothing. The two statements in the procedure concerning the clothing removal sequence were, "The more highly contaminated articles of clothing such as gloves, shoe covers, and sometimes the outer pair of coveralls are removed first," and "clothing is removed in a manner to prevent contamination of underlying clothing or skin." A licensee representative stated that methods for protective clothing removal are normally covered in the indoctrination training. The appraiser observed personnel removing protective clothing at Step Off Pads on several occasions. On two occasions personnel removed their only pair of gloves prior to removing their coveralls. These individuals grasped the outside surfaces of their coveralls and shoe covers with their bare hands while removing them. One of the individuals involved was a RRPD technician. Other personnel removed their clothing vigorously and could have easily contaminated themselves or the Step Off Pad. The appraiser is concerned by the fact that several individuals including RRPD technicians expressed a general lack of concern about contamination levels in some areas requiring

full sets of protective clothing. If the levels weren't "too high" then they weren't very concerned about the techniques for frisking, surveys or clothing removal. The appraiser realizes that stricter controls are required as contamination levels increase but an attitude of unconcern can easily precipitate into other areas.

The licensee's indoctrination program states that a Radiation Area is posted at 5mR/hr. Interviews with RRPD technicians and a licensee representative also indicated that 5 mR/hr was used to post Radiation Areas. The licensee's procedures contained the definition for a Radiation Area as given in 10 CFR 20.202. (i.e., 5 mR in one hour or 100 mR in five consecutive days.) Based on a normal 40 hour work week an exposure rate of 2.5 mR/hr will equal 100 mR in five days. When asked the basis for the 5 mR/hr used by the licensee the licensee representative stated that they had looked at the problem and determined that: (1) There were not any continuously manned areas in radiation areas; (2) They had looked at occupancy times in the Reactor and Turbine Buildings; and (3) Most normally accessible areas of the Turbine Building were less than 1 to 2 mR/hr. If the licensee plans to continue to use 5 mR/hr as the limit for posting Radiation Areas they need to conduct and document periodic reviews to demonstrate that the occupancy patterns don't change and that increasing radiation levels do not impact the validity of their basis for that limit.

Technical Specification 6.13 gives the licensee's commitment for "High Radiation Area" access and states that any individual or group of individuals permitted to enter high radiation areas, "shall be provided with a radiation monitoring device which continuously indicates the radiation dose rate in the area." Section II.1.3.3(a) and (b) of the RPP procedure provides requirements different than Technical Specification 6.13. Subparagraph (c) of the procedure provides the same wording as Technical Specification 6.13. This tends to be confusing. Paragraph 4.5.2(c) of the RPP procedure required that Self Monitors entering High Radiation Areas on an Extended RWP, "Enter area with appropriate radiation monitoring device, surveying as necessary." Paragraph 4.5.3 provides the licensee's procedural requirements for entry into High Radiation Areas under a RWP. Subparagraph 4.5.3(c) states in part, "When the potential for changing radiation levels indicates it would be advisable, a continuously indicating radiation monitoring device shall be provided. This may be provided by a portable survey instrument, a portable Area Monitor (Vamp or equivalent), or by Station ARM system (with or without local read-out.)" The licensee's procedures did not require the use of "a radiation monitoring device which continuously indicates the radiation dose rate" in high radiation areas except for Self Monitors entering on an Extended RWP. Additional guidance was needed in Procedure

RP-1 paragraph 4.5.3(c) for the use of the Station ARM system with local readout. If the monitor is not in the immediate vicinity of the workers or visible to the workers then use of Area Monitors would not meet the Technical Specification requirements. The use of Station ARM monitors without a local readout is not acceptable for meeting the requirements of Technical Specification 6.13. The appraisal Team found the licensee's procedure for control high radiation areas unacceptable and not in accord with Technical Specification 6.13.

In addition to the procedural problems indicated above the licensee is not implementing the requirements of Technical Specification 6.13. RWP's reviewed for work in high radiation areas do not require a continuously indicating monitoring device and only one required continuous RRPD coverage. A few examples were RWP number 1073 for a Fire Watch and the other RWP's issued daily for this job, plus RWP number 1092, and RWP number 1094. An appraiser asked five RRPD technicians and three licensee representatives what criteria Radiation Protection used for requiring continuous RRPD coverage on a RWP. All of the individuals questioned, initially indicated that there was not a specific exposure rate that required monitoring instruments or RRPD coverage. On 10/6/80 workmen were observed leaving

an area on elevation 236 of the Rad Waste Building. The door to the area was posted as a high radiation area. A high radiation area existed just inside the door where the radiation level was 100 mR/hr about 1.5 to 2 feet from a pipe. The appraiser did not see any of the workers carrying a monitoring instrument. Some of the tags used to post radiation levels in the area accessible to the workmen had not been updated since 10/79. (i.e., on elevation 248 a barrel was tagged as 1,200mR/hr at 3" and a resin line was tagged 260 mR/hr at 2 feet. Both tags were dated 10/79.)

On 10/7/80 an appraiser observed a contractor exiting a high radiation area near the Turbine Building exit to the Screen House. (The stairway to the next level down had a locked door across the entrance and was posted as a high radiation area.) The individual did not have a continuously indicating monitoring instrument. The appraiser questioned the individual and determined that he did not use a survey instrument in any of the high radiation areas that he entered. This individual was a fire watch and entered these areas several times a day. The individual was meeting the requirements of his RWP. The individual did understand the basic concept of mR/hr in relation to his dose in mR. He also indicated that tags indicated radiation levels in areas that he entered. When questioned about the

meaning of the 3" mR/hr readings on the survey section of the RWP he thought that they referred to radiation levels on 3 inch diameter pipes in the area. The failure of the licensee to require the use of or to use "A radiation monitoring device which continuously indicates the radiation dose rate" in high radiation areas is considered an item of noncompliance against Technical Specification 6.13.

There are a number of open stairways in the plant that are posted as entrances to high radiation areas. These stairways have handrails around the sides and back of the floor opening. The licensee provides a barricade across the front of the stairway that included a locked door. The enclosure does not extend around the floor opening and personnel could easily access the area by stepping over the handrail. These barriers are sufficient to meet the requirements of Technical Specification 6.13.1.a for access to areas less than 1,000 mrem/hr but do not meet the requirements of Technical Specification 6.13.1.b for areas greater than 1,000 mrem/hr. The appraiser did not have the opportunity to check these areas to determine if any of the radiation levels were greater than 1,000 mrem/hr. In view of the licensee's apparent lack of understanding of Technical Specification 6.13 this section should be thoroughly reviewed by the licensee and all RRPD personnel instructed on its implementation.

Previous USNRC inspections such as Inspection Report 79-7 have identified problems in findings doors or gates to high radiation areas open in violation of the licensee's procedures. Corrective action indicated by the licensee is to have RRPD personnel check the doors or gates three times a week. These door and gate checks are recorded on the licensee's Radiation Survey Log Sheets. The survey sheets reviewed for the period of August 25 through October 8, 1980 indicate that from one to four doors or gates are normally found open on each check and are shut by the RRPD technician. For example survey sheet number N47340 dated 9/5/80 indicated three doors were open and survey sheet number N47477 dated 9/12/80 indicated that four doors were found open. A Licensee representative was asked if any follow-up was done when doors are found open and if the problem is reported to higher management. He said that they tried to determine who left the doors open but had little, if any, success. He stated that to his knowledge the problem is not reported to higher management. The appraiser found a door to a high radiation area open during the appraisal (see "Facilities and Equipment" section of this report.) It is apparent that the licensee has not found an effective method of assuring that these doors or gates remain locked and closed. The requirement that RRPD periodically check these doors or gates does not appear to correct the problem. Evidence was not seen to

suggest that these requirements have been reemphasized to personnel or that higher levels of management are aware of or following up on the problem.

The RPP procedure and procedure RP-1 generally require the same posting requirements for radiation areas and high radiation areas as required by 10 CFR 20.203. Procedure RP-1 states that "Radiation-Contamination Tags" could be used, "When a Radiation Area or High Radiation Area sign is not required, or in addition to such signs to convey information concerning either or both hazards." In referring to the tags, procedure RP-1 also stated, "Appropriate precautions or requirements for entry to the area, or handling of the equipment tagged, are provided." The tags used and referred to by the procedure as "Radiation-Contamination Tags" are actually "Caution, Radioactive Material" tags that provide space on one side for radiation levels and space on the opposite side for contamination levels. The tags used meet the requirements of 10 CFR 20.203(f) for "containers" of radioactive material. These tags do not meet the requirements of 10 CFR 20.203(b) or (c) for radiation or high radiation areas. From the licensee's procedures it would appear that the licensee intends for the tags to provide additional information as recommended in 10 CFR 20.203(a)(2). However, the use of a "Caution-Radioactive Material" tag for this purpose is confusing and

inappropriate. The use of the tags is one method used by the licensee to provide some radiological data to plant personnel. In at least one instance the licensee used the tags as the only method to post radiation or high radiation areas. On 10/2/80 a "Caution, Radioactive Material" tag was the only method used to post the entrance to a high radiation area. This posting was at the stairs on elevation 261 of the Turbine Building for a Fan Room. For other areas observed one side of a roped-off radiation area would be properly posted but the other sides would only be marked with "Caution, Radioactive Material" tags. Two examples were: (1) Turbine Building elevation 261 around the air compressors; and (2) Turbine Building elevation 261 around the Feedwater Pumps. The use of "Caution, Radioactive Material" tags, referred to by the licensee as "Radiation-Contamination Tags" to post radiation or high radiation areas does not meet the requirements of 10 CFR 20.203 or the licensee's procedures. This is an item of noncompliance, contrary to 10 CFR 20.203(b), 10 CFR 20.203(c) and Technical Specification 6.11 (failure to comply with procedures.)

Procedure RP-1 in paragraph 4.3.6 states, "No specific wording is required by 10 CFR 20 in marking contaminated areas" and "no specific contamination levels are specified by 10 CFR 20" and further indicates that deviations to

guidance of "this section" of the procedure may be approved by the "Supervisor, Radiochemistry and Radiation Protection, or Assistant." While it is true that 10 CFR 20 does not specifically provide posting methods or limits for contamination, this does not relieve the licensee from clearly stating the methods to be used to delineate and control contamination areas. On 10/2/80 at elevation 261 of the Turbine Building, tags were hung on 1" lines coming off the suction or discharge line of two Cooling Water Pumps. The tags stated, "Do not stand on pump pad without shoecovers, 1,200 dpm/100cm^2." The pumps were not roped off and step off pads had not been put down in the area. The licensee's procedures imply methods of posting contaminated areas and provides limits that are subject to change by the Supervisor, Radiochemistry and Radiation Protection. The appraiser believes that these items need to be more clearly addressed in the licensee's procedures.

The licensee, as stated previously, required RWP's for areas that exceed specified radiation and contamination levels. In addition, levels were set, above which Self Monitors were not permitted entry under an Extended RWP. Individuals have two methods of determining if an RWP is required for an area. (1) They could ask Radiation Protection,

(2) They could check the tags, when available, at the entrance to an area, but many of these had not been updated for a year. RRPD technicians and a licensee representative stated that Self Monitors are responsible for making their own surveys to determine if an area exceeds the approval level for an Extended RWP. As noted earlier, the Self Monitors surveys are not recorded. Based on the licensee's procedures and the fact that many areas are not routinely surveyed, the determination as to whether or not a RWP is required often is not made until RRPD survey the area prior to issuing a RWP. The licensee does not have a clear method of indicating to personnel when areas require a RWP or which areas exceed the limitations for an Extended RWP. In some cases signs at the entrances to areas state that a RWP is required. In other areas requiring a RWP there is not any indication at the entrance to the area that a RWP is required. The licensee's procedures do not require posting entrances to areas to indicate that a RWP is needed for entry. Based on the survey data available it is not even apparent that the licensee could demonstrate that the information is available to determine if a RWP is required without conducting additional surveys. The appraiser has determined that the licensee's access control and posting procedures plus the posting methods actually used are generally unacceptable. In the Spent Fuel Area of the Reactor Building, cut up LPRM's had been

wrapped in plastic and stored in a corner of the room. The area had been roped off as a high radiation area. The tags on the LPRM indicated that some of them were reading as high as 1 R/hr. No shielding, temporary or permanent was used to shield the LPRM's. Some of the tags used to mark the individual packages had fallen off and were laying on the floor. This area needs attention by the licensee and should be reviewed from an ALARA standpoint.

A container housing a neutron source was located near the normal exit from the Spent Fuel Area in the Reactor Building. The source container was roped off and posted as a radiation area but the container was not labeled in accordance with 10 CFR 20.203(f) and the activity could not be determined from the information on the container. A licensee representative was informed of the problem and later stated that they had corrected the labeling on the container. This was not verified by the appraiser. On 10/3/80, the appraiser checked the labeling on three sources located in the Calibration Room that were used to calibrate Area Radiation Monitors. The calibration units were labeled, "A.R.M. Calibration Unit, Cat. No. 846D959G1." The serial numbers were: 5,481,654, 6,572,039, and 5,481,653. The calibration units were not labeled in accordance with 10 CFR 20.203(f) and did not even state that they contained radioactive material. On 10/3/80 an appraiser found four unlabeled

sources in the Calibration Room. The sources were about two inches in diameter and were marked C5, C6, C7, and C8. The 2 inch diameter C8 source which was reported as 29 microcuries read 7.5 mR/hr on acontact with a "Cutie Pie." One of the other 2 inch sources labeled "Cs-137, 80 mR @3" read 80 mR/hr on contact. Using this as a rough check it indicated that the second source contained approximately ten times the activity of the C8 source or about 290 microcuries. It could be readily assumed that the source contained in excess of 100 microcuries of a beta and/or gamma emitting isotope and thus was required to be leak tested by Technical Specification 3.6.5 and 4.6.5. This source has not been leak tested. This is an item of noncompliance. 10 CFR 20.203(f) requires the marking of containers of radioactive material that exceed the applicable quantities of 10 CFR 20, Appendix C. The quantity listed in Appendix C for Cesium-137 is 10 microcuries. Therefore, the source marked C8 and the source marked Cs-137, 80 mR @ 3" were not labeled in accordance with 10 CFR 20.307. Other 2 inch diameter sources were observed in plastic bags attached to "Vamp" portable area radiation monitors to provide an upscale reading. The sources observed were only labeled Cs-137 and/or indicated the radiation exposure rate at 3". The activities were not given on the sources and they were not labeled as radioactive material. The licensee apparently did not have records for many of these

sources; did not know how many they had; and, did not know the activities of many of the sources. The majority of the sources had apparently been made by the licensee. Without an inventory or recorded activities for these sources the licensee could not determine if any required leak testing, labeling or if any became lost and required a report in accordance with 10 CFR 20.402. The lack of inventory and control for these sources is an item of noncompliance. Contrary to Technical Specification 6.11. The failure of the licensee to properly label the neutron source referenced above, the four ARM calibration units, the source marked C8 and the source marked Cs137, 80 mR @ 3" is an item of noncompliance contrary to 10 CFR 20.203(f). It is quite probable that other sources are also in noncompliance. Other containers such as bags of trash piled up by the door to the trash compactor and a LSA box full of waste outside the door to the Rad Waste Building were not labeled to indicate they contained radioactive material.

The licensee does not have positive management controls established that would insure that individuals and equipment are adequately monitored for contamination within the plant or prior to leaving the licensee's restricted area. The procedure for the removal of protective clothing is not specific and techniques observed are inadequate. The

licensee needs to conduct and document periodic reviews of personnel occupancy patterns and radiation levels to continue to justify using 5 mR/hr as the criteria for posting radiation areas. The licensee has not implemented or incorporated into their procedures the requirements of Technical Specification 6.13. The method of barricading open stairways needs to be reviewed. The licensee still has not demonstrated the ability to keep doors and gates to high radiation areas shut and locked. The licensee's access control and posting procedures plus the posting methodology actually used are generally unacceptable. The licensee does not have adequate accountability, control, labeling or leak testing for all radioactive test and calibration sources.

3.6.8 Instrument Suitability and Use

3.6.8.1 Portable Dose Rate Survey Instruments

The "Radiation Protection Procedures" state that survey instruments are "located in strategic locations throughout the station." A sign out log and check source is provided in the Instrument

Storage Room for instruments obtained from that location. Procedure N1-RTP-67 and the RPP procedure both required that damaged or out-of-calibration instruments be tagged to indicate that they are not to be used. Two "wells" containing Co-60 sources are used to calibrate most dose rate instruments and a Ra-226 source is used to calibrate count rate instruments. Various lower activity sources are used for test and calibration of laboratory equipment.

The licensee's method of controlling instruments made it difficult to determine where instruments are located or how many are available. (This is discussed in more detail in the "Facilities and Equipment" Section of this report.) With the exception of instruments located in the Instrument Storage Room the licensee does not make provisions for checking survey instruments prior to use with a check source as recommended by ANSI N323, "Radiation Protection Instrument Test and Calibration." On 10/3/80 appraiser the observed that three Eberline RM-14 count rate meters located in the Source Calibration Room did not have calibration

stickers or a yellow Instrument Repair Tag as required by the RPP procedure, Section 11.1.3(e). Three other RM14's had calibration stickers affixed but were considered inoperative. A RRPD technician stated that the instruments had been returned by I & C because the batteries were discharged. Other instruments observed did have yellow Instrument Repair Tags Attached.

Procedure S-RTP-16 provides instructions for the operation and quarterly calibration of the Eberline Teletector. The Teletector is a GM survey instrument calibrated to measure dose rates. The ranges on the Teletector are: 0-2 mR/hr; 0-50 mR/hr; 0-2 R/hr; 0-50 R/hr; and 0-1,000 R/hr. Procedures S-RTP-16 requires calibration of all but the 0-2 mR/hr range. The procedure stated that the 0-2 mR/hr range is not to be used. The Teletectors had labels affixed to indicate that they are not to be used on the 1,000 R/hr range. On two separate occasions the appraiser asked a contractor Radiation Protection Technician and a licensee RRPD technician which ranges could be used on the Teletector. Both

individuals indicated that they could not use the 1,000 R/hr range but that the 0-2 mR/hr range is calibrated and could be used. When the appraiser questioned two RRPD technicians that had been calibrating the Teletector they stated that they did not calibrate the 0-2 mR/hr range. They also indicated that they had been instructed not to calibrate the 0-1,000 R/hr range because the Co-60 Well Source had decayed and did not have sufficient intensity to calibrate that range. The RRPD technician also stated that convenient dose rates were selected to give approximately a mid-point reading on each scale calibrated. The technicians do not follow the calibration procedure or use the calibration points specified in the procedure. A well designed job is used to position the Teletector for calibration. The procedure does not specify the distance that the probe be shall extended or address the fact that the high range detector is offset from the probe axis. Due to the detector offset it will effect the measured probe to source distance. This effect at small probe to source distances can significantly effect the

results. The calibration record form for the Teletector only requires entering the date calibrated and initials of the individual performing the calibration. The calibration record form does not require listing the ranges calibrated, dose rates used, the before or after readings or other information recommended by ANSI N 323. Procedure S-RTP-16 only provides for calibrating each range near the midpoint. The procedure does not require checking the calibration at the high and low ends of the scale as recommended by ANSI 323 paragraph 4.2.2.1. The procedure does not provide for making or recording check source readings following calibration.

