

U.S. NUCLEAR REGULATORY COMMISSION  
REGION I

Report No. 50-247/84-13

Docket No. 50-247

License No. DPR-26 Priority -- Category C

Licensee: Consolidated Edison Company of New York, Inc.  
4 Irving Place  
New York, New York 10003

Facility Name: Indian Point Nuclear Generating Station, Unit 2

Inspection At: Buchanan, New York

Inspection Conducted: June 12-15, 1984 and July 5-6, 1984

Inspectors: R. Clemons for 7/13/84  
R. L. Nimitz, Senior Radiation Specialist date

M. M. Miller for 7/13/84  
M. M. Miller, Radiation Specialist date

P. E. Clemons for 7/13/84  
P. E. Clemons, Radiation Specialist date

Approved by: M. Shanbaky 7/13/84  
M. Shanbaky, Chief, Facilities Radiation Protection Section date

Inspection Summary: Inspection on June 12-15, and July 5-6, 1984 (Report No. 50-247/84-13)

Areas Inspected: Special, unannounced inspection of the licensee's Radiological Controls for the current outage including: radiation protection organization; personnel selection, qualification, and training; ALARA; posting and access control; external and internal exposure control, and the circumstances surrounding the unplanned exposure of two workers on June 19, 1984. The inspection involved 100 inspector-hours on site by three region based inspectors.

Results: Five violations were identified in four areas: failure to post and barricade a high radiation area as required by Technical Specification 6.12, (details section 6.0); failure to perform airborne radioactivity surveys required by 10 CFR 20.103 (details section 7.3); failure to adhere to the physical security plan (details section 9.0); failure to instruct workers as required by 10 CFR 19.12 (Details section 8); and failure to properly control access to high radiation areas as required by Technical Specification 6.12 (details section 8).

## DETAILS

### 1.0 Persons Contacted

During the course of this routine inspection the following personnel were contacted.

#### 1.1 Licensee Personnel

- 1, 2 C. Jackson, Vice President - Nuclear Power
- 1, 2 M. Blatt, Director, Regulatory Affairs
- 2 J. A. Basile, General Manager, Nuclear Power Generation
- 2 G. A. Marquardt, Radiation Protection Manager
- 2 W. A. Homyk, Acting Radiological Engineering Manager
- 1, 2 M. Miele, General Manager, Environmental Health and Safety
- 2 A. J. Budnick, Manager, Nuclear Power QA

#### 1.2 Contractor Personnel

- 1, 2 T. A. Peterson, Manager, General Dynamics
- 2 R. Franklin, Westinghouse Services Manager

#### 1.3 NRC Personnel

- 2 T. J. Kenny, Senior Resident Inspector
- 1, 2 P. Koltay, Resident Inspector
- M. Shanbaky, Chief, Facilities Radiation Protection Section

1 attended exit on June 15, 1984

2 attended exit on July 16, 1984

Other licensee and contractor personnel were contacted during the inspection.

### 2.0 Purpose

The purpose of this special inspection on June 12-15, 1984 was to review the licensee's radiological safety program with respect to the following elements:

- Radiation Protection Organization
- Personnel Selection, Qualification, and Training
- ALARA
- Posting and Access Control
- External and Internal Exposure Control

Because of program deficiencies identified in the area of high radiation area control, airborne radioactivity sampling, and radiation protection personnel selection, qualification and training an additional site visit was conducted July 5-6, 1984.

### 3.0 Radiation Protection Organization

The inspector reviewed the licensee's Radiation Protection Outage Organization with respect to criteria contained in Technical Specification 6.2, "Organization."

The evaluation of the licensee's performance in this area was based on review of the Radiation Protection Outage Organization Charts, Outage Job Functions and Job Assignments, as well as discussion with licensee Radiation Protection personnel.

Within the scope of this review, no violations were identified. However, the outage organization chart had not been revised to reflect the changes made in the organization with regard to increased supervision. The licensee stated a revised organization chart would be developed. The inspector also noted that the licensee's radiation protection outage organization was expanded to approximately 150 members, including additional supervisors, senior and junior health physics technicians. This organization included a significant number of contractor personnel.

The licensee's development of a revised organization chart will be reviewed during a subsequent inspection (50-247/84-13-01).

