UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
101 MARIETTA ST., N.W., SUITE 3100
ATLANTA, GEORGIA 30303

Report No. 50-302/80-25

Licensee: Florida Power Corporation
St. Petersburg, FL

Facility Name: Crystal River Unit 3

Docket No. 50-302

License No. DPR-72

Inspection at Crystal River, FL

Inspectors: _____ 8/5/80
R. W. Zavadoski, Team Leader, Radiation Specialist — Date Signed

_____ 8/5/80
J. M. Puckett, Radiation Specialist — Date Signed

Accompanying Personnel: C. Henson, NRC, HQS
L. Munson, Battelle Northwest
R. Will, Consultant to Battelle Northwest

Approved by: _____ 8/5/80
A. F. Gibson, Section Chief, FF&MS Branch — Date Signed

SUMMARY

Inspection on June 16-27, 1980

Areas Inspected

This special announced inspection involved 548 inspector-hours onsite in the area of health physics appraisal including organization, qualifications, training, procedures, ALARA programs, external exposure control, personnel dosimeter program, internal dosimetry, respiratory protection, medical emergencies, instrumentation, surveillance and access control, radwaste control, facilities and equipment reentry, and in-plant systems.

Results

Of the 16 areas inspected, no items of noncompliance or deviations were identified in 11 areas; 9 items of noncompliance were found in 5 areas.

DETAILS

1. Persons Contacted

Licensee Employees

*D. C. Poole, Nuclear Plant Manager
*G. P. Beatty, Director of Power Production
J. A. Hancock, Director of Nuclear Operations
G. Moore, Vice President, Nuclear Operations
*R. Bright, Nuclear Operations
*J. R. Wright, Nuclear Operations
*T. C. Lutkehaus, Technical Services Superintendent
*R. E. Fuller, Plant Engineer
*W. E. Kemper, Plant Training Manager
*J. L. Bufe, Nuclear Compliance Auditor
*K. F. Lancaster, Nuclear Compliance Supervisor
*R. Clarke, HP Shift Supervisor
*G. R. Hutafor, Maintenance Supervisor
*H. B. Lucas, Administrative Supervisor
*G. D. Perkins, Health Physics Supervisor
*G. H. Ruzala, Chemistry and Rad Protection Engineer
*E. K. Neirschafer, Nuclear Compliance Auditor

Other licensee employees contacted included construction craftsmen, technicians, operators, mechanics, security force members, and office personnel.

*Attended exit interview

2. Exit Interview

The inspection scope and findings were summarized on May 16, 1980, with those persons indicated in Paragraph 1 above. The inspectors reviewed and examined all aspects of the health physics program at the facility. This examination included organization, staffing, audits, procedures, training, retraining, exposure control, instruments, access control, ALARA, radwaste surveys and facilities. The inspectors stated that the respiratory protection program, training/retraining program for health physics technicians, health physics records management program and the health physics surveillance program should be thoroughly reviewed and reevaluated by the licensee. The licensee agreed to review and reevaluate these programs. At the exit interview the inspectors also identified items of noncompliance which included: (1) failure to follow procedures in the respiratory protection area (discussed in paragraphs 7.b., 7.d., 7.e., 7.f., 7.g., 7.h., 9.c., and 9.e.); (2) failure to perform bioassays and failure to perform medical evaluations in a timely manner, both in support of the respiratory protection program (discussed in paragraphs 7.e. and 7.r.); (3) failure to provide dose rate survey instruments to individuals in high radiation areas (discussed in paragraph 9.b.); (4) failure to have an adequate retraining program which would maintain the proficiency of health physics technicians (discussed in

paragraphs 5.c. and 5.d.); (5) failure to post a high radiation area (discussed in paragraph 9.e.); (6) failure to take adequate airborne radioactivity surveys (discussed in paragraphs 9.f. and 10.c.); (7) failure to post a radiation area (discussed in paragraph 9.j.); (8) failure to have complete NRC Form 4's for individuals allowed to exceed 1250 millirem exposure (discussed in paragraph 6.g.); and (9) failure to follow procedures for pocket dosimeter functional checks (discussed in paragraph 6.i.). The plant manager acknowledged the items of noncompliance.

3. List of Unresolved Items, Noncompliance, and Inspector Follow-up Items

The following is a summary tabulation of all the unresolved items, noncompliance and inspector follow-up items identified throughout this report. Unresolved items are matters about which more information is required to determine whether they are acceptable or may involve noncompliance or deviations. New unresolved items identified during this inspection are discussed in the paragraphs indicated after each item. Inspector follow up items (IFI) are matters which the NRC desires to look into again and which will be examined in future inspections. IFI's are discussed in the paragraph(s) indicated after each item.

(Open) IFI (50-302/80-25-01) Reporting recommendations for health physics supervisor (paragraph 4.a.)

(Open) IFI (50-302/80-25-02) Evaluation of the present staffing requirements for the health physics group (paragraph 4.b.).

(Open) IFI (50-302/80-25-03) Increasing the ratio of supervision to temporary employees (paragraph 4.c.).

(Open) IFI (50-302/80-25-04) In-depth performance audits (paragraph 4.d.).

(Open) IFI (50-302/80-25-05) Establishing a formal group with the sole responsibility of ALARA (paragraph 4.e.).

(Open) IFI (50-302/80-25-06) Specialist assignment to specialty areas (paragraph 4.f.).

(Open) IFI (50-302/80-25-07) Formal selection criteria for each position in the Chem/Rad section (paragraph 5.a.).

(Open) IFI (50-302/80-25-08) Formal qualification requirements be established (paragraph 5.b.).

(Open) Infraction (50-302/80-25-09) Failure to have a training/retraining program (paragraph 5.c. and 5.d.).

(Open) IFI (50-302/80-25-10) Investigation and documentation of pocket dosimeter and TLDs variances greater than 30% (paragraph 6.d.).

(Open) IFI (50-302/80-25-11) Documentation for changes in the official dose record (paragraph 6.d.).

(Open) IFI (50-302/80-25-12) Simplified presentation of individual exposure data (paragraph 6.e.).

(Open) Infraction (50-302/80-25-13) Incomplete NRC Form 4's (paragraph 6.g.).

(Open) IFI (50-302/80-25-14) Development of historical records system using ANSI N13.6 as a guideline (paragraph 6.g.).

(Open) IFI (50-302/80-25-15) Proper wearing of dosimetry (paragraph 6.j.).

(Open) IFI (50-302/80-25-16) Inventory of pocket dosimeters (paragraph 6.h.).

(Open) Infraction (50-302/80-25-17) Out of date calibration for pocket dosimeters (paragraph 6.i.).

(Open) Infraction (50-302/80-25-18) Failure to follow procedures for the respiratory protection program (paragraphs 7.b., 7.d., 7.e., 7.f., 7.g., 7.h., 9.c., 9.e.).

(Open) IFI (50-302/80-25-19) Records system for respiratory protection training (paragraph 7.b.).

(Open) IFI (50-302/80-25-20) Annual medicals for respirator users (paragraph 7.c.).

(Open) IFI (50-302/80-25-21) Medical review of respirator program (paragraph 7.c.).

(Open) IFI (50-302/80-25-22) Consideration of quantitative fit test for respirators (paragraph 7.d.).

(Open) IFI (50-302/80-25-23) Provisions for annual respirator refit (paragraph 7.d.).

(Open) Infraction (50-302/80-25-24) Failure to perform bioassays and ascertain medical status annually (paragraph 7.e. and 7.r.).

(Open) IFI (50-302/80-25-25) Use of maintenance repair form for respirators (paragraph 7.i.).

(Open) IFI (50-302/80-25-26) Documentation of filter replacement on building air supply (paragraph 7.l.).

(Open) IFI (50-302/80-25-27) Calibration of WBC using commonly found isotopes (paragraph 7.n.).

(Open) IFI (50-302/80-25-28) Review of WBC results (paragraph 7.q.).

(Open) IFI (50-302/80-25-29) Establish new procedural limits for WBC investigations (paragraph 7.q.).

(Open) IFI (50-302/80-25-30) Procedural requirements for baseline WBC (paragraph 7.r.).

(Open) IFI (50-302/80-25-31) Development of an acceptable records system for health physics (paragraphs 8.a., 8.b., 8.c., 8.d., 8.e., and 8.f.).

(Open) Infraction (50-302/80-25-32) Failure to have a dose rate instrument in a high radiation area (paragraph 9.b.).

(Open) Infraction (50-302/80-25-33) Failure to post a high radiation area (paragraph 9.e.).

(Open) Infraction (50-302/80-25-34) Failure to take an adequate survey (paragraphs 9 f. and 10.d.).

(Open) IFI (50-302/80-25-35) Adequacy of routine airborne radioactivity surveillance program (paragraph 9.h.).

(Open) IFI (50-302/80-25-36) Recommendations for strengthening routine surveillance program (paragraph 9.i.).

(Open) Infraction (50-302/80-25-37) Failure to post a radiation area (paragraph 9.j.).

(Open) IFI (50-302/80-25-38) Incorporation of ANSI N323-1978 into plant calibration procedures (paragraph 10.b.).

(Open) IFI (50-302/80-25-39) Calibration of GM and neutron instruments using an NBS traceable radiation source (paragraph 10.c.).

(Open) IFI (50-302/80-25-40) Evaluation of instrument inventory (paragraph 10.e.).

(Open) IFI (50-302/80-25-41) Search for more sensitive portal monitor (paragraph 10.f.).

(Open) IFI (50-302/80-25-42) Frisker set points and frisking stations (paragraph 10.g.).

(Open) IFI (50-302/80-25-43) Calibration facility and training for calibration technicians (paragraph 10.h.).

(Open) IFI (50-302/80-25-44) Establishment of a formal ALARA program (paragraph 11.a.).

(Open) IFI (50-302/80-25-45) Real time computing system for ALARA concerns (paragraph 11.b.).

(Open) IFI (50-302/80-25-46) Post accident sampling capabilities (paragraph 12.e.).

(Open) IFI (50-302/80-25-47) Recommended changes to procedures (paragraph 14.b.).

4. Organization

a. The inspectors reviewed the organizational structure of the plant. Figure 1 shows the overall plant organization and Figure 2 shows the health physics organization. Figure 1 shows the normal reporting chain for the health physics supervisor to be through the technical services superintendent to the nuclear plant manager. The plant manager has the maintenance superintendent, plant training manager, administrative supervisor, operations superintendent, and quality assurance compliance manager also reporting directly to him.

The inspectors pointed out that Regulatory Guide 8.8, March 1977, Revision 2, section C.1.b.3, recommends that "The Radiation Protection Manager (RPM) (onsite) has a safety-related function and responsibility to both employees and management that can be best 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". No conflicts due to health physics reporting through technical services were ascertained by the inspectors; however, this may be strongly dependent on the people involved. Therefore, based on their judgement, the inspectors recommended a reporting chain of the health physics supervisor directly to the plant manager (Inspector Follow-up Item 50-302/80-25-01). The inspectors also noted that the chemistry and health physics functions were split at the facility, thereby not diluting the health physics effort.

b. The newly reorganized organization of the Chem/Rad group is shown in Figure 2. The entire health physics department consists of 12 people and is authorized 14. All aspects of the health physics program are handled by the Health Physics Coordinator from records keeping to review of surveillance data. Cognizant of the recent reorganization and the increase in staffing in the health physics area, the inspectors stated, based on their experience at other facilities, that the proposed health physics staff appeared to be inadequate. Licensee representatives stated that time will be required to evaluate the effectiveness of the new organization (Inspector Follow-up Item 50-302/80-25-02).