Procedure S-R7P-16 provides instructions for the operation and calibration of the Victoreen Models 740A and 740F, "Cutie Pie" survey instruments. The Cutie Pie is an ionization survey instrument and was calibrated to measure gamma exposure rates and beta dose rates. The ranges on the model 740A are: 0-50 mR/hr; 0-500 mR/hr; and 0-5,000 mR/hr. The ranges on the model 740F are: 0-25 mR/hr; 0-250mR/hr; 0-2,500 mR/hr; and

0-25,000 mR/hr. Procedure S-RTP-15 specifies calibrations on a quarterly basis as work schedules permit. The appraiser finds this unacceptable. The quarterly calibration frequency needs to be firmly established. The procedure specifies one calibration point at 4/5 full scale for each scale. The procedure does not require checking other points on the scale nor does it provide criteria for the accepted accuracy as recommended by ANSI N323 paragraph 4.2.2.1. A uranium slab is used to determine a beta calibration factor for the Cutie Pie for determining beta surface dose rates. The procedure requires recording the beta dose conversion factor on the instrument calibration sticker but not on the instrument calibration record. The calibration record form for the Cutie Pie only requires entering the calibration date. The calibration record form does not require recording the Technician's initials, beta conversion factor, ranges calibrated, dose rates used, the before and after readings or other information recommended by ANSI N323. The procedure does not provide for making or recording check source readings following calibration.

Procedure S-RTP-46 provides instructions for the operation and calibration of the Victoreen Model 808D-2 "Vamp" Area Monitor. The Vamp utilizes a GM tube and is calibrated in mR/hr. Procedure S-RTP-46 specifies a semi-annual calibration frequency for the vamp. The procedure does not specify a calibration source to be used for calibrating the Vamp or the method used to position the Vamp during calibration. The licensee has two different model Vamps. Both models have a three decade logarithmic scale. The procedure for one model requires two calibration points to cover the three decades while the other model requires three calibration points to cover the three decades. Neither calibration procedure meets the recommendation of ANSI 323 paragraph 4.2.2.2. The procedure data sheet indicates the calibration exposure rate, required accuracy and provided "as found" and "as left" readings at each calibration point. The procedure does not provide for making or recording check source readings following calibration. The operating procedure does not provide guidance concerning when Vamps should be

used or where alarm points shall be set. A licensee representative indicated the alarms are normally set just above the observed reading but that it is basically an individual's judgment.

Procedure S-RTP-47 provides instructions for the operation and calibration of the Nuclear Associates Model 05-571, Minimonitor II, GM survey meter. Procedure S-RTP47 specifies a semi-annual calibration frequency. Due to its usage the appraiser believes the Minimonitor II should be on a quarterly calibration schedule. The procedure only provides for calibrating one point on two of the three scales of the instrument which does not meet the recommendations of ANSI N323 paragraph 4.2.2.1. The procedure data sheet does indicate the calibration exposure rate, required accuracy and provided "as found" and "as left" readings at each calibration point. The procedure not does provide for making or recording check source readings following calibration.

The licensee has one Eberline model PNR-4 Neutron Rem Counter. The licensee does not have a procedure for the operation, use or periodic checks of the

instruments. This is an item of noncompliance contrary to Technical Specification 6.11. The licensee stated that the PNR-4 is calibrated by the manufacturer on an annual basis. On 10/9/80 the calibration sticker was checked by the appraiser and indicated that the instrument was due for calibration on 10/8/80. The licensee has a calibration certificate from the manufacturer indicating that the instrument was calibrated on 10/8/79. A note at the bottom of the calibration certificate states that the manufacturer recommendes calibration "on a routine basis (approximately 90 days)". The calibration frequency used by the licensee for the PNR-4 is unacceptable.

3.6.8.2 Portable Contamination Detection Instruments

Procedure S-RTP-17 provides instructions for the operation and calibration of the Victoreen Model 490 Thyac III count rate meter. This instrument can be used with various detectors and is normally used with a GM detector that has a wall thickness of 30 mg/cm^2. Paragraph 2.4 of Procedure S-RTP-17 requires quarterly calibraton with a beta-gamma detector and with the alpha detectors prior to use. A "G-M calibration device" with four shielded wells and containing a Ra-226 source is used for calibrating the beta-gamma detectors. Pu-239 sources are used for calibration of the alpha scintillation detector. Ra-226 is not one of the sources recommended by ANSI N323 for beta calibration. The procedure not does require a linearity check for each range by any method. A one point calibration is specified for each range. The calibration does not meet the requirements of ANSI N323. The procedure does not require making or recording check source readings following calibration or checking the instrument with a source prior to use as recommended by ANSI N323.

As discussed in the "Access Control" Section 3.6.7, of this report, the licensee does not have an operating or calibration procedure for the Eberline RM-3 or RM-14. This is an item of noncompliance contrary to Technical Specification 6.11.

Procedure S-RTP-17 for the operation and calibration of the Thyac III and the method used to calibrate the Thyac III are unacceptable. Procedures do not exist for operation or calibration of the RM-3 or RM-14.

3.6.8.3 Fixed Dose Rate Instruments

The operation and calibration of the fixed area radiation monitors was only briefly reviewed by the appraiser. Data sheet 3 of Procedure N-RTP-31, "Routine Calibration of Area Radiation Monitors, NMP-1" specifies the alarm points for 29 of the area monitors. Data sheets 1 and 2 only provide calibration data for 29 of the 34 station area monitors. The appraiser did not determine why the other 5 area monitors are not included on the data sheets. In discussing the alarm settings

for the fixed area monitors a licensee representative stated that the licensee does not use the alarm points specified on Data Sheet 3. The licensee representative said the alarm points are normally set two or three time the normal background for the monitor. The method actually used to set alarm points needs to be specified in the procedure and the procedure needs to be followed.

3.6.8.4 Continuous Air Monitors

The operation, use and calibration of the continuous air monitors (CAM) was only briefly reviewed by the appraiser reviewing surveillance. Procedure N1-RPT-18 contains the calibration procedure for the CAM. The licensee has five operable Nuclear Management Corporation air samplers. A licensee representative stated that the CAM's are only used for trend indication and not for determining MPC values. However, Section III B.1.2 of the RPP procedure states that CAM alarm set points, based on MPC limits, are used by the licensee for monitoring jobs and plant ventilation systems. That section also stated that the CAM alarm

points are used as criteria for evacuating areas of the building. One CAM is connected to the combined plant ventilation duct via a flexible corrugated hose that is over 30 feet in length. The appraiser is concerned about particulate loss in the hose from the plant vent to the CAM. That CAM has a remote alarm in the Control Room and is used to initiate a plant evacuation. The licensee uses six Cs-137 sources varying from .009 to 11 microcuries for calibration of the CAM's. The sources are not traceable to the National Bureau of Standards.

3.6.8.5 Portable Air Samples

The licensee utilized low volume portable air samplers to continuously collect air samples. High volume air samples were used for grab sampling. The use of the air samplers is described in the "Airborne" Surveillance Section 3.3.1.2 of this report.

The sample heads for the six low volume air samples in use were from 1 1/2 to 2 feet off the floor and the particulate filters were mounted horizontally. These could not be considered breathing zone samples. Two samplers were equipped with charcoal cartridges and prticulate filters. These samples were changed weekly. The particulate filter and charcoal cartridge were counted simultaneously on the Ge(Li) spectroscopy system immediately after sampling. One hundred percent charcoal retention efficiency is assumed.

The appraiser noted that according to published test results the retention efficiency for the charcoal cartridges may be expected to decrease from 95% to 35% as a function of flow rate and charcoal mesh size. A license representative stated that the licensee had tested a low volume charcoal cartridge by removing and counting 1/8 inch layers on a gamma spectroscopy system. The appraiser reviewed the data but due to the low count rates determined that the data was not conclusive or supportive, and noted that sufficient evaluation was still indicated to establish to account for collection efficiencies for iodine samples.

Four samplers contained only particulate filters. These samples were changed bi-weekly and were counted 24 hours after sampling with a thin window GM detector connected to the model BC-4 counter scaler. A RRPD Technician was asked if he knew the purpose for waiting 24 hours to count the samples. He replied that he didn't know why except that that was the way he had been taught to do it. The licensee did not have procedures for counting low or high volume air samples, and the appraiser noted that a number of the particulate filters checked showed evidence of leakage around the filter which would invalidate the results.

One magnehelic guage was used to determine the initial and final differential pressures for all low volume air samples. A graph was provied in Procedure S-RTP-11 "Operation and Calibration of the Low Volume Portable Air Sampler" to convert the average differential pressure to CFM. The magnehelic guage used did not have a calibration sticker affixed. A RRPD Technician stated that the magnehelic guage had been in use several years and to his knowledhe it had not been

calibrated during that time. Regulatory Guide 8.25, dated August 1980 "Calibraton and Error Limits of Air Sampling Instruments for Total Volume of Air Sampled" recommends semi-annual calibration of air flow or volume metering devices. The appraiser further noted that calibration frequency of greater than one year for flow measuring devices was not previously considered acceptable.

The low volume portable air samplers were equipped with an hour totalizer. Some of the totalizers were not operable, and none of them were relied on. As noted below under "Laboratory Instruments" the method used to determine the activity on the sample media used was unacceptable. Section III.B.1.2.2 of the RPP procedure stated that the low volume air samplers, "are used to evaluate long term chronic airborne activity exposure." Thus the low volume air samples are considered by the licensee to be part of the air sampling program. In view of these observations, the methods used for collecting, determining air flow, counting and analyzing low volume air samples were considered unacceptable.

The licensee utilizes staplex high volume air samplers. Procedure S-RPT-70 required quarterly calibration of the flow rate for the samplers. The calibration consisted of determining the flow rate of individual air samplers using the "staplex flow rator" discussed later in the report. The individual air samplers were not equipped with flow indicating devices. The flow rate determined quarterly was marked on each air sampler and was the flow rate used for successive air samples during the quarter. Flow rates were not checked before or after individual samples. A licensee representative was asked why initial and final air flow measurements were not made for each sample to account for flow changes due to filter loading. The licensee representative indicated that such action was not considered. A Gelman 70mm diameter type A&E glass fiber particulate filter and a MSA, GMA Part No. 44135 charcoal cartridge were used with the high volume air sampler. The charcoal cartridges screwed into the sampler and seated against a gasket. The particulate filter was placed on the convex surface of the charcoal cartridge and were held in place by the sample suction. Two of the three particulate filters observed on

9/30/80 indicated leakage around the filter which would invalidate the results. The dust loading on the third filter was not heavy enough to determine if leakage had occured. The high volume air sampler used on 9/30/80 was labeled 8CFM based on the quarterly calibration. The MSA cartridge contained 107 holes. Each hole was about 1/8 inch diameter which would result in a surface of approximately 1.3 square inches. Based on that surface area and a 8CFM flow rate the velocity through the sample media would be 875 feet per minute (fpm). (For a particulate filter positioned in the standard Staplex filter holder the velocity corresponding to 8CFM would be approximately 235 fpm due to the larger cross section area.) Based on data from another manufacturer of charcoal cartridges the retention efficiency at a velocity of approximately 833 fpm for a 40-50 mesh TEDA treated charcoal-coconut cartridge is only 50%. The retention efficiency for a 14-20 mesh TEDA treated charcoal-coconut cartridge was only 50% at half that velocity and would be well less than 50% at 833 fpm. The appraiser obtained the following information from MSA. The MSA, GMA Cartridge was designed for low velocity use on respirators and the

manufacturer recommended not using them for air sampling. The MSA cartridges contain approximately 14-16 mesh activated carbon. The manufacturer did not have any data on retention efficiency for iodine versus flow rates. Based on the information given above the retention efficiency of iodine for the MSA, GMA cartridge was approaching a negligible value when used with the licensee's high volume air samples at 8 cfm. However, the licensee assumed a 100% retention factor for that configuration. ANSI N13.1, "Guide to Sampling Airborne Radioactive Material in Nuclear Facilities" indicates that the collection efficiency for the Gelman E, Glass-Fiber filter at 106 cm/sec (approx. 209 fpm) is 99.986% and apparently increasing with velocity. The MSA cartridge and particulate filter were counted simultaneously on the Ge(Li) gamma spectroscopy system. The particulate filters are not counted for beta. A licensee representative was asked why the particulate samplers were not counted for beta. The licensee representative stated that based on the quarterly report of airborne releases from the plant, the primary isotopes were all gamma emitters. The appraiser reviewed the quarterly report with the licensee representative and the

report indicated that Sr-89 (beta emitter only) accounted for a significant percentage of the activity released. In addition, the appraiser noted the ratio of isotopes released through the stack cannot be equated to the ratios in the plant for a number of reasons. Also, as with the low volume air samples the method used to determine the activity on the sample media was unacceptable. Based on these observations, the methods used for collecting, determining air flow, counting and analyzing high volume air samples were considered unacceptable.

The portable air sampling methodology used by the licensee was unacceptable. The licensee did not have procedures to specify methods for counting air samples. The low volume and high volume air samples represented major elements of the licensee's radiation protection program. Therefore, this is an item of noncompliance, not meeting the requirements of 10 CFR 20.201 (Surveys), 10 CFR 20.103(a)(3) (Measurements of Airborne Concentrations for Respiratory Protection), and Technical Specification 6.11 (Procedure for Counting Air Samples.)

3.6.8.6 Portal Monitors

Procedure N1-RTP-48, "Operation and Calibration of Portal Monitor" required a semi-annual calibration and a monthly check of the portal monitors. The calibration and monthly check both verified a five second count time and the operation of the alarms using a check source. The source required by the procedure was a 10 microcurie Cs-137 source that had been shielded to give a count rate of approximately 1500 cpm. The procedure required setting or checking the alarm points so they would alarm within five seconds when the source was held approximately two or three inches from each detector. The procedure did not state the method of determining that the check source was 1500 cpm nor did it specify at what distance the 1500 cpm was determined. The source used by the licensee was labeled to indicate that it was 1700 cpm at one inch. A RRPD Technician, when asked, stated that the 1700 cpm was at one inch and was determined using a Thyac III equipped with a beta-gamma probe. (The Thyac III is calibrated against a shielded Ra-226 source such that it indicated cpm gamma). The technician did not know what

the cpm reading would be at three inches from the source. The technician indicated that they followed the procedure and held the source three inches from the detectors when setting the alarms. Assuming 1700 cpm at one inch the minimum indication from the source at 3 inches would be 190 cpm. Furthermore, assuming that the conversion for the Thyac III was 0.04 cpm/dpm (see "Calibration Program" section) the alarm on the portal monitor would have been set at approximately 4,700 dpm, minimum. The appraiser noted that the method and procedure used to set the portal monitor alarms needs significant improvement.

3.6.8.7 Laboratory Instruments

Laboratory counting equipment includes two Ge(Li) gamma spectroscopy systems (only one was calibrated and used), a NaI well detector with a single channel analyser, two gas flow proportional counters and several counter scales with thin window GM detectors.

A Ge(Li) system had been installed in 1977 and uses a Canberaa 8180 MCA. The spectral data is analyzed with a Hewlett Packard 9825A. The complete system was purchased, installed, set up and programmed by a vendor. Calibration sources traceable to NBS were supplied by the vendor for the geometries used by the licensee. The standards currently used were dated 1/1/80. The licensee does not have an operating procedure for this system. The instructions for its use consist of two pages of handwritten notes taped to the wall by the system. On 10/8/80 the appraiser briefly reviewed a Ge(Li) system operating procedure which was still in a handwritten draft form. A licensee representative told the appraiser that the procedure had not been sent for approval because he had not had time to review or understand it. The draft reviewed by the appraiser was dated January 1980 and did not meet the requirements of ANSI N18.7 paragraph 5.3, "Preparation of Instructions and Procedures." The system had been operated since 1977 without a procedure. The licensee identified the need for a procedure on 1/80. Ten months later the procedure had not been submitted for approval. This system is used for analyzing radiochemistry samples required

by Technicial Specifications, radioactive waste analysis and air samples. Therefore, this is an item of noncompliance contrary to Technical Specification 6.11.

As discussed in the "Surveillance" section of this report the RRPD Technicians knew little about the system except how to call up the program needed. It was apparent that the technicians had not received sufficient training to effectively or correctly use the equipment.

The older gamma spectroscopy system has not been used since the newer one was installed. Several technicians indicated that they could not understand how to calibrate or set the older system up. Procedure V.A.1-N covers the operation of the old gamma spectroscopy system. That procedure was not reviewed since the system was not in operation.

A NaI Well Counter is used for radiochemistry results and not for samples reviewed by the appraiser. The calibration of the well counter consists of using a pitchblend source and adjusting

the discriminator until the desired counts are obtained. Graphs of counts versus discriminator settings are also prepared.

A new Nuclear Measurements Corporation gas flow proportional counter was purchased and installed in mid 1980. The system was purchased as a result of a licensee's QC inspection which identified that smears were not counted for alpha on radioactive waste shipments. A cursory check by the appraiser indicated that the system was set up on the alpha plateau and appeared to be operating properly. The RRPD technicians indicated that this system is only used to measure alpha. A Nuclear Chicago gas flow proportional counter with an automatic sample changer is also in use. Procedure V.A. 2-N contains the operating and calibration instructions for this system. Several technicians stated that the system had not been operable for several years and had just recently been put back into operation. The technicians said they were reluctant to use the system because they felt that it was not operating properly. Two sets of counting efficiencies were available

dated 6/19/80 and 9/19/80. Alpha and beta efficiencies are given for: 47mm glass fiber filter; 2 inch, S.S. H_2O planchet; 1 1/4 inch, S.S. H_2O planchet; and disc smear. The results show significant inconsistencies between the two sets of data as shown below:

	ALPHA EFF.		BETA EFF.	
Sample Type	6/19	9/19	6/19	9/19
Glass Fiber	0.159	0.027	0.313	0.348
2" Planchet	0.156	0.025	0.114	0.133
1.25" Planchet	0.258	0.040	0.428	0.188
Disc Smear	0.167	0.025	0.271	0.378

Upon further review the appraiser discovered the following problems. (1) The method used to determine the alpha and beta plateaus is incorrect. (2) All of the calibration sources required by procedure V.A.2-N are not available thus they are not used. (3) The gas flow to the detector is not regulated properly resulting in low and inconsistant counts. (The appraiser verified with a short test that at least 5 to 6 minutes was required from the time a sample was positioned under the detector until the counts stabilized.

The licensee normally uses a one minute count time and counting starts in less than one minute after the sample is in position.) Thus the system is not set up or operated properly, and the calibration is not done by procedure. This is an item of noncompliance, not in accordance with Technical Specification 6.11.

Several model BC-4 counter scalers with thin window GM detectors are in use. These instruments are the ones normally used for counting smears and low volume air samples. The background for the BC-4 is normally 40 to 50 cpm. Smears and air samples are routinely counted for one minute. A one minute counting time for air samples is normally considered, too, short to provide good counting statistics. This is especially true for low activity samples. The licensee needs to review the method of counting air filters and other samples and account for the counting statistics involved.

