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

Report No. 80-20

Health Physics Appraisal Program

Docket Nos. 50-313
50-368

Licensee: Arkansas Power and Light Company (AP&L)
P. O. Box 551
Little Rock, Arkansas 72203

Facility Name: Arkansas Nuclear One (ANO)

Appraisal at: Russellville, Arkansas

Appraisal Conducted: October 27 - November 7, 1980

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G. D. Brown, Chief, Fuel Facilities and Materials Safety Branch — Date

Inspection Summary

Appraisal on October 27 - November 7, 1980 (Report Nos. 50-313/80-20/50-368/80-20)

Areas Appraised: Announced appraisal of the Health Physics Program, including organization and management, personnel selection, qualification and training, external and internal exposure controls, radiation surveys, access and contamination controls, radioactive waste management, ALARA, facilities and equipment, and emergency response capabilities. The appraisal involved 328 appraiser - hours on-site by two NRC Radiation Specialists and two NRC Contract Health Physicists.

Results: Several significant weaknesses in the health Physics Program were identified. These weaknesses were in the areas of engineering and contamination controls in the Unit 1 auxiliary building (Section 6), development and implementation of written procedures (Sections 3, 4, 6), reporting level of the Health Physics Supervisor (Section 1), use of personnel other than ANSI N18.1 qualified technicians (Section 1), deficiencies in the collection, identification and movement of radioactive waste materials (Section 6). Three apparent items of noncompliance were also identified: Failure to prepare written procedures to cover requirement of 10 CFR 20 (Technical Specification 6.10) (Section 3); Failure to comply with 10 CFR 71.3 (Section 6.2.3); Failure to label containers of radioactive material (10 CFR 20.203) (Section 5).

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SUMMARY

The Special Health Physics Appraisal was conducted during the period October 27 - November 7, 1980, to evaluate the adequacy and effectiveness of Arkansas Nuclear One's (ANO) overall Health Physics Program. At the time of the appraisal, both units were in operation and the Appraisal Team did not enter the containment buildings.

The Appraisal Team consisted of two inspectors from the NRC Region IV office and two contractor personnel; one from Texas A&M University and one from Battelle Pacific Northwest Laboratories. The appraisal effort included observation of work practices, interviews with AP&L personnel, independent measurements, and a review of selected procedures and records. The scope of the appraisal included:

A. Radiation Protection Organization and Management

B. Personnel Selection, Qualification and Training

C. External and Internal Exposure Controls

D. Radiation Protection Surveillance

E. Access Controls/Contamination Controls

F. Radioactive Waste Management

G. ALARA Program

H. Facilities and Equipment

I. Emergency Response Capabilities

Weaknesses in the FCS Health Physics Program were identified in several areas. Items the appraisal team considered significant weaknesses are as follows:

1. Lack of engineering and radiation controls in the Unit 1 auxiliary building has led to a series of instances where airborne radioactivity areas have been created, causing heavy use of respiratory protective equipment and a increased workload for the health physics staff.

2. The development and implementation of written procedures to cover all the activities of the health physics staff.

3. The plant organization structure is such that the Radiation Protection Manager does not have direct recourse to the Plant Manager and sufficient independence from Station divisions concerned with plant operations.

4. The use of personnel other than ANSI N18.1 qualified health physics technicians, to provide off-shift coverage.

5. The collection, packaging and movement of radioactive waste materials from radiologically controlled areas to final disposition was considered poor radiation control practices.

In addition to the weaknesses described above, three items of noncompliance with NRC requirements were identified as follows:

1. Contrary to Technical Specification 6.10, procedures were not prepared and implemented to cover the requirements of 10 CFR 20.

2. Contrary to 10 CFR 71.3, five shipments of radioactive waste materials were shipped from the site in type A containers when the total activity of each container exceeded three curies.

3. Contrary to 10 CFR 20.203, containers of radioactive materials were not labelled or their contents identified.

1.0 Radiation Protection Organization and Management

Documents Reviewed

ANO Units 1 and 2 Technical Specifications, License Nos. DPR-51 and NPF-6

ANO Administrative Procedure 1000.01, "Organization and Responsibility"

ANO Technical Specification Change Request, September 29, 1980

AP&L Position Impact Statements

AP&L Position Task Analyses

AP&L QA Manual

SRC General Audit Reports 1976-1980

QA Audit Report-Shipping Containers

ANO Administrative Procedure 1000.02, "Plant Safety Committee (PSC) Operation"

ANO Radiation Protection Procedure 1602.35, "Radiation Protection Manual"

1.1 Description

The functional organization for Arkansas Nuclear One (ANO) operations in place at the time of the appraisal is depicted by the chart in Figure 1. The organizational structure shown was observed to be somewhat different from that specified in Figures 6.2-2 of the ANO Unit 1 and 2 Technical Specifications (TS) but it was also noted that this had been included in a request for TS changes which had been submitted to the NRC in September 1980. The ANO radiation protection organization is shown in Figure 2. The Health Physics Supervisor (HPS) functions as the "Radiation Protection Manager" (RPM) as defined in NRC Regulatory Guide 1.8, although this title is not used in the official organizational structure of ANO. The HPS reports administratively to the Technical Analysis Superintendent, who in turn reports to the Manager, Engineering and Technical Support under the ANO General Manager. Reporting to HPS are four Assistant Health Physics Supervisors (AHPS) who supervise the daily activities of the barganing unit and contract Health Physics Technicians. Also reporting to the Technical Analysis Superintendent

are the Radiochemistry Supervisor, Chemistry and Environmental Supervisor, Radioactive Waste Coordinator and Emergency Planning Coordinator.

Arkansas Power and Light (AP&L) does not have a General Office radiation protection organization or health physicist assigned to radiation protection at the corporate level. Corporate management stated that having an additional radiation protection function at the corporate level was believed to be unnecessary since there is only one AP&L nuclear station. The Appraisal Team does not consider the lack of such a program to be a significant weakness in the overall radiation protection program but recommends that AP&L reevaluate the feasibility of establishing a radiation protection function at the General Office. The Team believes that a corporate health physicist could be used to assist in development of AP&L radiation protection policy, review performance of the ANO radiation protection program, provide technical assistance to the Station, coordinate the ALARA program and serve as a backup RPM during periods of extended absence of the onsite RPM. In order to be effective, the corporate health physicist should have RPM qualifications in accordance with NRC Regulatory Guide 1.8 and should devote a major portion of time to radiation protection programs.

The ANO organization described above places the RPM responsibilities at a reporting level separated from the General Manager by two intervening levels of supervision. Although the Health Physics Supervisor-RPM has access to the General Manager on radiation protection matters, as depicted by a dotted line on the organizational chart, it appears to the Appraisal Team that the RPM's ability to communicate with Department Heads together with his independence and authority to administer the radiation protection program adequately is questionable. Guidance on the placement of RPM functions in station organizations is contained in NRC Regulatory Guide 8.8, which recommends, in Section C.1.b.c., that "The Radiation Protection Manager (RPM) (onsite) has a safety-related function and responsibility to both employees and management that can best be fulfilled if the individual is independent of station divisions, such as operations, maintenance or technical support, whose prime responsibility is continuity or improvement of station operability." Therefore, the Appraisal Team considers the current reporting level for the RPM to be inadequate to provide the direct access to the General Manager and level of communication and authority comparible to operations and maintenance which is necessary for him to carry out his radiation protection function.

1.2 Scope of Responsibilities

The scope of authority and responsibilities in the radiation protection program are set forth in Station Administrative Procedure 1000.01, "Organization and Responsibilities" and Radiation Protection Procedure 1602.35, "Radiation Protection Manual." Procedure 1000.01 describes

the general functional responsibilities of the HPS in implementing the ANO health physics and radiation protection program and establishes the authority to stop work and evacuate areas if unanticipated exposure conditions may exist. The Radiation Protection Manual establishes the basic radiation protection requirements and defines the general responsibilities of the HPS, supervisors and individuals in implementation of these requirements in radiologically controlled areas. The Radiation Protection Manual was considered to be less than adequate by the appraisers in several areas, including the description of the radiation protection program in relationship to the responsibilities of the radiation protection organization, plant personnel and other personnel at ANO. The appraisers noted that the inadequacies of this manual had been recognized by AP&L and an outside consultant was preparing an updated manual and new implementing procedures for ANO's review at the time of the appraisal.

An appraiser reviewed the status of ANO position descriptions for the functional positions within the Technical Analysis Section to determine if the responsibilities and duties for each position were clearly defined. AP&L position impact summaries were reviewed for the following: Technical Analysis Superintendent, HP Supervisor, Assistant HP Supervisor, Radiochemistry Supervisor, Assistant Radiochemistry Supervisor, Radioactive Waste Coordinator and ANO Emergency Planning Coordinator. The appraiser found that, in general, adequate position descriptions were not in place but ANO had contracted with an outside consultant to analyze each position and develop detailed position descriptions. During the appraisal, draft position analyses were reviewed for the following: Technical Analysis Superintendent, HP Supervisor, Radiochemistry Supervisor, Assistant HP Supervisors, Radiochemists and Health Physics Technicians. This review indicated that adequate attention was being given to fully describing the duties and responsibilities for each position. The Appraisal Team recommends that additional attention be given to establishing a procedure for maintaining the position descriptions and updating when there are changes in duties and responsibilities.

The assignment of areas of responsibility for the Assistant HP Supervisors and duty assignments for the HP Technicians had changed somewhat since the recent reorganization of the section. At the time of the appraisal, an AHPS was assigned to each of the following functional areas: Unit 1 operations; Unit 2 operations; training, equipment, respiratory protection and special projects; ALARA, laundry, decontamination and TLD dosimetry. Within the operations area, individual assignments are made to HP office coordinator, computer, counting room, routine surveys, and duties, and job coverage. HP Technicians were reassigned to provide additional operational coverage for each unit. This realignment of operational areas improves operational coverage but also appears to weaken the ALARA program by the addition of responsibilities to the AHPS-ALARA and HP Technicians assigned to ALARA. The Appraisal Team feels that there may be problems

in implementing the management policy on ALARA effectively because of this and recommends that ANO reevaluate the assignments of the AHPS-ALARA. As indicated by the organizational chart for the Technical Analysis Section, Chemistry and Radiochemistry are separated from health physics and there is no rotation of technicians between the groups.

1.3 Staffing

The radiation protection staff under the Health Physics Supervisor at the time of the appraisal consisted of 4 Assistant Health Physics Supervisors and 15 AP&L HP Technicians. The AP&L technician staffing was supplemented by approximately 10 to 12 contract HP technicians ("rent-a-techs"). During outage conditions, the ANO staff is also supplemented with 15 to 20 rent-a-techs. The current staffing represents a substantial increase in the level of AP&L personnel from that previously employed. At the first of the year, there were 2 AHPS and 10 AP&L technician slots. Reorganization of the section in March 1980 included addition of 2 more AHPS and increased the technician slots to a total of 28 AP&L personnel. At the time of the appraisal, 25 of these technician slots had been filled; however, 10 of these personnel were not available for work for several months yet because they were part of a special program in which inexperience personnel were selected on the basis of interest and academic background, and brought in under extensive classroom and OJT training to eventually qualify as HP technicians. The Appraisal Team considers the improvements in staffing of the radiation protection personnel to be appropriate.