### 4.0 Personnel Selection, Qualification and Training

The inspector reviewed the selection, qualification and training of contractor Radiation Protection personnel and licensee Radiation Protection Supervisors with respect to criteria contained in the following:

- Technical Specifications 6.3, "Facility Staff Qualifications," and
- ANSI N18.1, 1971, "Selection and Training of Nuclear Power Plant Personnel."

The evaluation of licensee's performance relative to these criteria was based on:

- Discussions with the Radiation Protection Manager, and Lead Radiation Protection Supervisor;
- Draft Procedure EHS 3.002, "Verification of Contract Health Physics Technician/Supervisor/Engineer Qualifications;"
- Review of contractor personnel resumes and procedure sign-off records; and
- Observations of personnel providing radiation protection coverage.

#### Findings

Within the scope of this review, the following items were identified:

- The licensee used a draft procedure (EHS 3.002) for selection of radiation protection technicians. This draft procedure had not been implemented. Analysis sheets in the draft had not been completed for all technicians. The licensee had deleted the previous procedure for this purpose.
- Inspector review of twelve radiation protection technician resumes identified two individuals classified as senior contractor radiation protection technicians who did not possess the minimum experience required by ANSI-N18.1, 1971. Licensee representatives stated that one individual had not yet been brought on site while the other individual did not perform responsible level tasks. The licensee was unable to provide verification of technician qualification.
- The licensee was unable to provide evidence that a Health Physics Supervisor met minimum ANSI-N18.1, 1971 qualification requirements.

The above matters were discussed with licensee representatives. The licensee's plans in this area were documented in a Confirmatory Action Letter (CAL 84-11) dated June 21, 1984, a copy of which has been included as an attachment to this report.

The above findings will remain unresolved until the licensee's corrective actions, addressed in CAL 84-11 have been reviewed during a subsequent inspection (50-247/84-13-02).

#### 5.0 ALARA Program

The licensee's ALARA Program for the refueling/ten year inspection outage was reviewed against criteria contained in:

- Regulatory Guide 8.8 "Information Relevant to Ensuring that Occupational Radiation Exposures in Nuclear Power Stations will be As Low As is Reasonably Achievable",
- Regulatory Guide 8.10, "Operating Philosophy for Maintaining Occupational Radiation Exposures As Low As is Reasonably Achievable".

The evaluation of licensee's performance relative to these criteria was based on interviews with the Acting Radiological Engineering Manager, and two Radiation Engineers. Additionally, the following documents were reviewed:

- Corporate Policy Statement 200-5, "Control of Radioactive Materials and Radiation Exposures",
- Station Administrative Order (SAO) 134, "High Radiation Exposure Tasks",
- SAO-135, Revision 1, "Station ALARA Policy",
- HPP1.1, Revision 0, "Implementation of ALARA Policy", and

- HPP2.1, Revision 5, "Radiation Work Permit and Radiation Work Authorizations".

The inspector also noted that a draft SAO procedure for Pre-Job ALARA Planning was being developed.

The inspector discussed with licensee representatives the need for the following procedures:

- Administrative Procedures for the ALARA Group
- ALARA Design Reviews
- Operational ALARA Reviews including:
  - pre-job ALARA reviews
  - on-going ALARA reviews
  - post-job ALARA reviews
- Exposure management and tracking
- Temporary shielding
- Cost Benefit Analysis
- Mock-up Training

Based on the review in this area the inspector concluded that the licensee does not have fully documented ALARA implementation procedures.

Within the scope of this review, the following item was identified:

- It appears that outage scheduling was not properly planned to allow steam generator decontamination prior to personnel entry into the generators. The steam generator water box general area dose rates were approximately 20-25 R/hour. Decontamination may have substantially reduced personnel exposure during nozzle dam installation. The dam installation was aborted due to excessive exposure (~350 man-rem).

The licensee's ALARA Program will be reviewed during subsequent inspections (50-247/84-13-03).

#### 6. Posting and Access Control

The licensee's posting and access control (as required) to the following areas was reviewed:

- airborne radioactivity areas
- radiation areas
- high radiation areas.