The licensee does have operation and calibration procedures for the newer Ge(Li) gamma spectroscopy system and the Technicians are not adequately trained on the system. The operation of the

Nuclear Chicago gas flow proportional counter is unacceptable. The licensee needs to review the methods used to count samples in relation to the counting statistics involved.

3.6.9 Calibration Program

The licensee uses two source "wells" for calibrating dose rate instruments. Each well contains a Co-60 source that could be raised or lowered to vary the dose rate at the top of the wells. Survey instruments are positioned over the wells by the use of a plexiglass roller table and calibration jigs. A Victoreen Condenser R-Meter is used to calibrate the Co-60 source positions on an annual basis.

Procedure S-RPT-14, "Well Calibration" describes the method used to calibrate the well. Procedure S-RTP-13, "Use of Condenser R-Meter" provides instructions for the use and operation of the Condenser R-Meter.

Procedure S-RTP-13 indicates that a chamber correction factor for the "1/2 inch plexiglass chamber support if used" was required. The procedure was not clear as to when this factor was to be utilized. A RRPD Technician that used the equipment did not know what the factor had

reference to and didn't use it. The values given these correction factors are also included in Procedure S-RTP-14 and are called Chamber Correction Factors. Neither procedure requires the use of the correction factors assigned to each chamber when it was calibrated annually by NBS. The technicians performing calibrations on the well with the R-Meter use an additional data sheet that is not contained in either procedure. The data sheet indicates the correct factors needed to determine the exposure based on the R-Meter reading.

Procedure S-RPT-13 states that the R-Meter would be returned annually to the Victoreen Company for calibration. This procedure also indicates that six chambers are available for use with the R-Meter. Neither procedure specifically indicates which chambers are to be used for the well calibration. The technicians stated that the one or two R-Chambers calibrated with the Condenser R-Meter at NBS are used to calibrate the other R-Chambers. These other R-Chambers are also used in calibrating the Well sources. This secondary method for calibrating some of the R-Chambers does not meet the requirements of ANSI N323.

The Co-60 sources used in the well calibration have decayed to the point that the upper range on the Teletector can not be calibrated. A licensee representative stated that their current budget included purchasing new sources. Another licensee representative stated that they had considered having Victoreen review their entire calibration set up. No action had been taken on either item.

Procedure S-RPT-14 paragraph 4.3.15 requires that two measurements made at the same depth during the annual well calibration, agree within 25%. A 25% error is not acceptable for a calibration source used to calibrate instruments to ± 10%.

The calibration methodology provides a well designed calibration set up for dose rate instruments. However, the accuracy of the dose rate instruments calibrated with the well calibration is in question for several reasons. These include: the method used to calibrate some of the R-Chambers; procedural problems; and, the lack of training for the RRPD Technicians using and calibrating the sources.

A "G-M Calibration Device" is used to calibrate the licensee's beta-gamma count rate meters. The "G-M calibration device" is a "black box approximately 6x6x24 inches" and containes a "sealed radium needle in a lead cup and four probe wells

with varying thickness of lead between the wells and the radium source." Certificates supplied by the licensee indicates the source is 1.0 mgm of Radium and was purchased in mid 1967. Since the "open window" beta-gamma probe is more responsive to beta than gamma radiation the use of a gamma source (the beta was shielded by the device) does not seem appropriate. This source does not meet the recommendations of ANSI N323.

The beta-gamma probes normally used by the licensee are cylindrical and have a 30 mg/cm^2 wall thickness. In response to a TMI Lessons Learned Item the licensee conducted some tests to determine the minimum sensitivity of these probes. Cesco charcoal cartridges spiked with various concentrations of a radioisotope (presumably I-131) were used.

Of the count rate meters used by the licensee for personnel monitoring for contamination only one was observed by the appraiser to have a background lower than 150 to 200 cpm. The sensitivity of the licensee's count rate meters is well above the 100 $dpm/100\ cm^2$ limit set by the licensee for release limits for unrestricted areas. The 30 mg/cm^2 cylindrical detectors do not meet the requirements of ANSI N13.12 (Draft) for release of material to unrestricted areas.

The licensee's method of calibrating count rate meters used for contamination surveys is unacceptable. The minimum detectable activity of the instruments used for personnel monitoring and contamination surveys is above the licensee's release limits for unrestricted areas.

As stated previously the magnehelic guage used to determine the flow rate for the low volume air samplers was not calibrated. A "staplex flowrator" was used to calibrate the air flow for the high volume air samplers. Procedure S-RPT-70 provides a graph to relate the pressure drop across the "flowrator", determined by a manometer, to the flow rate in CFM. The graph is labeled "Staplex Flowrator, Filter Paper Curve." A licensee representative was asked about the origin of the calibration for the "flowrator" and if the "flowrator" was routinely calibrated. The licensee representative indicated that the "flowrator" and calibration curve were in use when he went to work there. To his knowledge the "flowrator" had not been calibrated since the original data was provided. The lack of routine calibration of the "flowrator" is unacceptable.

Procedure V.A.2-N specifies the use of Tl-204, Pu-239, Co-60 and Sr-90 sources for setting up and calibrating the Nuclear Chicago gas flow proportion counting system. The procedure requires the Co-60, the Sr-90, Tl-204 and Pu-239

sources for setting the alpha gain. Contrary to this Co-60, Sr-90 and Tl-204 sources were not being used by the licensee. The procedure requires the use of a series of Tl-204 standards prepared in different sample configurations for determining the gross beta counting efficiency. Contrary to this Cl-36 was being used instead of Tl-204. The licensee has a calibration certificate for the original vial of Cl-36 supplied by NBS.

A disc source labeled with a felt tip marker as a Pu-239, 0.006 µCi #11.182 is used to determine the alpha efficiency. RRPD personnel had reason to believe the source had been damaged (part of the activity wiped off) so the source had been "calibrated" against the NMC gas flow proportional counter. The NMC counter scaler is calibrated for alpha with a source stamped MRC-A-Pt-U-Pu-147 which is stored in a box labeled Pu-239, 0.047 µCi, 9/18/67. RRPD personnel also believe that this source has been damaged so it has been "recalibrated" with an NMC counter scaler at another nuclear power plant. The licensee had a calibration certificate for the Pu-239 serial number 11.182 source that stated the activity as 0.00594 µCi on 10/19/73 with an accuracy of $\pm$ 3%.

The BC-4 counter scaler is calibrated with the same Cl-36 standards that are used with the Nuclear Chicago counter scaler. Procedure V.A.4 for the BC-4 does not provide for determining the plateau for the detector as part of the calibration procedure. A daily check with a Cs-137 source is required.

The calibration sources used for the laboratory counter scalers, because of either damage or the preparation methods used can no longer be considered traceable to NBS. The calibration procedure for the Nuclear Chicago counter scaler is not being followed. The calibration procedure for the BC-4 is inadequate. The program for calibration and quality control checks of the instruments plus quality control for handling of sources is inadequate.

4.0 RADIOACTIVE WASTE MANAGEMENT SYSTEM

4.1 Program Responsibility

Overall program responsibility for all aspects involved in radioactive waste management are not vested in a single individual, but rather in several individuals that have functional responsibilities that are associated with radioactive waste processing, control and deposition. Though these associated responsibilities and interfaces are not documented, the appraiser learned from interviews with the various personnel that the responsibilities are generally distributed as follows:

Radwaste Operation Coordinator

a. Plans and schedules solid radwaste processing, transportation and deposition;

b. Coordinates liquid and gaseous processing including solidification or effluent release.

Supervisor, Radiochemistry and Radiation Protection

a. Provides for sampling and analysis of radioactive waste;

b. Provides radiological surveys and associated documentation for shipments.

Operations Department

a. Provides for the operation of process equipment;

b. Loads casks for shipment.

Maintenance Department

a. Provides for the physical and mechanical preparation of solid radioactive waste shipments;

b. Performs shipping cask opening and closing.

Security Department

Provides security for transports while on site.

While program responsibility is not centralized, coordination of these functional area appears to be vested in the Radwaste Operations Coordinator. Administrative Procedure APN-2A, "Conduct of Operations and Composition and Responsibilities of Station or Unit Organization", Revision 2, dated December 20, 1979, specifies the general responsibilities of the individual as follows:

"Radwaste Operations Coordinator

The Radwaste Operations Coordinator under the general direction of the Operations Supervisor is responsible for coordinating the safe and efficient conduct of waste operations. He schedules and coordinates waste shipments and supervises the packing and loading of radioactive waste as necessary. He directs and supervises the work of operators assigned to duties in the waste facility."

Figure 1 describes the position within the current organizational structure.

The Job Description for this position indicates more specific responsibilities, such as:

"Within the limits of established Company policies and procedures, the Radwaste Operations Coordinator has the responsibility and authority to accomplish the following duties:

(a) Develops procedures for operation of radwaste and preparation and loading of waste shipments.

(b) Schedules and coordinates waste shipments and supervises the packing and loading of radioactive waste as necessary.

(c) Institutes and implements formal waste building training for operators and Station Shift Supervisors.

(d) Reviews returned bids on Waste Disposal Contracts and makes recommendations to operations supervisor, monitors operations to insure that radwaste contract is being adhered to and submits any addition or deletion that may be required.

(e) Conducts inspections of facility, investigates any problems, and monitors the lubrication log insuring that it is up to date.

(f) Prepares various reports as required.

(g) Prepares the waste building budget.

(h) Insures the compliance with existing work standards and safety requirements for the benefit and protection of employees, customers, and the public.

(i) Within the Radwaste Operations Department, directs and supervises the work activities of employees, establishing clearly defined goals and standards of employee performance.

(j) Performs other associated duties as directed.

...Has direct supervision of a department consisting of one to five employees on an as-needed basis."

The implication that there is a "Radwaste Operations Department... consisting of one to five employees on an as-needed basis", is somewhat misleading since there is essentially only the single individual who appears to have very little real vested authority. The range of responsibility assigned appears beyond normal expectation of the person's capability, even though the individual is very competent and highly motivated.

Evidence of this can be demonstrated by the licensee's response to Inspection and Enforcement Bulletin 79-19, "Packaging of Low Level Radioactive Waste for Transport" dated August 10, 1979. This item is further discussed in Section 4.2.3 of this report.

From discussions with the Radwaste Operations Coordinator, review of records and tours through the areas associated with radwaste management it is evident that while the individual is charged with this specified responsibility, commensurate authority has not been assigned. For example, though the position appears to require a certain amount of line authority in order to produce this particular service, the priority placed on this activity is so low that a staff has not

been assigned. The Radwaste Operation Coordinator is able to acquire additional manpower only when it is evident that the radwaste status will interfere with normal operations or in order to prepare shipments for transport, i.e., ..."as-needed..." For example, it is not uncommon that compactible radwaste will be allowed to accumulate into large piles of material before personnel are assigned to compact the material for shipment. In such piles, much of the material is not monitored or controlled in any manner to preclude inadvertent contamination of personnel, or adjacent walkways. The same is true of contaminated areas that once identified are not systematically decontaminated and may in fact exist for long periods of time before being subject to any type of decontamination.

It appears evident that additional personnel in this area are always "needed" but are only assigned to the area when the need becomes dire.

4.2 Waste Processing Systems

4.2.1 Liquid Waste

Currently, the licensee uses the Chem-Nuclear Systems, Incorporated, Mobile Solidification System as the primary method for final processing (solidification) of liquid radwaste. A safety evaluation in accordance with 10 CFR 50.59, "Changes, tests and experiments," was performed for this facility change on May 16, 1979.

This system, used to solidify filter sludge and concentrated waste, utilizes urea-formaldehyde as the solidification agent. The process is performed on-site by a Chem-Nuclear contractor in accordance with Chem-Nuclear procedures. Though this activity comprises the licensees Process Control Program (it's essential effort in Liquid Radioactive Waste Solidification), the Chem-Nuclear procedures utilized have never been reviewed by the Site Operations Review Committee (SORC) or approved by the General Superintendent, Nuclear Generation in accordance with Technical Specification 6.8, "Procedures", which states in paragraphs 6.8.1 and 6.8.2;

> "Written procedures and administrative policies shall be established, implemented and maintained that meet or exceed the requirements and recommendations of Sections 5.1 and 5.3 of ANSI N18.7-1972 and Appendix "A" of USAEC Regulatory Guide 1.33 except as provided in 6.8.2 and 6.8.3 below.
>
> Each procedure and administrative policy of 6.8.1 above, and changes thereto, shall be reviewed by the SORC and approved by the General Superintendent Nuclear Generation prior to implementation and periodically as set forth in each document."

Regulatory Guide 1.33, "Quality Assurance Program Requirements (Operation)", Appendix "A", Section G.1 and G.2 specifies procedures required for Liquid Radioactive Waste Systems and Solid Waste Systems.

As a result this item appears to constitute an item of noncompliance with Technical Specification 6.8.

Due to changes in the acceptance criteria pertaining to the condition of solidified radioactive waste at disposal sites, the licensee has determined that urea-formaldehyde may not be an acceptable solidification agent after 1980, and has therefore initiated action to install a polymer solidification system, including a phase separator to decant water from filter sludge. The system is currently being installed and has been subject to a safety evaluation performed in accordance with 10 CFR 50.59 on March 21, 1980.

The installation of the polymer solidification system is to provide a means of complying with the regulation pertaining to free-standing water and corrosiveness, according to the licensee. The product from the system is expected to be a free standing non-corrosive solid monolithic-like substance.

In an effort to reduce and better control the generation of liquid radioactive waste, the licensee commissioned Catalytic, Incorporated to perform a plant wide evaluation to determine the sources and causes of liquid waste in plant. As a result of this study, the licensee has initiated actions and equipment changes to minimize the generation of liquid waste. Such action includes:

- rerouting several drains that normally direct flow to the floor drain collection sump, to the equipment drain sump in order to better separate high radioactive concentrations from relatively lower concentrations;

- consideration for replacing several pump packing seals in the radwastes building with mechanical seals in an effort to reduce pump seal leakage;

- consideration to install blocking valves on selected pumps to reduce head pressure on the seals when the pump is not operating, thereby reducing the potential for leakage;

- installation of conductivity cells in the waste collection system to reroute high-conductivity waste as necessary for separate processing;

- consolidation of radwaste equipment controls (pump operating indicators, flow indicators, level indicators, etc.) in the radwaste control panel to allow more direct oversight of equipment status.

In regard to the licensee's ability to process contaminated oil, Nine Mile Point currently contracts on site processing to the Delaware Custom Media Company. However, the licensee is also involved in testing a filtering system with a vacuum device to reduce water content as a possibility for later use.

4.2.2 Gaseous Waste Systems

The appraiser verified the licensee's tests of filter efficiencies for several High Efficiency Particulate Absolute (HEPA) and charcoal air clean-up systems.

The following system tests, required by Technical Specification were found to be satisfactorily performed:

- Reactor Building Emergency Ventilation System (Technical Specification 3.4.4)

- Control Room Air Treatment System (Technical Specification 3.4.5)

Additionally, the Radwaste Building Air Treatment System (no Technical Specification requirement) was reviewed and found to satisfactorily meet the requirements of Regulatory Guide 1.52, "Design, Testing, and Maintenance Criteria for Post Accident Engineered-Safety-Feature Atmosphere Cleanup System Air Filtration and Adsorpiton Units of Light-Water-Cooled Nuclear Power Plants," and ANSI N-510, 1975, Testing of Nuclear Air Cleaning Systems.

In reviewing this area, the following discrepancy was observed:

Figure 2, "Main Condenser Air Removal and Off Gas System" depicts a simplified view of the Condenser Air Ejector (Off Gas) System. This system is described in the licensee's Final Safety Analysis Report (FSAR) Section 2.1.1, "Condenser Air Ejector Exhaust (Off-Gas) System", which states:

> "This system handles almost all of the gaseous activity discharged from the Station. (See Section XI-2.3 for physical description of air ejector and schematic flow diagram of this system.)

The off-gas system exhausts non-condensible gases from the condenser through a 30-minute holdup pipe which allows short-lived activity to decay and provides an ample period to detect any serious release of fission product gases before they are released to the stack. Some of the short-lived noble gases decay into particulate daughters, so two high-efficiency filters are placed in series near the end of the holdup pipe to remove these particulates before the gases are exhausted to the stack. (An installed set of spare filters is provided to assure continuous filtration of the off gases.) As a result of these filters and the fact that halogens remain principally in the reactor water and are removed by the cleanup demineralizer system, radioactive particulates and halogens are not released from the offgas system in significant amounts."

The "two high-efficiency filters" mentioned in this section of the FSAR pertain to the filters identified as 77-26 and 77-27 in Figure 3.

According to the Radwaste Operation Coordinator, after the installation of the Augment System (Figure 2) in 1975, there were recurrent problems involving high differential pressure across the filter elements (77-26 and 77-27).

This high differential was thought to be related to water condensing in the stack vent header and thereby wetting the filter elements. To relieve the problem a vent drain was installed after the filters, but this did not successfully eliminate the high differential pressure. The problem was referred to Niagara Mohawk's Engineering Department for resolution.

On February 15, 1978 an internal memorandum from the Engineering representative to the General Superintendent, Nuclear Generation stated simply, "Off-Gas filters E.P. #77-27 and #77-27 are not required for the operation of the subject system. The elements can be removed and the filter body drains plugged."

It was apparently on this direction that these filter were removed, probably in Feburary 1978. No other documentation pertaining to this item was provided by the licensee.

The appraiser noted that 10 CFR 50.59, "Changes, tests and experiments" permits the licensee to make changes in the facility as described in the safety analyses report without prior Commission approval unless the proposed change involves a change in the Technical Specifications or an unreviewed safety question. The regulation further requires

the licensee to maintain records of changes in the facility as described in the safety analysis report including a written safety evaluation which provides the bases for the determination that the change does not involve an unreviewed safety question; and to inform the appropriate Regional Office with a report containing a brief description of such changes annually (or at shorter intervals if specified).

In review of this area, the appraiser determined that as of October 10, 1980 a safety evaluation in accordance with 10 CFR 50.59 had not been performed, nor was any justification ever developed to explain why the removal of these filters did not constitute an unreviewed safety question.

Additionally, the appraiser noted that the licensee's annual report of facility changes dated February 7, 1979 did not refer to this change.

Upon notification, the General Superintendent, Nuclear Generation indicated that a safety evaluation in accordance with 10 CFR 50.59 would be immediately performed. Subsequently a safety evaluation was performed on November 3, 1980, to support that the modification did not constitute an unreviewed safety question.

The appraiser noted that failure to perform a safety evaluation to support the change in the facility constituted noncompliance with 10 CFR 50.59.