As indicated on the current and proposed organization charts, the Chem/Rad Protection Engineer (Radiation Protection Manager) reports to the Technical Services Superintendent. Thus, the Chem/Rad Protection Engineer (CRPE) has no direct line of communications with the Plant Manager as stated above. Inspectors reviewed the incumbent Technical

Services Superintendent's technical qualifications document and interviewed the individual. There appeared little documented training and experience in health physics and radiation protection in the incumbent's background. The inspector's recommended that additional health physics training be provided.

c. The inspectors reviewed the adequacy of supervision of contractor supplied personnel by the permanent health physics staff. There are approximately 40 contractor-supplied individuals on board for radiation protection or decontamination work, few of whom have a significant amount of plant specific knowledge. The licensee stated that the supervisory responsiblity for these 40 individuals was primarily divided between the three permanent staff shift supervisors. (In addition see section 9.d.) Also, the decontamination personnel were supervised by contractor supplied junior health physics technicians, who reported in turn to the appropriate shift supervisor. The licensee further stated that some of the contractor supplied personnel were assigned requiring minimal supervision. In view of the inadequate training given to contract technicians and the lack of time afforded them to review plant procedures (discussed in paragraphs 5.a. and 5.b., respectively), the inspectors stated that, in their opinion, the supervisor-worker ratio appeared low, considering the number of temporary employees supervised and the minimal supervisory training and experience offered the health physics shift supervisors) (Inspector Follow-up Item 50-302/80-25-03).

d. The health physics program at the site is audited by the corporate health physics group. The review audit entails a review of procedures and some few practices at the facility. The corporate audit program was described by licensee's representatives as predominately a procedural audit and not a performance audit. Based on observations of the audits conducted and the contents of the audits, the inspectors stated that, in their judgement, performance audits as well as procedural audits should be conducted and could be accomplished with either in house personnel or outside independent contractors (Inspector Follow-up Item 50-302/80-25-04).

e. The inspectors noted that there was no formal structure within the organization which had overall responsibility for ALARA (i.e., maintaining plant personnel radiation exposures as low as reasonably achievable). From discussions with the plant manager, the health physics staff and other plant personnel, and through direct observation, the inspectors concluded that few elements of a formal ALARA program were present or functional. Based on their professional judgement and observations, the inspectors recommended the establishment of an ALARA coordinator with sole responsibility for implementing ALARA programs, and unencumbered by other responsibilities (Inspector Follow-up Item 50-302/80-25-05). Additional findings and comments on the ALARA program at Crystal River Unit 3 are discussed in detail in the ALARA section of this report.

f. The inspectors observed that the staffing level does not appear to provide for adequate numbers of specialists. It was noted that there was little or no backup for whole body counting, the incumbent on one shift having been assigned some two or three weeks ago, with little prior training or experience. Review of dosimetry and ALARA were noticeably absent. Respiratory protection was covered very perfunctorily during indoctrination, and contract technicians were observed instructing new personnel as to fitting, use and checkout. There was no single person in control of the pocket dosimeter program. As a result inspectors noted numerous instances in which calibration/drift dates had been exceeded, ranging from 15 days to two and three months as discussed in the External Exposure Control section (paragraph 6). The inspectors recommended that specialists be assigned to specialty areas (Inspector Follow-up Item 50-302/80-25-06).

g The inspectors found the organization at the Crystal River Unit 3 facility to be acceptable. Based on the inspector's professional judgement, improvements to the organization of the health physics program could be obtained if licensee consideration is given to (1) changing the reporting chain of the health physics supervisor (paragraph 4.a.); (2) establishing a group with the sole responsibility of ALARA (paragraph 4.e.); (3) evaluating the present staffing level and utilizing the staff to its optimum potential (paragraph 4.b. and 4.d.); and (5) performing performance, as well as procedural, audits of the health physics program (paragraph 4.d.).

5. Personnel Selection, Qualification, and Training

a. The inspectors did not find any documented formal selection criteria for positions in the radiation protection organization. The job descriptions set forth in para. 4.1.3 of Administrative Instructions AI-700, supplemented by 4.1.8, "Qualifications" are the bases for selection of personnel. The latter reads, "The qualifications of Chem/Rad personnel shall meet or exceed the qualifications referenced for comparable positions in ANSI N18.1-1971 or equivalent. A training program shall be established to ensure ANSI requirements or equivalent are met prior to selection for Chem/Rad Technician. Retraining of Chem/Rad Technicians is accomplished in accordance with FSAR Section 12.0." The inspectors found little evidence of any formal training of Chem/Rad Section personnel, nor was there evidence of a selection criteria other than loose adherence to the two year time requirements set forth in ASNI N18.1-1971. The selection system for plant personnel is modified by union requirements. The criteria do not appear to relate to the job description which the individual is expected to perform. The criteria appear only vaguely to include measurable formal education and experience factors, and then only at the higher levels. The modifying factor "or equivalent" appears to prevail. Again, union rules appear to prevail at the lower levels. Rental technicians do not appear to be subject to any criteria other than

ANSI 18.1-1971. The criteria do not appear to be used in the contracting, hiring, and promotion processes. Other than union requirements, most plant personnel and management are aware only of the time requirements set forth in ASNI N18.1-1971 for health physics technicians.

The inspectors recommended that formal selection criteria be established for each position in the Chem/Rad section (Inspector Follow-up Item 50-302/80-25-07).

b. The inspectors did not find any documented qualification requirements for permanent Chem/Rad personnel other than references to ANSI N18.1. The inspectors did not find any qualification requirements imposed by the licensee on contract personnel other than references to ANSI N18.1. All visitors (including contract personnel) are required to take an abbreviated "orientation" course before being badged. The subject matter touches very lightly on radiation protection. Individuals in the radiation protection program meet the basic ANSI N18-1 requirements as modified ("or equivalent") by FPC or by union rules. The inspectors recommended that formal qualification requirements be established (Inspector Follow-up Item 50-302/80-25-08).

c. The inspectors reviewed the radiation protection training program at the Crystal River facility. The Initial Plant Indoctrination and general employee training are minimal from a rad protection viewpoint. This aspect is discussed in more detail in the next paragraph. The requirement for the expanded general employee training within 90 days of entry was suspended at this time due to the outage. There is no specific Radiation Protection personnel training program. While not observed, there are, from time to time, special training, replacement training and and Retraining courses of seminars offered according to need. These are frequently provided by vendors and contractors. The basic document speaking to training is AI-800, Conduct of Administrative Services. The bulk of this document, 44 of 54 pages, is devoted to training. The remainder covers organization (of the Administrative Services Section), security, administrative, clerical and accounting, drawing and document control. The document is detailed and comprehensive. However, there is little evidence that the procedures found therein are followed in other than the licensed operator training area. The inspectors did note that the entire training organization is to be reorganized, additional personnel to be employed, new instruction format to be developed, and additional space to be provided. The entire program will be encompassed in a new administrative instructions document--AI 1400 Training.

d. The inspectors sat through a general employee training course. The inspectors noted that the instructor for the new employee indoctrination/orientation course did not stop films and elaborate on items, nor did he point out inconsistencies between the film and actual practice. For example:

- The exit from the RCA is not as shown.
- The dose control card is never given to the employee to be carried on the job.

- No glossary of terms or acronyms were provided prior to films and discussions.
- Frequently the terms used in the film were not those in use at the plant or even commonly used, e.g., "body burden counter" versus "whole body counter", or the film is entitled "Health Physics..." while the most common term at plant is "Radiation Protection".
- Nowhere were terms such as rem, millirem, Curie, microcurie, dpm, cpm, etc., discussed, defined, or compared. The booklet on radiation protection, given to each new employee, states that he will hear these terms, but even so, they are not defined.
- Filming of protective clothing as dressing out and removal was often unclear. A subsequent brief demonstration by a student was inadequate to clarify. See comments on practices observed at containment entry point.
- Too much jargon -- "OTA", "Mode 4", etc., was used in Emergency Plan discussion.

The following items were touched upon very lightly in the Training Plan or not discussed:

- The use of high range pocket dosimeters, zeroing of dosimeters, zeroing during operations (by users) vs. during an outage period (at control desk by a technician).
- Proper location of TLD and pocket dosimeter.
- Hair length and proper procedure in dressing out, etc.
- Unzipping and "rolling off" coveralls.
- Dosimetry pouch removal.
- Discussion of portal monitors -- purpose, what is accomplished or how one should use them.
- Testing for leakage of rubber gloves was not discussed or stressed.
- Types, capabilities or limitations of instrumentation was not discussed.

To assess the effectiveness of the general employee training, the inspectors observed radiological work practices in the Radiation Controlled Area and found:

- Several instances of improper positioning of TLDs; in some distances, pocket dosimeters and TLDs were on opposite sides and at different levels on the individual.
- During a containment exit, one female employee was observed with long hair outside her coveralls, and seen to "mop the floor" as she bent over to remove shoecovers, etc.
- An individual who had been in the inspector's class was noted to be having difficulty opening his dosimetry pouch. He was in the clean area, his red outer gloves were still on, and he ultimately reached up into the pouch and pulled the items out. He then took off the gloves and proceeded to dress in personal clothes.
- A worker laid a welding mask and other equipment on a drum in the clean area, proceeded to remove Anti-C's, dress, then pick up mask, with bare hands and place in yellow plastic bag.

- A worker wore his TLD in a shirt pocket and dosimeter in a pants pocket.
- A worker stepped onto a clean pad, then removed shoe covers.
- Several workers failed to frisk at any stage of redressing.

All of the above were observed at the entrance to containment which was under the control and observation of a health physics technician.

The inspectors found that: (1) there are no health physics personnel on the training staff; (2) there is no health physics/chemistry/radwaste training program; and (3) training, except for licensed operators and the short 6-hour new employee indoctrination/orientation, appears to be "shelved" for the present (from February 26, 1980 until startup, sometime in July 1980). It was made clear to the inspectors that HP personnel, plant or contract, were considered to be qualified prior to hiring and that Rad Safety and Emergency training at CR3 would be redundant.

The inspectors also found:

- Formal on-the-job training is available only for selected personnel (licensed operators, e.g.). None is available for Chem/Rad personnel.
- Other than for, licensed operators, retraining, requalification and training in the state-of-the-art is not available for permanent personnel, such as Chem/Rad.
- Special surveys, unusual conditions, non-routine survey locations are not covered in any course offered to Chem/Rad personnel.
- There is no operator training and qualification course for Radwaste facility operators.
- Instruction on the use, capabilities and limitations of survey instrumentation was not provided.

The inspectors informed licensee's representatives that failure to have a training/retraining program which maintained the proficiency of the health physics technicians, both permanent and temporary, was in noncompliance (Infraction 50-302/80-25-09) with Technical Specification 6.4.1.

e. In summary the inspector found the licensee's personnel selection, qualification and training program to be inadequate.

6. External Exposure Control

a. The occupational exposure control program at the Crystal River facility is described in their radiation protection manual, RP 101, Section 3.2. Personnel doses are maintained within 10 CFR 20.101 and 20.103 limits for both internal and external exposures with plant administrative guides in place. The licensee utilizes the concept of 5 (N-18) for workers both permanent and temporary. Paragraph 5.2 of the radiation protection manual stipulates that the thermoluminescent dosimeter (TLD) is the official exposure record. All TLD processing is done by a contractor,

either on site during outages or at the contractor's facilities during normal operation. TLD processing is normally done on a monthly basis, except for potential high exposures or personnel approaching a limit which is processed immediately.

b. RP 101, Radiation Protection Manual, and RP 201, Personnel Exposure Documentation, specifies the licensee's exposure control system. The guidelines are a maximum of 300 millirem per week with exceptions. The quarterly limit is 3 rem per quarter whole body penetrating radiation, 18.75 rem per quarter for extremities and 7.5 rem per quarter for skin dose. The procedure specifies that an updated NRC Form 4 must be provided and accumulated lifetime whole body dose will not exceed the 5 (N-18) quantity. It further specifies that personnel without an updated NRC Form 4 shall not exceed 1.25 rem whole body per calendar quarter. The exceptions as stated in paragraph 3.3.1 allow the Chem/Rad supervisor to authorize exposures up to 600 millirem per week, and for the plant manager to authorize exposures greater than 600 millirem per week up to 2 rem per week. Section 3.3.7 further authorizes the plant manager to allow individuals to receive up to 2.5 rem in one week for special work assignments. A special exposure approval form, Authorization to Exceed Radiation Exposure Limits, is required to document exposure limit extension. Additional controls are specified for individuals under age 18 or females known or suspected to be pregnant. They are limited to radiation dose of 125 millirem per calendar quarter. Section 3.3.6 of the radiation protection manaul does consider emergency exposures. A specific limit is not defined. However, guidance is provided to state that emergency whole body dose of 25 Rem is acceptable during an accident or emergency once in a lifetime. For emergencies involving saving of human life, a dose of up to 100 Rem has been recognized as an accepted value. These emergency procedures have never been utilized by the licensee.