Although there had been an increase in staffing, it was noted that radiation protection coverage by HP technicians was not being provided on backshifts or weekends during normal operations. Plant personnel stated that routine health physics coverage after regular hours was by Radioactive Waste Operators who had received some health physics training and nonroutine problems were handled by having a call-out list with the Shift Supervisor, whereby HP personnel could be called in and be at the plant within 20 to 30 minutes. The Appraisal Team is of the opinion that this arrangement weakens the health physics and ALARA programs and significantly reduces the capabilities for recognition and response to radiological problems which may occur on offshifts. Because of this, the Team recommends that twenty-four hours a day, seven days per week health physics technician coverage be instituted. Responsible technicians for backshift coverage should be fully qualified in accordance with ANSI N18.1 specifications.

1.4 Review and Audit

The licensee's independent review and audit program for the radiation program has been conducted by the AP&L Safety Review Committee (SRC)

in accordance with the functions specified in Section 6.5.2 of the Units 1 and 2 Technical Specifications. Quality Assurance (QA) auditing under the operational QA program has been previously limited to radioactive materials packaging and shipment. During the appraisal, it was noted that AP&L was in the process of expanding the QA audit program to include auditing of radiation protection. This auditing will be under the cognizance of the SRC and will replace the SRC audits in this area. In implementing this audit program, AP&L had contracted with an outside consultant for development of procedures for auditing health physics and additional QA auditors were being stationed at the site. The procedures (QAP) were being written for audits of health physics, environmental monitoring, radioactive waste treatment and disposal, and emergency planning. It is planned that technical expertise will be supplied to the audit teams from the SRC. This program was projected to be initiated in January 1981.

An appraiser reviewed the QA audit report, "QA Requirements for Packaging of Radioactive Shipping Containers" August 24, 1980, and SRC audit reports for the period July 1976 through July 1980. It was noted that the SRC audits had been conducted on a semiannual basis during this period utilizing the technical expertise of the SRC radiation protection consultant or AP&L Technical Analysis Manager. The format and contents of the reports were such that it was difficult to determine the scope and depth of the health physics program review. Follow-up information for items identified in the audit reports indicated that response to audit findings had been generally timely. The Appraisal Team feels that the new QA audit program for radiation protection will result in improved documentation of the audit scope, depth and follow-up actions on audit findings.

In addition to the SRC audits described above, a comprehensive evaluation of the ANO radiation protection program was performed by an outside consultant in the period of August to November, 1979. Numerous weaknesses in the licensee's program were identified as a result of this review. During the appraisal it was noted that AP&L-ANO management had responded to the consultant's recommendations by various measures already implemented or in progress to strengthen the overall radiation protection program. The findings of this evaluation should indicate to management that an in-depth independent appraisal of the program is needed periodically to complement the routine compliance oriented audit program. The Appraisal Team recommends that management establish a formal radiation protection appraisal on a periodic basis as necessary to evaluate the continuing adequacy of the overall radiation protection program at ANO.

1.5 Communications

Communications within the health physics staff and with other station departments appeared to be generally weak, particularly during normal,

nonoutage operations. There was no provision for daily or weekly formal meetings with the Assistant HP Supervisors and routine maintenance or operations planning and scheduling information is not routed to them. In the past, routine maintenance information was communicated to health physics from Planning and Scheduling by an HP working there but after this person left the communication channel was no longer available. Also a routing system had been set up to identify routine maintenance plans and schedules and this system functioned for a period but was not being implemented at the time of the appraisal. HP staff members stated that it was common for personnel to show up at the health physics office to get a SWP for routine maintenance without any prior notice. This is an inefficient practice and impacts the provision of health physics preplanning and controls necessary for an ALARA operation.

For outages, communications were improved somewhat, according to health physics staff statements. The HP Supervisor is involved in outage planning and attends status meetings during the outage. Communications with Assistant HP Supervisors is better during this time and turnover reports are generated, with meetings held at the shift turnover.

The Appraisal Team review did not identify any specific exposure problems related to the poor communications but recommends that measures be taken to improve the internal and external lines of communications, and provide for more involvement of health physics in planning and scheduling of routine work involving potential exposure to radiation or radioactive materials.

1.6 Conclusions

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

1. The reporting level of the Regulatory Guide 1.8 qualified person (RPM) in the present organization does not provide the Radiation Protection Manager with adequate independent access to the General Manager or provide a level of authority comparible to operations and maintenance sufficient to carry out the radiation protection function.

2. The use of persons other than ANSI N.18.1 qualified health physics technicians to provide the radiation protection function for off-shifts is considered poor practice.

Other areas of the organizational and management aspects of the radiation protection program appear acceptable, however, the following items should be considered for improvement:

1. Establish an offsite radiation protection function at the corporate level with a minimum of one individual, RPM-qualified in accordance with NRC Regulatory Guide 1.8.

2. Establish a procedure for maintaining position descriptions with current statements of duties, responsibilities and authority for the health physics staff.

3. Institute twenty-four hours per day, seven days per week health physics technician coverage.

4. Establish a formal radiation protection program appraisal on a periodic basis as necessary to evaluate the continuing adequacy of the overall radiation protection program.

5. Take steps to improve communications within the health physics staff and with other station organizations, including more involvement of health physics in planning and scheduling related to routine operations and maintenance.

FIGURE 2

ARKANSAS NUCLEAR ONE

TECHNICAL ANALYSIS SECTION - PRESENT ORGANIZATION

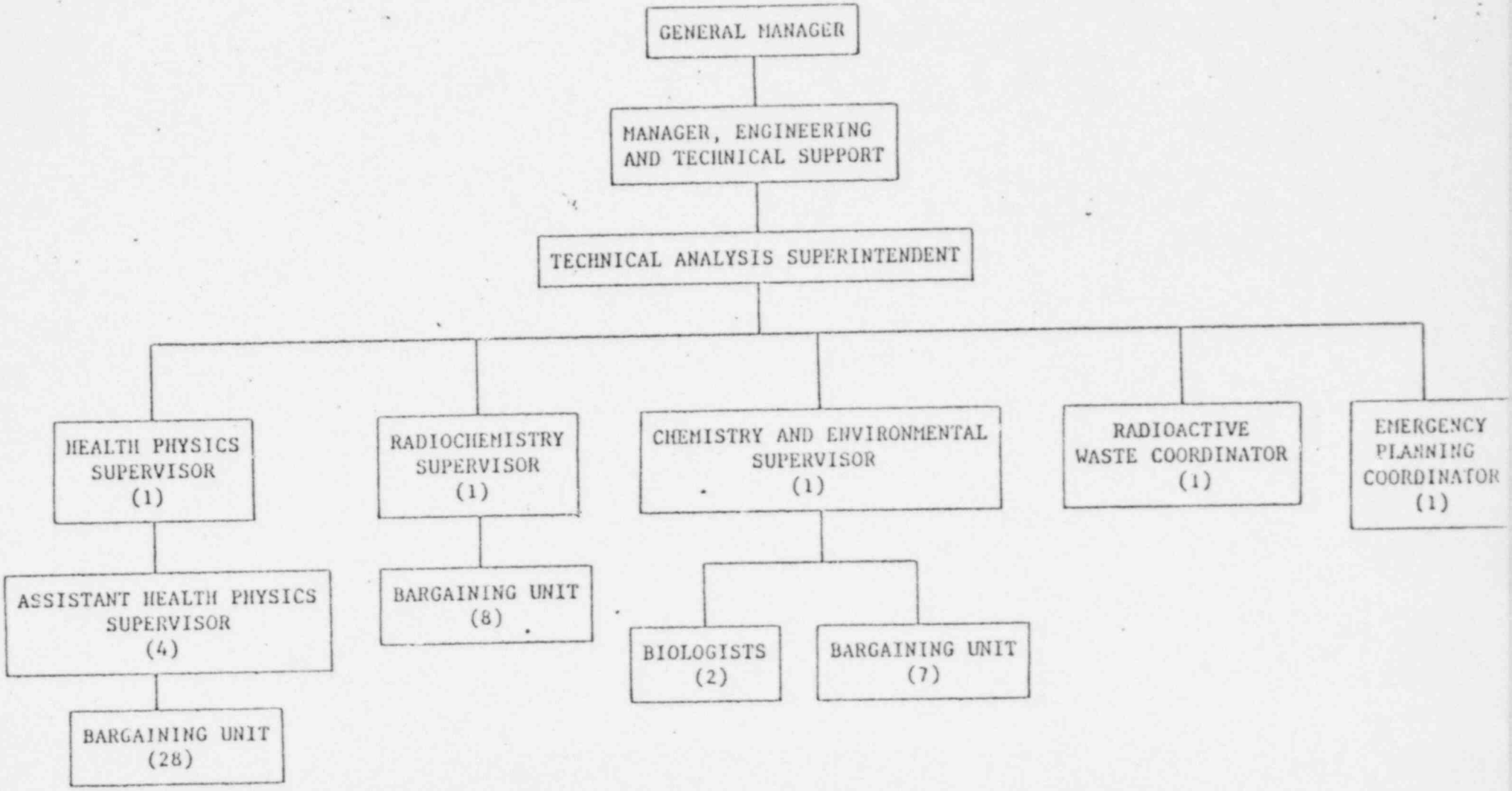
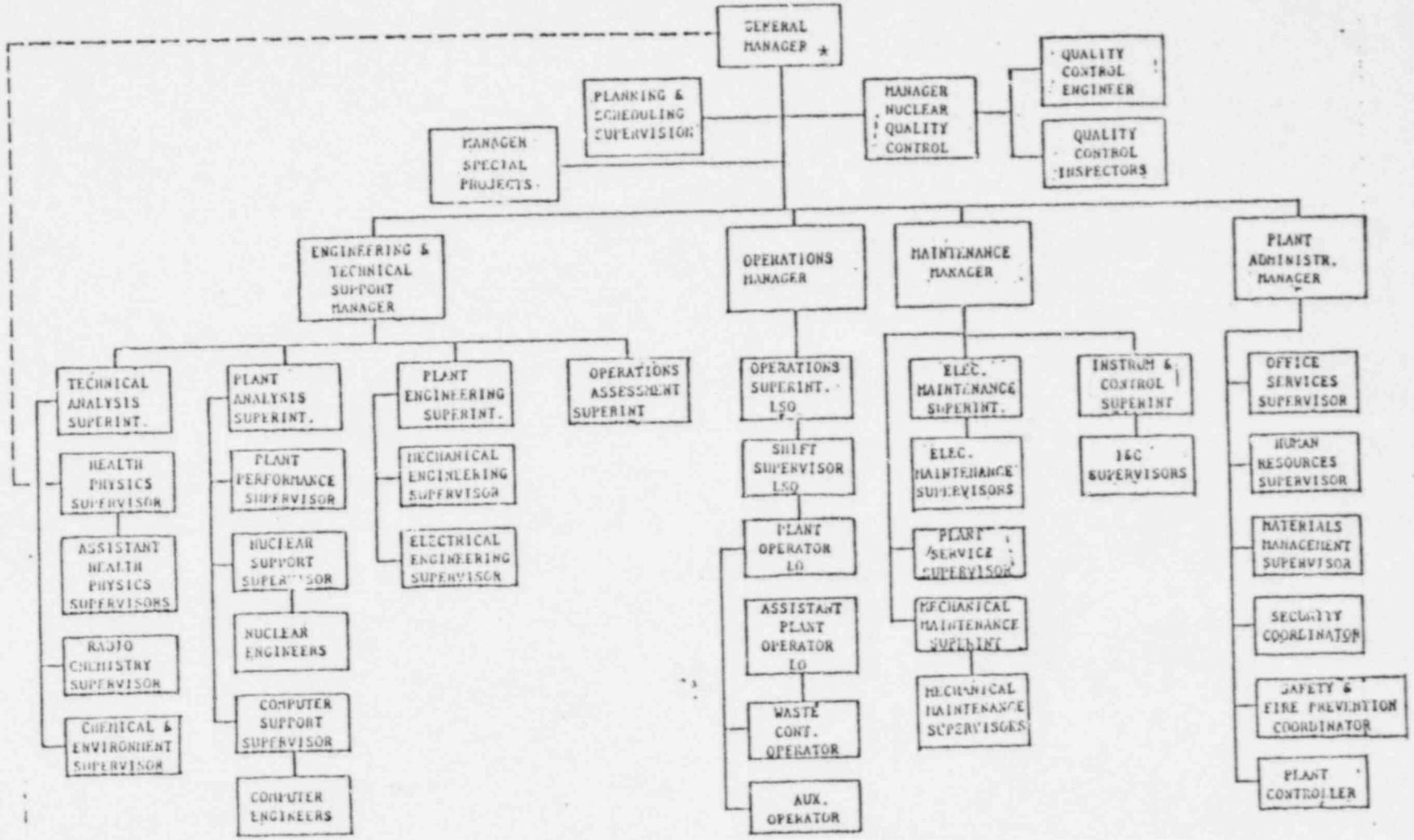