The appraiser reviewed all gaseous effluent controls from the plant including releases from the Mechanical Vacuum Pump and the Turbine Gland Seal System. These sources are very small and are treated by a 1.75 minute hold-up pipe prior to being exhausted to the stack, which is in accordance with plant design. The Main Condenser Off-Gas System provides treatment via a charcoal delay bed process. These beds provide a 50 hour hold-up for krypton and 890 hour hold-up for xenon prior to exhausting to the stack. The Augmented System is composed of a catalytic recombiner, condenser, the original 30 minute delay pipe, chiller system for dehumidification, pre-adsorbers for solid particle removal, and charcoal adsorbers for selective adsorbtion of xenon and krypton isotopes. (See Figure 3)

4.2.3 Solid Waste

The licensee's response to IE Bulletin 79-19, "Packaging of Low Level Radioactive Waste for Transport", dated August 10, 1979, designated the Radwaste Operations Coordinator and the Supervisor, Radiochemistry and Radiation

Protection as the persons responsible for activities pertaining to the transportation of radioactive waste material. This IE Bulletin also required the licensee to "Provide management-approved detailed instructions and operating procedures to all personnel involved in the transfer, packaging and transport of low-level on the chemical and physical form of the low-level radioactive material and on the containment integrity of the packaging."

Niagara Mohawk Quality Control Surveillance Report, SR-79-026, dated September 27, 1979, to this end an internal audit was performed by the licensee, and identified that waste handling procedures were required to be developed and approved to meet the requirements of IE Bulletin 79-19.

The licensee's response (letter to the Director, NRC Region I from the Vice President, Niagara Mohawk dated September 21, 1979) stated, "A comprehensive set of procedures for waste handling are being developed to cover the transfer, packaging and transport of waste. These procedures will be completed by January 1, 1980."

This was further modified by another letter to the Director, NRC Region I, from the Executive Vice president, Niagara Mohawk, dated January 4, 1980, which stated "At this time, we expect that the procedures should start being approved

and available for use by February 1, 1980. At this time, there are 16 procedures in the Waste Handling Procedure Package that are being developed. The various procedures have been put into priority to insure that the required procedures are expedited."

The appraiser's finding in this area indicated that as of October 10, 1980, of the 16 procedures that were scheduled to be completed, only one had been actually developed, approved and implemented. The remaining were still in various states of development and approval with no apparent priority or emphasis being directed to the effort by the licensee's management.

On November 4, 1980, the licensee developed a new schedule for the completion of procedures as follows:

Title	Procedure Number	Completion Schedule
Required Documents	N1-WHP-1	Completed
Initial Paperwork	N1-WHP-2	1/1/81
Cask Handling Procedures	N1-WHP-3	Completed
Waste Transfer	N1-WHP-4	1/1/81
Sampling	N1-WHP-5	1/1/81
Analysis	N1-WHP-6	1/1/81

Title	Procedure Number	Completion Schedule
Process Control Program	N1-WHP-7	2/1/81 (Chem Nuclear)
Solidification Process	N1-WHP-8	1/1/81
Solid Waste	N1-WHP-9	1/1/81
Storage Inventory and Retrieval	N1-WHP-10	6/1/81 (Dow System)
Truck & Cask Loading	N1-WHP-11	1/1/81
Final Documentation and Approvals	N1-WHP-12	2/1/81
Record Distribution	N1-WHP-13	2/1/81
Emergency Planning Interface	N1-WHP-14	1/1/81

In an effort to complete this action the licensee intends to commission a contractor to assist in the development of the procedures.

This procedure development entails both the operation of new procedures but also the incorporation of existing procedures, for example, it is planned that the licensee's procedures OP-28, "Liquid Waste System", and OP-29-"Solid Waste System" will appear as part of the planned Waste Handling Procedures (WHP).

The licensee's Quality Assurance Program is described on the Thirteenth Supplement to the Final Safety Analysis Report, July 4, 1979.

The QA effort in this area is largely confined to periodic audits of the activity that largely are pro forma in nature. There is no other systemized QA function that is performed that specifically pertains to the preparation and shipment of packages of radioactive waste material. While the QA department is normally informed of the schedule for shipment, there are no procedural hold points or verifications that require their presence or observation. According to the site QA Manager, it is normally a matter of personnel availability that is the deciding factor when determining if a QA representative should observe package preparation and shipping procedures.

Further discussion with the individual revealed that a significant portion of the QA effort in this area is based on "peer verification". That is, according to the licensee's site QA Program, provided that an individual has been appropriately trained, any individual can provide a QA verification in the area of his responsibility provided he does not actually perform the activity. For example, if two mecahnics were assigned to fasten a cask lid to the specified torque value, one of the mechanics, if appropriately trained, could document the necessary QA verification that the activity was performed to the specified values, provided the individual did not actually torque the closure nuts. Such "peer verification" is commonly practiced

since there are few QA representatives available for verification assignments at the station. The QA Manager also indicated that more QA involvement in this area is pending the development of procedures for the Waste Handling Activity.

In the course of this appraisal of this area it was determined that personnel assigned to prepare and ship packages of radioactive waste are not provided with any training in regards to this activity. Personnel assignments in this area are usually transient and by the time an individual is familiar with the requirements of the job, the person is most often transferred to some other station responsibility. In fact the area of solid radioactive waste processing appears to be regarded by the station as the place were new hires are just assigned until they qualify for a better position. The result is a situation that personnel unfamiliar with the requirements for this activity are frequently utilized to perform in this area.

From a review of selected records of previous shipments of radwaste for 1980, it appears that the activity has conformed to the regulatory requirements (NRC and DOT) in most aspects. However, the following descrepancies were noted:

1. In review of the printout of the gamma spectrum analysis of certain waste shipments, the appraiser noticed that only those peaks that were identified by the computer were evaluated for the waste shipments. Gamma peaks that the computer did not identify by isotope were disregarded, without any effort taken to determine if the unidentified peaks represented a significant contribution to the radioactivity content of the package. This item is further discussed in Section 3.3 of this report.

2. The licensee does not make any effort to determine if beta emitters provide significant contribution to the shipments. Analysis for Sr-89, Sr-90 or H-3 are not normally performed, nor does the licensee utilize ratios between known gamma and the beta activities for estimating the radioactivity due to beta emitters.

The Radwaste Operation Coordinator though being highly motivated and competent to perform in this area, is handicapped by the following:

1. The authority assigned to the individual is not commensurate with the responsibilities assigned;

2. The responsibilities assigned to the individual are beyond the capacity of a single person to perform adequately;

3. The personnel normally assigned to the area of solid radwaste processing and shipping are normally transient; and are not provided with any formal training particular to this activity;

4. Other than periodic audits, there is no other systematic quality assurance activity applied to the area of radioactive waste preparation or shipping.

As a result the following discrepancies were noted.

1. The current procedure for solidification of liquid radwaste (Chem-Nuclear Mobile Solidification Procedure), had not been subject to review by the SORC as required by Technical Specification 6.8;

2. The majority of the Waste Handling Procedures that were required in response to IE Bulletin 79-19 have not been established or implemented by the licensee.

The technical inadequacies, such as, failure to adequately evaluate radioisotopic peaks that are unidentified by the computer; and failure to adequately determine if beta emitters present a significant contribution to radwaste shipments, appear to be related to insufficient technical proficiency as discussed in Section 1.0 of this report.

Based on the above findings, improvements in the following areas are required to achieve an acceptable program:

1. Authority assigned to the Radwaste Operations Coordinator should be reviewed and amended as necessary to assure that the individual has the required recognized authority to execute the responsibilities assigned. In this endeavor, action should be initiated to assign additional personnel to assist the Radwaste Operations Coordinator in fulfilling his responsibilities.

2. Personnel assigned to perform in the area of solid radioactive waste packaging and shipping should be subjected to training in order to assure that they understand and are proficient in the procedures and requirements associated with this activity.

3. Waste Handling Procedures should be established, implemented and maintained as was required by IE Bulletin.

4. The site Quality Assurance Department should have more active participation in activities relating to radioactive waste packaging and shipping. Such involvement should include direct observation and documented verification of certain significant procedural steps performed for each shipment.

5. Action should be taken to assure that all radioisotopes that may significantly contribute to the radioactive content of a package of radwaste material are evaluated. This includes radioisotopic peaks that may not be identified by the normal computer output of the analysis; and other isotopes such as beta emitters (i.e., Sr-89 and Sr-90) that may contribute to the total radioactive content of a radioactive waste shipment.

In addition, the following items should be considered for improvement of the program:

Efforts should be taken to stabilize certain personnel assignments in the area of radwaste packaging and shipping in order to assure continuity and reliability in the area.

4.2.4 Process Monitor Calibration

Process radiation monitor records were reviewed for completeness of calibrations and the associated records. Records were noted not to be kept in an acceptable manner and data recommended by ANSI N-323-1978 was missing from the calibration record.

Routine calibration of Containment Spray Heat Exchanger Monitors (Procedure RTP-19) uses the Area Radiation Monitor (ARM) portable calibration units. The procedure specifies the units to be calibrated quarterly. Records of calibration show them to be calibrated on a six month schedule.

Routine calibration of Liquid Radwaste Monitor (Procedure RTP-21), Revision 0, December 13, 1974, specifies using Cesium-137 sources C-5, C-6 and C-7 for the quarterly calibration. Section 4.14 states "Record on the data sheet the count rates obtained with the calibration sources (C-5, C-6, C-7) during the Performance of Preoperational Test No. 65." Also, in Section 4.3.9 Note ... "are not within 20% of the values..." "adjustments should be made

in accordance with Preoperational Test No. 65." A copy of preoperational Test No. 65 was requested from the licensees representative on two occasions but the individual was unable to provide the report. It can only be assumed that the sources used for this calibration are not traceable to an N.B.S. source. When a review of the Calibration Sheet was made, a count rate (dpm) was recorded in the space provided under the heading C-5, C-6, C-7 without any additional information as to source strength in units of curie content or date of calibration.

In Procedure RTP-24, Routine Calibration of Reactor Building Closed Loop Cooling Monitor, Revision 0, December 16, 1974, and Procedure RTP-25, Routine Calibration of Service Water Monitor, Revision 0, January 10, 1975, the same sources are used and the data is recorded in the same manner as stated above. This is again not acceptable.

Stack Radiation Monitor Quarterly Calibration (Procedure RTP-26), Revision 0, June 10, 1979 states in Section 2.1.1 "(traceability was established via GeLi, analysis of C-5 thru C-8 sources on May 12, 1977. See Stack Monitor Traceability Data File for Details)". Once again this file was requested from the licensees representative who could not furnish it for review. The record system used by the licensee was disorganized and difficult to review.

Records were not centrally located, some records were maintained in the I&C area, Radiochemistry and Radiation Protection Supervisor office and others in the Chem Lab Office. Information contained in the Calibration Record Sheets for the instruments were incomplete, sources were not identified as to type, manufacture, date of manufacture, serial number, or NBS traceability but were only identified by the count rate (dpm) on instruments during calibrations.

The appraiser asked for a copy of the procedure and calibration data sheets for the "Ejector Offgas Radiation Monitors Channel 11 and 12." The licensees representative stated that there was no procedure for this calibration and that they did not perform a calibration on these detectors, but they did do an "alarm set point determination." This is contrary to the Environmental Technical Specifications, Appendix B, to Facility Operating License No. DPR-63 which states in Section 2.4.4.d "All waste gas effluent monitors shall be calibrated at least quarterly by means of a known radioactive source which has been calibrated to a National Bureau of Standards source." Technical Specification 6.8.1 "Written procedures and administrative policies shall be established, implemented and maintained that meet or exceed the requirements and recommendations of Section 5.1 and 5.3 of ANSI N18.7-1972 Appendix "A" of USAEC

Regulatory Guide 1.33 except as provided in 6.8.2 and 6.8.3 below." Contrary to the above, no procedure has been written or implemented for the radiological calibration of the Ejector Offgas Radiation Monitor Channel 11 and 12.

4.3 NUREG 0578 Lessons Learned (Post Accident Gaseous Effluent Monitoring Capability)

In the course of the appraisal, the appariser reviewed the licensee's efforts to implement certain post-accident actions that were identified in NUREG-0578, TMI Lessons Learned Task Force Status Report and Short Term Recommendations. During the course of this review the following documents were examined.

(1) Letter to All Operating Nuclear Power Plants, from D. G. Eisenhut, Acting Director, Division of Operating Reactors, NRC dated September 13, 1979

(2) Letter to All Operating Nuclear Power Plants, from H. R. Denton, Director, Office of Nuclear Reactor Regulation (NRR), dated October 30, 1979

(3) Letter to D. P. Dise, Vice President, Niagara Mohawk, from H. R. Denton, Director, NRR, dated January 2, 1980, forwarding Order to Show Cause, dated January 2, 1980

(4) Answer to Order to Show Cause (January 2, 1980) dated January 22, 1980, submitted by J. Bartlett, Executive Vice President, Niagara Mohawk

(5) Letter to H. R. Denton from D. P. Dise, Vice President, Niagara Mohawk, dated December 31, 1979

(6) Letter to D. P. Dise, Vice President Niagara Mohawk, from T. A. Ippolito, Chief, Operating Reactors Branch-3, dated March 21, 1980.

The particular item reviewed was NUREG-0578, Section 2.1.8.b "Increased Range of Radiation Monitors", which discusses the necessity for nuclear power plants to have the capability to monitor and quantify high level releases of noble gas in the post-accident situation, and recommends the acquisition of equipment to establish an installed capability to monitor nobel gases up to 10^5 uCi/cc (Xe-133).

Reference (1), directed all operating reactor licensee's to implement the actions contained in NUREG-0578 as soon as possible in accordance with the implementation schedule attached. The schedule defined two Implementation Categories as follows:

Category A: Implementation complete by January 1, 1980.

Category B: Implementation complete by January 1, 1981.

In the letter, Reference (1), Item 2.1.8.b was designated as Category "B" and referred to the requirement to complete installation of extended range monitors with an upper range capacity of 10^5 uCi/cc (Xe-133).

Reference (2) provided further clarification of the requirements, and in the case Item 2.1.8.b expanded the specification to include a Category "A" interim requirement ("provisional fix") to quantify noble gas releases as high as 10,000 Ci/sec until final installation of the extended range monitors as follows:

1. Radiological Noble Gas Effluent Monitors - January 1, 1980 Requirements

   Until final implementation in January 1, 1981, all operating reactors must provide, by January 1, 1980

an interim method for quantifying high level releases which meets the requirements of Table 2.1.8.b.1. The method is to serve only as a provisional fix with the more detailed exact methods to follow. Methods are to be developed to quantify release rates of up to 10,000 Ci/sec for noble gases from all potential release points..."

The following was specified in Table 2.1.8.b.1:

INTERIM PROCEDURES FOR QUANTIFYING HIGH LEVEL ACCIDENTIAL RADIOACTIVITY RELEASES

- Licensees are to implement procedures for estimating noble gas and radioiodine release rates if the existing effluent instrumentation goes off scale.

Examples of major elements of a highly radioactive effluent release special procedures (noble gas).

- Preselected location to measure radiation from the exhaust air, e.g., exhaust duct or sample line.

- Provide shielding to minimize background interference.

- Use of an installed monitor (preferable) or dedicated portable monitor (acceptable) to measure the radiation.

- Predetermined calculational method to convert the radiation level to radioactive effluent release rate."

Additionally the 2.1.8.b Category "A" specification of Reference (2) required the licensee to describe and document the method they intended to utilize, as follows:

"The licensee shall provide the following information on his methods to quantify releases of radioactivity from the plant during an accident.

1. Noble Gas Effluents

   a. System/Method description including:

      i) Instrumentation to be used including range or sensitivity, energy dependence, and calibration frequency and technique,

ii) Monitoring/sampling locations, including methods to assure representative measurements and background radiation correction,

iii) A description of method to be employed to facilitate access to radiation readings. For January 1, 1980, Control room read-out is preferred: however, if impractical, in-situ readings by an individual with verbal communication with the Control Room is acceptable based on (iv) below.

iv) Capability to obtain radiation readings at least every 15 minutes during an accident.

v) Source of power to be used. If normal AC power is used, an alternate back-up power supply should be provided. If DC power is used, the source should be capable of providing continuous readout for 7 consecutive days.

b. Procedures for conducting all aspects of the measurement/ analysis including:

i) Procedures for minimizing occupational exposures

ii) Calculational methods for converting instrument readings to release rates based on exhaust air flow and taking into consideration radionuclide spectrum distribution as function of time after shutdown.

iii) Procedures for dissemination of information.

iv) Procedures for calibration."

The licensee's response to the expanded requirement, Reference (5) dated December 31, 1979, stated the following:

"By January 1, 1980 the following provisional steps will be taken:

The existing in-line stack monitors are capable of detecting 50 Ci/sec. or approximately 0.55 uCi/cc (Xe-133) with normal ventilation flow of 180,000 $ft.^3$/minute. These monitors have read out and alarm capability in the main control

room. Quantification of higher level noble gas releases will be provided by means of a portable gamma survey instrument. This instrument will be installed such that it will monitor a portion of the sample line to the existing stack monitors. This line comes from an isokinetic probe in the main stack.

Background radiation will be shielded by means of a lead cave built around the detector. The instrument has an upper limit of at least 1000 R/hr. It will be calibrated with a Xe-133 source such that the reading can be related from R/hr to uCi/sec stack release discharge. Until the Xe-133 calibration can be accomplished, the existing stack monitor calibration dependence data will be utilized to establish a calibration factor.

Readings on the interim monitor will be taken locally and the results verbally communicated to the main control room. This method would be used only in a case where the existing monitor were off-scale (high). Communications will be by means of a headset and will be taken approximately every fifteen minutes, when required.

The in-line monitors are powered from redundant AC power sources. These monitors are not presently powered from emergency sources. Power to the interim monitors will be from a DC battery source, capable of eight consecutive days of continuous readout."

Further correspondence from the licensee to the Director, Office of Nuclear Regulation on October 18, November 26, and December 19, 1979 indicating that some Category "A" requirements would not be implemented by January 1, 1980 resulted in a Show Cause Order being issued to Niagara Mohawk Power Corporation, Reference (3) on January 2, 1980, which discussed the basis of Category "A" implementation and stated:

"Accordingly, pursuant to the Atomic Energy Act of 1954, as amended, and the Commission's regulations in 10 CFR Parts 2 and 50, IT IS HEREBY ORDERED THAT the Licensee show cause, in the manner hereinafter provided, why it should not:

By January 31, 1980, implement all "Category A" requirements (except the requirement of 2.1.7.a of NUREG-0578) referred to in Part II of the Order, except those for which necessary

equipment is shown, by appropriate and timely documentary justification to the Director, Office of NRR, to be available, or in the alternative, place and maintain its facilities in a cold shutdown or refueling mode of operation. "Category A" requirements not implemented by January 31, 1980, owing to the unavailability of necessary equipment shall be implemented within 30 days of the date such equipment becomes available but no later than June 1, 1980."

Reference (4) (dated January 22, 1980), provided the licensee's answer to the Show Cause Order, and identified the status of Item 2.1.8.b in the attached Exhibit "A", as:

"Requirement	Title	Implementation Category[1]	Date Implementation Completed
2.1.8.b	High Range Radiation Monitors Effluents - Procedures	A	December 31, 1979

[1]Category A: Implementation Complete by January 1, 1980"

On October 8, 1980, during review of this area the inspector noted that the only action that had been performed for Item 2.1.8.b was the installation of a single lead brick (approximately 7" x 4" x 2" on the main stack sampling line; with a small hole, about 1" diameter and 1" deep bored through the face of the brick to the stack sampling line.