While not defined in the licensee's procedures, a system is utilized whereby the margin between authorized exposure lmits and the individual's estimated dose is used as a dose control mechanism. A daily computer printout is provided which lists the individual by name and his estimated dose, (TLD and pocket dosimeters), and the margin between his authorized quarterly exposure and his dose received to date. When the margin is reduced to 1500 millirem, the individual's TLD is read to determine the official dose. Thereafter, at increments of 200 millrem estimated dose, TLD's are removed and read to assure he does not exceed the authorized limit.

c. Self-reading pocket dosimeters are used by the licensee to estimate daily external exposure. Each individual issued a TLD which is required for entering the radiation controlled area, is also issued a radiation exposure record card. These cards are maintained on file at the entry to the radiation controlled area. For entry into the radiation controlled area, the individual must report to the health physics person at the entry to receive a pocket dosimeter. The pocket dosimeter zero is verified by the HP person, the dosimeter is issued to the individual,

and the fact of issuance entered on the radiation exposure record with date and area that he is to work. The card is then transferred to an "in" file which indicates that those people have been issued dosimeters and are somewhere in the RCA. Upon exit from the radiation controlled area, the penciled dosimeter is returned to the HP person at the exit. The self-reading dosimeter is read by HP and the radiation exposure recorded on the exposure record card, and the card transferred back to the "out" file. The radiation exposure received is also transcribed onto a record log which is, at least daily, entered into the dosimetry computer program.

d. Individual dosimetry information is maintained by the licensee on a computer system. All personnel, plant personnel and contractor or visitor personnel, are entered on the computer program when they are issued a permanent TLD dosimeter. The computer program also contains their lifetime radiation exposure dose from the NRC Form 4, and the authorized limit. Computer data is updated at least daily (and during outages frequently each shift) by inclusion of self-reading dosimeter estimates. Once each day a printout program is run listing all personnel and the exposures received to-date. This printout also includes the margin between the individuals estimated exposure and the limit to which he had been authorized. This program is posted at the entrance to the RCA. A weekly program is run which lists daily exposures for every day of the week and accumulated TLD and estimated pencil dosimeter doses to-date. Monthly, upon receipt of the vendor's TLD report, a transfer of exposure information from the contractor's TLD evaluations to the computer update program is made. Section 2.1.2 of RP 201 states that "In all cases the vendor TLD report shall remain in the primary exposure record." Conversations with licensee representatives indicated that the primary exposure record as used at the plant is the plant computer printout. A program, started in May 1980, for comparison of TLD results and pocket dosimeter readings for comparable periods is being designed into the computer program. A procedure is being written but has not yet been issued. At the present time, a manual calculation is made to compare self-reading dosimeters and TLD results, and if the variance is greater than 30%, the high reading is accepted as the true dose. This is an automatic review and is not an investigation of the reason for the variance between the devices or validation of either. In those instances where the pencil dosimeters are greater than 30% above comparable TLD readings, a letter of request is issued to the TLD contractor to alter his dose reports to read what the pocket dosimeters indicate. When the contractor's report is received, this information is entered into the plant computer program and filed as the primary exposure record. No basis for altering the official dose record is documented. The inspectors recommended that an investigation and documentation be made each time a variance between pocket dosimeters and TLD of greater than 30% was observed (Inspector Follow-up Item 50-302/80-25-10). The inspectors also recommended that any altering of the official dose record be fully documented (Inspector Follow-up Item 50-302/80-25-11).

e. The computer dosimetry record program, while routinely posted at the entrance to the RCA, was noted by the inspectors to be rarely used by the workers. A review of the printout indicated that all information needed by workers to determine their exposure status was indeed there. It was confusing, difficult to read, and consequently, seldom used. Discussions with licensee representatives indicated that in the past, instructions had been given on the meaning of the various categories listed on the computer printout but that they also recognized that numerous requests had been made for clarification of the meaning of the data on that program. Based on observations by the inspectors of worker utilization of similar forms at other facilities, the inspectors recommended that a more simplified form be developed by the licensee (Inspector Follow-up Item 50-302/80-25-12).

f. The licensee utilizes a contractor supplied TLD dosimetry service. The contractor reads all of the TLDs. During outages, a contractor representative is onsite and reads the TLDs as requested. During normal operation, TLDs are sent to a facility outside of the plant. The contractors onsite TLD reading program was reviewed by the inspectors. A daily calibration and light source response check of the TLD leader is accomplished and documented. The standard system is for each even numbered (100, 200, 300, etc.) TLD be utilized as a control. The plant places these controls at the main guard station where the TLDs are stored when not being worn. During routine reading of the TLD by the contractor, data from the controls are read and utilized as they come up in sequence from the reading series. If no control is available, a calculated background is used. A background of 1 millirem per week if the TLDs are read at the site, and two millirem per week if they are read at the contractor's facility offsite. The contractor's documented readout data indicates which is used, either a calculated number or a number derived from the controls. For the number of TLD badges used at this facility, there may be up to 30 controls used per month. The contractor's TLD dosimetry readout system appears to be appropriate and responsive to plant needs. A system for quality control checks of contractors dosimetry evaluation is defined in RP-216, Health Physics-Vendor Services Spike Program. The procedure calls for both TLD and bioassay samples to be "spiked" on a routine basis. Records were in place to indicate the system was implemented and functioning.

g. Procedure RP 201, Personnel Exposure Documentation, provides the administrative requirements for occupational exposure records. Deficiencies were noted in the quality and maintenance of dose exposure records for individuals. As noted above, changes are frequently made in the occupational exposure records without documentation of the basis or authority for the change. Retrieval of information to trace an individual's exposure history including changes, deletions, additions, or assigned values is difficult, if not impossible, with present system. As suggested by ANSI N13.6, "Practice for Occupational Radiation Exposure Records Systems", a central historical record file should be maintained for each occupational worker. The inspectors recommended that the licensee develop a historical records system following the guidelines of ANSI N13.6

(Inspector Follow-up Item 50-302/80-25-14). In a random review of the exposure record history file, discrepancies were noted in observing incomplete NRC Form 4's, incomplete records of TLD issuance forms, and numerous instances of incomplete records on termination of personnel. The inspectors found files of two individuals which did not contain complete NRC Form 4s, yet control records at the facility indicated the individuals in question were allowed to be exposed up to 3 rem in the present quarter. One of these individuals had actually received 1274 millirem exposure as measured by pocket dosimeter and TLD. The inspectors informed licensee's representatives that failure to have a complete NRC Form 4 before allowing an individual to be exposed to more than 1250 millirem whole body radiation was contrary to the requirements of 10 CFR 20.102.b., and an item of noncompliance (Infraction 50-302/80-25-13).

h. The inspectors reviewed the pocket dosimetry program. The regular issue pocket dosimeters have a range of 0-200 millirem. Also available are pocket dosimeters with a range of 0-1 rem, 0-5 rem, and 0-100 rem, which are provided to personnel when deemed necessary. The range covered by the dosimeter is suitable for the radiation exposure levels encountered during routine and non-routine operations. There appeared to be a sufficient numbe of pocket dosimeters for use during normal operations. However, the inspectors noted shortages several times of pocket dosimeters for work crews. This lack of pocket dosimeters resulted in half-hour or longer delays for workers waiting to enter the RCA. The inspectors recommended that the current supply of pocket dosimeters be evaluated by the licensee and the inventory adjusted accordingly (Inspector Follow-up Item 50-302/80-25-16).

i. Pocket dosimeters are read, re-zeroed, and calibrated onsite. According to Procedure RP-213, "Pocket Dosimeter Functional Check", "the various dosimeters will be calibration checked on a rotational basis at six month intervals or at such times as there is reasonable doubt as to the authenticity of the dosimeter's performance". One of the HP shift supervisors spoken to was unclear as to the actual pocket dosimeter calibration interval. At one time during the appraisal period a batch of out-of-date (greater than 6 months since last calibration) dosimeters were taken from the storage area and distributed to workers entering the RCA. Several out-of-date pocket dosimeters were also found in the distribution bin of dosimeters at other times during the visit. When inspecting for calibration stickers or the high range dosimeters (0-1R, 0-5 R, 0-100R) the inspector found that all the high range dosimeters in the emergency kits, and a majority of the high range dosimeters in the HP office lacked any calibration sticker at all. When the inspector tried to find the listings for the unlabelled high range dosimeters in the dosimeter calibration card file, only one out of 10 high range dosimeters checked was found. The calibration cards appeared to be missing for the rest of the dosimeters. This indicates that the pocket dosimeters file should be updated, checked for completeness and used to ensure that all pocket dosimeters are calibrated on a

6 month interval as required in the plant procedures. (Inspector Follow-up Area 50-302/80-25-16). The records reviewed on June 25, 1980, also indicated that pocket dosimeter numbered 007 and 581 were last calibrated on February 8, 1980. The actual dosimeters were in use somewhere in the RCA. The inspector informed licensee's representatives that failure to calibrate pocket dosimeters within the time requirements of plant procedure RP-213 was contrary to the requirements of Technical Specification 6.11 and an item of noncompliance (Infraction 50-302/80-25-17).

j. RP 101, Radiation Protection Manual, in Section 5.3.1 and in Section 5.4 states that "Dosimeter should be worn in close proximity of the TLD badge, and personnel dosimeters should be worn on the front of the clothing in a visible position." During the appraisal period numerous instances were noted on self reading dosimeters and TLDs being worn widely separated, i.e., belt-shirt pocket, back pocket-shirt pocket, and either or both being worn elsewhere than on the front portion of the body, i.e., side, belt, back pocket, shirt sleeve, etc. For more representative measurements of typical body dose, comparability of dosimeter readings and compliance to procedure, proper wearing of personnel dosimeters should be enforced. The inspected noted that the anomaly was particularly apparent by HP personnel who should be providing the example for plant personnel guidance (Inspector Follow-up Item 50-302/80-25-15).

k. In summary, the inspectors found the licensee's external exposure control program to be acceptable but recommended the following modifications: (1) documentation of pocket dosimeter and TLD variances greater than 30% (paragraph 6.d.); (2) documentation of changes made to the official dose record (paragraph 6.d.); (3) a simplified presentation of an individual's exposure data (paragraph 6.e.); (4) completion of NRC Form 4's (paragraph 6.g.).