FIGURE 1

ARKANSAS POWER & LIGHT COMPANY
ARKANSAS NUCLEAR ONE



CODE: LSO-SENIOR OPERATOR LICENSE REQUIRED
LO- OPERATOR LICENSE REQUIRED
*ONSITE RESPONSIBILITY FOR FIRE PROTECTION PROGRAM

2.0 Personnel Selection, Qualification and Training

Documents Reviewed

ANO Health Physics Personnel Training Plans

ANO General Employee Health Physics Indoctrination

ANO Training Records for Waste Control Operators

ANSI N18.1-1971, Selection of Personnel for Nuclear Power Plants

Regulatory Guide 1.8, Personnel Selection and Training

2.1 Personnel Selection

Arkansas Nuclear One has no formal written personnel selection criteria. Their Technical Specifications require them to meet ANSI N18.1 requirements for health physics technicians and meet Regulatory Guide 1.8 for the Health Physics Supervisor. These requirements are not reflected in the hiring process and new employees have not been made aware of the criteria contained in the referenced documents.

2.2 Personnel Qualifications

The Health Physics organization at Arkansas Nuclear One consists of the Health Physics Supervisor, four Assistant Health Physics Supervisors, fifteen Arkansas Power and Light health physics technicians and twelve contractor health physics technicians. Six of the ANO technicians are listed as OJT or technicians in training. The most experienced ANO technicians are assigned to permanent job functions such as personnel dosimetry, respirators, laundry etc., and are not available for job coverage. The contractor technicians do most of the day to day job coverage and the lead men in both units were contractor technicians. The lead man assigns technicians to specific job coverage on a day to day basis. There are no written qualification requirements for the technicians to meet in order to do a particular job. The Assistant Health Physics Supervisors are available to review work of inexperienced technicians, but there is no requirement that this review be done or a sign-off procedure to indicate a review.

Most of the contractor technicians meet the ANSI N18.1 experience requirements and so do the ANO technicians not listed as OJT. There are, however, no written procedures for qualifying the inexperienced technicians and no restrictions on what jobs they can do.

There are no health physics technicians assigned to back-shift on a routine basis. Waste Control Operators (WCO) are given some health physics training, certified as radiation protection qualified by the Operations Superintendent, and given health physics duties. These are generally operators in training for licensing and do not remain in the WCO jobs for very long. They do not meet ANSI N18.1 requirements for health physics technicians but are instructed to call in health physics help if a problem arises. Communication between health physics and operations personnel seems to be poor and as a result the health physics technicians usually do not know what the WCO did during previous night shifts.

2.3 Health Physics Training

2.3.1 General Employee Training

All new employees at ANO must go through the health physics indoctrination training before they can receive a badge allowing unescorted access to the plant. This training consists of approximately six hours of tapes and lectures covering the appropriate material. The training and counseling department conducts the training and maintains records of all attendees. Form No. 1023.01 A&B contains the outline for the material to be covered and classroom guidelines for the instructor. The instructor is from the Training and Counseling Department and is a former health physics technician with academic health physics training. The outline seems to have the pertinent topics listed and observation of the actual training process revealed no obvious shortcomings. A test is given at the end of training with 80% required for passing.

Retraining is required of all personnel on an annual basis. This is a shortened version of the initial health physics indoctrination. A test is given along with the one-hour specific portion of the training program. If an employee fails the test then he or she must go through the entire indoctrination.

2.3.2 Specialized Training

Specialized health physics training at ANO is very limited. All personnel who must wear respiratory protection equipment are given the required training by the instructor in the Training and Counseling Department. When a person is qualified for respiratory equipment he or she is given a card specifying what respiratory equipment he is qualified for and signed off by the instructor.

Health Physics training for job related radiation protection has not been done in the past at ANO. The new training programs proposed

by the Training and Counseling Department for various other departments do not include any job related health physics training.

Waste Control Operators are given applied health physics training by the health physics technicians and Assistant Health Physics Supervisors. This training is to make the WCO's radiation protection qualified. It consists of portable instrument operation and plant health physics procedures with a test at the end. The test is given by the operations man in the training department. Annual requalification is required but the training department representative said no one has ever been on the job long enough to require requalification. They have all become licensed operators first. Licensed operators are also considered radiation protection qualified but they get no training from the health physics department, only the health physics portion of operator retraining.

2.3.3 Health Physics Staff Training

Training of health physics technicians at ANO has been limited and haphazard in the past. Several training programs have been started only to fall by the wayside because of outages and workloads. No records are available of the topics covered, names of trainees, or tests given. Contractor technicians have been put on job coverage without even introduction to plant health physics procedures. Recently, training of health physics technicians has become of concern and programs have been proposed. The Health Physics Department has a plan as outlined by the H.P. Supervisor on October 24, 1980. The Training and Counseling Department also has a proposed outline for training health physics technicians. The two outlines are not the same and training being done at the present time does not seem to follow either plan. One hour training sessions are being held three times weekly but no specific outline is being followed. Topics covered are primarily health physics procedures but in no formal sequence. One of the Assistant Health Physics Supervisors has been given informally the responsibility for technician training along with several other job responsibilities. He has not been given written authority or responsibilities in training. He and one technician have started to develop an OJT program with a list of tasks. Not all of the tasks listed are covered by procedures and contractor technicians and WCO's are not to be included.

In discussions with the licensee on January 15 and 27, 1980, they described significant improvements in the health physics technician training program sufficient to satisfy most of the appraisers concerns in this area. This portion of the licensees's program will be reviewed again in the next inspection.

2.4 Conclusions

Based upon the above findings, this portion of the licensee's program appears acceptable, however, the following items should be considered for improvement:

1. Develop written personnel selection and qualifications criteria for health technicians and the Health Physics Supervisor consistent with ANSI N18.1 and Technical Specification requirements.

2. Develop a procedure or qualifying process whereby new or inexperienced technicians can progress to senior or fully ANSI N18.1 qualified status.

3.0 Exposure Control

3.1 External Exposure Control

Document Reviewed

ANO Procedure 1602.2, Radiation Exposure Control

ANO 1602.25, Operation of the Harshaw Model 2000 TLD System

ANO Procedure 1602.21, Personnel Dosimetry Control

ANO Procedure 1602.54, Calibration of Gamma Calibrator

ANO Procedure 1602.53, Calibration of Model 682 Calibrator

ANO Procedure 1603.94, Calibration of Self-Reading Gamma Pocket Dosimeters

ANO Procedure 1303.85, Quality Control Check for Personnel Monitoring

ANO Procedure 1303.91, Monthly Dose Versus Change Curve for Personnel TLDs

ANSI N13.5-1972, Performance Specifications for Direct-Reading and indirect-Reading Pocket Dosimeters

3.1.1 Dosimetry Program

ANO has its own personnel radiation dosimetry program and issues and processes the whole body TLD badge on a monthly basis. Beta-Gamma exposures are measured using two Harshaw-700 chips in a suitable holder. A Model 2271 Harshaw TLD system is used to process the badges. A TLD-600 badge is used when neutron exposures are to be monitored. Other dosimeters such as finger and wrist badges are available for use when deemed necessary by the Health Physics staff. These badges and the TLD-600 badges are processed by an off-site vendor. At the time of the appraisal, TLD reporting was about six weeks behind schedule and the TLD reader was back at the factory for repair. Day to day control of personnel gamma exposure is accomplished using pocket ionization chambers.

3.1.2 Exposure Limitations/Review

Personnel exposure limits at ANO are based upon 10 CFR 20 limits and weekly and quarterly administrative limits are used to insure part 20 limits are not exceeded. For individuals limited to 1250 mrem/quarter, the plant limit is 100 mrem/week and for those with

the 3000 mrem/quarter limit, the plant limit in 300 mrem/week. Corresponding quarterly limits are 1000 and 2500 mrem respectively. Authorization to exceed 100 mrem/week is left to the individual's supervisor while authority to exceed 600 mrem/week can be granted by the Health Physics Supervisor and the Plant Manager. Worker pocket chambers are read by the worker or guard at each controlled access point. The guard enters the exposure into the computer. Hand copy exposure listings are posted at each control point for each worker. These exposures are adjusted as exposures are entered into the computer. When the monthly TLD are read out, the pocket chambers values are corrected. These corrected values become the permanent worker exposure record. An exposure review indicated no whole body or extremity exposure in excess of part 20 limits. Beta and neutron exposures were quite low and plant man-rem values were average to lower than typical PWR values.

3.1.3 Quality Assurance/Quality Control

A slab of depleted uranium is used for beta calibration and a ^{137}Cs source is used for gamma calibration. While these two sources are adequate, the calibration facility could be improved and will be discussed later. The exposure ranges used for calibration are acceptable since they fall within the range of expected monthly personnel exposures.

ANO has a quality control procedure whereby outside organizations are used to supply beta, gamma and neutron calibrations which are compared to their own. This practice has been in place for quite some time, however, the two technicians who routinely operate the TLD system, were unaware of the two procedures that required this to be done. Although independent neutron exposures had been done once or twice in the past none have been done for quite some time. The Appraisal Team believes that this is another example of the licensee's failure to carry out procedures in the Health Physics area.