Discussions with the Superintendent, Radiochemistry and Radiation Protection revealed that the lead brick was in actuality the licensee's only action taken to quantify high level noble gas releases. The individual indicated that it was the licensee's intention to dispatch a person with a teletector (an instrument having a range of 1000 R/hr) to the stack area, insert the probe into the bored hole provided for this purpose in the event that normal stack monitoring equipment went off-scale in the emergency situation.

To this end, the Superintendent Radiochemistry and Radiation Protection produced data by which the licensee determined that the conversion factor (for a teletector calibrated with Co-60) that relates noble gas concentration to dose rate was 0.5 uCi/ cc/mR/hr. Upon examination of the data it was found that the method employed by the licensee was subject to many errors and was in actuality not based on increasing concentration of noble gas versus dose rate, but rather on a questionable technique involving the decay of normal gaseous activity versus declining dose rate.

Further examination of this item revealed the following pertaining to the requirements of Item 2.1.8.b as specified in Reference 4(2) and as represented by the licensee in Reference 4(5):

1. No portable gamma survey instrument is installed on the indicated sampling line nor was there an instrument dedicated specifically to this particular monitoring activity;

2. No lead cave or other shielding sufficient to minimize background interference exists on the sampling line, however, a small piece of lead block as attached to the line that is used by the licensee to correlate concentration to dose rate as provided by a teletector (normal survey instrument) calibrated to Co-60. At the time of this finding there had been no indication of action initiated to construct a lead cave around a detector;

3. While teletectors do have a range capability of 1000 R/hr, the licensee facilities are unable to provide any instrument calibration beyond ~ 27 R/hr (Co-60);

4. A calibration of the teletector with Xe-133 was never performed, however, the licensee did attempt to correlate dose rate to concentration by questionable method that was later found to under estimate Xenon concentration by a factor of 40. Also, at the time of this finding there had been no action ever intiated to perform the calibration with a Xenon-133 source;

5. Although verbal communication to the Control Room was stated to be via a headset, there was no system in place or planned to provide this ability;

6. The teletector was correctly described as being powered by a DC source, and could be capable the eight days of continuous operation;

7. Instrument sensitivity, energy dependence and calibration information was not provided;

8. A method to facilitate access to the location where the radiation readings were taken was never developed;

9. Procedures relating to the implementation of this requirement were never developed;

10. A predetermined calculational method to convert the radiation level to radioactive effluent release rate was not developed.

In addition, it was further determined that personnel had not received any training regarding the performance of activities relating to Item 2.1.8.b.

In order to effect immediate resolution of this item, the licensee committed to perform corrective actions in this area as described in a letter from B. H. Grier, Director, NRC - Region I, to T. E. Lempges, Vice President, Niagara Mohawk, dated October 17, 1980 (IAL 80-40).

Based on the above findings it was found that the licensee had failed to comply with the Order to Show Cause of January 2, 1980 as it related to the completion of Category "A" Item 2.1.8.b described in the October 30, 1979 letter from Director, Nuclear Reactor Regulation, Reference 4 (2), in that the stated requirements were not completed by January 31, 1980.

Aspects of this finding pertaining to regulatory action is discussed in IE Report 50-220/80-18. Other investigation concerning this item was performed, and is reported in IE Report 80-17.

5.0 MAINTAINING PERSONNEL EXPOSURES AS LOW AS REASONABLY ACHIEVABLE - ALARA PROGRAM

The licensee's effort in ALARA has not been developed into a fully implemented program, i.e., a plan on procedure, but rather a number of specific efforts (sometimes intensive) to reduce personnel exposure in certain

instances. As the general case with the radiation protection program, there is no written management policy that presents corporate management's position or commitment with regard to ALARA. Again, it is a matter of individual perogative.

Regulatory Guide 8.10, "Operating Philosophy for Maintaining Occupational Radiation Exposures As Low As Reasonably Achievable", discusses the aspects of this type of commitment, and indicates that it should provide that:

- Plant personnel be made aware of management's commitment to keep occupational exposure as low as reasonably achievable, what ALARA means, and how to implement it on their jobs.

- Management perform periodic formal audits to determine how exposures might be reduced.

- A well supervised radiation protection capability with well-defined responsibilities is in place.

- Plant workers receive sufficient training.

- The RPM has sufficient authority to enforce safe plant operation.

- Procedures, equipment and facilities be modified in the case that they effect substantial exposure reduction at reasonable cost.

The appraiser noted that some of these aspects due appear in station generated administrative procedures....

A station generated administrative procedure APN-12, Revision 2, "Administrative Procedure for Maintaining Occupational Exposure to Radiation and Airborne Contamination As Low As Reasonably Achievable", provides a written statement of the site organizations position with regard to ALARA; and tends to reflect some of the aspects presented in Regulatory Guide 8.10. This procedure assigns the implementation responsibility for ALARA to the "...Radiochemistry and Radiation Protection Supervisor...who is responsible to the Results Supervisor who is in-turn responsible to the General Superintendent -Nuclear Generation". This, of course, is in reference to the previous organizational structure and does not accurately reflect the current organization; however, it is evident that the designate RPM (Superintendent, Radiochemistry and Radiation Protection) is the assigned individual.

The responsibilities assigned to the RPM in connection with ALARA, as described in APN-12, compare somewhat with the specifications of Regulatory Guide 8.8, "Information Relevant to Ensuring That Occupational Radiation Exposures at Nuclear Power Stations Will Be As Low As Is Reasonably Achievable", but they are not as inclusive. The APN does not indicate that the RPM has the responsibility and authority for ensuring that an effective measurement system is established and used to determine the degree of success achieved by station operations with regard to the

program goals and objectives; for ensuring that such measurement system results are reviewed on a periodic basis and that corrective actions are taken when attainment of the objectives is jeopardized; for ensuring that the authority for providing procedures and practices by which specific goals and objectives will be achieved is delegated; and for ensuring that the resources necessary to achieve the specified goals and objectives to maintain personnel exposures as low as reasonably achievable are made available.

These particular aspects are basic to any ALARA program, and the failure to specify them as pertaining to the RPM is because specific objectives and goals have never been developed by the licensee; therefore statements of responsibilities and authorities designed to establish management controls are not germaine to the licensee's current effort.

Although the APN tends to reflect some of the concepts presented in Regulatory Guide 8.10, there does not appear to be an active formal implementation of an ALARA program.

In terms of an ALARA program, Regulatory Guide 8.8 further indicates that such a program should be in a written form and should contain sections that cover the generally applicable guidance as provided in the guide as a minimum or be combined with the station radiation protection manual, safety analysis report or other documents of submittal. The APN indicates that details of ALARA concepts are described in the Radiation Protection Procedures, the Study Guide for Radiation Protection Qualification Course; and the Plant Chemistry and Radiation Protection Manual.

According to the Assistant Supervisor, Training the Study Guide for the Radiation Protection Qualification Course was merely a study aid that is not even normally utilized. The appraiser noted that while it does discuss elementary problems involving time, distance and shielding, it does not have any real relation to an ALARA program implementation. The other documents, Radiation Protection Procedures and Plant Chemistry and Radiation Protection Manual, provide directions as to the performance of normal operational exercises involving health physics such as radiological survey performance, dosimetry issue, instrument calibration, exposure record maintenance, Radiation Work Permit Issuance, etc. Such procedures are certainly germaine to an ALARA program as they describe the licensee's radiation protection activity. However, such procedures are only a portion of the scope that entails an ALARA program. It appears that a formal ALARA program description does not exist as evidenced by the lack of any stated goals or objectives for such a program.

In the current organization a new position, Dosimetry and ALARA Coordinator, was established; and an individual was assigned. However, a Job Description for this position has not yet been developed which has left the assigned individual to determine for himself what responsibilities, authorities and functions are required. From interviews it is evident that management has provided very little guidance in this area, has not provided any training or education in the subject and has not provided any authority by which the individual could expect to implement a program.

The individual though highly motivated, was largely unaware of how to implement the ALARA concept and the requirements of such a program. The individual indicated that he had not read Regulatory Guide 8.8 or 8.10, and was largely unfamiliar with the guidance provided. It was also evident that the individual had very little authority vested in him by which to establish, implement or maintain such a program.

The deficiencies as noted in this report are not to indicate that the licensee does not provide for exposure reduction. Certain efforts have been noted to reduce radiation exposure to personnel. Examples include:

- Current facility modifications are underway to employ the DOW, Polymer Solidification Rad Waste System, a design expected to be more efficient with less dose expenditure;

- Decontamination and painting of torus area prior to torus modification work in an effort to reduce personnel exposure to airborne radioactivity during the performance of the job;

- Extensive planning and preparation for expected pump seal replacement work scheduled for the February 1981 outage. Such efforts included provisions to decontaminate the system prior to work as well as the installation of temporary shielding in the work area.

In addition, the licensee's most generic action in this area has been efforts to maintain plant chemistry and water treatment system such that coolant activity will not unnecessarily cause increased personnel exposure.

While it appears evident that the licensee has taken certain actions to reduce personnel exposure, the appraiser noted that there exists no plan or procedure for conducting and implementing an ALARA program that is formally based on the concepts presented in Regulatory Guide 8.8. For example:

- There is no system or procedure developed that provides the methods, decision process or analytical program for determining if given exposure reductions are in fact as low as reasonably achievable;

- There are no apparent measurable goals set for the ALARA effort; there is no management system developed that would indicate the degree of success of any ALARA effort undertaken, i.e., if the goal has been achieved.

- There is no contamination central effort effectively practiced, i.e., contaminated areas, if found by radiological surveys, are identified and measured, but usually no real effort is made to decontaminate the area, and such areas may exist for long periods of time; additionally, personnel self-monitoring practices are extremely poor and would not likely detect the presence of personnel contamination;

- The existing ALARA effort, as noted from observations, discussions with personnel and review of APN-12, appears to be largely limited to reducing exposure to individual workers and does not fully involve radiation workers collectively, nonradiation workers, members of the general public and the environment.

- There is no radiological area access control effectively established, i.e., under the current system individual workers largely warrant their own exposure and are permitted to readily gain access and perform work with very little control exercised by the Radiochemistry and Radiation Protection Department. The Radiation Work Permit is not used effectively as an administrative control but rather a pro forma detail.

- The respiratory protection program is deficient in the majority of the aspects identified in Regulatory Guide 8.15, "Acceptable Program For Respiratory Protection".

- There is no data base effectively derived from previous operational history nor does the current system (radiation surveys and dosimetry records) lend itself to being readily useful and meaningful for ascertaining the goals and direction of the ALARA effort;

- According to the designated ALARA Coordinator, there is no established practice to conduct pre-or post-job briefings for most operations;

- There is no priority established as to the extent of ALARA consideration that should be applied to any particular operation (work activity), i.e., there are no estimates of expected personnel exposure developed for particular operations on which to base decisions as to the implementation of exposure reduction techniques.

- There are no qualified personnel currently involved in the ALARA Group capable to establish, implement, and maintain a competent ALARA program.

Based on the above findings this portion of the licensee's program is unacceptable, in that:

- There is no policy statement or formal commitment issued from the corporate organization to ensure that the exposure of station personnel, as well as the general public and environment will be as low as reasonably achieveable.

- The station's administrative procedure APN-12, "Administrative Procedure for Maintaining Occupation Exposure to Radiation and Airborne Contamination As Low As Reasonably Achieveable" does not specify any goals and objectives in implementing the ALARA program and the means utilized to attain such objectives.

- The Dosimetry and ALARA Coordinator has not been educated, trained or qualified sufficient to establish, implement, and maintain an ALARA program, nor has the individual been provided with any directions as to the responsibility and authority assigned to this position.

- There is no management control system established to monitor, control and measure the performance of the licensee's efforts in ALARA in order to determine if implemented ALARA efforts are successful.

6.0 HEALTH PHYSICS FACILITIES AND EQUIPMENT

Documents Reviewed:

a. Procedure RP-1, "Access and Radiological Control," Revision 0, January 9, 1979

b. Procedure RP-2, "Radiation Work Permit Procedure," Revision 1, February 13, 1979

c. Procedure RTP-62, "Respiratory Equipment-Assembly, Test and Inspection, Storage," Revision 1, October 4, 1978

d. Procedure RTP-63, "Laundering of Respiratory Equipment," Revision 1, December 20, 1978

e. Procedure APN-5, "Procedure for Control of Procedures, Instructions, Orders and Drawings," Revision 4, December 28, 1979

6.1 Radiation Protection Facilities

The Health Physics facilities were comprised of the following:

Area	Location/Elevation
. H.P. Tech and Foreman Office	261'0"
. Dosimetry Issue	277'0"
. Instrument Calibration	261'0"
. Counting Room	261'0"
. Resp. Decon/Laundry	261'0"
. Resp. Fit/Training	261'0"
. Training Room	261'0" & 277'0"
. Control Point	261'0"
Related Facilities Included:	
. Contaminated Equip. Storage	(Various Locations)
. Equip. Decon Room	261'0"
. Change Areas	(Various Locations)
. Personnel Decon	261'0"
. Medical	261'0"
. Chemistry Lab	261'0"

Permanent locker rooms are located in the unrestricted area for usage by plant personnel only, trailers are brought onsite for contractor personnel usage during an outage or maintenance activity. Workers can change from their street to work clothing in these areas. Showers and restroom facilities are available adjacent to the locker rooms. Female employee's have locker and restroom facilities available in the first aid room. However, no shower is provided. Changing to or wearing protective clothing is not allowed in these areas.

Temporary change areas, consisting of a bench with a rack to hold clothing are provided, when required, within the restricted area where personnel may change from their work to protective clothes. Frisking instrumentation are not always available at exits from contaminated areas where protective clothing was removed. Personnel who entered the radwaste building would not have the opportunity to frisk until they were exiting the restricted area. Personnel exiting the radwaste building were observed using poor practices in removing their protective clothing such as taking off head covers and coveralls with ungloved hands.

A frisker station, when provided, consists of a count-rate meter (RM-3) with an audibile indicator and a G-M detector (30 MG/cm^2 wall thickness). This type of detector offers marginal sensitivity to beta radiation. The background radiation at frisker station locations

were observed in the range of 100 to 350 counts per minute (CPM). Shielded detectors or booths to reduce the levels of background radiation are not utilized by the licensee. An adjustable alarm is provided with the RM-3 which the licensee choose not to use. All alarms were set for off scale readings, greater than 500 CPM.

Numerous employee's were observed performing an inadequate check (monitoring to rapidly or skipping parts of the body) when leaving the restricted area. This indicates that the licensee's self-monitoring program and frisking stations present marginal control against the spread of contamination.

Laundry faclities consist of four commerical dryers and three washers. Clothing is picked up from the various change areas and taken to the hallway outside the laundry room. A RRPD technician would check each bag for radiation level. The bags are then opened and sorted, rubber goods, clothing, etc., are deposited into open canvas carts. The carts are then rolled into the laundry room and loaded into the washers. The appraiser observed personnel hand sorting, without wearing any protective clothing or gloves. Upon notification of this practice, the licensee took immediate corrective action. The appraiser later observed personnel removing the clothing from the washers and placing it in the dryers again without wearing any protective clothing.

The appraiser asked the personnel operating the laundry as to what instructions or specific training they received regarding the handling of contaminated clothing. They indicated no such training had been provided; that they meerly observed the people doing the job before them and did the same thing.

There was no air monitor in the sorting or laundry area. There is no written procedure for the laundry operation and the facilities are inadequate.

There appeared to be an adequate number of portable radiation detection instruments available in the instrument storage room. A review of the files kept on portable instrument status and calibration showed many more instruments than those physically identified. Eighteen instruments were shown in the files which recorded last calibration date entered between 4/23/71 to 12/4/79. In reviewing the quantities of instruments available with the supervisor responsible for this activity, it was determined that he really had no idea of the quantity available. RRPD technicians stated that even during normal operation it was sometimes necessary to wait for an instrument to be returned before they could perform surveys. The appraiser observed instruments tagged "defective" sitting in the storage room during the length of the appraisal. Although there appeared to be an adequate quantity of instruments available, no apparent effort appeared to be directed toward the prompt repair of instruments and maintaining of accurate records. Control and issuance of equipment were questionable.

6.2 Protective Equipment

6.2.1 Respiratory Protection

The facilities for testing of personnel to wear respirators are located in the restricted area, a potentially contaminated area. This same area is used to check masks for contamination and reassembly. Respirators are disassembled and decontaminated in the laundry area, where a four compartment stainless steel sink is available for hand washing the masks. Two drying cabinets are located outside the laundry in the hallway but are not normally used. Masks are placed on pegs above the washing sink and allowed to air dry. Procedure RTP-63 "Laundering of Respiratory Equipment" list a pair of rubber gloves as special equipment. The appraiser observed personnel decontaminating masks, wearing no protective clothing other than rubber gloves. Section 5.5.4 states that masks which have a higher than acceptable level of fixed contamination "shall be stored for a period of time to allow the activity to decay..." but fails to specify where or how these respirators shall be identified. The procedure and facilities for respiratory equipment is inadequate.

6.2.2 Decontamination Facilities

Decontamination areas for tools and equipment are spacious and well stocked with supplies for decontamination work. This was found to be acceptable.

Personnel decontamination consists of a single shower and wash basin in the unrestricted area. It is not located within close proximity to the protective clothing change areas. It would be necessary to transport contaminated personnel over a distance to the decontamination facilities thus increasing the probability of spreading contamination. No radiation detection equipment is installed or dedicated to this area to monitor the progress of the decontamination effort. This is contrary to Regulatory Guide 8.8, Revision 2, March, 1977. The appraiser noted that housekeeping in the personnel decontamination room was marginal.

6.3 Calibration Facilities

Calibration of radiation detection equipment and portable air samplers are performed in a dedicated room. Two source wells are available which provide the capability to calibrate radiation detection instruments over a range of levels from 1.9 mr/hr to 29 R/hr. The calibration of air sampling equipment was questionable since it relied on a

calibration graph which came from an unknown origin. See Section 3.3 for more details. Calibration of radiation detection instruments used by the licensee was unauditable. The record of a calibration contains the date it was performed and initials of the person doing the calibration. No results of calibration such as "as found" or "as left" readings are documented or are any slope curves generated. The licensee stated they calibrate a single point on each instrument range, records are not available to substantiate this statement. Thus the calibration of portable radiation detection and air sample equipment is inadequate.

6.4 Chemistry Facilities

The appraiser observed that the facilities available for chemical analysis and sample preparation were adequate. The laboratory design provided for segregation of radioactive and nonradioactive sample analysis. There were no accommodations for the storage of radioactive samples. A letter of agreement exists between Nine Mile Point and James A. FitzPatrick, making available the use of laboratory, counting room and the whole body counter, should the need arise because of an emergency, unavailability of equipment or need for assistance.

Based on the above findings, improvement in the following areas are required to achieve an acceptable health physics facilities program.

The protective clothing change areas were found to be unacceptable and need:

- The inclusion of personnel clothing lockers at the change areas.