7. Exposure Controls - Internal Exposure Controls

a. The licensee's Respiratory Protection Program was reviewed for training, content and adequacy, medical examination, respiratory fit program, cleaning and decontamination methods, inspection and testing, repair packaging and storage, actual field use and inventory.

b. The respirator protection training consisted of a 24 minute video tape from a commercial vendor. The tape was presented by the CR-3 Training Department with no discussion or demonstration of respirator use being given by the instructor. The instructor was not a member of the Chem/Rad staff, nor had he had health physics respirator training. The video tape covered primarily proper respirator wearing, correct removal procedure, discussions on respiratory control and engineering control and an emphasis that if you have a problem, remove the respirator and immediately leave the area. The training did not discuss: (1) the application of various cartridges and canisters available for air-purifying respirators; (2) field training to recognize and cope with emergency situations; and (3) familiarization with plant respiratory protection devices. The training

material did not include all of the elements considered necessary in NUREG-0041, section 8.3 or defined in RP-102, Section 4.0, "Respiratory Equipment Manual". The inspectors informed licensee's representatives that failure to follow procedure RP-102 by not having a member of the Chem/Rad staff perform the training and not including all the elements called for in the procedure were items of non-compliance with Technical Specification 6.11 (Infraction 50-302/80-25-18). The respiratory protection training program does not require a written examination or any signature or indication to document that a student has completed respiratory protection training. The inspectors recommended that a records system be developed to demonstrate and document the fact that an individual has successfully completed respiratory protection training (Inspector Follow-up Item 50-302/80-25-19).

c. The medical examination to determine fitness for the purpose of wearing respiratory protective devices is conducted by a first aid technician. Procedure RP-102, Respiratory Equipment Manual, Section 3.4, requires that workers be evaluated to assure that they are physically and mentally able to wear respirators. The procedure does not specify a frequency for medical examinations. The inspectors informed licensee's representatives that 10 CFR 20.103 and Regulatory Guide 8.15, section 4.h, requires that the medical status of each respirator user is to be reviewed at least annually and recommend that this provision be incorporated in RP-102 (Inspector Follow-up Item 50-302/80-25-20). Discussons with licensee personnel indicate that an annual medical examination is informally required. However, this was not found to be the practice as discussed in paragraph 7.e. The examination consists of completing a one page medical history, blood pressure and pulse rate measurement and a lung capacity test. The lung function test uses a spirometer. The acceptance criteria for lung function is within 35% of the norm for age and weight. The inspectors noted that the acceptance criteria for lung capacity appeared high and recommended that the licensee have medical authorities review the medical aspects of their program (Inspector Follow-up Item 50-302/80-21).

The spirometer is calibrated annually in house using commercial calibrating equipment. The output of the spirometer is a printed tape which is attached to the medical history form and maintained in file as a record of lung function. A random selection of personnel approved for wearing respiratory protection was selected and medical records verified as being in place for each of them. Medical records were also verified as being in place (on those reviewed) for each year they had been at the plant site. However, no documented criteria are established for acceptance for authorization to wear respiratory protection and the medical report is not signed by the medical technician. No documentation was available to show that the medical technican or the other three technicians who also give the medical examinations were authorized or qualified to do so. The inspectors suggested that the medical review stated above should also include these elements.

d. The Respiratory Fit Program uses a qualitative irritant smoke test to determine respirator fit. During the time of the appraisal numerous instances were noted, including fitting of inspectors, where contract health physics technicians administered the irritant smoke mask fit test. The technicians were not supervised nor were they trained at the facility to perform respirator fits, nor were they supervised by a trained individual. Other than general instructions in putting on the mask and testing with a negative pressure to see if you had a fit, no other instructions were given by these personnel during this period. Section 5 of RP 102 which discusses the fitting program at the facility states that "testing will be carefully supervised and/or performed only by responsible and thoroughly trained individuals". The inspectors informed licensee's representatives that failure to follow procedure RP-102 by not having trained and supervised individuals performing the respirator fitting was an item of noncompliance contrary to Technical Specification 6.11 (Infraction 50-302/80-25-18). The inspectors also suggested that a quantitative respirator fit test with a physical record of the actual fit test provided a greater degree of assurance that an adequate fit had been obtained. Licensee representatives stated they would consider the use of a quantitative fit test (Inspector Follow-up Item 50-302/80-25-22). Procedure RP-102 does not specify the frequency necessary for refit. Discussions with licensee personnel indicated that an annual refit test was informally required. The inspectors recommended an annual refit provision be incorporated in the procedure (Inspector Follow-up Item 50-302/80-25-23).

On completion of respirator training, medical examination and respirator fit, an individual is authorized to wear respiratory protection. This authorization is indicated by filling out a Rolodex card. The card contains the name of the individual, a tested date (which actually means the date the individual completed his training), a fitted date and a medical examination date. The card also contains a series of initials for the various types of respiratory protection devices and a circle around the one he is qualified to wear. The Rolodex file is maintained at the entrance to the radiation control area (RCA) and is used as a reference file when respiratory protective devices are issued. Discussions with licensee personnel and a review of respiratory program records indicate that no documentation is required to verify that training has been given, no authorizing signature is required on the medical examination form, no signature is required on the mask fitting and apparently no review is made by supervision. The Rolodex file was reviewed for completion of the Rolodex authorization card. Numerous instances were noted where some section of the documentation card had not been completed and yet a circle indicating approved respiratory usage was on the card. Instances were noted where no fit date had been entered, other instances where no testing date had been filled and in some instances where neither had been entered, and yet individuals were approved to wear respiratory protection.

Plant personnel reviewed the respiratory protection authorization cards and removal 119 cards which were incomplete or various requirements overdue. Four days after the plant review, the inspectors again

reviewed the file and identified an additional 16 individuals whose medical examination, retraining and fit date were up to 2 years past the due date. The inspectors informed licensee's representatives that failure to maintain records indicating training and fit historical data was contrary to section 5.1.4 of procedure RP-102, was another example of failure to follow procedures as required by Technical Specification 6.11 and was an item of noncompliance (Infraction 50-302/80-25-18). In addition, failure to ascertain the medical status of respirator users within one year was contrary to the requirements of 10 CFR 20.103.c and Regulatory Guide 8.15, section 4.h., which requires the medical status to be reviewed annually and was an item of noncompliance (Infraction 50-302/80-25-24). Respirators are issued by the Chem/Rad Department at the entrance to the RCA. Issuance of an RWP for a job determines the respiratory protection requirements for that particular job. Based upon those requirements, personnel request respirators from the Chem/Rad personnel. A Chem/Rad technician verifies approval to wear a respirator by reviewing the Rolodex card file. The name of the individual, the date and the time are recorded on a respiratory issue record form when a respirator is requested.

f. The respirator cleaning, drying and decontamination station is located in the service area. Personnel leaving a respirator use area are instructed to survey respirators and to place them in receptacles provided. The respirators are then delivered to the service area where they are placed in a dishwasher type cleaning machine. The respirators are washed using commercial cleanser as the detergent material. The respirators are then hung on a wall rack for air drying. The cleaned respirators are delivered to another area where they are surveyed by Chem/Rad personnel, inspected, tagged and bagged. When questioned by the inspectors, Chem/Rad personnel performing the cleaning stated that no disinfectant was used at this time. Disinfectants had been used in the past, but discontinued months ago. The inspectors informed licensee's representatives that failure to disinfect respirators was contrary to the requirements of procedure RP-102, section 8.3, which requires the use of disinfectants and was another example of noncompliance with Technical Specification 6.11 (Infraction 50-302/80-25-18).

g. Section 8.5.2 of RP-103, "Decontamination of Personnel, Areas and Equipment" states "Areas and equipment are considered contaminated when there is loose, removable contamination in excess of 30 dpm/100cm^2 alpha and/or 300 dpm/100cm^2 beta-gamma activity, or where there are fixed contamination levels greater than 0.25 mrem/hr at one inch distance." Several bagged respirators were removed at random from the issuing supply. Smearable contamination on the outside surface of the respirators in excess of the limits specified in section 3.1.2 of RP-103 were detected on each of them. Water was found in several of the respirators after removal from the bags. The inspector informed licensee representatives that failure to maintain contamination levels on respirators less than the limits specified in RP-103 was another example of failure to follow procedures required by Technical Specification 6.11 and was noncompliance (Infraction 50-302/80-25-18).

h. Section 8.1.5 and Section 8.2.1.2 of RP-102 specify that inspections and repair of respirators will be carefully supervised and performed only by responsible and thoroughly trained individuals. Discussions were held with two contract HP technicians and one plant Chem/Rad technician actually performing inspections and repairs to determine the level of training they had received for respiratory protective device inspection and repair. Each individual indicated they had received no special training and have relied upon either reading the manual or experience. One individual indicated that he had received training several years ago on a different kind of respirator at a different facility. The inspectors informed licensee representatives that failure to have thoroughly trained individuals performing respirator inspections and repairs was contrary to the requirements of Technical Specification 6.11 and another example of noncompliance (Infraction 50-302/80-25-18).

i. Enclosure 4 of RP-102 is a form identified as Respiratory Protective Equipment Maintenance sheet. No instruction could be found in the procedure to use the sheet or in practice that the sheet was used for identifying repair of respirators. The inspectors recommended that instructions on how to use Enclosure 4 to RP-102 be included in the procedure and that the form be used (Inspector Follow-up Item 50-302/80-25-25).

j. The inventory and supply of respiratory devices was reviewed for adequacy. No specific inventory is taken to determine the quantity of respiratory protective devices in normal use. Discussions with the health physics supervisor indicated that the inventory method is informal, and supply is maintained based upon usage. The licensee's stores department has an automatic order at a level of 35 Scott respirators or less. These discussions indicated that a rotating supply of approximately 300 respirators is in stock. Some limited supply of other types (other than Scott full face) respirators are maintained at the plant for personnel who cannot be fit with the standard Scott respirator. A supply of repair parts for Scott full face respirators and Scott self-contained breathing apparatus is maintained in the service area. The supply of both respirators and self-contained breathing apparatus appears to be adequate.

k. Both NUREG-0041 and RP-102 specify that breathing air shall meet the minimum standard of grade D. Breathing air at this facility is provided by oil-less air compressors used for plant instrument air supply. A program is in place to provide quality testing of supplied air for personnel breathing. Testing of certification of the air was reviewed as adequate for March of 1980. The plant provides its own service in refilling SCBA air bottles. Documentation was reviewed and indicated that an air bottle has been sent to a certification facility and qualified as better than grade D air. The inspector had no further questions in this area.

l. The breathing air supply is fed to a system of Bullard filters. These filters are fitted with appropriate breathing air connectors and air lines. Licensee personnel indicated that the filters are changed prior to outages but no documentation is established. No identification of filter change or periodic review for replacement of filters in use is in place. The inspectors recommended that a record system be established which documents the replacement of filters (Inspector Follow-up Item 50-302/80-25-26).

m. Scott self-contained breathing apparatus is used as emergency respiratory protective devices and for entries into areas of extremely high radioactive air concentrations. Inspection records were reviewed for these devices and appeared adequate except as noted below. Inspection reports were available for January, February, and May of 1980. The records for March and April could not be found. The overall problem of records retention/management is discussed in paragraph 8 of this report. The training of personnel who had made these inspections was discussed in paragraph 7.h.

n. In vivo analysis is performed in the plant using a mobile whole-body counter. The counting system is composed of the chair counter with detectors, high voltage sources, multichannel analyzer, and a computer with memory system and impact printer for the data analysis and reporting. The system utilizes 3 detectors, 1 for the lower torso, 1 for the lung, and 1 for the thyroid. Procedure RP-214, Whole Body Chair Calibration, defines the calibration program. The system was fully calibrated in 1975 after installation. No complete calibration has been performed since. Records of that calibration or certification of the sources used for the original calibration and semi-annual detector drift checks could not be found. (See paragraph 8 for problems in records management.) A daily energy check and alignment program using a certified sodium-22 source are performed and documented. The semi-annual check of detector drift is performed using source solutions in a phantom. Documentation was available except for source certification.