Pocket ionization chambers are returned to the vendor for calibration. A review of the licensee's quality control program for pocket dosimeters revealed that: There is no initial testing and acceptance for any of the new chambers; in most instances, there was no protection cap on the electrode end; and the chambers sent offsite for calibration were put into service upon receipt without any acceptance tests. ANSI N-322 specifies calibration exposures at 80%, 50%, and 20% of full-scale, and each dosimeters should read within ±10% of the true value. It is believed that if the licensee utilized this standard, many of their current supply of pocket chambers would fail the test. Also, if an acceptance test was performed on as-received pocket chambers many would fail. In summary, it appears that the

poor results obtained with the self-reading pocket chambers is due to the lack of on-site calibrations, and the blind acceptance of the chambers from the vendors. There may be other reasons such as the way the chambers are issued and retrieved, in that the guard(s) either read pocket chambers or records the reading from personnel exiting radiation controlled areas. In any event, the guard makes the entry via teletype into the computer and there is opportunity for errors to be made. An appraiser noted that pocket chambers are sometimes cleaned ultrasonically. This practice should not be continued.

The extremity and neutron badge results are accepted from the off-site vendor as submitted. No QC procedures or practices are performed for these vendors.

ANO also participates in a intercomparison program with Battelle NW labs, where TLD badges are given standard exposures and ANO reads them out for comparison purposes. ANO performance on these samples has been quite good. These QC check are for gamma only and no beta checks are made. ANO performs an inhouse beta calibration using a depleted uranium slab previously described. With each TLD read-out run at ANO, control and test badges are included. Test badges are placed at various locations in the plant.

3.1.4 Exposure Records

ANO uses a computer dedicated to the health physics organization for tabulating personnel exposure. As TLDs are read on a monthly basis, the files maintained in the computer are updated on the same schedule. This file is compared to pocket chamber dosimeter results for the same time period and corrections made to the pocket chamber results as necessary. Permanent personnel exposure records are maintained by a clerk with hand entries from the TLD results. The Appraisal Teams believes that the number of hand entries that are required could lead to errors in exposure records. Another drawback with this system is that in the event that either a neutron dosimeter or a special dosimeter is issued, the clerk that maintains the individual records is the only one that would be cognizant of the fact and that a reading had not been obtained for that issuance. Overall, the personnel exposure records were found to be complete and to be adequate. ANO is now in the process of putting all permanent personnel records onto a centralized computerized file system.

3.1.5 Conclusions

Based upon the findings reported above, the portion of the licensee's program appears acceptable; however, improvements should be made in the following areas:

1. Procedures for the use, calibration and acceptance of pocket chambers should be upgraded to include the elements specified in ANSI N-322.

2. Some type of QC program is needed for vendors who provide extremity and neutron exposure monitoring services.

3. Review present practices with respect to numerous hand entries of exposure data to eliminate potential for errors.

4. Quality control measures are needed with respect to beta monitoring to insure proper evaluation of noble gas skin exposures and other beta exposure modes.

5. The data obtained in the evaluation of neutron energy spectra needs to be evaluated and proper correction factors applied to neutron survey meters in order to obtain a correct dose equivalent for neutron exposure.

3.2 Internal Exposure Control

Documents Reviewed

ANO Procedure 1602.35, Radiation Protection Manual

ANO Procedure 1602.63, Procedure for Monitoring Personnel Monitoring Personnel Exposure to Airborne Radioactivity

ANO Procedure 1602.11, Personnel Decontamination Procedure

ANO Procedure 1609.04, Radiological Respiratory Protection Program

Helgeson Nuclear Services, Inc. Whole Body Count Reports

ANO Procedure 1602.07, Radiological Posting Requirements

3.2.1 Dosimetry Program

Review of the licensee's capabilities for internal exposure assessment and dosimetry indicated the general lack of a comprehensive, formally established program. The use of bioassay is

addressed in procedures but the criteria for use is limited and there are no procedures for conducting the bioassay. The routine bioassay program described in Procedure 1609.04 consists of annual whole body counting of all ANO employees who enter radiologically controlled areas, with more frequent body counts of personnel working in high airborne radioactivity areas, at the HP Supervisors' discretion. The application of other bioassay techniques is to be conducted when deemed appropriate. The whole body counting is done inhouse using a Helgeson Nuclear Services "do-it-yourself" type counter. The counter is located on the ground floor of the Administration Building, and is operated by a clerk or HP technician. The counting data are transmitted to Helgeson for analysis by telephone data link after each count. Significant results are reported back immediately by telephone and a written report is generated covering a two weeks period of counting.

In reviewing the whole body counter operation, it was noted that the operating procedures consisted of the Helgeson operating instructions and there were no approved ANO procedures to control this operation. In addition, there was no periodic calibration by ANO or daily quality control checks to determine if all of the operating parameters were within specifications prior to counting subjects. The calibration and quality control was considered to be a function of the vendor's service. Quality control data maintained by the vendor on several operating parameters for the months of July through September were reported in a section of the September 16-30, 1980 report. This data may provide some basis for evaluating the past performance during this period but does not replace the licensee's responsibility for quality control. In addition to implementing an inhouse quality control program, a satisfactory program must also include periodic calibration by the licensee. The Appraisal Team recommends that standardized sources traceable to the National Bureau of Standards be obtained and used with suitable phantoms to establish and maintain the calibration of the counter system.

3.2.2 Exposure Review

Whole body counting data in the Helgeson Nuclear Services reports are reviewed by the HP Supervisor. In the event or circumstance requiring assessment of suspected or actual intakes of radioactive materials, the HP Supervisor makes the assessment and estimates the dose commitment when necessary. The appraiser noted that the HP Supervisor was familiar with standard calculational techniques and biological models, but there were no approved plant procedures which established the methods of application and use of these methods of internal dosimetry. The foregoing is not in accordance with the guidance contained in NRC Regulatory Guide 8.26 and ANSI N343-1978, "Internal Dosimetry for Mixed Fission and Activation Products", which

recommend that in addition to an appropriate measuring program (bioassay), an internal dosimetry program should include the establishment of the necessary biological models and calculational techniques. In addition, it was noted that there were no ANO procedures developed for obtaining urine, fecal, or other indirect bioassay media for assessment of intakes of radionuclides which cannot be effectively quantitated in the body by gamma ray whole body counting, and interpreting the results of such samples. Also, it was noted that there were no action levels established for the initiation, continuation, or termination of direct or indirect bioassay techniques, or guidance in interpreting bioassay results in terms of the intake limits of 10 CFR 20.103. These observations show that an adequate internal dosimetry program had not been fully implemented at ANO and covered by written approved procedures.

3.2.3 Exposure Limitations

The ANO administrative controls for exposure to airborne radioactive materials and designation of airborne radioactivity areas were addressed in Procedures 1609.04, "Radiological Respiratory Protection Program" and proposed Procedure 1602.63, "Procedure for Monitoring Personnel Exposure to Airborne Radioactivity." In reviewing these procedures and the Radiation Protection Manual, it was noted that the documents fail to define airborne radioactivity areas in terms of 10 CFR 20.203 (d). It was also noted that the limitations of 10 CFR 20.103(a) and (b) were not clearly defined, although there were statements that the exposure to airborne radioactive materials in excess of 10 CFR 20.103 constituted technical overexposure and that intake of radioactive materials would be limited to 40 MPC-hours based on Part 20, Appendix B values.

Proposed Radiation Protection Procedure 1602.63 was written to describe the requirements and method of estimating personnel exposure to airborne radioactivity using air sample data and time of potential exposure. The procedure establishes administrative limits of 2 MPC-hours per day and 10 MPC-hours per week. In addition, an MPC-hour area designation and documentation are established. This, in accordance with prior practice at ANO, requires documentation of MPC-hours only when the airborne radioactive iodine levels are greater than 25 percent of MPC, or radioactive airborne particulate levels are greater than 1.0 MPC and the personnel entering that atmosphere are not wearing supplied-air respiratory equipment. The latter condition reflects the reliance on the degree of protection afforded by this type of respiratory protection. There is no requirement to log the air sample data, stay time and device used (if any) to provide a record for future evaluation if necessary.

Action required by the proposed procedure include whole body counting if the 2-MPC hour per day or 10 MPC-hour per week is exceeding, and assessment if intake occurred with whole body dose projection of 50 mrem being reported in the individual's radiation exposure record. There was no provision for evaluating intakes which exceeded the 40 MPC-hour control measure, taking action to assure against recurrence of a similiar exposure, and documenting the evaluation and action as required by 10 CFR 20.103(b)(2). During the appraisal it was noted that such an exposure had occurred to a maintenance worker and an evaluation in progress indicated an intake of iodine-131 equivalent to about 220 MPC-hours of exposure. The appraiser was not able to review the licensee's full corrective action and documentation for this case prior to the end of the appraisal. This matter will be reviewed during the next routine radiation protection inspection at ANO. The licensee's failure to develop and implement written procedures to cover requirements of 10 CFR 20 is further discussed in Sections 4, 5.

3.2.4 Respiratory Protection

The licensee's respiratory protection program is described in Radiological Respiratory Protection Procedure 1609.04, "Radiological Respiratory Protection Program" and other procedures in the 1609 series of procedures. It was found that not all of the implementing procedures were written and approved at the time of the appraisal, and this was attributed to waiting on the writing of a Respiratory Protection Manual currently in progress by an outside consultant.

Prior to receiving authorization to use respiratory protection equipment, each worker is required to have a physician evaluate his or her physical and psychological fitness to work and use the equipment. Requalification by an annual review of medical status is required to maintain user qualification, and records of these evaluations are kept in the individual's permanent file. Each worker must also attend classroom and practical training given by a health physics qualified instructor from the training section.

An appraiser attended the training and observed the fit testing of respiratory protection equipment during the appraisal. The training consisted of video tapes and lecture by the instructor. The appraiser considered the training to be well done. All of the topics specified in Section 8 of NUREG 0041 were covered and the combination of taped and instructor presentation provided good plant specific information to the workers. All of the class was required to demonstrate proper donning, use and removal of the device and a qualitative fit check was made with an irritant

smoke challenge atmosphere. Upon satisfactory completion of the medical evaluation, training and respirator fit the worker is authorized to wear respiratory protection equipment at ANO by issuance of a qualification card. ANO does not have the equipment for quantitative fit testing or quality control testing for filters and masks. ANO representatives stated that the necessary equipment had been ordered prior to the appraisal. The Appraisal Team considers this to be necessary for a satifactory program. Respiratory issuance is under the control of health physics. The individual's current qualifications to wear respirators is verified by the qualification card, which is collected and held during the use perid. The issuance and return of equipment is controlled by means of a sign out record which is made out each time a device is issued. The individual using the respirator is responsible for inspecting the equipment prior to donning and conducting a negative pressure field test prior to use.

The respirator cleaning, decontamination, inspection and drying is performed by specially trained janitorial contractor personnel. The process includes collecting, decontaminating, surveying, sanitizing, drying, inspecting and bagging for issuance. A routine maintenance and inspection program is also carried out by a trained HP technician for the SCBA units. At the time of the appraisal, the licensee's facilities for performing all of the above functions were considered poor. The cleaning and decontamination was being performed by hand in a sink in the Unit 1 Reactor Building purge ventilation room; drying after sanitation was done by hanging the respirators on wooden racks on the turbine deck; and inspection, maintenance and preparation for issuance was done in a temporary building located on the turbine deck. The AHPS responsible for respiratory protection described the licensee's plans for providing improved facilities in an existing room on the turbine deck. These plans apparently did not include obtaining adequate cleaning and decontamination facilities and equipment. The supply of respiratory protective equipment and inventory control procedures were reviewed by an appraiser. It was noted that there were provisions for an inventory system in Procedure 1609.04 but it was not fully implemented at the time of the appraisal. An inventory of equipment was obtained after several days and the quantity of equipment on hand plus the equipment which had been ordered appeared to be adequate to support operations requiring respirators. The appraiser noted that only NIOSH approved respiratory equipment was in use and this specification is included in orders for new equipment.

