



U.S. Department  
of Transportation

**Maritime  
Administration**

*Savannah* Technical Staff  
Office of Ship Disposal Programs

1200 New Jersey Ave., SE  
Washington, DC 20590

**Ref: 10 CFR 50.36(c)(5), 50.59(d)(2), 50.75(f)(1)**

February 28, 2008

**ATTN: Document Control Desk**  
U.S. Nuclear Regulatory Commission  
Washington, DC 20555

**SUBJECT: Docket No. 50-238; License No. NS-1; N.S. Savannah**  
Annual Report for CY 2007, Revision 0

**References:** (a) Letter from Mr. J. H. Eads (NRC) to Mr. E. W. Koehler (MARAD), dated October 19, 2006, NRC Inspection Report No. 50-238/2006-201

Pursuant to Technical Specification 3.4, the United States Maritime Administration (MARAD) is required to submit an annual written report. MARAD hereby submits Revision 0 to the CY 2007 Annual Report as Enclosure (1).

The annual report is also intended to meet the reporting requirements of 10 CFR 50.59(d)(2) to provide a summary of 10 CFR 50.59 evaluations for activities implemented under 10 CFR 50.59 and the reporting requirement of 10CFR 50.75(f)(1) to provide the status of decommissioning funding.

As noted in Reference (a), the CY 2004 and CY 2005 Annual Reports included no discussion of the results of occupational exposure indicated by personal dosimetry. These results are addressed in Section 3 of Enclosure 1.

This submittal contains no new Regulatory Commitments.

If there are any questions or concerns with any issue discussed in this report, please contact me at (202) 366-2631, and/or e-mail me at [erhard.koehler@dot.gov](mailto:erhard.koehler@dot.gov).

Respectfully,

Erhard W. Koehler  
Senior Technical Advisor, N.S. Savannah

Enclosures

NM5501

NM55

**Docket No. 50-238; License NS-1; N.S. Savannah  
Submittal of Annual Report for CY 2007, Revision 0  
February 28, 2008**

Enclosure:

1. Annual Report for CY 2007, Revision 0

**Docket No. 50-238; License NS-1; N.S. Savannah**  
**Submittal of Annual Report for CY 2007, Revision 0**  
**February 28, 2008**

cc:

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NSS ESC  
NSS RAC  
Division of Atlantic Operations  
MAR 615

Hardcopy, cover letter only

MAR-600, 640, 640.2

Hardcopy w/ all enclosures

MAR-100, 640.2 (rf)  
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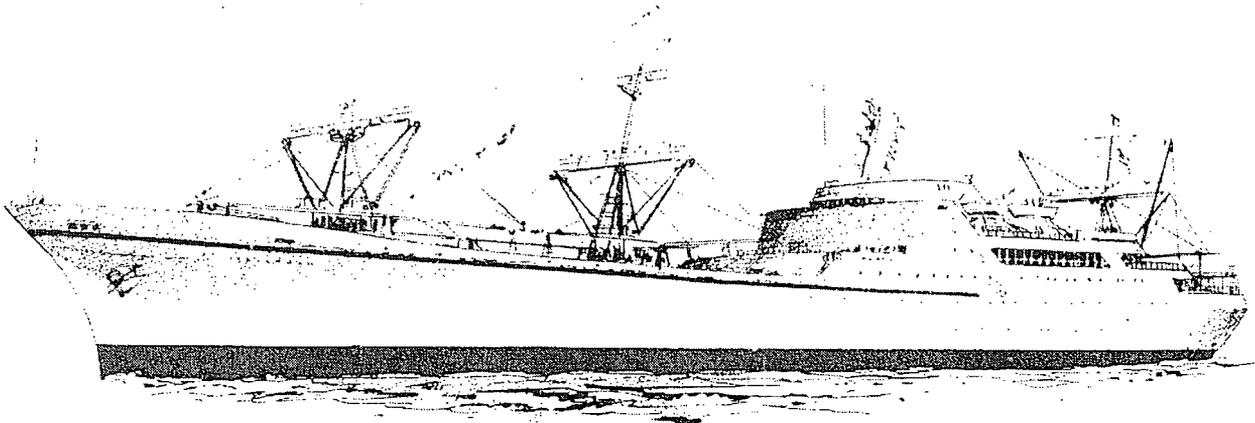
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Washington, DC 20590