The inspectors recommended that the WBC system calibration be performed using standardized solutions in common abundance in an operating reactor and traceable to the Bureau of Standards, as recommended by Section 8.2, ANSI N343-1978 (Inspector Follow-up Item 50-302/80-25-27).

o. The Whole Body Counting (WBC) program is capable of detecting .01% MPBB. The chair is energy checked daily, and the MPBB's detected (as part of background) are listed on the WBC printouts. The program prints out the μCi seen. The WBC chair has adequate energy discrimination capability. To insure that peaks are assigned to proper energies, an energy check and alignment program is run daily. WBC records are printed on hard copy which are reviewed by the HP supervisor, and then entered into the persons exposure file. The inspector noted that WBC records were entered into the files immediately or not more than a day or two after the WBC was performed.

The inspector noticed no regular comparison of survey and internal exposure data. However, when a WBC indicates internal exposure greater than 5% MPBB, the WBC data is shown to the HP supervisor and a followup study is performed. The inspector noticed several WBC records indicating internal contamination. In most cases, the person was requested to shower and be recounted wearing a paper suit. In most cases studied, the inspector noted that the contamination was external and the recount showed normal levels of radioactivity. In a few cases, however, the recount still indicated elevated WBC levels.

The following two cases of possible internal contamination were found by the inspector when going through the exposure files of 39 contractor health physics technicians hired during the outage. One rent-a-tech technician received possible internal contamination on April 1, 1980 after undressing steam generator jumpers without a respirator. His intial WBC showed a 0.63% MPBB of Co-58, 0.13% MPBB fo Co-60, and lesser amounts of Fe-59 and Cs-137 in his lower torso, Co-58 and Co-60 peaks in his lungs, and Co-58, Co-60, Cs-134, and I-131 peaks in his thyroid count. After showering he was recounted and still showed a majority of the isotopes present. A followup count a day later still indicated the presence of the same nuclides. Finally, an exit WBC given over seven weeks later still showed traces of cobalt and iron.

The second technician received possible internal contamination on June 8, 1980. His WBC on that date shows a 0.47% MPBB of Co-58, Co-60, Cs-137, and Fe-59 to the lower torso. The lungs showed peaks for Co-58, Co-60, Cs-134, and Cs-137. His thyroid shows a Co-58 peak. After showering, some of the peaks were gone, notably Co-58 and Cs-134. However, a third WBC taken a day later still showed peaks.

Both of these cases were Health Physics rental technicians who should have taken better precautions to have prevented these internal uptakes. The inspector found no further documentation in either of these files to indicate any sort of followup actions or investigations. However, in neither case was the 5% MPBB limit for followup study exceeded.

q. The inspector reviewed the exposure files of all currently employed health physics technicians. The files of those having two or more WBC while at Crystal River Unit 3 were pulled for further study. Out of 12 technicians with more than one WBC on file, 10 of them showed increased counts over their initial baseline WBC taken at CR3. This indicates that there is a possible internal contamination problem at CR3. However, the peaks recorded were small, and the WBC system is more sensitive than other units commonly employed. The inspectors recommend that a review of the Crystal River WBC data with other programs be completed to ascertain if a problem exists (Inspector Followup Item 50-302/80-25-28).

WBC records are not reviewed by the HP supervisor unless they show internal contamination of 5% MPBB. It is solely up to the person performing the WBC as to whether he makes a person showing possible internal

contamination shower and return for followup WBC's. To avoid false internal contamination readings due to external contamination on the clothes or body, all persons receiving WBC's and showing positive results greater than a certain amount should be made to shower and change into throw-away paper clothing prior to receiving their WBC's. The limits should be established by procedure (Inspector Follow-up Item 50-302/80-25-29). This will give a more accurate reading of the person's internal contamination and will not result in WBC records in the persons files which indicate possible contamination peaks but which may be due to external contamination.

r. In addition to checking the Allied Nuclear personnel files for increases in internal contamination, the inspector checked the files for the completeness of the WBC records. Out of 39 HP files checked, 5 files had no WBC records on file. The starting dates for these five HP rent-a-techs ranged from February 29, 1980 to June 19, 1980. One of the five was a senior technician. Procedure RP-208 "Bioassay Sampling Procedure" requires that only employees permanently assigned to CR-3 receive baseline whole body counts followed by routine annual counts. There is no stipulation that rent-a-techs or other temporary personnel receive WBCs at any time during their employment except if required by specific maintenance items. The inspector recommended that a WBC should be part of the initial physical and should be given to all employees at the start of their employment, even for temporary employees. This will ensure that all workers have baseline whole body counts to compare with in the event that they are internally contaminated. In addition, the CR3 facility has no requirements for exit WBCs. This too should be added as part of the procedures for terminating employees.

Of the 39 Allied Nuclear personnel files checked, in addition to the five persons without any WBCs, the inspector found one technician who only had an exit WBC. On June 25, 1980, the inspector obtained the files for 12 building services personnel. These personnel had been hired as 1000-hr temporary personnel during the outage to do such jobs as solid waste compaction. Their jobs involved working in areas where respiratory protection was usually required. Of the 12 files reviewed, 6 had not received whole body counts. All 6 were hired in March of 1980. The inspector personally interviewed one of these persons who had not received a whole body count. This job was the employee's first job in a radiation area. He had worked compacting waste for two weeks wearing a respirator and had done some work in the reactor building wearing a bubble suit.

The inspectors informed licensee's representatives that failure to perform baseline bioassays for individuals requiring and wearing respiratory equipment is contrary to the requirements of 10 CFR 20.103.c and Regulatory Guide 8.15, section 4.f, which requires "bioassays...to evaluate individual exposures and to assess protection actually provided" and was an item of noncompliance (Infraction 50-302/80-25-24).

s. In summary, the inspectors found the respiratory protection program, as practiced, is not adequate. Correction of deficiencies identified in the above paragraphs are necessary to upgrade the program to an acceptable level of personnel protection.

8. Radiation Protection Records Systems

a. The radiation protection records system as found at the Crystal River facility was inadequate as explained below. The records requirement for documentation of the radiation protection program is included in each specific procedure. However, there is no single document that outlines the records retention or maintenance program. This system was reviewed for retrievability of records, completeness of records, protection of records, and the training of personnel whose function is to maintain records.

b. During the course of the appraisal, numerous instances were found where retrievability of records was not possible. Licensee personnel were requested to provide various records and were unable to do so. For example, the initial calibration data of the whole body counter was not retrievable from record storage. Various radiation surveys, requested to support radiation work procedure documents, could not be found in the survey records. Files of radiation protection records are scattered, some being maintained in the service area, some being maintained in the Health Physics Office, others being maintained in the dosimetry area while others were being maintained in the plant vault. Discusssions with plant personnel indicated extreme reluctance to send records to the plant vault record system for fear of permanent loss of those records.

c. During the course of the appraisal, numerous record files were reviewed to verify various portions of the program. Instances were found of incomplete records. The records of personnel authorized to wear respiratory protection devices was found to have numerous errors. Instances were found where the training date and the mask fit date were not entered and yet approval had been given to wear respiratory protection. The file was in use by plant personnel.

Dosimetry record files contained incomplete NRC Form 4's and TLD issuance data forms. In the file containing weekly work schedules for the years 1977 to 1980 numerous schedules were missing. Other instances were noticed, where surveys which had not been completed on one week were to be carried forward to the following week but were not. No indication was made as to whether the survey was completed. Instances were found where radiation work procedure forms indicated that surveys had been completed to support the requirements of the RWP. Check of files failed to disclose those particular records. In the Exposure History file for terminated employees, records were found mixed between two employees folders. This was corrected immediately. A Radiation Incident Report was found documenting a skin contamination incident, but no radiation levels were indicated.

d. The licensee has employed a temporary clerk to maintain records for the present outage. Discussions with the records clerk indicated that no specific training or instructions had been given for maintenance of their records system. Discussions with the HP technician responsible for maintaining the computer dosimetry records indicated that approximately two hours of instruction had been given for the total computer dosimetry program.

e. Records are filed in non-fireproof cabinets easily accessible to all personnel. It should be noted that protection of these important records is not adequate. At the beginning of the appraisal period no system was in place to require sign out of records being removed from files and no assurance that records removed were replaced.

f. In summary, the Crystal River radiation protection records system should be reviewed and upgraded to provide adequate maintenance and radiation protection records to meet the requirements of ANSI N13.6 and good industry practice. The inspectors recommended that the entire records system for radiation protection records be reviewed by legal and records experts to develop an acceptable records system (Inspector Follow-up Item 50-302/80-25-31).

9. Routine Surveillance Program

a. During the course of the apprasial period, the inspectors, toured, surveyed and observed radiological practices throughout the facility in order to gain a first hand appreciation of the effectiveness of the routine surveillance program. Tabulated below are accounts from some of these inspectors tours which are selectively entered here to illustrate the weaknesses of the licensee's surveillance program.

b. An inspector, while observing the health physics practices in use during the placement of the reactor vessel head on the vessel flange, questioned the contract senior health physics technician controlling the job concerning the requirements for entry into the refueling pool area. The technician was not aware of the requirements of Technical Specification 6.12, i.e.,: a dose rate indicating instrument must be used by individuals entering an area where the whole body dose rate is in excess of 100 mRem/hr. It is also permissible for a group of individuals to be accompanied by a single individual or health physics technician who has such an instrument. The question from the inspector was occasioned by the fact that the technician was about to allow a refueling engineer to go down to the vessel flange area while he and the Quality Assurance man was still in the process of dressing. The inspector stopped the engineer and asked the health physics technician if he was going to permit the man to enter the area, the technician told the engineer to wait for him.

The technician, Quality Assurance man, and refueling engineer entered the area together. The technician took a thorough survey of the area, and then came back up the ladder to the top of the refueling bridge crane, and brought the instrument with him. The inspector suggested, at that point, that the technician had violated the requirements of T.S. 6.12, and that he might want to either leave the instrument with the people near the flange or go back down and accompany them. The technician stated that he would return because he didn't trust the others to use the instrument properly. The inspector informed licensee representatives that failure of individuals to have a dose rate indicating instrument while in a high radiation area was contrary to the requirements of Technical Specification 6.12 and was an item of noncompliance (Infraction 50-302/80-25-32).

After the completion of the above evolution, the inspector questioned the technician with regards to the training he had received concerning plant procedures and health physics requirements. He stated that he had been given a copy of RP-101, entitled Radiation Protection Manual, was told to read it, and was put to work. He said he had not had time to read the procedure and also stated that he felt that his case was not unusual.

The inspector also asked the technician if it was his intent to comply with the requirements of 10CFR20.103 in that air samples must be taken, for example in the vicinity of the vessel flange, to determine exposure to concentrations of airborne radioactive material. The technician was familiar with this requirements, he said, and stated that he was intending to immediately re-enter the area after assisting the other two individuals in undressing and he would obtain the air sample.

The inspector questioned the shift health physics supervisor regarding practices and requirements for training of contract health physics personnel and he stated that the amount of training received by this individual was not unusual.

c. On June 17, 1980, an inspector entered the reactor containment to observe work in the reactor cavity. Upon emerging at the 164' elevation, the inspector noted that five workers were engaged in cleaning up miscellaneous waste and equipment which remained from the completed work on the vessel head. Four of the workers were inside an area bounded by rope and signs and were equipped with respiratory masks. The masks were worn over their protective clothing hoods and it was apparent to the inspector that the cloth material was interfering with the masks sealing surface in at least one case because when asked about the hood, the worker pulled it from beneath the seal. A fifth worker was receiving the waste material picked up by the other four, and was placing it in a 55 gallon drum, presumably for disposal. This individual was not wearing a respiratory protective device, though he was handling the same material as the other four on the other side of the rope barrier.