The appraiser noted that service air was used for air-line respirators and SCBA bottles were filled with special portable breathing air compressors temporarily located on the turbine deck. The breathing

air for air-line respirators was supplied through Del-Monox filter manifolds to provide Class D air quality. There was no testing for air quality but the Del-Monox units were checked once per shift. Two breathing air systems have been ordered and the licensee plans to install them during the next refueling outage. The appraiser observed the operation of a portable breathing air compressor and noted that this operation was not controlled by approved plant procedures and significant operating parameters were not documented. This was brought to the licensee's attention and procedures were provided prior to the conclusion of the appraisal. The Team recommends that routine testing of air quality for breathing air systems be initiated and records of air quality be maintained at ANO.

3 2.5 Conclusions

Based on the above findings, internal dosimetry procedures for evaluating intakes of radioactive materials need to be developed and procedures for establishing and evaluating airborne radioactivity areas require improvement to achieve a fully acceptable program. In addition, the following should be considered for improvement of the internal exposure control program:

1. Perform routine quality control and calibration of the whole body counter using necessary phantoms and sources traceable to the National Bureau of Standards.

2. Implement a quantitative respirator fit program using suitable equipment for evaluating and documenting the fitting of personnel respiratory protection equipment.

3. Provide documented evidence that air quality for SCBA and air-line respirators meet the minimum specifications of Grade D breathing air.

4. Provide improved facilities and equipment for cleaning, storing and issuing respiratory protection equipment.

4.0 Radiation Protection Surveillance

Documents Reviewed

ANO, Procedure 1602.17, Instrument Monitoring and Survey Procedures

ANO, Procedure 1602.18, Smear Sampling

ANO, Procedure 1602.19, Air Sampling with Portable Instruments

ANO, Procedure 1602.24, Portable Survey and Monitoring Instruments - Operation

ANO, Procedure 1602.35, Radiation Protection Manual

ANO, Procedure 1602.36, Air Sampling with Emergency Kit Equipment

ANO, Procedure 1602.38, Field Test for Iodine-131

ANO, Procedure 1602.31, Operation of the PMC-4B/PMP-4B/C Portal Monitor

ANO, Procedure 1602.32, Operating Procedure for the Nuclear Chicago Model 8203 and 1152 Sample Changer

ANO, Procedure 1602.33, Operating Procedure for Eberline Mini-Scalar MS-2.

ANO, Procedure 1602.62, Portable Iodine Counting

ANO, Procedure 1604.14, Reactor Building Purge Analysis

ANO, Procedure 1604.21, Use of the ND 6620 with user generated programs

ANO, Procedure 1303.76, Calibration of PNR-4, Portable Neutron Counter

ANO, Procedure 1304.21, N-16 Monitor Calibration

ANO, Procedure 1303.101, Model PNP4B/PMC-4B, Portable Monitor Calibration

ANO, Procedure 1303.102, Hand and Shoe Monitor Calibration

ANO, Procedure 1602.31, Operation of PMC-4B, PMP-4B/C, Portable Monitor

4.1 Procedures and Basis

ANO's routine surveillance program is not described in plant procedures, however, daily, weekly, monthly surveys are made at locations that appeared to be appropriate. A monthly gamma survey is made at the unrestricted area fence. Routine surveys consist of direct radiation measurements (gamma)

and indirect contamination measurements (beta/gamma) using smears. Daily air samples are taken to evaluate certain locations (beta/gamma) specified by the lead technician. Routine air sampling for alpha activity in air is not performed. Monthly smears are counted for alpha activity. Routine surveys for beta dose rate, neutron dose rate are not conducted. All surveys are conducted by health physics staff.

During the appraisal, radiation and contamination surveys conducted by the health physics staff were observed by the Appraisal Team. It was apparent that a routine surveillance program is being conducted, however, a program has not been documented in procedures that would specify the locations, frequency and types of surveys to be performed. Additionally, present procedures do not speak to instrument selection for routine or special surveys.

4.2 Responsibility

Radiation Protection Surveillance is under the direction of the Supervisor of Health Physics. Each survey is reviewed by the lead health physics technician and the Assistant Health Physics Supervisor. The assistant HP Supervisor of each unit also reviews the survey coverage and is authorized to make changes as required by plant conditions.

4.3 Types

ANO conducts daily air sampling in areas specified by the lead HP technician. A low volume sampler is used at about 60 liters per minute for 15 minutes. The charcoal and glass fiber filter are counted without delay using a computer based Ge(Li) detector spectrometer system. The collected spectra is examined by the assistant HP supervisor and isotopic concentrations are determined. Decay corrections are made from the start of counting to the beginning of sampling. Corrections for decay during sampling in the case of Rb-88 and Cs-138 are not made. The gamma spectrometer is in a poor location at the Unit I controlled access point to the auxiliary building. Evidence of cave contamination was present at the time of appraisal and this background was not being subtracted from the sample spectra. It was apparent that the procedure being used to evaluate airborne activity was not the one prescribed in procedure 1602.19, "Air Sampling with Portable Instruments." The failure to write and implement a written approved procedure for this survey evaluation and the lack of procedures for evaluating intakes of radioactive materials cited in Section 3 was considered an item of noncompliance against the ANO Technical Specifications, Section 6.10. Recently, some of this air filters have been counted for gross alpha using a gas flow proportional counter. Present procedures do not speak to alpha in air surveys and the volume of air sampled was found to be insufficient to detect the gross alpha MPC specified

in 10 CFR 20. High volume samplers are available and have been used on occasion to determine gross beta/gamma activity in air. The use of a 4 inch filters (TFA No. 2133), however, requires that a piece be cut from it in order to accommodate the proportional counter. No corrections for alpha absorption is made. Monthly smears samples for alpha have not revealed any significant alpha build-up. The appraiser reviewed the HP gross counting capabilities for each unit. Quality control techniques such as background and efficiency graphing were not being used. The technician on duty did not have a clear understanding of what was an acceptable background or efficiency value.

Routine gamma survey are typically conducted using an ionization chamber (RO-2A) or a high range Geiger tube instrument (teletector). Some guidance as to instrument selection is provided on the instrument cabinet door. An ANO representative stated that this was intended for the station operators who provide health physics coverage off-shifts. No routine beta dose rate surveys are made and procedures do not speak to this measurement. An ANO representative stated that on certain jobs, such as reactor coolant pump seal replacement and steam generator work, TLDs are taped to the inside of respirators to monitor beta dose to the lens of the eye. The RO-2A instrument is calibrated using uranium slab and is available for use if needed, however, procedures do not describe the use of correction factors to obtain the beta dose rate.

Neutron surveys have been conducted inside and outside containment when the reactors are at power. The PNR-4 survey instrument is used in these surveys. The neutron energy spectra has been measured and evaluated by a consulting group. This data has not been used to correct the response of the neutron survey instruments. Neutron dose equivalents are assigned primarily based upon the use of neutron/gamma ratios which have been determined in the past. Gamma surveys inside containment are conducted primarily using the teletector. The gamma energy spectra in containment and the response of the teletector to this spectra is not known.

Samples of containment air are collected and analyzed by chemistry personnel prior to containment entry or containment purge.

The appraisal team observed the performance of surveys by ANO personnel on several occasions and collected independent smear samples in and outside controlled areas. These samples were in general agreement with ANO values.

4.4 Records

The results of surveys are recorded on a series of survey sheets that outline the survey area. Survey records were sufficiently clear and traceable to the instrument used and the person performing the survey. Large survey maps are also used and are posted at access control points. The

maps show radiation and contamination levels at each level of the auxiliary and containment buildings.

4.5 Instrument Suitability and Use

The suitability, quantity and calibrations of portable health physics instruments were found to be adequate. There is some concern in the way that the portable instruments are stored but ANO is in the process of improving their storage facilities. By and large they had a reasonably good selection of instruments for the surveys to be performed and in adequate numbers for routine operations, except for the number of high range gamma surveys instruments which appears small.

4.5.1 Portable Instruments

Listings of portable instruments on hand and the status of each was reviewed. ANO presently uses the RO-2A ionization chamber instrument for routine gamma surveys and the teletector instrument for high range gamma surveys. ANO's inventory of teletectors is somewhat small for a two unit plant and a shortage could occur if both units where in an outage at the same time or some emergency occurred. The teletector measures exposure rates to 10^3 R/hour and ANO calibrates those instruments up to 200 R/hour. The Pic-6A and the teletector instruments have been used in the past for beta dose rate surveys which are not satisfactory, however, the ANO HP staff presently uses the RO-2A for these surveys. The RO-2A is calibrated for beta dose rate using a depleted uranium slab and use of a beta correction factor. The ratio between the instrument reading and the stated 190 mrads/hour from the uranium slab is the factor to be applied when the instrument is used for beta surveys. Their portable instrument procedure, however, does not speak to beta dose rates surveys and the proper use of the instrument or its correction factor for beta.

ANO uses the PNR-4 and PNC-4 neutron survey instruments and the PAC-4b alpha survey instrument for non-routine neutron and alpha surveys.

4.5.2 Portable Instrument Calibration

ANO uses two calibrators for portable instruments and these calibrators are calibrated using a condenser R-meter and chamber or a Radecon instrument. These instruments are sent to a certified regional calibration laboratory for calibration and certification. High range calibrations are performed in the unit two health physics office area. This location is less than adequate due to high scatter from the calibrator and the adjacent structures. The high range calibrator is limited to exposures of about 200 R/hour. The Appraisal team recommends that a

calibration facility be developed for both low and high range calibrations and a new calibrator be purchased that would deliver the exposures desired in a reproducible geometry. Neutron survey instruments are calibrated by an off-site vendor using a minipulser where 200 pulses/minute is equivalent to 4 mrem/hour. ANO does own a PuBe neutron source which is used to check the response of these instruments. If the response is different by more than 10%, the instrument is sent to I&C for repair or re-calibration. Measurements of neutron energies inside containment have been made by ANO using an outside consultant. Average energies were determined to be between 100-200 Kev. Since the neutron instruments are response checked against the PuBe source, one would expect a overresponse on the energy spectra in question. The gamma energy spectra inside containment has not been determined and the response of their gamma survey instruments is based upon a Cs-137 calibration. The Appraisal Team believes the present calibration procedures should be improved and the responsibility for calibrations be clearly assigned.

4.5.3 Portable Air Samplers

ANO appears to have a good supply of low and high volume air samplers on hand. Calibrations are performed on a quarterly basis using a calibrated flow meter. Samplers were in a good state of repair and no problems were noted in this area.

4.4.4 Friskers

All friskers that were observed in calibration, functioned properly, alarmed when checked with check sources and were in adequate numbers. Most calibrations on portable instruments are on a 90-day turnaround. There is no tickle mechanism in place to indicate when an instrument is out of calibration. It is left to the individual checking out the instrument to make certain that it is in calibration, i.e., that it was not past the calibration due date.