The review was with respect to criteria contained in the following:

- 10 CFR 20, "Standards for Protection Against Radiation"
- Technical Specification 6.11, "Radiation Protection Program"
- Technical Specification 6.12, "High Radiation Areas."

The evaluation of licensee performance in this area was based on:

- independent radiation surveys by the inspector
- observations by the inspector
- discussions with cognizant licensee personnel and
- review of documentation.

### Findings

Within the scope of this review, the following violation was identified:

Technical Specification 6.12 requires, in part, that each high radiation area in which the intensity of radiation is greater than 100 mrem/hr but less than 1000 mrem/hr be barricaded and conspicuously posted as such.

Contrary to the above, on June 5, 1984 at about 10:00 a.m., an area near the south stairwell on the 46 foot elevation of the primary containment was found to exhibit radiation dose rates which could result in a major portion of the body receiving between 100 and 150 millirem in an hour and the area was neither posted nor barricaded. The radiation levels in the area had increased from 40 millirem/hour following oxygen addition to the primary system and subsequent let down of soluble contaminants via local piping.

This matter had been brought to the licensee's attention by the NRC resident inspector.

The inspector notified the licensee representatives that failure to post and barricade a high radiation area was a violation of Technical Specification 6.12 (50-245/84-13-04).

Within the scope of this review, the following matter requiring licensee attention was identified:

- In May 1984, the NRC resident inspector determined that the licensee was not properly controlling access to areas inside primary containment with dose rates greater than 1000 millirem/hour (See Inspection Report 50-247/84-12). Subsequently, an inspector tour of these areas on June 13, 1984 found that personnel could readily gain unauthorized access to such areas by a variety of routes.

Upon notification, the licensee placed personnel at the access to each of these areas to prevent unauthorized access. Following review, the licensee implemented a number of interim corrective actions until such time that long term corrective actions could be taken. The licensee's plans in this area were documented in a Confirmatory Action Letter (CAL 84-11) dated June 21, 1984, a copy of which has been included as an attachment to this report.

## 7.0 Exposure Control

### 7.1 General

The licensee's external and internal exposure control program was reviewed with respect to criteria contained in the following:

- Technical Specification 6.11, "Radiation Protection Program"
- 10 CFR 20, "Standards for Protection Against Radiation"
- Health Physics Procedure No. 2.1, Revision 5, "Radiation Work Permit and Radiation Work Authorizations", dated September 14, 1982
- IE Information Notice No. 81-26, Part 2, "Placement of Personnel Monitoring Device for External Radiation Exposure", dated August 2, 1981 and Supplement 1, dated July 19, 1982
- IE Information Notice No. 83-59, "Dose Assignment for Workers in Non-Uniform Radiation Fields", dated September 15, 1983.

The evaluation of licensee performance in these areas was based on:

- independent radiation surveys by the inspector
- observation of on-going work and review of radiological surveys for the following radiation work permits:
  - RWP No. 7964, "Install Plugs in Hot and Cold Water Lines - (Nozzle Dams)", dated June 11, 1984
  - RWP No. 7934, "Repair Manways on Steam Generators", dated June 13, 1984
  - RWP No. 7924, "Steam Cleaning and Wire Brushing Valves and Flanges Inside and Outside Crane Wall from the 46' elevation to 80' elevation Unit 2 V.C.", dated June 9, 1984, and
- discussions with cognizant personnel.

## 7.2 External Exposure Control (Findings)

Within the scope of this review, no violations were identified. The licensee was providing acceptable external personnel monitoring for steam generator work.

Within the scope of this review, the following items requiring licensee attention were identified:

The following example of inadequate job planning was identified:

- On June 14, 1984 the inspector identified a number of personnel waiting in a radiation area of about 10-15 millirem/hour on the 46 foot elevation of the primary containment. Discussions with the personnel indicated their work task, steam clean valves on the 46 foot elevation of the primary containment, had been suspended. The valves were contaminated to about 200 mRad/hour of loose contamination. Discussions indicated the task was suspended by a Health Physics Technician covering the job due to the possibility of generation of high airborne radioactivity during anticipated steam cleaning of valves. The inspector noted that the radiation work permit for the job was issued about four days earlier and the follow-up surveys were performed the previous evening (June 13, 1984). The inspector also noted that an RWP was issued to repair the valve after steam cleaning. The personnel assigned to the valve repair also arrived at the area. The inspector noted that failure to identify the high contamination as a potential airborne radioactivity problem, and failure to plan and initiate appropriate corrective action (e.g. enclosing the valve in a tent prior to steam cleaning) resulted in a number of personnel receiving unnecessary exposure waiting in the area. The inspector noted that the technician exhibited good judgement in stopping the work. However, personnel were not confined to a low background area while waiting for resuming the work.
- On July 5, 1984 one individual appeared to be sleeping on a contaminated floor on the 46 foot elevation of the primary containment. The individual was using his partially unbagged respiratory protection equipment as a pillow. Although the individual was in an assigned low background waiting area (2-3 millirem/hour), the individual could receive personnel contamination or may not properly respond to a primary containment evacuation alarm signal. The inspector noted a health physics technician was in the area and appeared to be oblivious to the sleeping individual.
- On July 5, 1984, a Junior Health Physics Technician, controlling high radiation area keys was found to be sitting in a 5 millirem/hour radiation area on the 95 foot elevation of the primary containment. A Senior Health Physics technician informed the inspector that this was the lowest background area. The inspector independent dose rate measurements, however, identified an area where other personnel were waiting with a dose rate less than 1 millirem/hour which was a short distance

away from the location. The junior technician was not overseeing access to any unlocked high radiation area.

The above example indicates additional licensee attention should be directed to coordinating radiological tasks with appropriate work groups in order to minimize exposure.

- Licensee procedures for addition of chemicals to the reactor coolant system (IPC-S-003, IPC-A-028) provided no guidance for notification of radiation protection personnel. Guidance should be included to alert shift radiation protection personnel to the potential increase in radiation levels on certain systems (e.g. radiation dose rates on let down piping may increase).

### 7.3 Internal Exposure Control (Findings)

Within the scope of this review, the following violation was identified:

10 CFR 20.103(a)(3) requires that licensees use suitable measurements of concentrations of radioactive material in air for detecting and evaluating airborne radioactivity for purposes of the determining compliance with the requirements of 10 CFR 20.103.

- Contrary to the above, on June 13, 1984 at about 6:30 p.m. suitable measurements of the concentrations of airborne radioactivity were not made while workers installed and/or manipulated components of man-way machining equipment on number 21 and 22 steam generators. One airborne radioactivity sampler was being used to monitor the work on both man-ways. The sampler was located about 10 to 15 feet away from each man-way and thus did not provide a sample representative of each worker's breathing zone.

The faces of the workers were in close proximity to the highly contaminated man-ways while the workers periodically reached their hands into the man-way to position components. Although the workers wore respiratory protection equipment (full face respirators with HEPA cartridges), the licensee does not make allowance for use of such equipment in assessing intake of airborne radioactive material.

- Contrary to the above, on June 13, 1984 at about 10:00 A.M. suitable measurements of the concentrations of airborne radioactivity were not made for two individuals performing work on number 24 steam generator. The worker's lapel air sampler head was positioned at the waist, inside the worker's protective clothing. Such sampling was inadequate to quantify airborne radioactivity the worker was exposed to.

The inspector noted that the licensee was not conforming to his procedural requirements (Procedure 3.402) which requires that the sample head be positioned inside the air supplied hood. The inspector further noted that the steam generator work, including suiting up of the workers, was over-

seen by a licensee Health Physics Supervisor. This supervisor did not identify this inadequacy.

The inspector notified licensee representatives that failure to make suitable measurements of airborne radioactivity to ensure compliance with 10 CFR 20.103 was a violation (50-247/84-13-05).

Upon notification, the licensee immediately initiated corrective action to ensure appropriate airborne radioactivity samples were collected and personnel exposure assessed accordingly. The licensee's plans in this area were documented in a Confirmatory Action Letter (CAL 84-11) dated June 21, 1984, a copy of which has been included as an attachment to this report.