- Decontamination showers and sinks in close proximity to the change areas.

- The availability of protective clothing change areas for both sexes according to OSHA guidelines.

Respiratory fit-testing and mask reassembly areas were found to be unacceptable and need:

- A dedicated area outside the restricted area for fit testing of masks.

- A dedicated area where mask reassembly maybe performed free of contamination and in a low background.

Access Control and Contamination Control were found to be unacceptable and need:

- The utilization of shielded detectors on friskers or shielded booths to monitor personnel leaving the restricted area when background levels are high.

- The use of friskers within the restricted area at step-off pads and/or protective clothing change areas to reduce the potential for spreading contamination.

- Radiation monitoring equipment installed or dedicated to the Personnel Decontamination room to monitor decontamination efforts.

- A means of communications between the ingress/egress point on the 277 foot elevation and the Radiation Protection Office.

The following matters should be considered for improvement of the Health Physics Facility Program.

- The establishment of contaminated equipment storage areas should be limited to a few locations taking into account ALARA considerations.

- A formalized method of contamination survey controls for all clothing and personal items being removed from the restricted area.

- The use of portal type or hand and foot monitors to reduce the potential spread of contamination from the restricted area.

- The use of models and mock-ups in training which should be preserved for future use and reference.

- An area with airborne particulate monitoring capability for the sorting of dirty protective clothing.

7.0 ADMINISTRATION OF EMERGENCY PLAN

During May 1980, the licensee formally appointed an individual as Emergency Planning Coordinator. This individual was assigned the overall responsibility for the station Emergency Plan and Implementing Procedures, reports directly to the Superintendent of Chemistry and Radiation Management and acts with adequate authority in all such matters. The Emergency Planning Coordinator devotes all his time to emergency planning functions.

The Superintendent of Chemistry and Radiation Management acts as liaison with their consultant at Nuclear Utility Services (NUS) who helped to prepare the new proposed Emergency Plan and Implementation Procedures.

The individuals charged with responsibilities in the area of Emergency Planning as noted above appeared to have adequate authority to ensure program implementation. In addition, based on the purchase orders for new equipment, such as required for the new Technical Resources Center, the Operations Support Center and the proposed Emergency Operations Facility, the licensee appeared to be devoting adequate resources to the upgrading of the program.

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

8.0 EMERGENCY ORGANIZATION

8.1 Onsite Organization

The auditors reviewed the licensee's Emergency Plan and Implementation Procedures and held discussions with licensee's personnel to evaluate the adequacy of the description of the onsite emergency organization, including assignment of emergency duties and responsibilities.

The Emergency Plan did not provide a clear description of the emergency organization but stated that the Emergency Director will direct all emergency operations in accordance with the detailed emergency implementing procedures. In addition, it made provisions for an emergency director at all times, including an individual onsite at the time of the accident (the Shift Supervisor), having the authority and responsibility to initiate any emergency actions within the provisions of the Emergency Plan, including the exchange of information with authorities responsible for coordinating offsite emergency measures.

The line of succession for the Emergency Director was described in general terms in the Emergency Plan and so was the scope of the authority and responsibility vested in him.

The functional responsibilities assigned to the Emergency Director were not clearly specified in the Emergency Plan with the exception of two areas: making all the necessary contacts with local, state and federal authorities, and verifying personnel accountability. Furthermore, those Emergency Director responsibilities which should not be delegated were not addressed by the Emergency Plan.

Licensee's EPP-13 "Emergency Center Operations," outlined the duties and responsibilities of the emergency organization at the Emergency Center, as follows:

Functional Area of Emergency Activity		Persons Assigned
Emergency Director		General Superintendent
	or	Station Superintendent
	or	Operations Supervisor
	or	Maintenance Superintendent
	or	Station Shift Supervisor (called in)
	or	Station Shift Supervisor (on duty)
Communication Chief		Station Superintendent
Emergency Procedures Aide		Emergency Planning Coordinator
Survey Team Coordinator		Radiation Protection Supervisor
Off-Site Dose Estimator		Results Supervisor
Communications Aide		Instruments and Control Supervisor
Corrective Action Aide		Operations Supervisor
Accountability Aide		None (to be designated by the Emergency Director at the time of evacuation)
NMPC Advisors		Reactor Analyst
		Maintenance Superintendent
		Public Relations Department
		Environmental Engineering Dept.
		Vice-President Electric Operations

The line of succession was specified for the Emergency Director, but not for any other supervisory position within the emergency organization. As a consequence, in the absence of the General Superintendent, it was not clear who would be assigned as Communications Chief, since the Station Superintendent would normally then assume the role of Emergency Director. Backup personnel have not been designated to occupy supervisory positions within the emergency organization. Moreover, the procedure stated that the Accountability Aide would be designated by the Emergency Director on an ad hoc basis. This would give the Emergency Director no assurance that the individual had been qualified to adequately perform this function.

The specific assignment by title or position of some of the Niagara Mohawk Power Company (NMPC) advisors was not made (e.g. Public Relations Department, Environmental Engineering Department).

The licensee's Emergency Plan described in general terms the concept of operation during periods of minimal staffing (e.g. backshifts, weekends) as follows:

> "The normal shift operating crew consists of five (5) plant personnel: One Shift Supervisor (SS), one Chief Shift Operator, and three operators. All have been trained in fire fighting, radiation protection and rescue. During emergencies they will

function as an emergency survey team, fire brigade, and as a rescue brigade. The SS on duty will act as Emergency Director until relieved by other ranking members of the emergency organization...."

The limitations of the response to be provided by the minimal staff were not specified, and their response priorities were not clearly delineated.

Various functional responses were assigned to the emergency organization as follows:

Functional Area of Emergency Activity	Person Assigned
Provide (verify) notifications to Local, State and Federal Authorities. Designate Accountability Aide. Verify personnel accountability. Assign duties and delegate responsibilities to members of the operating staff and security force. Direct all activities of the Site Emergency effort.	Emergency Director (ED)
Establish and maintain communication via radio and/or telephone with the Control Room, survey teams and off-site agencies. Keep the Emergency Director (ED) informed as to the progress of emergency actions.	Communications Chief
Assist ED in implementing the emergency procedures by maintaining a status log and the Survey Assignment Log/Corrective Action Log.	Emergency Procedures Aide
Direction of Emergency Survey Teams (i.e. re-entry, in-plant, downwind off-site teams) Tabulation of survey results. Advise dose-estimator.	Survey Team Coordinator

Dose assessment and projection of off-site radiological consequences.	Off-Site Dose Estimator
Assists communication chief by handling radio communications.	Communications Aide
Helps to reduce severity of accident by supervising plant operations. Evaluates conditions to classify emergency and make required notifications of site personnel and/or off site agencies.	Corrective Action Aide
Accounts for personnel in accordance with EPP-5.	Accountability Aide
Advise the Emergency Director	NMPC Advisors

As members of the emergency organization arrive at the Emergency Center they would take a numbered envelope containing instructions. This, according to EPP-13, would be performed in a sequential order, so that the first member to arrive would act as Emergency Director (Envelope #1), the second one would act as Communications Chief (Envelope #2) and so forth.

This procedure contradicts the unique assignment of emergency functions by title in the above table.

The auditors noted that the site organization did not clearly specify emergency functions at the working level. In addition there was no designated management structure for the following emergency functions: Security of Plant and Access Control, Personnel Monitoring and Decontamination, Repair and Corrective Actions, Search and Rescue, Radiation Protection, and Plant Chemistry.

The licensee did not have provisions, such as a manager of resources to permit a response to other than emergencies having a short duration.

Based on the above findings, improvement in the following area is required to achieve an acceptable program:

-- Provisions for a specific and complete organizational delineation (reaching to the working levels) of the emergency command hierarchy for all the distinct emergency functions, describing the the assignment of supervisory and non-supervisory personnel by title positions for each functional area of emergency response.

In addition, the following matters should be considered for improvement:

-- Specification of which actions should not to be delegated by the Emergency Director.

-- Provisions for back-up personnel and manpower planning as required for continuous (24 hr) emergency response, designed for an emergency lasting for an indefinite period.

8.2 Augmentation of Onsite Emergency Organization

The licensee's Emergency Plan and Implementing Procedures failed to specify personnel who would augment the plant staff in the following areas: logistic support for emergency personnel (e.g. transportation,

temporary quarters, food and water, sanitary facilities in the field, procurement of special equipment and supplies, etc.); environmental monitoring; technical support for planning and re-entry operations; notification of governmental authorities; and release of information coordinated with governmental authorities to news media during an emergency.

The auditors found that the licensee had no detailed provisions for supplementing the health physics staff beyond twenty-four hours under accident conditions. The licensee had letters of agreement to extend ambulance, medical and fire capabilities, but these letters were general in nature and vague regarding authorities, interfaces and responsibilities.

Based on the above findings, improvements in the following areas are required to achieve an acceptable program:

-- Specification of provisions for the augmentation of the onsite emergency organization (personnel and equipment) in the following areas considering a continuous (24 hour) emergency situation projected to last an indefinite period: health physics, environs monitoring, logistical support, technical support, notification of governmental authorities and release of information to the news media.

-- Clarification of the authorities, responsibilities, limits and interfaces of contractors, private organizations, and local services with the onsite emergency organization.

9.0 EMERGENCY TRAINING/RETRAINING

The licensee's program for training personnel who were assigned specific emergency duties was not specifically addressed in their Emergency Plan or Implementing Procedures, but was contained and described in Administrative Procedure APN-10F "Emergency Preparedness Training."

According to that procedure, training was broken down into five categories: Shift Operating Crew, Radiation Protection Personnel, Site Supervisory Personnel, Energy Information Center Personnel Training, and General Employee Emergency Training. This latter training was required for all personnel frequenting restricted areas.

The first two categories required training to be given in selected Emergency Plan Implementing Procedures. Site Supervisory Personnel were specifically required to receive training on EPP-13 "Emergency Center Operations," and personnel employed full-time at the licensee's Energy Information Center (EIC) were required to receive training on EPP-1, "Radiation Emergencies," and in particular, in reference to the actions required of EIC personnel and visitors. General Employee Training consisted mainly

of the actions the individual would take at the sound of the three alarms (i.e., fire, evacuation, and station). With the exception of General Employee Emergency Training, all training/retraining was required annually.

The auditors reviewed documents and records related to emergency training and held discussions with the site's Training Director, instructors and persons assigned to various functional areas of the emergency organization.

The review of individual records indicated that only operations personnel had received Emergency Training during 1980.

Other personnel having specific functional duties during emergencies, namely radiation protection personnel, and key supervisory emergency personnel, had not received emergency training/retraining since July 1979. The licensee stated that training was planned for October 1980.

The licensee did not have approved, formal lesson plans for each of the five categories of emergency training, However, the auditors found sketchy descriptions of emergency training for radiation protection personnel, and operator requalification training, which did not add information beyond that found in APN-10F.

The auditors verified that training had taken place during 1979 for all categories, and for the shift operating crews during 1980. Training, however, did not include information on what might be expected during unusual plant conditions (e.g., components and areas with high radiation levels, changed nuclide composition, etc.).

Training and periodic retraining programs were not addressed in APN-10F for each of the following functional areas of emergency responses: Security, Radiation Protection, Chemistry, Repair/Corrective Action, State and Local Agencies, Licensee's Headquarters Support and Local Services Support.

In addition, the records showed that eight individuals from the licensee's radiochemistry department were given a lecture in March 1980 concerning the special procedures related to post-accident sampling. This was done in order to meet requirements set forth by NUREG 0578. The instructional materials used included procedures: NI-PSP-10, "Reactor Water Sampling - Suspected High Activity;" NI-SP-11, "Reactor Water Sampling with Reactor Clean-up System Isolated;" and NI-SP-12, "Procedure for Determining Drywell Equipment and Floor Drain Activities After Containment Auto-Isolation."

The licensee, however, did not train individuals on the post-TMI, high range main stack monitor. The auditors questioned instructors and found that they had no knowledge of the procedures nor the equipment to be used for monitoring release rates from the stack to the environment higher than 40 Ci/sec. (See Section 4.3 above.)

Training of individuals assigned to the licensee's first aid team included the Red-Cross Multi-Media Course, which was to be performed every three years in accordance with APN-10F. This training, according to the same procedure was exclusively for the shift operating crews and was included within that training category. The same individuals were assigned as fire and rescue brigade members.

The auditors' review of training records showed revealed that some training had been offered to local fire and ambulance services. Firemen received training in April 1980, and ambulance services in January 1979. There were no lesson plans for this training nor was there a detailed description of the training content.

Training of onsite emergency personnel did not include practical exercises and/or tests in which the individual demonstrated his ability to perform his assigned emergency function. The only exception was in the case of the operational crew, who did receive an exercise on how to perform dose assessment and projection using available equipment. Additionally, student performance objectives were missing from the emergency response training/retraining program.

Individuals who were responsible for conducting each category of emergency were specified by name on the attendance list. There were, however, no specific qualifications required for instructors. The individuals responsible for conducting each category of emergency training were not specified by position or title.

The auditors found no provisions for training members of the emergency organization in changes to procedures and equipment which occurred between scheduled training sessions.

Based on the above findings, improvements in the following areas are required to achieve an acceptable program:

-- Development of formally approved lesson plans for each functional area of the emergency organization including student performance objectives, tests and practical exercises in which individuals demonstrate specific abilities.

-- Development of means to provide training/retraining of all individuals with specific functional duties in the emergency organization to meet schedule requirements, and to provide additional training in those areas where significant changes in emergency response planning or procedures occur.

In addition, the following matters should be considered for improvement:

-- Establishment of instructors' qualification requirements.

-- Specification of individuals who are responsible for conducting each category of emergency training by position or title.

10.0 EMERGENCY FACILITIES AND EQUIPMENT

10.1 Emergency Kits and Emergency Survey Instrumentation

The licensee maintains pre-positioned emergency supplies and survey instrumentation in kits at various locations, However, the specific kit locations were not always clear. Licensee's EPP-10 "Emergency Equipment Inventories and Checklists," described the locations in a general manner. Examples were as follows: "One rescue cabinet shall be maintained onsite, located in or near the maintenance shop"; "One off site Emergency Kit shall be kept in a location convenient to the off site Emergency Center." In addition, checklists did not specify a permanent location. Each time the inventory is taken, the kit locations are written on the checklist. EPP-10 provided a listing of specific equipment and indicated the frequency of inventory for each kit or cabinet. This varied from a monthly to a yearly basis for different kits. Fire cabinets, for example were checked yearly, off site emergency kits on a quarterly basis, and self-contained breathing apparatus on a monthly basis.

The auditors performed an inspection of selected emergency kits and cabinets and determined that equipment was generally as specified in the Inventory Checklists of EPP-10. One exception was a 24-volt power supply. The licensee explained that this item was not being

used. Instrumentation available for individuals reentering the facility did not include the capability to detect and measure radiation areas in excess of 50 R/hr. This could prevent various emergency teams from performing their duties (e.g., Search and Rescue, Emergency Repair, etc.) since accident conditions could cause radiation fields greater than 50 R/hr and such teams would have no way of ascertaining the intensity of the radiation fields which they were entering.

The auditors noted that Thyac III rate-meters coupled with GM probes were used by the licensee to detect and measure radioiodine concentrations from charcoal cartridges. The licensee was unable to produce any documentation or data pertaining to the efficiency of their counting system. The auditors were unable to find any assurance that the licensee's counting system could detect and measure airborne radioiodine concentrations of at least 10^{-7} uCi/cc under field conditions. In addition, the licensee had no data concerning the retention efficiency of the charcoal cartridge used for radioiodine measurements, the effects of the purging in trying to remove noble gases from the charcoal, nor the effects of higher than normal backgrounds on their lower detection limits. (See Section 3.3.2.5 above)

The auditors noted that locations of emergency kits were in some instances distant from the place of intended use. In particular, the two kits to be used in the principal Emergency Operations Center (EOC) were kept on a different floor of the Administration Building, one in a cabinet near the employees' lunch room and another with the off site emergency kit, whose location was not clearly specified in EPP-10.

Operability checks were not performed routinely on emergency instrumentation nor was there a policy for maintaining an adequate state-of-the-art supply of survey instrumentation.

Based on the above findings, improvements in the following areas are required to achieve an acceptable program:

-- Provisions for survey instrumentation with a range to at least 1000 R/hr.

-- Provisions for detecting and measuring radioiodine airborne concentrations of at least 10^{-7} uCi/cc under field conditions.

-- Determination of detection efficiency for counter/detector system for I-131 and the retention efficiency of cartridge-media for airborne iodines.

10.2 Fixed Facilities and Instrumentation for Radiological Accident Assessment

10.2.1 Area and Process Radiation Monitors

The auditors inspected read-outs of area and process radiation monitors located in the control room and noted that all monitors were operable. Two stack gas monitors were installed with readouts in the control room. The Low Range Stack Gas Monitor had a maximum range of 10^6 counts/min and the High Range Stack Gas Monitor had a range up to 10^6 counts/sec. Using conversion factors for routine releases, the maximum monitor range was equivalent to a main stack release rate of about 40 Curies/second. In addition, the licensee made some provisions for a post-TMI interim high-range monitoring system (up to 10^4 Curies/sec). Discrepancies were found concerning this latter system, which resulted in an Immediate Action Letter (IAL #80-40) and a civil penalty. (See Section 4.3 above).

The fixed instrumentation with readouts in the control room appeared to be properly calibrated and adequate for routine needs.

Based on the above findings, and in the subsequent resolution of the items of the IAL #80-40, this portion of the licensee's program appears to be acceptable.

10.2.2 Meteorological Instrumentation

The licensee's meteorological instrumentation included sensors for wind speed, wind direction and ambient temperature located at 32, 100 and 200 ft; temperature differentials referenced to 32 ft; dew point at 32 ft; and barometric pressure at ground level. The system used included a Climatronix system for measuring wind speed/direction (with a starting threshold of one mile per hour) and additional Bendix Aerovanes (with a starting threshold of two miles per hour). All the above sensors were located at the site's meteorological tower. Meteorological readouts consisted of stripchart analog recorders located at the Weather Station and at the control room. Another readout was located at J. A. Fitzpatrick's Nuclear Plant Control Room.

There were procedures for performing calibration and maintenance of the above instrumentation. A technician performed daily operational checks and biweekly electronic adjustments. Corporate personnel conducted analysis of

data and gave feedback of results to the site. There were no provisions for vital or redundant power for meteorological instrumentation. Moreover, the licensee pointed out that some sensors located on the meteorological tower freeze during foul cold weather conditions, incapacitating the system. (One occasion in which an event of this nature was reported can be seen in licensee's LER 80-20).

Based on the above findings, this portion of the licensee's program appears to be acceptable, but the following matters should be considered for improvement:

- Provision of vital or redundant power to meteorological instrumentation.

- Development of means for protecting (e.g. heating) wind speed/direction sensors to prevent them from freezing during adverse weather conditions.

10.3 Emergency Communication Equipment

The equipment for communications during emergencies was found to be as specified in the plan and procedures.

The licensee has distinct alarms for: local area, site evacuation and fire. Alarms were tested on a weekly basis and found to be operable at the time of the appraisal.