4.5.5 Portal Monitors

Portal monitors and hand and shoe counters are calibrated by the I&C Department. They are electronically set to alarm slightly above background. They are response checked with a 8 uCi Cs-137 source. The insensitivity of these portal monitors to detect contamination at plant control limits will be discussed later. The use of these monitors should be supplemented by the required use of friskers at each controlled access point.

4.5.6 Constant Air Monitors or CAMS

There seem to be a sufficient number of CAMS in both units, however, on tours by the Appraisal Team the CAMS seemed to be in various stages of disrepair. It was the view of the appraisal team that the CAMs were not being maintained and treated with the care required for these kinds of instruments. It was noted that hoses and electrical lines were cut, miscellaneous material was stacked on them, chart paper was missing and various other problems. CAM care and maintenance is listed as a daily routine of the health physics staff, however, this is not being done on a regular basis.

4.5.7 Area Radiation Monitors

The types and locations of area monitors in both units are as specified in the ANO FSAR. The Appraisal Team noted that procedures were in place to adequately cover the maintenance and the calibration of all these devices. The system used in Unit 2 was found to be very good. This system consisted of an extra cable running from the control rack where the readout equipment is located to the calibration source such that the detector for a monitor could be removed, brought to the calibrator, connected to this cable, that cable in turn is connected to its particular unit in the readout rack in the control room, and a calibration of the complete system done. Unit 1 area monitor calibration requires personnel to take a source to the detector or perform an electronic calibration. The Appraisal Team considered the present calibration procedures to be adequate.

4.6 Conclusions

Based upon the findings reported above, this portion of the licensee's program appears acceptable, however, consideration should be given to improvements in the following areas:

1. Increase surveillance for alpha contaminants in air, using proper equipment and techniques as specified in a written approved procedure.

2. Document the routine surveillance program as to type, coverage and frequency in a written approved procedure.

3. Increase quality control measures in the health physics counting areas to identify instrument malfunction and potential contamination.

4. Initiate an improved CAM maintenance program that will improve the operability and reliability of these units.

5. Establish clear responsibility between I&C and Health Physics for instrument calibration and maintenance.

6. Replace the present instrument calibrator and locate in a suitable facility where full range, low scatter calibrations can be made.

7. Review inventory of high range survey instruments to insure an adequate supply to meet contingences.

5.0 Access Controls/Contamination Controls

Documents Reviewed

ANO, Procedure 1602.01, Controlled Access Area Entry and Exit Procedure

ANO, Procedure 1602.04, RWP and SWP

ANO, Procedure 1602.07, Radiological Posting Requirements

ANO, Procedure 1602.08, Anti-Contamination Clothing Minimum Requirements

ANO, Radiation Protection Manual

5.1 Restricted Access Area

At ANO the exclusion area is considered to be out to a 0.65 mile radius from the reactor. The restricted access area is inside the security fence. Access to the restricted area is controlled by a guardhouse and security badges which are coded for the extent of access for each individual.

5.2 Controlled Area Access

The Controlled Access Areas (CAA) at ANO are primarily the containment and auxiliary buildings for each of the two units and a few radiation areas outside of these such as the rad-waste storage building and the personnel dosimetry room. The first stage of access to controlled areas is obtained by using a coded badge and punching a personal identification number in the electronic door lock control. The second stage of access to radiation areas is by signing in on a RWP or SWP, checking out two pocket ion chambers from a guard at the control point, and donning the appropriate protective clothing. All entries to controlled access areas require an active RWP or SWP and that the person entering these areas must sign the RWP or SWP acknowledging that he or she has read it and understands the radiation protection requirements. One need only sign the RWP or SWP once but the procedure requires reading it before each entry. The TLD badge is required for entry along with two 0-200 mR pocket chambers with are read by the guard and by the user. Visitors in the plant for eight hours or less may be required to wear only two pocket chambers. The guard at the access point checks out the dosimeters on a log and when he has time he also checks on a computer terminal that the person is entering on a valid RWP or SWP. In practice, this check is usually after the person has already entered because of overloading of the computer system.

5.3 Radiation Area Access

Radiation areas within the controlled access area are defined as in 10 CFR 20 ie 5 to 100 mrem per hour. "Caution-Radiation Area" signs are required and rope or barrier tape are used to define the area. The procedure states that if all areas inside the CAA become radiation areas, then only a sign at the entrance to the CAA is required, however, this did not apply in practice since all radiation areas inside the CAA were found posted.

Radiation areas outside the CAA are individually posted with signs reading "Caution-Radiation Area - RWP/SWP Required for Entry." The sign also shows the highest radiation reading to be encountered in the area. All radiation areas appeared to be properly marked.

5.4 High Radiation Area Access

High radiation areas are defined and controlled as specified in 10 CFR 20. High radiation areas are posted with signs reading "Caution High Radiation Area - Health Physics Escort Required." HRA's in the controlled access areas were found locked and under key control. The health physics escort must carry a survey meter to read dose rates, however, the procedure specifically exempts operating personnel, doing routine tasks, from the H.P. escort requirement if they have a survey meter. It does not say that these persons must be radiation protection qualified.

5.5 Airborne Radioactivity Area Access

Airborne radioactivity areas are defined as those having airborne activity greater than the applicable MPC. Such areas are marked with signs reading "Caution, Airborne Radioactivity Area, Respiratory Protection Required, Notify Health Physics Before Entering." RWP/SWP's for these areas contain the information on respiratory protection requirements.

5.6 Other Areas

The ANO procedures define Contamination Areas, Radioactive Material Areas and No Access Areas in addition to the areas previously described. Each of these has posting and entry requirements spelled out in the procedures. No problems were noted.

5.7 Contamination Control

ANO plant contamination limits for unrestricted use are 200 dpm per 100 cm^2 (beta-gamma), 50 dpm per 100 cm^2 (alpha) and 0.3 mR per hour for fixed contamination. Contamination measurements are made by taking smears and by radiation surveys of tools and equipment or by use of hand and foot monitors and portal monitors by personnel. The smears and meter survey of

tools and equipment are probably sufficient to meet the limits. Personnel use of hand and foot monitors or portal monitors are not capable of detecting anywhere near the limits specified. The plant does have pancake GM probes or friskers available at access points but they are not required to be used by present procedures. The procedures speak to the use of the frisker if an alarm sounds on one of the portal monitors. The Appraisal Team believes that the routine use of friskers would provide much better contamination control. The appraisal team tested the response of all portal monitors at ANO using a 8 uCi source. Detectors alarmed when the source was placed in close contact with the detector, however, most of the portal monitors at the main gate and at the controlled access points to both units did not alarm when the source was in the pocket of a person using the portal monitors. Therefore, unless the friskers are used and used properly, as much as 8 uCi of activity could leave the site undetected.

Contamination control in the controlled access areas is maintained by requiring anti-contamination clothing. Types A, B and C clothing are defined in the procedure and are required based upon contamination levels in the areas and the type of work to be done. RWP's and SWP's list the anti-C clothing required for each individual area.

At the controlled access points to both auxiliary buildings the entry and exit paths cross each other. Workers don coveralls, foot covers, head covers and gloves, then step across the potentially contaminated exit pathway to get respiratory equipment and rubbers. A better layout for access would provide better contamination control.

Release of tools and equipment from the controlled access areas is done by health physics personnel at the access control point. The procedure specifies that if the person bringing an item out is not present when the survey is done a "clean" tag is to be attached to the item. In practice this is not done but the technicians puts the item outside the control door in the turbine building with no tag on it. A better tagging procedure would be helpful in contamination control. Contaminated tools and equipment leaving the Unit 1 containment building are stored in an area adjacent to the personnel hatch. At the time of the appraisal this area was disorderly and lacking in good housekeeping. Equipment was stored in piles rather than in locked cabinets or a suitable locked enclosure.

5.8 RWP and SWP

ANO uses both RWP's and SWP's. The two forms have essentially the same information and are initiated in the same manner, by the supervisor in charge of the work to be done. The difference between the two is their duration and the radiation levels to be encountered. RPWs are limited to areas less than 1 R/hour. RWP's are for long term coverage and are in effect for the duration of a specific job with a maximum of one month.

Health Physics personnel enter the radiation levels present in the area and the protective measures to be taken. Health Physics also has the authority to terminate a RWP or SWP on a radiation protection basis. Review of the active RWP's and SWP's revealed no apparent problems.

5.9 Conclusions

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

1. Entry and exits paths from controlled access areas should be clearly identified and seperated in order to provide good contamination control.

2. Personnel who enter high radiation areas unescorted by health physics personnel should be radiation protection qualified as certified by the Health Physics Supervisor.

3. Attention should be given to the required use of friskers and a review of portal monitor sensitivity in order to detect activities as close as possible to administrative contamination limits.

4. The release of contaminated tools and equipment from controlled access areas should be conducted by an improved tagging procedure.

6.0 Radioactive Waste Management

Documents Reviewed

ANO, FSAR, Units 1 and 2 Section 11

ANO, Procedure 2104.22, Gaseous Radwaste System

ANO, Procedure 1602.12, Radioactive Waste Disposal

ANO, Procedure 1604.14, Reactor Building Purge Analysis

ANO, Procedure 1604.16, Analysis of Gaseous Wastes

ANO, Procedure 1604.17, Analysis of Liquid Waste

ANO, Procedure 1104.21, ANO Compacting Procedure

ANO, Procedure 1402.17, Replacement of Contaminated Filters

ANO, Procedure 1602.10, Receipt, Inspection and Inventory of Solid Waste Containers

ANO, Procedure 1602.12, Radioactive Waste Disposal

ANO, Procedure 1603.03, Shipment of Radioactive Material

ANO, Procedure 2409.13, Resin Transfer to Transport Cask

ANO, Radioactive Waste shipment records for 1980

ANSI/ANS-55.1-1979, American National Standard for Soid Radioactive Waste Processing Systems for LW Cooled Reactor Plants

ANSI/ANS-55.4-1979, American National Standard for Gaseous Radioactive Waste Processing Systems for LW Reactor Plants

ANSI/ANS-55.6-1979, American National Standard for liquid Radioactive Waste Processing Systems for LW Reactor Plants

ANSI-101.1-1972, Efficiency testing of air cleaning systems containing devices for removal of particulates

ANSI-N510-1975, Testing of Nuclear Air Cleaning Systems

6.1 Program Responsibility

The plant systems designed to store, process and dispose of gaseous, liquid and solid radioactive waste are described in Sections 11 of the Unit 1 and Unit 2 Final Safety Analysis Reports. The Unit 1 waste system was designed to limit radioactive releases to 10 CFR 20 limits. The unit two waste system was designed to reduce radioactive releases to as low as reasonably achievable and within Appendix I, 10 CFR 50 design objectives. Plant procedures have been developed and implemented to control the processing and disposal of radioactive waste. Each unit operations Supervisor has the responsibility for the proper operation of each radioactive waste system. Routine operations are conducted by waste control operators of which there are one per shift. Training of waste control operators is both classroom and on the job. The natural progression for operating personnel is: auxiliary operator - waste control operator - reactor operator - shift supervisor. The appraiser reviewed the major components of each rad waste system, design changes, 10 CFR 50.59 evaluations, operating history and reported effluent releases from the plant. ANO surveillance and testing of HEPA/charcoal units in the plant was also reviewed and included in this section.