On July 5 and 6, 1984, the licensee's air sampling results and bioassay program were selectively reviewed. The review of airborne radioactivity sampling and analysis results for personnel entries into number 21 steam generator during June 1984 indicates the airborne radioactivity concentrations were relatively low and that the personnel exposure thereto was minimal and within regulatory requirements. The review of the bioassay program indicated that the licensee was attempting to upgrade the bioassay program to support the respiratory protection program. Examination of procedural control found them to be deficient in that procedure controls did not assure that personnel exposures in excess of 40 MPC-hours in any one working week would be identified and appropriate corrective actions taken. This was due to the lack of specific guidance regarding frequency and evaluation of whole body counting in the procedure.

Inspector discussions with licensee representatives indicated no steam generator jumpers had received detectable intakes of airborne radioactive material. The licensee's detection limits are well within regulatory limits for applicable radionuclides.

The licensee's bioassay program will be reviewed during a subsequent inspection (50-247/84-13-06).

Within the scope of this inspection the following was identified:

- Airborne radioactivity samples were being collected inside air-supplied respiratory protective equipment (air-supplied hoods) during steam generator entries. The licensee had not determined if the sampler could collect a sample at proper flow rates or if the samplers could be used to obtain an appropriate minimum detectable activity considering the volume of sample collected.
- The licensee was not collecting airborne radioactivity samples outside the hoods during steam generator entries and assessing exposures accordingly, pending whole body counting and correction (as necessary) of such exposure results.

The above matters are unresolved pending further NRC review and evaluation (50-247/84-13-07)

## 8.0 Unplanned Exposure To Two Workers

### 8.1 Background

During this refueling outage, the licensee elected to install nozzle dams in the steam generators. The nozzle dams are flat-plug like devices which are installed in the inlet and outlet piping of each of the four steam generators. Use of the nozzle dams allows the licensee to flood the reactor cavity and perform steam generator inspection and maintenance (as necessary) concurrent with reactor refueling. The nozzle dams are installed in the inlet and outlet piping nozzles of the steam generators by personnel who enter the generators. The personnel entering the generators wear air-supplied hoods and are normally "staged" in a low radiation area while they are waiting to be called. The personnel wear head sets inside their air supplied hoods. This allows the workers to maintain communication with a technician coordinating the steam generator entries.

### 8.2 Event Description

On June 19, 1984 at about 3:00 p.m. three Contractor workers were suited up at the 95 foot elevation access point in preparation for work on the number 21 steam generator. The suiting up included placement of multiple dosimeters on the workers. The workers were then led to the 46 foot elevation of the primary containment south access control point by a licensee Radiation Protection Supervisor. Believing that the workers were to be needed at the work area shortly, the Radiation Protection Supervisor directed a Junior Radiation Protection Technician at the Control Point to send the three workers inside the crane wall to wait in a low dose rate area until they were called. The workers donned their head-sets and air-supplied hoods and were directed to wait at the labyrinth area (See Figure 1).

Worker A entered the crane wall and proceeded to the steam generator platform to assist in the work. Workers B and C waited at the labyrinth area. After several minutes, the Junior Health Physics Technician was notified that the two workers (Workers B and C) would be needed at the steam generator in a short while. As a result, the Junior Health Physics Technician directed the two workers to go inside into the low background area behind the shield wall (see Figure 1) and wait until called. The workers were not shown the area they were to enter on a map or a diagram. The individuals entered inside the crane wall and noticed what they believed to be a shield wall, (see Figure 1) and went to it. Although there was a rope barrier with a sign on it which stated "High Radiation Area-No Entry At This Point", the workers apparently did not see either the sign or barricade and passed it. At the apparent shield wall, the workers moved aside a small-unposted "fish net" gate at the entrance to the shielded area and entered behind the apparent shield wall.

The workers entered the temporary shield cubicle of the Regenerative Heat Exchanger (see Figure 1) and proceeded to wait in the area until called. Unbeknown to the workers, the area was a High Radiation Area with radiation dose rate between 2000 millirem/hour and 4000 millirem/hour. The

workers had neither a survey meter or alarming dosimeter to alert them to the high dose rates in the area.

The workers (Workers B and C) remained in the area between 30 and 40 minutes. During this time, no attempt was made by radiation protection personnel to locate the workers or determine that they were in the assigned low dose rate waiting area.

After about 30-40 minutes, the workers were contacted via their head-sets and requested to proceed to the number 21 steam generator platform to perform their work.