The licensee had no provisions for routinely checking the operability of emergency communications devices and equipment. However, communication devices were found to be working properly at the time of the inspection.

There were no provisions for automatic recording of telephone and radio communications originating from or going to the Emergency Operations Center (EOC) and control room. Communication links, however, did have backups.

Onsite and off-site communication systems appeared to be adequate to support the performance of vital functions in transmitting and receiving information throughout the course of an emergency.

Communication system and devices were not supplied by vital redundant power sources with the exception of the Gaitronics Public Address System onsite.

The licensee did have onsite communication capability to assure contact with the off-site authorities responsible for implementing protective measures in the form of an integrated PBX telephone system, dedicated telephone lines and radio communications.

The licensee had a dedicated line from the EOC to the control room for the exchange of health physics and operational data during emergencies.

Based on the above findings, this portion of the licensee's program appears to be acceptable but the following matters should be considered for improvement:

a. Provisions for automatic recording telephone and radio communications.

b. Establishment of a source of vital or redundant power to insure the workability of communications during loss of normal power, coincident with an emergency situation.

10.4 Emergency Operation Centers

The licensee has a principal Emergency Operations Center (EOC) from which direction, evaluation and coordination of all licensee activities relating to emergencies are performed. The EOC was located on the second floor of the site's Administration Building. This space was normally used as classrooms. In addition, the licensee had an alternate EOC, located at the Niagara Mohawk Service Center in Oswego, New York.

The location and size of the EOCs were found to be adequate in terms of space and location to support the licensee's present emergency response scheme.

The following equipment and supplies were not available at the onsite EOC: low range beta/gamma survey meter; air sampler with capability for particulate and radioiodine sampling; counting system with capability of performing specific radionuclide determinations and capable of detecting radioiodine concentrations of $1x10^{-7}$ uCi/cc with a substantial degree of confidence; personnel dosimetry; check or calibration sources; site map, USGS 7-1/2 minute map marked with cardinal polar coordinates; emergency assignment board with team designations and emergency assignments; isopleths; plant layout drawings; readout of the station meteorology; first-aid kits and adequate decontamination supplies.

The alternate EOC had a site map, but in addition to the items found lacking at the onsite EOC, did not have a high range gamma survey meter available.

Based on the above findings, improvements in the following areas are required to achieve an acceptable program:

Provision of equipment and supplies to both EOCs to protect and assist personnel coordinating and evaluating the emergency response effort (e.g., air samplers, beta/gamma survey instruments, calibration sources, site maps, isopleths, etc.)

10.5 Medical Treatment Facilities

The licensee maintained a 10x20 ft. first-aid room (located on the first floor of the Administration Building in front of the lunch room) to be used for the treatment of minor injuries. The first-aid room was readily accessible to a stretcher being carried by two individuals. The facility contained first-aid equipment and supplies, and was not far removed from supplies/facilities for personnel decontamination, and the Health Physics Control Point. There were no provisions made within the first-aid room for handling contaminated persons. The first-aid room, therefore, had no survey instrument, supplies nor procedures for decontamination. Decontamination, in the case of small injuries, would take place according to the licensee in another room located on the same floor of the Administration Building, adjacent to the Health Physics Control Point. Personnel with serious injuries would, according to EPP-4 "Personnel injury or illness" be sent by ambulance to the Oswego Hospital or in the case of extensive contamination, would be referred to the State University Hospital in Syracuse, once his injuries have been stabilized.

There was no registered nurse at the plant site to handle injuries on a routine basis and no procedures were available for treatment of small injuries. The first-aid room was unattended.

Based on the above findings, this portion of the licensee's program appears to be acceptable but the following matters should be considered for improvement:

-- Provisions for a registered nurse to handle the treatment of small injuries on a routine basis and to assist in making a determination as to the condition and required care and treatment of injured personnel.

10.6 Decontamination Facilities

There were provisions for decontamination of personnel located on the first floor of the Administration Building, in close proximity to the Health Physics Control Point. These provisions consisted of one dedicated shower, detergent and various decontaminants (e.g., potassium permanganate, titanium dioxide, sodium acid sulfite, etc.)

Liquid waste resulting from decontamination goes into the radioactive liquid waste processing system.

The licensee's primary assembly area was located at the lunch room, near the decontamination facility. There were no provisions, however, for decontamination of personnel in any other assembly area, including the alternate EOC, where personnel will be directed to in the event of a serious radiological emergency.

Based on the above findings, improvements in the following areas are required to achieve an acceptable program:

-- Provisions (e.g., supplies, equipment, decontaminants) for decontamination of personnel during serious emergencies at each of the assembly areas.

10.7 Protective Facilities and Equipment

The primary assembly area was located on the first floor of the Administration Building and was used routinely as a lunch room. It was not located nor designed with emphasis on those features that would ensure its adequacy with respect to: capacity for accommodating the number of persons expected, shielding, ventilation and inventory of supplies (e.g., respiratory protection, protective clothing, etc.).

Based on the above findings, improvements in the following area are required to achieve an acceptable program:

-- Provisions for a primary assembly area and other designated assembly areas so that they can accommodate the number of persons expected, and having equipment and supplies as required to ensure the physical safety of personnel (e.g. respiratory protective equipment, etc.)assembled.

10.8 Damage Control Corrective Action and Maintenance Equipment and Supplies

There were onsite damage control, corrective action equipment such as cranes, fork lifts, etc., and as a consequence of the Unit 2 construction site, additional equipment could be made readily available at this time. The licensee stated that he maintained a stock of supplies for repairing and maintaining equipment.

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

11.0 EMERGENCY IMPLEMENTING PROCEDURES

11.1 General Content and Format

The licensee's Implementing Instructions and most Emergency Plan Implementing Procedures specified the organizational elements having

the authority and responsibility for performing the tasks covered by the procedures. Exceptions, however, were found in EPP-4, 8 and 12, where responsibilities were either lacking or unclear.

Emergency Actions Levels (EALs) and Protective Action Guides (PAGs) were specified along with emergency actions to be implemented in EPP-1, and action steps were generally displayed in a step-by-step sequential fashion. Procedures described prerequisites and conditions that must exist before specified actions are performed, as well as the precautions to be observed during the performance of the actions.

For the most part, guidelines for areas in which the user is permitted to exercise judgment in the implementation of EALs or in the making of recommendations for applying PAGs were provided. A noted exception was the lack of guidelines for the comparison of radiological environmental emergency surveys with dose estimates and projections based on measured release rates from control room instrumentation and from the High Range Main Stack Gas Monitor.

The licensee's procedures were weak in providing cross-references between implementing procedures and other peripheral procedures that may be applicable during emergency conditions. (See for example, Section 11.4.5 below).

Emergency Implementing Instructions and Emergency Plan Implementing Procedures generally provided data sheets, check lists, and sign-off spaces to document that certain actions described within the procedures had been completed.

Based on the above findings, this portion of the licensee's program appears to be acceptable, but the following matters should be considered for improvement:

-- Incorporation of guidelines for the comparison of radiological environmental survey data with that obtained from the measurement of radioactivity release rates based on installed instrumentation, in order to make dose assessments and projections, as well as recommendations as to protective actions based on such data.

-- Incorporation of cross-references, as deemed necessary in Emergency Plan Implementing Procedures, Emergency Implementing Instructions and related procedures for providing a coherent emergency response.

11.2 Emergency Operating Procedures

The auditors reviewed a sampling of the licensee's Special Operating Procedures developed pursuant to Regulatory Guide 1.33 and noted that they did not contain a step in the "Immediate Action Section"

which required an evaluation of emergency conditions relative to Emergency Action Levels contained in the licensee's Emergency Plan and Implementing Procedures, nor did they make specific reference to the proper Implementing Instructions for classifying a situation and taking necessary actions within the Emergency Plan.

Based on the above findings, improvements in the following area is required to achieve an acceptable program:

-- Modification of Special Operating Procedures developed pursuant to Regulatory Guide 1.33 to include a step in the "Immediate Action Section" which requires an evaluation of emergency conditions relative to EALs and emergency classification criteria contained in the Emergency Plan or Implementing Instructions.

11.3 Implementing Instructions

The licensee did not have a separate procedure (Implementing Instruction) for each class of emergency specified in their Emergency Plan. The licensee's Emergency Plan had eleven distinct categories involving radioactive emergencies, six of which involved high radiation events, four dealt with high airborne radioactivity and one pertained to accidental releases of radioactive liquid to the Ontario Lake. On

the other hand, their EPP-1 "Radiation Emergencies" procedure only referred to three distinct categories: "High Radiation - Local Area," "High Radiation General Area or High Airborne Activity" and "Accidental Release of Radioactive Liquid from the Restricted Area."

The procedure failed to address the following distinct categories found in the licensee's Emergency Plan: High Radiation Level in Primary Assembly Area (PAA), High Airborne in PAA, High Radiation Level in On-Site Emergency Center (EOC), High Radiation level down-wind security fence, High Airborne Activity at the EOC, Radiation levels greater than 2 mR/hr at the site-boundary, and Airborne Releases affecting off-site personnel. The classification system described by EPP-1 was not clearly graded, except for the distinction made between "Local" and "General" areas.

EPP-1 specifies Emergency Action Levels (EALs) for each of the four distinct emergency categories addressed in the procedures.

EPP-1 outlined pre-planned response actions required to be considered by the Senior Shift Supervisor, by personnel in the area, by the Shift Supervisor and the Security Force for the "High Radiation - Local Area" emergency category. The "High Radiation - General Area or High Airborne Activity" classification outlined, in addition, preplanned actions to be taken by the Emergency Director, Unit 2 construction personnel, Energy Information Center and offsite personnel.

The third emergency category in EPP-1, "Accidental release of radioactive liquid from the restricted area," outlined preplanned actions to be taken by the Shift Supervisor, the Radiation Protection Supervisor and the General Superintendent.

In addition to the actions required within the body of the EPP-1 procedure, checklists outlined specific action items for the Senior Shift Supervisor (SSS), the Emergency Director, and Chief Senior Operator.

The Implementing Instructions EPP-1 was written so that it orchestrated the implementation of other, more specific Emergency Implementing Procedures which have been developed to support the implementation of the Emergency Plan. This was evident from the aforementioned SSS and Emergency Director Checklists, which made reference to EPP-5, Accountability; EPP-3, "Search and Rescue" and other procedures as needed.

Conclusions

Based on the above findings, improvements in the following areas are required to achieve an acceptable program:

-- Development of Implementing Instructions which provide separate procedures for each emergency category specified in the Emergency Plan providing a clearly graded classification system and distinct Emergency Action Levels based on available quantitative indicators.

11.4 Implementing Procedures

11.4.1 Notifications

The licensee did not have a separate notification procedure to be used during emergencies. For each class of emergency addressed in EPP-1, the sequence of notification to alert or mobilize the onsite emergency organization, as well as, local and state supporting agencies was incorporated in the "Action Steps" for the Senior Shift Supervisor, Emergency Director and Chief Senior Operator. Federal agencies, notably NRC, were not addressed in the same checklists, but indirectly in the summary of the procedure, Par. 1.2.3, which referred to EPP-13, "Emergency Center Operations." EPP-13, contained an "Emergency Contact List" (Figure 10) and it was in accordance with item five of this list that NRC, Region I was to be notified. The same applied to

DOE, and Niagara Mohawk corporate personnel. The appraiser found no reference in the Emergency Implementing Procedures to the Emergency Notification System, that is, the "Hot Line" to NRC.

Specific action levels for selective notification of the various agencies were not provided in EPP-1 nor in EPP-13. No detailed logic for making notifications was available except that, apparently when a site evacuation is mandated, or if the accident was judged to have potential off-site consequences, all agencies are required to be notified.

The licensee relied on alarms, pre-planned messages and announcements over the public address system for initial notifications of onsite personnel. The contents of pre-planned messages were incorporated in EPP-1. These did not apply to off site support agencies.

EPP-1 contained a listing of Radiation Protection Supervisors and Technicians to be contacted during emergencies. The list had not been updated since October 1978. There was no additional listing of persons and agencies included in the emergency response scheme, except for the "Emergency Contact List" found as part of EPP-13.

The means to be used to make notifications were specified and where telephone numbers would be required, they were listed. The auditors noted, however, that there was no authentication scheme for initial notifications of off site authorities.

Based on the above findings, improvements in the following areas are required to achieve an acceptable program:

-- Development of a coherent scheme for emergency notification of all off site agencies, including specific action levels for selective notifications of such agencies in accordance with a graded classification of emergencies.

-- Provisions for upgrading and maintaining a current "Emergency Contact List."

11.4.2 Off-site Radiological Surveys

The methods and equipment to be used by the licensee to perform emergency off-site radiological surveys were specified in EPP-7, "Downwind Surveys." The licensee specified predetermined survey locations and routes where

radiation readings and airborne samples would be taken during emergencies. In addition, the procedure provided for interfaces with EPP-8 "Emergency Off-site Dose Estimate," and EPP-16 "Environmental Monitors Emergency Operation."

EPP-7, Figure 1, "Survey Log Sheet" provided means for team members to record the date and time of each survey, the location of the same, the names of survey team members, the type of filter medium and volumes used for airborne samples, and the dose rates in counts per minute or milliroentgens per hour. Moreover, the "Survey Log Sheet" included two distances from the floor (3 inches and 3 feet), at which radiation levels would be measured.

The "Survey Log Sheet" failed to provide means to record the instrument used by type and serial number; the mode in which the instrument was used (e.g., window open or window closed); the duration of the meter reading; air sample flow rates; background radiation levels at the time of air sample count; and sample count time.

EPP-7 failed to specify means for unique labeling of each environmental sample for later identification. Additionally, the same procedure did not specify to which element of the

emergency organization, the original data sheets would be provided nor when and how the exchange of information would take place. EPP-7 did not designate a central collection point for all the environmental samples collected. The licensee did, however, state in EPP-7: "The results would be radioed back to the director in the Onsite Technical Support Center when obtained so that the activity may be calculated and relayed to the New York State Department of Health."

Provisions for transportation of off-site survey team members were specified in EPP-7. In addition, a radiation survey at the security fence was specified in licensee's EPP-6 "In-plant Emergency Surveys."

Based on the above findings, this portion of the licensee's program appears to be acceptable, but the following matters should be considered for improvement:

-- Provision of means for recording the instrument used by type and serial number, the mode in which the instrument was used, the duration of meter readings, air sample flow rates, background radiation levels at the time of air sample counting and sample counting times, for off site environmental surveys.

-- Provision of means for uniquely labeling each environmental sample for later identification.

-- Specification of which member of the emergency organization, how and when original data sheets would be provided for further analysis.

11.4.3 Onsite (Out-of-Plant) Radiological Surveys

The licensee did not have a separate procedure for performing onsite (out-of-plant) Radiological Surveys, but Survey Team B, under EPP-7 "Downwind Surveys" was required to perform surveys of specific locations (e.g.trailer area, security building area, etc.) which in essence included onsite (out-of-plant) surveys.

Based on the above findings, this portion of the licensee's program appears to be acceptable, but the same matters as those described in Section 11.4.2 should be considered for improvement.

11.4.4 In-Plant Radiological Surveys

The methods and equipment to be used by the licensee to perform emergency in-plant radiological surveys were specified in EPP-6 "In-Plant Emergency Surveys." The

licensee specified predetermined survey locations where radiation readings and airborne samples would be taken during an emergency.

EPP-6 described the equipment to be used by the in-plant survey team and their location. In addition, the procedure described the line of command initiating the surveys and the precautions to be taken into consideration before entering the plant.

Figure 1 of EPP-6 "In-Plant Survey Data Sheet" provided the team members with means to record the date and time of each survey, the area surveyed (location), the names of individuals performing the survey, and the instrument used by type and serial number. The procedure did not, however, provide means for recording the duration of the meter readings, air sample volume and flow rates, background radiation levels at the time of air sample counting, and the sample counting time. In addition, this procedure did not provide guidelines for counting the particulate and charcoal media in a low background location, nor indicated whether purging for charcoal cartridges would be required. EPP-6 failed to indicate the type of count-rate instrument

and detector that would be used, the method for measuring the amount of airborne radioactivity in the different media used; nor did it address uniquely labeling samples for later identification.

EPP-6 instructed the team members to report the results of all surveys to the Emergency Director so that evaluation could be made of radiological conditions. The procedure failed to specify the means by which results would be reported to the director, including original survey data sheets. In addition, no central collection point was designated for all samples. The procedure did not address how the results of in-plant surveys would be integrated with other surveys (e.g., onsite out-of-plant surveys).

Based on the above findings, improvements in the following areas are required to achieve an acceptable program:

-- Provisions for recording the duration of meter readings, air sample volume and flow rates, background radiation levels at the time of filter media counting, and sample counting times.

-- Provision of guidelines for counting particulate and charcoal media in a low background area and whether purging (and by what means) for charcoal cartridges would be required.

-- Specification of the type of count-rate instrument and detector to be used and the method for measuring the amount of airborne radioactivity in the different media used.

-- Provisions for uniquely labeling samples for later identification and laboratory analysis.

In addition, the following matters should be considered for improvement:

-- Specification of the means by which results of all surveys would be reported to the Emergency Director, to include original data sheets.

-- Designation of a a central collection point for all samples, and indication of how the results of in-plant surveys would be integrated with other surveys.

11.4.5 Personnel Monitoring and Decontamination

The licensee's EPP-1 "Radiation Emergencies" procedure, failed to clearly address who will monitor personnel for contamination, and what actions and procedure will be used if a group of persons is found contaminated. The procedure did not reference other procedures in which personnel monitoring, decontamination and follow-up (e.g., monitoring for internal contamination) were specifically addressed (EPP-4, RP-61) or in which instruments action limits and methods to be used were described. Instead, Paragraph 3.2.2(h) stated, "If they (personnel) are found to be contaminated (greater than 400 cpm on a GM probe survey) appropriate precautions will be taken to prevent spread of contamination."

Licensee's Radiation Protection Procedure RP-61, Section III, Paragraph 3, "Personnel Decontamination", addressed routine decontamination using areas normally available, but did not reference emergency conditions. RP-61 provided for recording the names of individuals surveyed, the extent of contamination found, and the results of the decontamination effort. However, the form did not request the instrumentation used nor did it provide sketches to facilitate the description of the body area(s) affected.

Licensee's procedure EPP-4, "Contaminated Injury" addressed injured personnel who are also contaminated. The procedure distinguished between minor and major injuries. Again, the main thrust was in preventing the spread of contamination from the patient to the ambulance or the hospital. EPP-4 did not define the level of radioactivity on the skin which would require decontamination. For example, Paragraph 2.3 stated "if contamination is detected", but failed to indicate instrumentation used, and the limit above which skin decontamination would be required. In additionthe above procedures made no reference to decontamination of the skin involving radioiodine. Moreover, decontamination procedures provided no guidance as to when the decontamination effort should stop, and who would be authorized to make such a decision.

Finally, procedures for decontamination of personnel did not indicate means for providing data collected to the responsible element in the emergency organization.