The inspector noted that this seemed to be indicative of a problem with the licensee's respiratory protective training program in that this practice had been observed before in a tent constructed in the hot machine shop. On that occasion, two workers were observed to be grinding on a metal surface while wearing their masks on the outside of the hood. RP-102, Respiratory Protection manual requires workers to wear masks and other protective devices in accordance with the training they receive. The training film specifies that hoods be worn externally when wearing a mask. Since the effectiveness of a respirator's fit to an individual's face is determined only by qualitative methods at the licensee's facility (i.e. smoke tube test) the importance of absolute adherence to the procedural requirements for wearing of respiratory protective devices cannot be overemphasized. The inspector informed licensee representatives that the general practice of wearing respirators over the top of anticontamination clothing was contrary to the training received and procedure, RP-102, "Respiratory Equipment Manual," Enclosure 5, footnote b and was an item of noncompliance (Infraction 50-302/80-25-18).

d. On June 18, 1980, a health physics shift supervisor was questioned by an inspector as to how frequently he entered the reactor containment for audit and inspection purposes. He stated that the last time he had been in the containment was about 10 days previously. He indicated that he felt his job was to direct, not oversee, activities and that he relied upon contract technicians to perform in a proper manner. It seemed to the inspector that this implied too few individuals were charged with the responsibility for supervision of contractors. When confronted with this observation, the health physics shift supervisor agreed that he was just too busy to do the kind of job he felt would be required to adequately supervise (in addition see section 4.d).

e. On June 18, 1980, inspectors noted, during a tour of the reactor containment, that during maintenance of the fuel transfer tube, two workers were observed to wear their respiratory protective masks on the outside of the protective clothing hood. This is contrary to the plant's instruction regarding the proper method of wearing of respiratory protective equipment as described in Procedure RP-102, Respiratory Protection Manual. See Paragraph 9.c for item of noncompliance.

When the Health Physics Technician controlling the job was questioned regarding the radiation exposure rates in the area involved with the work in progress, he had to go to check the levels previously noted by another technician, without knowing the dose rates to which the workers were exposed.

During the same job, the inspectors observed a worker to signal to a coworker outside the airborne controlled area that he needed to have lights turned on to be able to see to complete his work. When informed that the lights available would only function properly when submerged under water, he pulled the MSA mask from his face while in

an airborne controlled area and shouted to the coworker to have lights provided. This action effectively defeated the protective capability of the mask.

An inspector measured whole body dose rates in excess of 150 milliRem per hour 18 inches from a vacuum cleaner used in the maintenance of the reactor vessel head. Four workers were in the immediate vicinity of the vacuum, working on the head stator tubes. When questioned by the inspector about the radiological conditions pertinent to their job, they proved unaware of the hazard, the vacuum, located not more than ten feet from their work area. This vacuum measured 2.2 Rem per hour on contact. The area in which the vacuum and the mem were located was posted as a contamination controlled area only. In this same area, a motor tube housing, shielded with lead blankets but not marked in any way, was measured by an inspector to be 100 milliRem per hour at 18 inches. The workers were unaware of the hazard. The inspectors informed licensees representatives that failure to post a high radiation area was contrary to the requirements of 10 CFR 20.203(c) and an item of noncompliance (Infraction 50-302/80-25-33).

f. One June 19, 1980, an inspector conducted a tour of the auxiliary building and the reactor containment on the midnight shift. While in the hot machine shop. The inspector found a worker, not actively engaged in work activities, apparently resting while seated on a box in an area with a whole body dose rate of 2.5 mrem per hour. The inspector observed the individual for about three minutes.

During the tour of the reactor containment, the inspector observed several individuals working in the vicinity of the vessel head bolts. These individuals were wearing supplied air hoods while performing this task. The inspector subsequently inspected the previous twenty-four hours' air samples and could find no documentation of air samples which could be verified as having been taken in the workers' breathing zone. The inspector asked the health physics shift supervisor to explain the meaning of several location descriptions on the air sample result sheets, but he could not do so and said he would have to contact the technician who had taken the sample to determine the exact location where the sample had been taken. When asked, he also said he could not determine from the available documentation whether the samples had been taken while the work was in progress, though he stated that the requirement for respiratory protection was based on the high levels of loose surface contamination present in the work area, rather than a continuing airborne contamination problem. The inspector concluded that on the basis of available documentation, the requirements of 10 CFR 20.103.c could not be met in that calculations of individuals' exposure to concentrations of airborne radioactive material could not be determined and informed licensee's representatives that this was an item of noncompliance (Infraction 50-302/80-25-34).

g. On June 20, 1980, inspectors questioned two workers involved in the maintenance of a coolant sampling valve located in the reactor containment regarding their work efforts. The workers stated that the work involved grinding away a portion of the angle-iron support of the valve. The inspectors noted that due to the recent February flooding of the lower level of the containment where the valve was located, it was very likely that such maintenance activity would involve the potential for airborne activity. When questioned about the Radiation Work Permit covering the job he was performing, the worker could not provide information regarding air sampling requirements to the inspectors. The inspectors decided to return at a later time to examine the work in progress. Upon their return, about twenty minutes later, the inspectors found the two workers resting in a prone position on the floor on the lower level of the containment buliding near the valve upon which maintenance was to be performed. The radiation dose rate in this area was 2.5 millirem per hour.

The inspectors noticed three workers in the area of the top of the letdown heat exchanger room roof in the basement of the containment, moving along the piping toward a wooden ladder. When asked by the workers, the inspectors moved the ladder to provide access to the lower elevation in the containment building. The inspectors then climbed into the piping, up the ladder, after the workers had left the area. The inspectors discovered several pairs of unused protective clothing, apparently arranged into five resting areas. Additionally, popular reading material was found in the area. The dose rate in the area was measured to be 2.0 millirem per hour. The inspectors informed licensee representatives of this matter.

Records of the routine surveillance program for the facility were reviewed for completeness and adequacy. The program is defined in RP 202, Radiological Surveys procedure. An adequate review of the implementation of the program was hampered by difficulty in reviewing records as indicated in Section 8 of this report. Review of the surveillance records for January of 1980 indicated that the routine survey records for weekly and monthly surveys were completed, in file and unusual conditions noted and supervisory reviews indicated. The routine surveys generally appeared to be complete and adequate with the exception that, on the indicated survey records, only 21 air samples were taken for that month. This does not include the reactor building air sample analyses. For the quantity of work and number of locations within the auxiliary building, this does not appear to be an adequate number of air samples or appropriate air concentration analyses.

The inspectors recommended that the routine airborne radioactivity surveillance program be reviewed for adequacy (Inspector Followup Item 50-302/80-25-35). During the same period, two RWPs (RPW 80-16 and RWP 80-18) were noted for which no air samples or radiation survey records could be found. Both RWPs require respiratory protection to be worn. The respirator issue log was also reviewed to verify use of respirators. Pages for the period were missing. The previous month and following months records were in the log. The inspectors again noted, and passed on to licensees representatives, the inadequacy of the records management system. RWP 80-30 was issued during this period for the changing of A and B post filters. Respiratory devices were indicated as required on the RWP. The Health Physics log book indicated that during the performance of this job the RMA2 alarmed and the auxiliary building was evacuated. The log indicates that reentry was made on the basis of E120 instrument surveys. A review of the records indicated that the survey sheet for this work did not indicate air sample concentration measurements were made for the work or for reentry, only for immersion dose measurements. During the period June 1, 1980 through June 21, 1980, 263 air samples were logged. For the period January 1, 1980 to June 21, 1980 only a total of 506 surveillance documents were logged.

i. The review of the routine surveillance program indicated an acceptable frequency and adequacy were included in the procedures with exception of air sampling. The inspectors made the following recommendations to strengthen the program: (Inspector Followup Item 50-302/80-25-36)

1. Implement a daily (shiftwise during outages) survey of the Health Physics lunch room area in the Control Complex.

2. Periodic surveys should be included of areas outside the protected area. Surveys of preselected quadrants would establish background data and preclude undetected surprises.

3. Include periodic survey of tool room and lunch rooms in adjacent fossil fuel plants.

4. Revise RP 202 Section 2.1.1.2 to include more definitive guidelines on air sampling locations and frequencies for the routine surveillance program.

j. During their various tours of the facility, the inspectors noted several instances where radiation areas were not posted as required by 10 CFR 20.203.b. Specifically:

1. On June 23, 1980 an open LSA box outside the compactor room which read approximately 30 milliRem per hour at 18 inches was not posted as a radiation area.

2. On June 25, 1980, a general area of 25 milliRem per hour was measured outside the compactor room and the room was unmarked. The sign was found under debris.

3. One June 25, 1980, the safeguards area pipe gallery at the 95 foot elevation was unposted and measured 15 milliRem per hour.

The inspectors informed the licensee representative that the above observations were items of noncompliance (Infraction 50-302/80-25-37).

k. On June 25, 1980 at approximately 1:30 p.m., three individuals in the lower level of the reactor containment building were noted laying on the floor. Two were semi secluded behind stored scaffolding and the third in an open area nearby. All were dressed in PC's. No work was in progress anywhere in the area. It would seam appropriate for non-working personnel to leave the radiation areas for exposure conservation. In addition see paragraph g. of this section.

l. No central change room facilities are provided for radiation work in the auxiliary building. Personnel collect the required protective clothing at the cooridor supply shelves, proceed to the work area step off pad and don the PC's for the work. Personnel clothing is left at the step off pad. Upon exit from the work site, PC's are removed and placed in containers provided, personal clothing is put on and personnel then proceed to the RCA exit where the frisker is located. Procedures should be implemented to require a contamination survey of all personnel after work in a contaminated area and before donning personal clothing. Provisions of change room facilities for storing of personal clothes, dressing in PC's and including survey instrumentation would assist in assuring personnel contamination surveys.

m. The inspectors found the routine surveillance program at the Crystal River Unit 3 facility to be inadequate and recommended changes, outlined above, to achieve an acceptable program.

10. Instrumentation

a. RP 206, Radiation Protection Instrumentation Calibration Procedures, details the calibration program for the facility. The facility uses a calibrator with a 46 Curie Cesium-137 source. Instrument calibration is normally performed on sit If the procedure criteria cannot be met during calibration, the instrument is sent to an outside vendor for repair and calibration. The calibration procedure establishes a 3 month frequency.

b. Records are maintained in the instrument history file and a calibration sticker is placed on each unit after calibration is completed. A random check of records to verify calibration and frequency showed that instrument history files were in place for 1978, 1979 and 1980 and calibration frequency and repair data were documented. Daily laboratory counter background and source checks were also documented. Calibration practices and procedures do not meet the requirements of the industry standard, ANSI N323-1978, Radiation Protection Instrumentation Test and Calibration. Section 3 of the standard requires certain test to be performed routinely because of aging of the components.

These tests, such as range, sensitivity, linearity, detection limit, response to overload conditions, accuracy and reproducability, and energy dependence are not indicated as being performed by the facility. The requirements in the standard, Section 4.2.1, to check reproducability by exposing the instrument to a radiation field 3 or more times under identical conditions is not performed in the facility. In addition, a periodic performance test, Section 4.6 of ANSI N323-1978, to assure proper operation between calibrations is not performed by the facility. A response check is normally used but no identified reference source or response to a source is performed. The inspectors recommended to licensee's representatives that the content of ANSI N323-1978, be reviewed and incorporated into plant procedures (Inspector Followup Item 50-302/80-25-38)

c. GM and neutron type instruments were found to be only calibrated electronically using a signal generator. A radiation response is not used. The inspectors recommended that the instruments be calibrated using an actual NBS traceable radiation source (Inspector Followup Item 50-302/80-25-39)

d. The licensee does not use personnel dosimeters to monitor neutron exposure. Neutron exposures are estimated by using dose rate measurements and times of exposure. That product is entered on the individuals exposure record. The neutron exposure estimates are questionable since the neutron survey instrument detector is not calibrated with a neutron source. The only calibration performed is an electronic calibration which does not check the entire instrument (detector is not checked). The inspector stated that the entire instrument must be calibrated, using a known source if the instrument is to be used to determine neutron dose rates that are the basis for determining that dose limits are not exceeded. 10 CFR 20.201(b) states that each licensee shall make or cause to be made such surveys as may be necessary for him to comply with the regulations in this part. 10 CFR 20.101 requires, in part, that occupational radiation dose limits not be exceeded. The inspector states that failure to perform neutron radiation surveys used for the purpose of determining the neutron radiation dose received by individuals, with instruments that have been calibrated with a raidation source traceable to a national standard was in noncompliance with 10 CFR 20.201(b). (Infraction 50-302/80-25-34)

e. A supply of 108 instruments of all types is listed on the inventory and located chart posted in the service area. A licensee representative indicated that location information may be inaccurate. The number of dose rate instruments, coupled with the damage rate and the stated plant requirements to carry a dose rate instrument when entering a high radiation area, appeared to be inadeuqate to assure availability of instruments to HP personnel. The inspectors recommended to plant personnel that the present inventory of plant instruments be evaluated

and the inventory adjusted as the need is determined (Inspector Follow-Item 50-302/80-25-40). It was noted that of 6 Teletectors available to the plant, 4 were out of service for repair, one could not be found and only one was available for use.