While on the platform and prior to steam generator entry, one of the worker's pocket dosimeters (located on the head) was read by the Senior Health Physics Technician monitoring the steam generator work. The technician found the dosimeter to be reading high (about 1-2 rem) and questioned the workers as to where they had been. The technician requested that the workers leave the area. The technician then performed a radiation survey of the area where they had been and found that the workers had been waiting in a high radiation area of between 2000 millirem/hour and 4000 millirem/hour. The technician notified licensee radiation protection supervisory personnel and an investigation was initiated.

The licensee notified the resident inspector of the incident on June 20, 1984.

### 8.3 Dosimetry Results

The licensee read the dosimetry of the two workers who had waited in the area next to the Regenerative Heat Exchanger. Worker B received a whole body exposure of 1050 millirem during the wait in the area. Adding this exposure to this workers previous second calendar quarter exposure of 764 millirem, results in a total second quarter whole body exposure of 1814 millirem. Worker C received a whole body exposure of 1500 millirem during his wait in the area. Adding this exposure to this worker's previous second quarter exposure of 895 millirem results in a total second quarter whole body exposure of 2395 millirem. The NRC quarterly exposure limit is 3000 millirem to the whole body with a complete exposure history.

The inspector examination of records determined that the NRC Form 4, "Occupational External Radiation Exposure History", had been completed for these workers as required.

### 8.4 Conclusion

Evaluation of the information acquired during this inspection, this incident resulted in the following conclusions:

- On June 19, 1984 at about 3:00 P.M. workers were inadequately informed of the location of a low background area inside the 46 foot elevation of primary containment that they were to wait in prior to being called

to work. Due to insufficient instructions to the workers, the workers entered and waited in a high radiation area next to the Regeneration Heat Exchanger. 10 CFR 19.12, "Instructions to Worker", require that workers be instructed in precautions and procedures to minimize exposure. This appears to be an apparent violation of 10 CFR 19.12, "Instruction to Workers" (50-247/84-13-08).

- On June 19, 1984 the entrances to the Regenerative Heat Exchanger Area, an area exhibiting general area radiation dose rates between 2000 millirem/hour and 4,000 millirem/hour was not locked or otherwise controlled in any manner to preclude unauthorized entrance thereto. Technical Specification 6.12.1.b requires, in part, that the access to high radiation areas greater than 1000 millirem/hour be controlled. This appears to be an apparent violation of Technical Specification 6.12.1.b, "High Radiation Area" (50-247/84-13-09).
- On June 19, 1984, two workers entered the Regenerative Heat Exchanger Area, an area exhibiting general area dose rates between 2000 millirem/hour and 4000 millirem/hour and were not provided with a radiation monitoring device which continuously indicates the radiation dose rate in the area. Technical Specification 6.12.1.a requires the workers entering a high radiation area be provided with such a dose rate instrument. This appears to be an apparent violation of Technical Specification 6.12.1.a, "High Radiation Area" (50-247/84-13-09).

NOTE:

The individuals were not provided with an alarming dosimeter, were not accompanied by a health physics technician and were not cognizant of the radiation dose rates in the heat exchanger cubical. The following was also noted: Licensee procedure SAO-132, "Analysis of Operational Events", specifies in section IV that preliminary reports of operational events should be prepared within two working days of the event. The procedure specifies that events in which personnel exposure exceeds administrative dose guidelines be reviewed and reported per SAO-132. The inspector noted that although this incident necessitated the generation of this report, the report was not issued within sixteen days after the event. This inadequacy was brought to the licensee's attention.

The licensee stated that a report of this incident was being prepared in accordance with SAO-132.