**Docket No. 50-238; License No. NS-1; N.S. *Savannah***

**Enclosure 1 to Submittal of Annual Report for CY 2007, Revision 0**



**U.S. Department of Transportation  
Maritime Administration  
Office of Ship Disposal Programs**



***N.S. SAVANNAH***

**ANNUAL REPORT  
2007**

**STS - 105**  
Revision 0

Approved:  February 28, 2008

Manager,

N.S. Savannah Programs

Date

Prepared by:  
Sayres and Associates Corporation

## **RECORD OF REVISIONS**

Revision	Summary of Revisions
0	The original version of the 2007 Annual Report License NS-1

**LIST OF EFFECTIVE PAGES**

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13	0				

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## **1.0 INTRODUCTION**

In accordance with the requirements of Technical Specification 3.4.1, an annual written report shall be submitted prior to March 1 of each year.

This report is arranged into two sections. Section 2.0 provides a discussion of the nine items required by the Technical Specifications. Section 3.0 provides a discussion of optional issues.

## **2.0 ITEMS REQUIRED BY TECHNICAL SPECIFICATION 3.4.1**

The report shall include the following:

- a. The status of the facility;
- b. The results of the radiation surveys and monitoring station dosimeter readings;
- c. The results of environmental sample analysis surveys;
- d. The results of quarterly intrusion alarm system checks;
- e. The amount of radioactive materials removed from the N.S. *Savannah* (NSS) by releases, discharges, and shipments of radioactive waste material;
- f. A description of the principal maintenance performed on the vessel;
- g. Any unauthorized entry into radiation control areas by visitors or employees and corrective action taken to improve access control;
- h. Any degradation of one of the several boundaries which contain the radioactive materials aboard the NSS; and,
- i. Results of occupational exposure indicated by personal dosimetry.

### **2.1 STATUS OF THE FACILITY**

As defined by Reference (a), the NSS has been permanently defueled and placed in a Mothballed condition. This state of protective storage was approved in Reference (b). During calendar year (CY) 2007, the ship was layberthed in three locations:

- o Colonna's Shipyard in Norfolk, VA (January 1-30);
- o Pier 23 in Newport News, VA (January 30 to May 30); and,
- o BAE Systems Norfolk Ship Repair facility in South Norfolk, VA (May 30 – December 31).

While in layberth, maintenance, minor repairs and other activities to prepare for dry-docking and future layberth operations were completed. These are listed in Item 2.6. After funding issues for dry-docking were resolved in 2007, the dry-docking contract was awarded to BAE Systems in August 2007 and scheduled for January 2008. (Note: Actual, dry-docking commenced on January 19, 2008.)

The most significant change to the status of the NSS in 2007 was that MARAD personnel were routinely on board during normal workdays. The benefit of this change included the opportunity to perform frequent tours and inspections that facilitated the detection and correction of problems.

#### **2.1.1 LICENSE ACTIVITIES**

MARAD completed two significant licensing actions in 2007:

- MARAD submitted a license amendment request (LAR) 2007-001 to redefine RCAs, require visitors to be escorted and resolve conflicts resulting from implementation of the Decommissioning Quality Assurance Plan; and,

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- MARAD submitted the Final Safety Analysis Report (FSAR), Rev. IV on May 1, 2007.

MARAD continued developing and implementing a prioritized procedure development program. The most significant of these were those associated with the radiation protection program.

An independent review of the NSS document control system was performed. It included: 1) recommendations to improve the document control program and 2) a draft procedure for administering the document control program.

### 2.1.2 ORGANIZATION

In 2007, MARAD continued its on-going efforts of improving the technical capabilities of the *Savannah* Technical Staff (STS). This year, MARAD filled the following positions with nuclear and/or maritime experienced staff:

- Nuclear Advisor;
- First Engineer;
- Electrician; and,
- Two General Vessel Assistants.

This increase in staffing along with staffing increases completed in CY 2006 continues to foster improvement in the physical and administrative aspects of the NSS programs.