6.2 Waste Processing Systems

6.2.1 Liquid Waste Processing System

Liquid wastes in Unit 1 are processed on a batch basis utilizing filtration and demineralization. Cross-connects between Unit 1 and Unit 2 allow use of the Unit 2 evaporator and discharge from Unit 2. Laundry wastes are collected into laundry drain tanks and the liquid filtered prior to discharge into circulating condenser cooling water. The Unit 1 waste system appeared to have adequate storage volumes and ability to recirculate liquids into other tanks if necessary. The Unit 1 liquid effluent monitor (RE-4642) is alarmed such that higher than expected releases will close the discharge line. The monitor background at the time of appraisal was 6.32×10^{4} CPM, indicating residual contamination from the last release.

The Unit 2 liquid waste system was designed to limit releases to Appendix I of 10 CFR 50 levels. The Unit 2 waste system is composed of the Boron Management System, the Waste Management System and the Regenerative Waste Processing System. Filtration, demineralization and evaporation is utilized in carrying out liquid processing. Chemistry personnel collect samples at certain points in the waste processing system to verify design decontamination factors. Liquid discharges are monitored (RE 2330) prior to discharge into service water.

Other liquid release pathways were also reviewed. Turbine building sump discharge is through a oil separator prior to discharge to the discharge canal. This pathway is not monitored. Steam Generator blowdown flow for Unit 2 is to the main condenser. Vacuum pump discharge is monitored with element RE-8542. Unit 1 has a once-through secondary system and therefore there is no blowdown effluent.

Liquid effluent release records for Units 1 and 2 for the period July, 1979 to July, 1980 were examined. Releases ranged between 3.3% to 12% of the Technical Specification limit. Average effluent concentrations were found to be a few percent of the Technical Specification limit. The design objectives of the liquid waste processing system appeared to have been met.

6.2.2 Gaseous Waste Processing System

In Unit 1 hydrogen bearing gases are separated in a degasifier and collected in a surge tank. Compressors move the gas to a series of decay tanks for storage. An alternate path is to bypass the degasifier and move gases into the gas header for disposal. The header is monitored and closure of the header can occur upon a high activity signal from the monitor. At the time of the appraisal the degasifier was not in operation and the decay tanks were about empty. Several major changes are planned for the gas collection system. Corrosion of the system and the need for better gas handling capability has dictated these changes. These problems are further compounded by the failure of the auxiliary building ventilation system to maintain a sufficient negative pressure and prevent the movement of radioactive gases into adjoining areas, such as the health physics area at the controlled access to the auxiliary building. Additionally, the lack of effective decontamination of work areas and spills in the auxiliary building has further added to existing problems. The Appraisal Team toured the auxiliary building on numerous occasions and noted many examples of poor housekeeping and reactor coolant leakage that had not been cleaned up. The licensee has recognized some of these problems and has developed a waste gas work list and some of the items may be completed prior to refueling in January, 1981. In April, 1980, the auxiliary building ventilation system was cleaned and re-balanced by a consultant. The system has been placed on a maintenance schedule. The design temperature for the building is 95°F which makes very uncomfortable working conditions in the summer. The appraiser also discussed with ANO representatives the feasibility of placing a fan in the gas header in order to improve flow and prevent leakage into the auxiliary building and improve the loop seals on the auxiliary building sump to prevent pressure fluctuations in the header from moving gases from the sump into the floor drains and into the auxiliary building. Other sources of radioactive gas in the

auxiliary building that should be addressed are: Insufficient flow in the reactor coolant sampling hood, and sampling of the make-up tank and other systems of high activity.

The problems and conditions above have resulted in a series of gas releases in the auxiliary building which created airborne radioactivity areas and evacuation of personnel. The events have resulted in the heavy use of respiratory protective equipment by workers and a increase in the workload of the health physics staff.

In Unit 2 hydrogen bearing gases are collected in the gas surge header and surge tank. Compressors then move the gases to a series of decay tanks. The compressors and decay tanks can be bypassed after initial start-up. Decay tank releases are to the radwaste stack being monitored by RE 2429. At the time of Appraisal, RE 2429 had a background by 10^5 cpm. No one seemed to know the source of this activity. The appraiser reviewed the release points and associated monitors for the gas surge, gas collection and containment vent headers and identified no significant problems.

Gaseous effluent release records for both units was reviewed for the period July, 1979 to July, 1980. Gaseous activity ranged between 7.4% and 27% of the technical specification limit. Iodine and particulate activity ranged between .02% and 25% of the technical specification limit. Although releases were within limits, the releases do not appear to be as low or reasonably achieveable.

6.2.3 Solid Waste Processing and Shipment

Dry-compactable waste is handled by at least four different departments at ANO with no clear indication of the responsibilities of each. Unmarked waste bags are placed at many points throughout the auxiliary buildings as temporary collection areas. All waste is assumed to be radioactive and no radioactive labels are put on the bages. ANO procedures state that when a bag reads 25 mR per hour it should be removed but almost no bags reach that level. Full bags are taken to the compacting area and stacked up for the compacting operation, usually once a day. There is no written directive as to who is to place the bags in these areas and who is to take them to the compacting area. Presently the Maintenance Department does the compacting but Health Physics is supposed to take over soon. Compacted drums are smeared and surveyed by Health Physics and they are removed from the auxiliary building through a hatch to the turbine building truck bay. There are no procedures covering these tasks. Presumably, after the drums leave the auxiliary building they become the responsibility

of the Rad Waste Coordinator who has them taken to the rad waste storage building for storage and eventual shipment. There is poor communication and coordination between the different departments and few procedures stating who is responsible.

The rad waste storage building also contains stored contaminated equipment which is periodically taken back into the controlled access areas for reuse. Organization and control of material in the building are not good because no one person is responsible for inventory and moving items in and out. An ANO representative stated that the Rad Waste Coordinator would be made responsible for the building in the future. The Appraisal Team toured the auxiliary buildings, the rad waste storage building and the turbine building and the turbine building on numerous occassions. At each of these locations containers of radioactive waste material were found without the required radiation caution symbol and identification of the contents. Failure to label containers of licensed materials constituted non-compliance with 10 CFR 20.203(f)(1)&(2). The above locations were within the licensee's restricted area and radiation levels on the containers were measured to be less than 5 mR/hour.

Spent resins are loaded into shielded shipping casks using a portable loading system provided by a contractor. The loading operation is covered by a procedure and the casks are approved for LSA greater than type A quantities. The loading operation for spent resins and filters is performed in the truck bay of the turbine building. Spent filters are also loaded into shielded snipping casks but the casks are not approved for greater than type A quantities. The ANO method for determining activity in these latter casks is to use a dose rate reading at the surface of the casks and a conversion factor to arrive at the millicurie content. The method was apparently developed properly but no procedure was written. When the Rad Waste Coordinator position was established in early 1980 it was filled with a person inexperienced in the rad waste procedures and requirements. The person who developed the initial correct method for determining millicurie content has left the company. As a result a misuse of the method has resulted in an underestimate of millicurie content of at least five containers shipped in 1980. The Rad-Waste Coordinator was not aware of how the conversion factor was derived or how it was to be used.

These shipments were made as follows:

Date	RSR No.
January 8, 1980	10-80
June 19, 1980	19-80

June 20, 1980	20-80
August 21, 1980	27-80
October 10, 1980	36-80

Shipments were made in type A, DOT 7A containers and the total activity of transport group III nuclides in each container exceed three curies. Therefore, the shipments were made in noncompliance with 10 CFR 71.3. The calculated curie content of these containers was believed to be low by a factor of about 25.

The Rad Waste Coordinator has attended several short courses on shipping regulations for rad waste shipments and has copies of the requirements for each disposal site. Better communication between Health Physics and the Rad Waste Coordinator is required and also technical support to the rad waste coordinator.

6.3 Process and Effluent Monitors

Process and effluent monitors are calibrated annually using standard liquid and gas concentrations. Response checks are performed quarterly using standard check sources. These checks must fall within 10% of the last annual calibration. An appraiser reviewed the calibration procedures and concluded they were adequate.

6.4 High Efficiency Air Filtration Systems

Seventeen (17) HEPA/Charcoal adsorber units are installed and maintained at various location in both units. Twelve (12) units are covered by Technical Specification requirements. A licensee respresentative stated that in-place testing of these units is performed in accordance with appplicable sections of ANSI N510-1975. The appraiser reviewed surveillance procedures and test results for several units and found no areas of concern. Several units were visited and no discrepancies were found.

6.5 Conclusions

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

1. Engineering controls and design changes in the Unit 1 auxiliary building ventilation and gas collection systems are necessary to prevent or control leakage of radioactive gases and the exposure of workers.

2. Decontamination and housekeeping practices in the Unit 1 auxiliary building need considerable improvement in order to reduce radiation areas and gaseous releases to the auxiliary building.

3. The sampling of high activity systems should be improved using localized exhaust hoods, proper equipment and adequate procedures.

4. The collection, compaction and movement of waste materials from controlled access areas to the rad waste building and the movement and shipment of materials from the rad waste building needs to be covered by specific procedures and the responsibility for each phase of the process assigned.

Other areas appear acceptable, however, the following should be considered for improvement:

1. The turbine building sump is a potential source of radioactive water and releases from the sump should be monitored.

2. The causes of high backgrounds on effluent monitors should be determined and corrective action taken.

7.0 ALARA Program

Documents Reviewed

ANO Procedure 1602.35, "Radiation Protection Manual"

Memorandum from W. Cavanaugh, III to Generation & Construction Department Directors, "Management Directive-Radiation Protection," March 13, 1980

Memorandum from D. D. Snellings to J. P. O'Hanlon, "ANO ALARA Program," October 24, 1980

An appraiser reviewed the licensee's administrative policies and implementation of measures for maintaining occupational radiation doses as low as reasonably achievable (ALARA) at ANO. This review indicated that the licensee did not have a formal ALARA program in place at the time of the appraisal although some progress in ALARA program development had been made in 1980. Management attention to the lack of and need for development of an ALARA program was brought about by the radiation protection program review conducted by an outside consultant in 1979. As a result of this review, licensee management mandated action in the following areas; (1) issuance of a written mangement commitment to radiation protection incorporating the ALARA philosophy, (2) reorganization and strengthening of the ANO health physics organization and creation of a staff position entitled Assistant Health Physics Supervisor-ALARA, (3) review, updating and revision of the ANO Radiation Protection Manual and procedures to implement the radiation protection policy, and (4) development and implementation of an effective ALARA program. The Appraisal Team review of this part of the licensee's program found that items 1 and 2 above had been implemented, with significant progress made on item 3 in review of the Manual and procedures. Progress in program development was less apparent since requests for proposals for consultants to develop the program had only been sent out in October. It was noted that the licensee projected the completion of program development and implementation of the full ALARA program in July 1981.