9. Security

The inspector arrived on site at about 12:30 P.M. on June 12, 1984. While processing in at the Main Security Control Point to the protected area, the following violation was identified:

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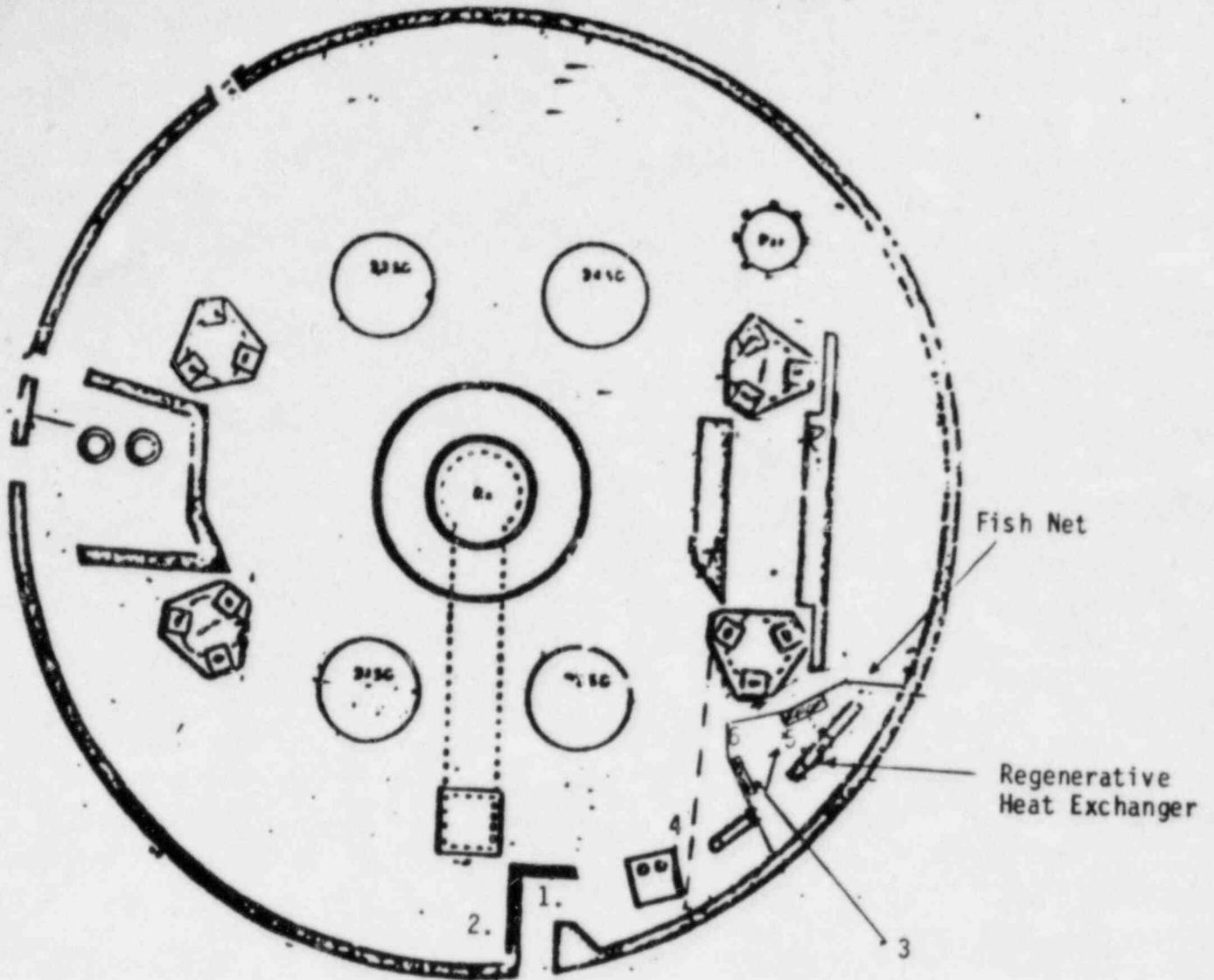
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INFORMATION AND IS NOT FOR PUBLIC  
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This apparent violation was brought to the licensee's attention (50-247/84-13-10).

9. Exit Interview

This inspector met with licensee representatives (denoted in Section 1) at the conclusion of the inspection on June 15 and July 6, 1984. The inspector summarized the purpose, scope and findings of the inspection. At no time during this inspection was written material provided to the licensee by the inspector.

46' Elevation of Primary Containment  
(Inside Crane Wall)



1. Labyrinth Area
2. Low Background area behind shield wall
3. Shield wall believed by workers B and C to be proper shield wall
4. Approximate location of rope barrier and posting
5. Area where workers waited
6. Entry point