The portal monitors at the main gate and the exit to the RCA were checked to verify response to a Cesium 137 source of 0.5 microcuries. None of the seven detectors on each portal monitor responded to the source when the source was placed directly at the window of the detector. It should be noted that the portal monitor count time appeared to be very short (on a order of a few seconds) and that the safe light indicating acceptable radiation levels to leave the area appeared to be predicated more on foot pressure on the portal monitor than on radiation levels. The inspectors observed individuals being randomly frisked by a health physics technician in lieu of portal monitors. The inspectors recommended that the possibility of obtaining a more sensitive portal monitor should be explored (Inspector Followup Item 50-302/80-25-41).

g. Four friskers at established frisking and exit points were checked for radiation response and for alarm levels. Each of the friskers appeared to respond appropriately to the 2000 counts per minute source used. However, each of the friskers alarmed at 450 counts per minute or full scale. Frisker alarm settings are not specified in plant procedures. Licensee personnel indicated that the frisker alarm trips should be approximately 60 to 80 counts above background. With the background of 150 to 200 counts per minute in the areas of these frisker locations, alarm setting of 450 to 500 counts per minute appeared to be inappropriate to assure personnel contamination levels within the release limits specified in the program. The inspectors recommended that a specific limit be written into the plant procedures, and the feasibility of constructing frisking stations be considered (Inspector Followup Item 50-302/80-25-42)

h. Calibration of instruments by plant personnel was observed on June 26, 1980. The calibration procedure was available and used. When questioned by the inspector, plant personnel indicated that they had received no specific training for instrument calibration except to read the procedures. Plant personnel were requested to verify the calibration of an instrument supplied by the inspector. A significant amount of time was spent searching for appropriate calibration jigs. Personnel commented that inadequate storage space and rotation of calibration activities through numerous personnel promoted inefficiencies in ability to perform required calibrations. Calibration verification of the inspector's instrument indicated that on the 5 and 50 mR/hr range, the calculated and as-found readings were identical as close as could be read. On the 500 mR/hr range, the calculated response was higher than the instrument response by approximately 11%. At the 5000 mR/hr range, again the calculated and instrument responses were identical as near as could be determined.

It was noted that instruments for repair were piled on a bench and no tags were affixed. Some instruments did have masking tape across them indicating out of service or repair needed. However, not all instruments were identified as needing repair.

Calibration of instruments is normally done in the same service area where counting of air samples and smears were accomplished. This is also the storage area for available instruments for Health Physics personnel use. The size of the facility, the traffic to which it is subjected, and the incompatibility of calibration of instruments using a source and the levels required for air sampling and smear counting, would seem to indicate additional facilities are necessary. (Inspector Followup Item 50-302/80-25-43)

i. In summary the inspectors found the licensee's instrumentation program to be adequate but recommended changes to inhance the program effectiveness.

11. ALARA Programs

a. The recommended bases for an ALARA program are contained in Regulatory Guides 8.8, "Information Relevant to Ensuring That Occupational Radiation Exposures at Nuclear Power Stations Will be as Low as is Reasonably Achievable (ALARA)", and 8.10, originally dated April 1974, "Operating Philosophy for Maintaining Occupational Radiation Exposures as low as is Reasonably Achievable". In addition, 10 CFR 20.1.c recommends that "... persons engaged in activities under licenses issued by NRC ... should ... make every reasonable effort to maintain radiation exposures .. as low as is reasonably achievable." From discussions with licensee's representatives and observation of actual work practices, the inspectors found that some elements of an ALARA program did exist at the facility. However, licensee representatives stated that maintenance and operations procedures do not routinely receive formal health physics review prior to issuance. The inspector commented that all procedures involving work on radioactively contaminated systems, handling of radioactive material or work in radiation areas should be formally reviewed by the radiation protection staff as far in advance of the work as possible. This review is necessary to insure that adequate consideration is given to health physics and engineering aspects of the work, including staffing, availability of health physics equipment and supplies, temporary shielding, engineering controls to minimize airborne radioactivity and to keep exposures ALARA. In addition, the inadequacies the inspectors found in the areas of training/retraining, surveillance, respiratory protection and records management were all indicative of a weak ALARA program. In the professional judgement and observations of the inspectors, the ALARA program practiced means no one receiving radiation exposures in excess of the administration limits. A formal ALARA program with a specialist assigned primary responsibility for ALARA and with technical engineering support did not exist and the inspectors recommended that one be established. (Inspector Followup Item 50-302/80-25-44)

b. Cognizant of the efforts being undertaken at the corporate level, the inspectors found the ALARA program acceptable but urged licensee representatives to consider the recommendations in the Regulatory Guides and implement a formal ALARA program at the facility. Licensee management agreed to look into the matter. The inspectors also mentioned to licensee representatives that one of the basic elements of an ALARA program is the capability of collecting and sorting historical radiation exposure data in order (1) to evaluate the status of any ongoing job and (2) to plan in the future for further reductions in exposures. The inspectors recommended that consideration be given to a real time computing system which is capable of taking care of the above. (Inspector Followup Item 50-302/80-25-45)

12. NUREG 0578 Items Followup

a. The inspector examined the licensee's procedure (Item 2.1.5.c H_2 Purge Procedures) EM-215, entitled Post Accident Hydrogen Purge, and ensured that this procedure including the use of the station air system provides post accident combustible gas control of the containment atmosphere.

b. The inspector examined the licensee's leak reduction program (Item 2.1.6.a System Integrity) implementation procedure. These are too numerous to list here, but the aggregate provides an effective system to keep leakage from NUREG 0578 specified systems to low-as-practical levels. The program includes checks for leakage from periodic interated leak rate tests; daily identification of leakage from the reactor coolant system leakage tests; the total water inventory program and visual surveillance by plant personnel; area radiation monitors and the unit ventilation effluent monitors; and the plant preventative maintenance program.

c. The inspector reviewed the licensee's Procedure EM.304, (Item 2.1.8.b Increased Range of Radiation Monitors) dealing with the quantification of high level radioactive noble gas and iodine/particulate effluents from the plant and found them adequate to meet the requirements of NUREG 0578. The main steam line radiation monitoring system was observed to be in the process of being installed and according to a licensee representative should be functional prior to plant operation. This is a NUREG 0578 Category B requirement and need not be complete until January 1, 1981.

d. The inspector verified that equipment, training and procedures required for analysis of air samples (Item 2.1.8.c Improved Iodine Instrumentation) during an accident were available. EM-210, the licensee's emergency air sampling procedure has been modified to reflect the control room and technical support center analysis equipment as well as the existance of a portable sodium iodide instrument.

e. The inspector determined that the procedures (Item 2.1.8.a Post Accident Sampling) to take and analyze reactor coolant and containment air samples were not adequate for the following reason; the radiation dose rates in

the GeLi (Germainium-Lithium) detector room would be very high and preclude accurate analysis. A licensee contractor's study appeared to have failed to consider several sources of very high radiation near the counting facility. The bases for this study has not been made available to plant personnel and were unavailable for the inspectors' review, although the tabulated results of the study were available. A telephone conversation with the contractor's representative who performed the study was singularly informative in that only the decay-heat removal piping was considered a significant source; reactor coolant sample lines, letdown piping, and radioactive liquid waste sampling lines were identified by the inspectors when a tour was made outside the sample room. The study performed by the licensee's contractor indicated a radiation field of 1,200 Rem/hr from the decay heat piping outside the counting room. While the inspectors verified the licensee's commitments made to NRR had in fact been performed, the inspectors noted that the evaluation should have considered all the potential sources of radiation, including the effects of a possible airborne radiation problem in the counting room (Inspector Follow up Item 50-302/80-25-46).

13. Radwaste Systems

a. The inspectors did not review the liquid and gaseous radwaste systems at this facility because of lack of time.

b. The responsibility for Radioactive Waste Mangement is assigned to the Chem/Rad Protection Engineer and is delegated, currently, to the RadWaste Supervisor who is also the Chem/Rad Plant Engineer. Proposed organization will delegate the responsibility to the Chemistry-Waste Coordinator (See Section 4.0 of this report). In the opinion of the inspectors, the responsibility for solid radwaste is assigned at a sufficiently high level.

c. The inspector studied the solid waste processing system at CR-3. The initial design of the radwaste system was to use cement as a solidification system. This system was abandoned after a few drums of waste had been solidified due to failure of the equipment to homogeneously mix the cement and waste products. A UF system was then purchased and used in one of the storage rooms of the radwaste area to solidify the waste. This system uses liners which are filled from overhead bases. The operator must use a ladder to climb up and look down into the liner to ensure that the waste is solidified or if there is free standing water. This involves unnecessary operator exposure because the system is not designed for remote viewing of the liner filling. The inspector was informed that CR-3 was considering switching to a new system which uses 55 gallon drums. This system would be remotely operated and be able to be viewed from the radwaste control room.

Since the currently used UF system is a makeshift system, it is located in a crowded room and requires unnecessary exposure to operate. Liner shipments are harder to make than drum shipments and consequently the full liners must be stored on site outside the building for a longer time before being shipped offsite

d. There has been a marked increase in the amount of compacted waste per drum since the start of the current outage in March. During the early part of the outage many of the waste bags being sent for compaction contained non-compressible tools, boards, etc. Since a lot of these items could be salvaged and decontaminated, compactor operators began slitting open these bags before compaction and removing any non-waste or non-compressible items. Since the operators began the operation, the number of bags compressed per drum (and consequently the net weight per drum) has steadily been increasing since March. The following data was complied by the inspector from the low level waste drum shipping records.

Month	#Barrels Shipped	Total Weight	Net Weight of Waste
January	39	3023 lbs.	77.5 lbs.
March 13th	138	12771 lbs.	92.6 lbs.
April	227	32660 lbs.	144 lbs.
May	150	26755 lbs.	178 lbs.

e. With regard to solid waste packaging and transportation the inspectors observed:

1. Processed waste packages appeared to conform to DOT and NRC regulations for shipment.

2. The RadWaste Supervisor appears to be well aware of the current burial site requirements for the State of South Carolina. A copy of the State memorandum, dated May 28, 1980, addressed to "All Shippers and Carriers of Radioactive Waste into and within the State of South Carolina" was furnished this inspector. The memorandum details the current state and site requirements. The Supervisor is in liaison with the site operator via the assigned representative for solidification processing.

3. There is an effort to reduce volume. However it is limited by absence of training and information in this area of concern. Compacting personnel remove, by hand, as much noncompactible material as possible.

4. QA personnel were observed to survey an outgoing shipment before release to the driver. However, the inspectors did not observe QA looking at waste handling, packaging, etc. in depth.