Based on the above findings, improvements in the following area are required to achieve an acceptable program:

-- Revisions of the procedure for monitoring and decontamination of personnel during emergency conditions to

include: cross-references to Implementing Instructions which orchestrate all emergency actions; definition of contamination levels, methods, instrumentation, follow-up surveys for internal contamination; and logistics to handle a large number of contaminated persons during an emergency.

11.4.6 Evacuation of Onsite Areas

The licensee's Emergency Plan had action levels based on radiation alarms and MPC airborne concentrations which required evacuation of specified areas, buildings or the site.

The location of the licensee's Primary Assembly Area (the lunch room) and its criteria for use were specified in EPP-1. However, paragraph 3.2.2.b stated that, "...when large numbers of personnel are onsite, other designated assembly areas may be used." However, no other assembly areas had been designated by the licensee at the time of the HP Appraisal, and Emergency Implementing Procedures failed to specify alternate assembly areas. The personnel accountability procedure, for example, refers only to the lunch room. (See EPP-5)

The licensee EPP-1 procedure had provisions for concise oral announcements over the facility's public address system to describe the immediate actions of non-essential personnel. The same procedure included a reference to personnel accountability, but did not cross-refrence EPP-5 "Personnel Accountability" procedure. Similarly, EPP-1 failed to reference personnel monitoring and decontamination procedures. (See Section 11.4.5 above)

Based on the above findings, improvements in the following area are required to achieve an acceptable program:

-- Specification of all designated assembly areas in the Emergency Plan, Emergency Implementing Instructions and Procedures.

In addition, the following matter should be considered for improvement:

-- Provision of cross-references for personnel accountability, monitoring and decontamination procedures.

11.4.7 Personnel Accountability

EPP-5 "Personnel Accountability" is supposed to provide for a full accounting of all individuals onsite within 30 minutes from the declaration of an emergency. The procedure specified that reports of accountability would be made to the Personnel Accountability Coordinator, otherwise described as Accountability Aide in licensee's EPP-13.

EPP-5 failed to reference the Search and Rescue procedure (EPP-3), as required, to follow-up on the whereabouts of "missing" persons. Instead, the procedure says, "...the Accountability Coordinator will proceed to the TSC via the Control Room, resolving 'missing' persons as they are encountered."

EPP-5 did not address continued personnel accountability of all individuals onsite after the initial accountability has been completed.

Based on the above findings, this portion of the licensee's program appears to be acceptable, but the following matters should be considered for improvement:

-- Provision of cross-references for the personnel accountability and search and rescue procedures as required to follow-up on "missing" persons.

-- Provisions to maintain continued personnel accountability of all individuals onsite after the intial accountability has been completed.

11.4.8 Assessment Actions

The system used by the licensee for gathering information and data upon which to base decisions to escalate, de-escalate, take corrective actions, or recommend actions to onsite and off site individuals consisted of: effluent monitors, area and process monitors, and off site radiation, environmental surveys performed by emergency personnel. Applicable procedures identified the sources of information available to calculate the source of information needed or expected to be available from area and process monitor readings, meteorological information and offsite radiation surveys.

The licensee had made some modifications to install an interim high-range main stack monitor for estimating the amount of radioactivity being exhausted to the environment

per unit of time Ci/sec), in accordance with the requirements of NUREG 0578. Various descrepancies were found in this area. (See Section 4.3 above)

The licensee's EPP-8 "Off-Site Dose Estimate Procedure" identified the installed main stack process monitors located in the control room, as well as, back-calculations for radioactive release rates from data provided by environmental radiation emergency surveys. The licensee failed, however, to incorporate the interim high-range main stack monitor to allow a measurement of release rates through the stack when installed control room process monitors are off-scale or inoperable.

Action levels and protective guides were specified to be used as a basis for dose projections based on the State of New York's emergency procedures. These levels and guides provided means for projecting whole body and thyroid exposures to individuals offsite located within the plume.

Licensee's assessment procedures to project whole body doses to individuals offsite relied mainly on control room instrumentation. However, the upper limit of the installed

Main Stack Process Monitor is approximately 40 Ci/sec. After this release rate is exceeded, the licensee depends entirely on down-wind measurements (e.g., gamma dose rates and air samples using portable instruments).

EPP-1 included provisions for immediate notification of state, local and federal agencies in the event initial assessment actions indicated an actual or potential exposure to the whole-body or the thyroids of persons affected by the plume in excess of protective action guides.

The licensee had no provisions, however, for trend analyses of assessment data, but maintained contact and information exchange with offsite agencies in the State of New York responsible for implementing protective actions on behalf of the general population.

EPP-16 "Environmental Monitors Emergency Operations" outlined the collection of radiological environmental monitoring air samples and TLDs from the licensee's six environmental stations. Other data, such as soil, vegetation and animal feed samples were not addressed as part of the assessment actions.

Based on the above findings, improvements in the following area are required to achieve an acceptable program:

-- Development and implementation of procedure(s) to incorporate into the radiological assessment procedure the interim high-range main stack monitor to measure radioactive release rates from the main stack in the event the presently installed process monitors with control room readouts are off-scale or inoperable.

In addition, the following matters should be considered for improvement:

-- Consideration of soil, vegetation, animal feed and other environmental samples in the procedures used to ascertain the environmental impact during accident situations.

-- Provisions for trend analyses of assessment data.

11.4.9 Radiological and Environmental Monitoring Program (REMP)

The licensee had no provisions for an REMP program other than the one described in EPP-16, which is subject to the limitations indicated above. (See Section 11.4.8)

Based on the above findings, this area appears to be acceptable, however, the item related to REMP sampling described in Section 11.4.8 should be considered for program improvement.

11.4.10 Onsite First-Aid/Rescue

EPP-4 "Contaminated Injury" described the licensee's pre-planned response to an onsite first aid or medical emergency, including the handling and transporting of injured persons who may also be contaminated. The same procedure described the interface and action levels for using the offsite medical treatment facility.

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

11.4.11 Security During Emergencies

The security measures to be placed in effect during emergencies were specified in the Emergency Procedure portion of the licensee's Security Manual. References to this security procedure are made in Emergency Implementing Instruction EPP-1.

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

11.4.12 Radiation Protection During Emergencies

The licensee did not have radiation protection procedures which reflected their usage and applicability during emergency conditions and which included such areas as: personnel dosimetry, exposure records, positive access controls, instructions to emergency workers regarding radiological conditions due to the accident, dose assessment, provisions for preventing re-exposure of individuals, or limiting exposures and other ALARA considerations.

Based on the above findings, improvements in the following area are needed to achieve an acceptable program:

-- Provisions for radiation protection during emergencies which include personnel dosimetry, exposure records, positive access controls, instructions to emergency workers regarding radiological conditions due to the emergency, dose assessment, limiting exposures/re-exposures and ALARA considerations.

11.4.13 Recovery

Licensee's EPP-12 "Re-entry Procedure", addressed the radiological controls required for performing a re-entry during a recovery phase. This procedure is made reference to in the licensee's Emergency Plan, Part VIII, Recovery and Re-entry. The Emergency Plan specified the Emergency Director as the organizational authority responsible for judging, based on radiological survey and operational data, the risk-benefit of each recovery phase. Notifications of various individuals and agencies that a recovery mode has been initiated was not clearly specified in either the Emergency Plan or Implementing Procedures.

Based on the above findings, this portion of the licensee's program appears to be acceptable, but the following matters should be considered for improvement:

-- Incorporation in EPP-12 notifications emergency response individuals and agencies that a recovery mode has been entered.

-- Designation in EPP-12 the organizational authority responsible for declaring that a recovery phase had been entered and the criteria upon which such decision

is to be based, including plant operating conditions, as-well-as, in-plant and out-of-plant radiological conditions.

11.4.14 Repair/Corrective Actions

The licensee had no specific procedures for emergency repair/corrective actions, to be performed in order to mitigate or terminate the consequences of an accident. This finding was related to the fact the emergency organization defined by the licensee did not assign the emergency repair/corrective action function to any particular functional group.

Based on the above findings, improvements in the following area are required to achieve an acceptable program.

-- Provisions for emergency repair/corrective actions, including designation of the responsible emergency organization element, team make-up and necessary procedures.

11.5 Supplementary Procedures

11.5.1 Inventory, Operational Check and Calibration of Emergency Equipment, Facilities and Supplies

The licensee's EPP-10 "Emergency Equipment Inventories and Checklists" established requirements for emergency response kits, and listed equipment reserved for use during emergencies. The location was not always clearly specified in the procedures. For example, Paragraph 3.1.5 "one off-site emergency kit shall be kept in a location convenient to the Off-Site Emergency Center", Paragraph 3.13 "One Rescue Cabinet shall be maintained on site, located in or near the maintenance shop"

The procedure specified the frequency at which emergency equipment is to be inventoried. Instruments were checked to ascertain their calibration status. EPP-10 failed, however, to specify operational checks for survey instrumentation, as well as, the type and model of the instruments in the inventory. In addition, the licensee did not have source checks available for performing operability checks. The checklists relied on broad descriptions such as "GM Survey Meter."

The auditors stated that, based on the above, assurance could not be provided that specific instrumentation with adequate operating characteristics would be available (e.g., desired range) and that instruments gave reliable data. (See also Section 10.1.)

Based on the above, this portion of the licensee's program appears to be acceptable but the following matters should be considered for improvement:

-- Specification of location of emergency kits and equipment.

-- Specification of survey meters by type and model in inventories of emergency supplies and equipment.

-- Development of provisions for operability tests for all emergency radiation survey meters, including sources to perform such checks.

11.5.2 Drills

Emergency drills are administered in accordance with licensee's EPP-18 "Emergency Drill Procedure." According to this procedure drills are administered by the General

Superintendent, and not by the Emergency Planning Coordinator in accordance with a scenario developed in advance. The General Superintendent selected observers from members of his staff. Documentation and evaluation of observers' and participants' comments were turned over to the Emergency Planning Coordinator at the end of the critique following a drill. Management controls in assigning responsibilities for evaluation of deficiencies noted in the drill and recommended corrective actions were also addressed in broad terms. The auditors noted no specific provisions for backshift drills.

Based on the above findings, this portion of the licensee's program appears to be acceptable, but the following matters should be considered for improvement:

-- Administration of drills by Emergency Planning Coordinator.

-- Specification of the mechanism for scheduling corrective actions and follow-up on correcting deficiencies noted during drill.

-- Provisions for emergency drills on backshifts.

11.5.3 Review, Revision and Update

Licensee's EPP-11 "Review and revisions of the Site Emergency Plan and Procedures" established requirements for a periodic review and revision of the Site Emergency Plan and Implementing Instructions and Procedures. Telephone numbers were required to be updated for emergency-related agencies and individuals. The auditors noted that for the most part emergency procedures had been reviewed, updated and distributed as required. One exception noted was the Radiation Protection Team Contact List (EPP-1, Figure 7) which listed persons not employed by the licensee at the time of the Health Physics Appraisal. (See also Section 11.4.1.)

Based on the above findings, this portion of the licensee's program appears to be acceptable, but the following matter should be considered for improvement:

-- Provisions for ensuring that qualified emergency personnel call lists are updated in a timely manner.

ANNEX A

Exit Meeting and Licensee Commitments

On October 10, 1980, the NRC Health Physics Appraisal Team met with the licensee representatives, denoted in Annex B, to discuss the scope and findings of this appraisal. In the course of that discussion, the following plans for program improvement were identified:

1. An action plan, detailing milestons and schedules, to upgrade the radiation protection program at Nine Mile Point will be developed on a priority basis. This action plan shalll address, as a minimum, the following areas:

   - The Radiation Protection Organization
   - Personnel Selection, Qualification and Training
   - Exposure Controls (External, Internal and Respiratory Protection)
   - The ALARA Program
   - Radioactive Waste Management
   - Procedure Revision and Upgrade
   - Calibration and Use of Instrumentation
   - Work Area Radiation Controls (Including Contamination and Radiation Area Controls)

   If necessary, the services of professional level Health Physics personnel who are experienced in nuclear power plant radiation protection programs will be utilized in the plant's staff in the development of this plan.

   The plan will be submitted to the Director, NRC Region I (Philadelphia) by December 1, 1980. Monthly progress reports summarizing your efforts in upgrading the radiation protection program will also be submitted on a monthly schedule to the NRC Region I Office starting January 1, 1981 and continuing until the upgrading is completed.

2. By December 31, 1980, the technical expertise and capability of station personnel in radiation protection will be augmented with professional level Health Physics personnel who are experienced in the operation of nuclear power plant radiation protection programs to assist in the implementation of the licensee's action plan for program improvement, and to provide management support in the area of Health Physics. Such personnel will be retained until it is apparent that necessary program improvement has been achieved and the regular plant staff capabilities are at such a level that the new upgraded program can be sustained.

These commitments were further documented in a letter to the Vice President, Electric Production, Niagara Mohawk Power Corporation from the Director, NRC Region I (Philadelphia), dated October 10, 1980.

In addition, the licensee indicated that efforts had been completed on the installation of a lead cave at the stack sampling location that was to be utilizied to fulfill the requirements of NUREG-0578, Category A, Item 2.1.8.b.

ANNEX B

PERSONS CONTACTED

* T. Lempges, Vice President, Electric Producton
* T. Perkins, General Superintendent, Nuclear Generation
* T. Roman, Station Superintendent
* E. Leach, Superintendent, Radiochemistry and Radiation Protection
  M. Silliman, Superintendent, Technical Services
  R. Abbott, Supervisor, Nuclear Operations
  B. E. Taylor, Supervisor, Instruments and Controls
  J. Krakow, Training Records Clerk "A"
  J. Coates, "B" Technician
  D. Barcomb, "D" Technician
  J. Cook, "D" Technician
  J. Gray, "D" Technician
  M. Goldych, "A" Technician
  S. Dull, Technician (Contractor)
* J. Duell, Chemistry and Radiation Protection Supervisor
  R. Fortino, Chief Technician for Days
  Z. Miahky, "D" Technician
  L. Kellock, "D" Technician
  L. Sanderson, "D" Technician
  N. Sereno, "C" Technician
  C. Brozenich, "B" Technician
  D. Regan, "B" Technician
  W. Thomson, "C" Technician
  J. Hurley, "C" Technician
* P. Volza, Emergency Planning Coordinator
* H. Flanagan, Environmental Protection Coordinator
* M. Hedrick, Dosimetry and ALARA Coordinator
* J. Pavel, Assistant Supervisor of Nuclear Training
  N. Allen, Plant Operations, "D" Clerk
  M. Lagoe, Plant Operations, "A" Clerk
  J. Shea, Assistant Supervisor of Nuclear Operations
  C. Gerber, Radwaste Operations Coordinator
* G. Leskin, Assistant Supervisor of Quality Control Operations
  A. Wineguard, System Quality Control Coordinator for Vendor Quality
  R. Trabor, Contractor Engineer, Stone and Webster
* P. Harrison, Technical Assistant
* K. Zollitsch, Training Supervisor
* M. Mosler, Licensing Engineer
* W. Connally, Quality Control Representative

* denotes personnel attending the HP appraisal exit meeting on October 10, 1980.

In addition, other personnel from the operations and radiation protection department (including contractor personnel) were interviewed in the course of this appraisal.

FIGURE 1 - CURRENT ORGANIZATIONAL STRUCTURE (10/10/80)

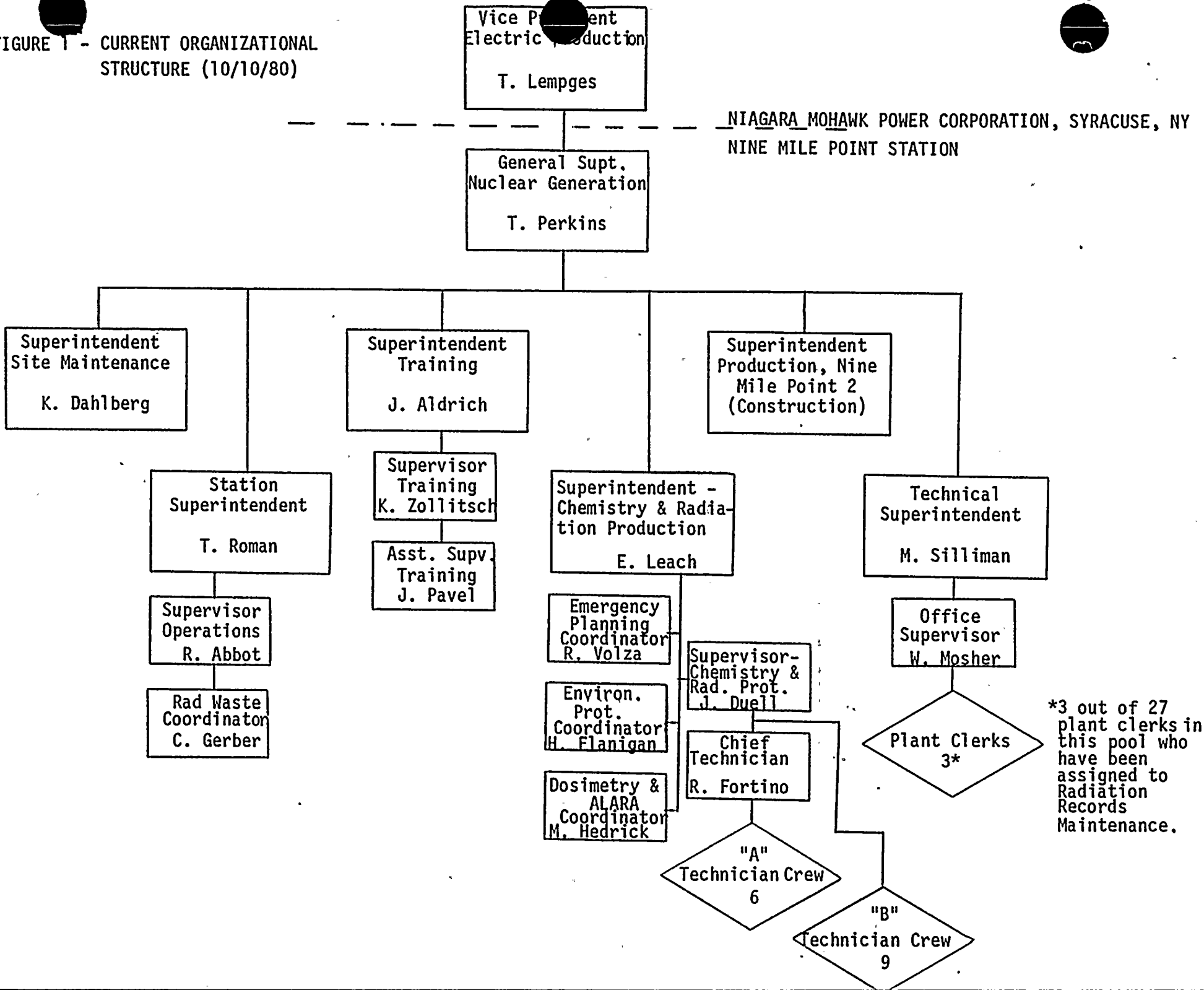

FIGURE 2 : MAIN CONDENSER AIR REMOVAL & OFF GAS SYSTEM