A review of ALARA accomplishments since the appointment of the AHPS-ALARA showed that the establishment of an ANO radiation and ALARA information data base had been initiated. This system appeared to have the dose and work classification data necessary to assess and control radiation dose at ANO. The implementation of ALARA principles in various areas, although there was no formalized program, was discussed with the AHPS-ALARA. Some areas of ALARA considerations included the use of mock-ups and special training relating to plugging of steam generator tubes, the use of photographs prior to jobs for planning and training, reduction in anti-contamination clothes radiation levels and the availability of

portable ventilation/filtration units to reduce airborne radioactive materials concentrations. However, there appeared to have been no consistant application of ALARA principles in the absence of a formal program.

Based on the appraisal findings, this portion of the licensee's program appears to be acceptable considering the progress made up to the time of the appraisal and in view of the management commitments to developing and implementing a formal ALARA program.

8.0 Health Physics Facilities and Equipment

8.1 Facilities

The appraisers visited and reviewed the facilities used by the Technical Analysis section in carrying out the various radiation protection and radiochemistry functions. Since little guidance is available to determine the adequacy of these facilities, appraisal findings are based upon appraiser judgement and comparison with practices at other nuclear power plants. The following facilities were observed; Units 1 and 2 health physics field offices and access control points, health physics counting area, instrument calibration and storage areas, equipment and personnel decontamination facilities, laundry area, respiratory protection equipment areas, training facilities, radiochemistry facilities, and office space for the staff.

8.1.1 Radiation Protection

The Unit 1 and 2 health physics field offices are located at the 386 ft. elevation access to the auxiliary buildings, just off the turbine building operating floor. The space in both areas, particularly Unit 1, appeared to be somewhat inadequate for the expanded staff and the layout of the areas does not appear to be particularly good in regard to personnel flow through. The facilities do provide adequate observation of the access and exit points. The personnel decontamination facilities inplant are small enclosures at each controlled access point. Dedicated facilities are not provided for female workers although there is a separate area provided for female workers to change clothes. As stated in Section 3.2.4 of this report, ANO did not have dedicated respiratory protection facilities at the time of the appraisal. The cleaning, decontamination, drying and preparation for issue were all done in different areas, none of which were designed to accommodate these activities. The Appraisal Team considers these facilities to be inadequate and recommends that ANO follow through with plans to provide better facilities for the respiratory protection program.

Health Physics counting areas have been established at the controlled access points to each auxiliary building. These areas are small and devoted to performing gross beta-gamma and gross alpha measurements on swipes and air samples. These areas were considered adequate although there is good potential for contamination of samples and equipment unless care is exercised. The Unit 1 control point also has a computer based spectrometer/Ge(Li) detector system used to identify and quantity specific gamma emitters on air samples. The Appraisal Team considered the location of this unit to be poor in that it was in close proximity to be controlled access point and subject to

contamination. An Appraiser noted evidence of cave contamination from the print-outs from each analysis.

Laundry facilities and equipment are located on the 386 ft. elevation of the Unit 1 auxiliary building. The appraisers noted that the equipment was in poor repair, housekeeping was in need of improvement and the laundry room was inadequate in size for efficient operation. Equipment decontamination is accomplished in an area near the laundry facilities. This area appeared to be adequate for the work load at the time of the appraisal.

8.1.2 Radiochemistry

The radiochemistry staff supports the health physics function by periodic analysis of certain health physics samples and by providing standard samples for calibration purposes. The radiochemistry lab was previously located in the auxiliary building, which was a poor location from a radiation background and contamination standpoint. The radiochemistry counting equipment has now been relocated to a room off the turbine deck. The area appears to be much better than the previous location. The lab does not have its own ventilation supply and occasionally the staff notes increased backgrounds from gaseous releases from the plant vents. The old lab is still used for sample collection and some analytical work. The appraisers considered the present radiochemistry facilities to be acceptable, although a separate HVAC system is recommended.

8.2 Protective Equipment

8.2.1 Respiratory Protective Devices

The ANO supply of respirators, filter cartridges, airline manifolds and related equipment on hand at the time of the appraisal was reviewed for adequacy of numbers and types necessary to support normal and emergency conditions. Plans for maintaining inventory levels and orders for additional equipment were also discussed with licensee representatives. It was noted that a new inventory system was being implemented and a significant amount of new respiratory equipment was on order, in some cases doubling the numbers on hand. Based on the results of this review, it appeared to the appraisers that an adequate supply of respiratory equipment is being maintained at ANO.

8.2.2 Anti-Contamination Clothing

The present inventory of Anti-C clothing on site consists of 3500 sets which appears to be adequate for normal operations but not

for outages. About 1000-1500 sets of Anti-C clothing are consumed per day during an outages and the present laundry facilities are limited therefore, additional clothing supplies are necessary. More clothing is on order and should be on site before the next outage.

9.0 Emergency Response/Re-entry

Documents Reviewed

ANO, Procedure 2607.01A, Unit II Reactor Coolant Sampling Systems

ANO, Procedure 1903.15, Unit I and Unit II Auxiliary building Ventilation Exhaust Radiation Monitors

ANO, Procedure 1607.01A, Unit I Reactor Coolant Sampling Systems

ANO, Procedure 1602.36, Air Sampling with Emergency Kit Equipment

ANO, Procedure 1602.62, Portable Iodine Counting

AP&L letters of October 17, 1979 and July 21, 1980 in response to NUREG-0578 requirements

9.1 NUREG-0578 Items

NREG-0578 contains items that impact directly upon the health physics staff. The items reviewed by the Appraisal Team included post accident sampling, high range effluent monitors and in-plant iodine monitoring. Interim emergency plans and procedures were reviewed with the plant staff in the above areas as well as supplies, protective equipment and facilities.

Interim procedures describe how a reactor coolant sample would be taken at the existing coolant sampling hood, adjacent to the hot chemistry laboratory in the auxiliary building. Using a shield wall and reach rods, a 25 ml coolant sample would be taken and placed in a shielded container. The procedure specifies that the sample would be stored in the hot lab behind portable shielding. A licensee representative stated that the sample would be analyzed by a consulting laboratory. This lab could not be identified and arrangements for this service appear to be vague. The appraiser expressed concern that this area of the auxiliary building may be inaccessible to personnel under accident conditions and whether the sample could be taken and handled and maintain personnel exposures below 10 CFR 20 limits.

Unit 1 containment gas, particulate and iodine samples would be taken at existing locations. These locations are both at the 335' level, one at the monitor RE 2400 location and the other at the hydrogen purge line. Monitor location RE 2400 is maintained by the operating staff and HP personnel have no experience in collecting samples at this location. Samples of gas, particulate and iodine would be taken by the purge method utilizing

existing equipment and procedures. Samples would be carried to the radiochemistry lab on the turbine deck. The appraiser expressed concern that little apparent attention has been given to expected dose levels during sample collection and handling. The radiochemistry laboratory has not specified what radiation levels could be sucessfully analyzed in the laboratory. Since silver zeolite cartridges will be used for iodine collection, noble gas adsorption should be minimal. Unit 2 containment gas and particulate samples would be taken behind the Unit 2 sample room in the auxiliary building. Similar to Unit 1, samples would be taken using existing equipment and procedures. Samples for iodine and particulate activity in plant vents stacks would be taken at existing locations using present procedures.

The radiochemistry counting equipment is located off the turbine deck in a location somewhat removed from sources of activity, however, the laboratory may be affected by gaseous plumes from either unit.

The licensee has located containment monitors capable to 107 R/hour, however, they need to be environmentally qualified prior to installation. The installation of noble gas effluent monitoring instrumentation capable of measuring up to 105 uCi/cc has been purchased and will be installed according to commitments. These monitors will be installed on three release paths in Unit 1 and four paths in Unit 2.

ANO appears to have a dual sampling and analysis capability for in-plant iodine measurements. A SAM-2 [illegible] analyzer with silver zeolite adsorber is available and covered by a written procedure. Iodines can also be collected using conventional low volume air movers and measurement using the Ge(Li) detector/spectrometer system in the radiochemistry counting area.

9.2 Emergency Response

An appraiser reviewed the ANO radiation protection staff's preparedness for responding to an accident and preparations for radiation protection following an accident. The review in this area during the appraisal did not duplicate other NRC emergency planning program evaluations in progress. It was noted that AP&L was working on a revised emergency plan and developing implementing procedures to meet the requirements of 10 CFR 50 and NUREG 0654 at the time of the appraisal. A licensee representative stated that the package would probably be submitted to the NRC for approval in February 1981. Discussion with licensee management indicated that the organization for accident response and recovery had been formulated. It was also stated that an agreement had been made with the rent-a-tech contractor to provide additional health physics support personnel on request in the event of an accident. It was also noted that an Emergency Planning Coordinator position had been established in the Technical Analysis Section. This

position is responsible for maintaining the emergency plan, conducting training related to the plan, upgrading emergency response equipment, and coordinating drills and test exercises. No specific problems were identified by the appraiser during the review of this area.

9.3 Conclusions

The NRC is conducting a separate power reactor emergency planning evaluation program as well as a task group to evaluate NUREG 0578 items. Because of this, the Health Physics Appraisal Team will not make conclusions of adequacy in this area except to recommend that a review be made of expected rates at samples collection points and samples themselves so that protective equipment, additional shielding and specialized sampling apparatus can be fabricated and stored for ready use. In addition, consulting laboratories expected to analyze highly radioactive samples from the site should be identified and agreements or contractual arrangements formalized.

ANNEX A

EXIT INTERVIEW

The Appraisal Team met with licensee representatives (identified in Annex B) at the ANO site on November 7, 1980. The Appraisal Team leader summarized the scope and major findings of the appraisal. The findings were classified into three categories:

A. Significant appraisal findings are described in Appendix A of the transmittal letter forwarding this report and are summarized at the conclusion of each applicable section of this report. Written responses to these significant findings will be required to be submitted by the licensee. Actions taken on these findings will be reviewed during subsequent inspections.

B. Apparent items of noncompliance identified during the appraisal are described in Appendix B of the letter forwarding this report. Written responses to these items will be required to be submitted by the licensee. Actions taken on these items will be reviewed during subsequent inspections.

C. Findings of lesser significance but which are considered important by the appraisal team are summarized at the end of each report section. No written response to these findings will be required, however, it is expected that these findings will be used by the licensee in formulating a radiation protection plan. Requirements for the radiation protection plan will be specified by the NRC in the future. Progress and improvements in these areas will also be reviewed in subsequent inspections.

ANNEX B

PERSONS CONTACTED (AP&L)

W. Cavanaugh III, Vice President of Generation and Construction
*J. Griffin, Director Nuclear Operations
*J. O'Hanlon, ANO General Manager
H. Miller, Manager, Engineering and Technical Support
*D. Snellings, Technical Analysis Superintendent
*D. Glenn, Health Physics Supervisor
*R. Roderick, Human Resources Superintendent
*J. Vandergrift, Training and Counseling Supervisor
*L. Schempp, Manager of Nuclear QC
*B. Baker, Operations Manager
G. Fiser, Radiochemistry Supervisor
L. Sanders, Maintenance Manager
L. Humphrey, Plant Administrative Manager
R. Pool, Rad-Waste Coordinator
D. Rueter, Director, Technical & Environmental Services
D. Horton, QA Manager
T. Pugh, Emergency Planning Coordinator
J. Roberson, I&C Supervisor

*Denotes those present at the exit interview on November 7, 1980.

Other persons contacted included technicians, operators, training instructors, etc.