5. RadWaste equipment is limited, [illegible] time, and a maintenance problem does not appear to exist

6. Burial site limitations impose a time restriction on waste storage at CR3. The storage facilities are not adequate, either in respect to space or layout. As a result, drums are stored in an open fenced area.

f. In summary, the inspectors found the solid waste program at this facility acceptable.

14. Procedure Review

The following procedures were reviewed by the inspectors:

RP 101 Radiation Protection Manual, Rev. 10
RP 102 Respiratory Equipment Manual, Rev. 9
RP 103 Decontamination of Personnel, Areas, and Equipment, Rev. 1
RP 105 Radioactive Airborne Release Permit Procedure, Rev. 6
RP 106 Radiation Work Permit Procedure, Rev. 4
RP 107 Standing Radition Work Permit Procedure, Rev. 3
RP 201 Personnel Exposure Documentation, Rev. 1
RP 202 Radiological Surveys, Rev. 1
RP 203 Receipt of New Fuel, Rev. 1
RP 204 Receipt of Radioactive Materials
RP 205 Leak Testing of Sealed Sources
RP 206 Radiation Protection Instrumentation Calibration Procedures, Rev. 1
RP 207 Non-Routine Reporting Requirements for Internal and External Overexposures, Rev. 1
RP 208 Bioassay Sampling Procedure
RP 210 Special Radiation Protection Considerations for Females
RP 211 Assessment of Containment Atmosphere, Rev. 1
RP 212 Radioactive Source Documentation and Control
RP 213 Pocket Dosimeter Functional Check
RP 214 Whole Body Chair Calibration
RP 215 MS-2 Scaler Operation and Calibration
RP 216 Health Physics - Vendor Services Spike Program
RP 217 Radioactive Material Tagging, Rev. 2
RP 218 Estimation of the Ci Content of Packaged Radioactive Material
RP 219 Inventory and Availability of Emergency Supplies/Equipment, Rev. 0

The following comments or recommendations are offered by the inspectors (Inspector Follow-up Item 50-302/70-25-47):

(1) RP 101, Radiation Protection Manual, Rev. 10. The manual appears to be well written and provides all of the elements for an appropriate radiation protection program. The following recommendations are offered to strengthen the program:

- Section 3.3.1, establish document control limits for quarterly doses that assures personnel will be excluded from radiation work before exceeding the regulatory limits of Section 3.2.2, taking into account the variation and accuracy of dosimetry systems.

- Section 4.10.2, add a statement to require personnel contamination surveys prior to donning personal clothes.

- Section 5.9, add a requirement for base line bioassay analyses on all personal authorized to enter a radiation control area, periodically during work tenure, and upon termination from the site. Requirements of ANSI N343-1978 should be included.

(2) RP 102, Respiratory Equipment Manual, Revision 9, it is recommended that the respiratory protection program be reevaluated, and the manual revised to reflect the results of that evaluation. The following comments apply to the existing manual. Section 3.3, the last sentence does not reflect plant practice. Section 3.4, criteria for authorization should be established and documented either in this procedure or in supplementary documentation. Section 5.0, recommend revising the section to include quantitative mask fit using either DOP or sodium chloride test booths and equipment as recommended in NUREG 0041. Revise section to reflect plant practice in mask selection and documentation. Section 6, revise to include system for assuring only authorized personnel are issued respiratory protective devices. Define the information to be verified: i.e., current medical examination, current training, current mask fit, and authorizing review signature are considered the minimum requirements. Section 8.5.2, the statement as written, is not practical. Acceptable contamination levels should be defined. Section 10.1.2, the breathing air criteria table should include requirements for condensed hydrocarbon concentration. The frequency of testing of air quality should be established.

(4) RP 106, Radiation Work Permit, Rev. 4. In section 4 a statement is made that a RWP is required "when it is anticipated that individuals may receive greater than 100 mrem per week to the whole body for performing the required work". The use of the term 100 mrem per week in this context is questionable. It is not clear if this is a dose rate or if it is intended to be a total dose received for the job. Clarification should be included. Section 5 should include provisions for altering the requirements of a RWP. Provision should include the approval and documentation required for reducing or increasing the radiation protection requirements specified. RP 107, Standing Radiation Work Permit Procedure, Rev. 3. Section 1 uses the same terminology as Procedure RP 106 (100 mrem per week) in a similar context. This should be clarified also. The comment included under RP 106 for provisions for altering requirements of the RWP are applicable here, also.

(5) RP 201, Personnel Exposure Documentation. In Section 2.1.2, the statement is made "in all cases, a vendor TLD report shall remain the primary exposure records". This statement cannot be true in all cases; i.e., lost TLDs or invalid TLDs for various other reasons. Plant personnel stated that the "DDPRNT" program is the official personnel dose record. Procedures should be revised to rectify that discrepancy. Under section 2.3.1, the employee exposure history record file should be revised to include the employee's training records, medical examination records, mask fit records, and dose records in a more complete file.

(6) RP 202, Radiological Surveys. In section 2.1.1.1, recommend adding the following surveys; daily survey of the HP lunchroom in the control area and, on some frequency, surveys inside the turbine generator system condensors or any of the piping of the secondary system when it is open. The program should include routine surveillance outside of the plant perimeter as a precautionary survey to assure background levels and that plant releases are not cumulative or unnoticed. It should include surveys of clean tool rooms and workshops in adjacent fossil plants. Section 2.1.1.2 should include more definitive guidelines for routine airborne activity surveys.

(7) RP 205, Leak Testing of Sealed Sources. In section 3.7, the formula for determining gross activity includes the term "percent abundance" in the denominator. The use of this term in this particular formula appears inappropriate and is not included in the source leak test data sheet attached. Procedure should be revised to delete the term or explain its purpose.

(8) RP 206, Radiation Protection Instrumentation Calibration Procedures, Rev. 1. The procedure should be revised to include the requirements of ASNI N323-1978, Radiation Protection Instrumentation Test and Calibration and ANSI N42.3-1969, Standard Test Procedures for Geiger Muller counters. It does not provide for a reproducability check of instruments as indicated in ANSI N323 section 4.2.1, nor does it provide for radiation source calibration of several of the instruments for gamma photons and neutrons. The procedure does not provide for a calibration check at 20% and 80% full scale as recommended in ASNI N323 section 4.2.2.1. Provisions for periodic performance testing as indicated in ANSI N323 section 4.6 are not specifically provided for in this procedure. In the calibration of portal monitors, no radiation source calibration is actually provided and the alarm setpoints are not specified.

In those instruments used to determine release of material and personnel from radiation controlled areas, the requirements of ANSI N42.3 section 2.3 and others should be included in the procedures. In addition, frisker alarm trip points should be specified.

(9) RP 208, Bioassay Sampling Procedure. The procedure should be revised to include the requirements for a baseline bioassay analysis on all personnel authorized to enter the radiation controlled area, periodically for personnel during work tenure at the plant, and for all personnel when terminating the facility.

(10) RP 211, Assessment of Containment Atmosphere, Rev. 1. The procedure should be revised to include consideration and measurement of neutron exposure rates. While section 3.2.4 of this procedure provides for people to take neutron survey instruments with them, there is no provision in the procedure or in the documentation for evaluation and recording of neutron dose rates.

(11) RP 213, Pocket Dosimeter Functional Check. The procedure should be revised to include the requirements of ANSI N14.5-1972, Performance Specifications for Direct Reading and Indirect Reading Pocket Dosimeters for X and Gamma Radiation. It provides for a drift check of dosimeters at 50% of full scale while the section 9.3 of ANSI standard requires a drift check of a fully charged dosimeters.

(12) RP 214, Whole Body Chair Calibration. Section 2 should include a specified frequency for calibration of the total whole body counter. Details of the procedure for whole body counting should include a listing and assurance of certification of all the sources to be used for the calibration. (See ANSI N343-1978, for Internal Dosimetry for Mixed Fission and Activitation Products).

Fig. 1 CRYSTAL RIVER ORGANIZATIONAL STRUCTURE

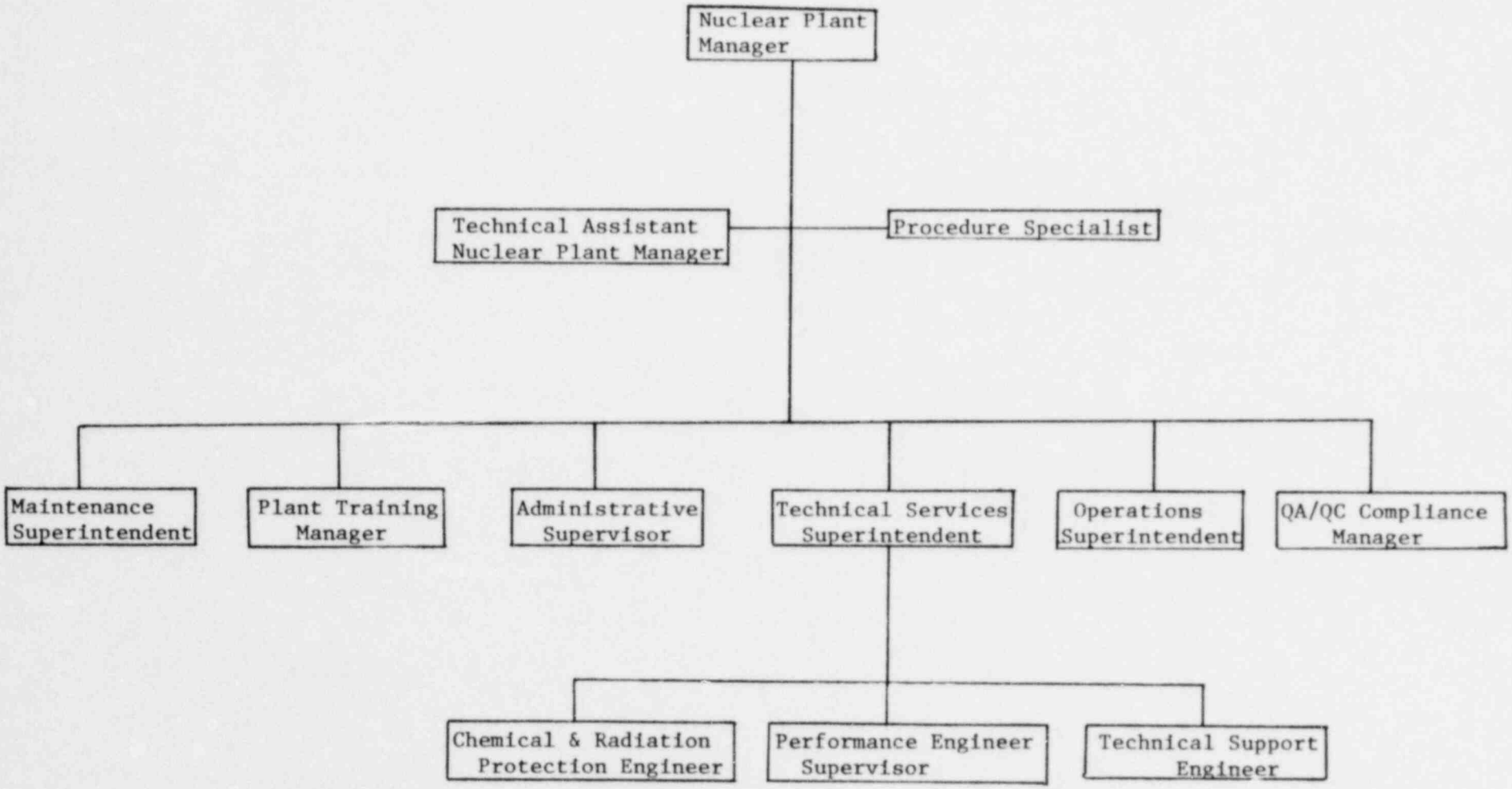

Fig. 2 CRYSTAL RIVER RADIATION PROTECTION ORGANIZATION