### 2.1.3 REVIEW OF OTHER TECHNICAL SPECIFICATIONS REQUIREMENTS

In accordance with the NSS Technical Specifications, the Review and Audit Committee (RAC) is specifically required to review the following items with or without a formal meeting:

- a. Written reports of any deficiency discovered as a result of audits, on-the-spot checks, and evaluations to assure that all work is being done safely and in accordance with established procedures per TS 3.6.3;

Any identified deficiency was documented in the Corrective Action Program. The Quality Assurance Manager provided a summary review of all completed CAR Resolution Documents at the December 2007 Annual Meeting.

- b. Proposed changes as required by 10 CFR 50.59 per TS 3.6.4;

This paragraph is intended to meet the reporting requirement of 10 CFR 50.59(d)(2) to provide a brief description of any changes, tests, and experiments, including a summary of the evaluation of each.

No Changes, Tests or Experiments were proposed in 2007 that would require a 50.59 evaluation.

- c. Proposed changes to Technical Specifications per TS 3.6.4;

License Amendment Requests (LARs) and Responses to Requests for Additional Information on LARs were reviewed and approved prior to submittal.

- d. Proposed changes or modifications to the vessel's controlled radiation area entry alarm system or containment vessel system per TS 3.6.4;

The radiation area entry alarm system was improved during the year with the addition of new equipment to an existing system under a contract with ADT Security. ADT will now provide remote monitoring of all installed flooding, fire and intrusion alarms from one of its central ADT monitoring center. The old MOSCAD (Motorola Supervisory Control and Data Acquisition) radio system was deenergized and abandoned in place. The function of the

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MOSCAD was replaced with an ADT provided cellular phone system that dials out to the continuously manned ADT monitoring center system on receipt of any alarm condition. The ADT center then initiates notification to designated MARAD representatives. Post-modification testing confirmed that the alarms functioned as required, both locally and remotely.

There were no changes to the containment vessel system.

- e. Substantive changes to radiation surveys or security surveillance procedures per TS 3.6.4;  
There were no substantive changes to radiation surveys or security surveillance procedures.

- f. Reported violations of Technical Specifications per TS 3.6.4;  
There were no TS violations discovered in 2007.

- g. Licensee Event Reports (LERs) per TS 3.6.4;  
There were no LERs during the reporting period.

- h. Annual reports to the NRC per TS 3.6.4;  
The CY 2006 Annual Report and its Revision 1 were reviewed prior to their submittal on February 28, 2007 and March 23, 2007, respectively.

- i. Proposals to access Restricted areas without HP direction per TS 3.3.1;  
The RAC was briefed on the results of a survey conducted on October 2, 2007. The survey discovered and designated a new restricted area on the tank top deck starting at the top of the port and starboard ladders on the 14 foot flat that go down to the Tank Top deck. Restricted areas are defined in TS 3.3.1. The highest dose rate readings were found on a valve "nest" at the foot of the port ladder where the contact reading is 40  $\mu\text{R/hr}$  and 7  $\mu\text{R/hr}$  general area. In addition, under the deck plates a contact dose rate reading on the charging system piping was 50  $\mu\text{R/hr}$  and 6  $\mu\text{R/hr}$  general area. The area was administratively posted as "Restricted Area – Authorized Personnel Only." The current TS define a Restricted area as an area greater than 5  $\mu\text{R/hr}$  above natural background that may be entered only by employees, contractor personnel, escorted guests and official visitors.

The RAC agreed that the new Restricted area may be entered without health physics supervision by "GET trained" individuals and escorted visitors. NSS access procedures require all visitors to be escorted.

- j. Surveys that re-designates areas as Unrestricted per TS 3.3.1;  
The RAC was briefed on the results of a survey conducted on August 17, 2007 in Cargo Hold 4. The survey discovered that all of Cargo Hold 4 C-deck and the port side of D-deck could be re-designated as Unrestricted areas. The restricted area entrance on D-deck was moved to the locked door that prohibits access to the starboard side of D-deck. The RAC agreed with re-designating these areas as Unrestricted.

- k. Procedures listed in TS 3.5;  
Procedures listed in TS 3.5 were reviewed prior to approval.

- l. Grounding or sinking events per TS 3.6.5;  
There was no grounding or sinking event in 2007.

- m. Events since the previous RAC meeting not discussed elsewhere per TS 3.6.; and,

All notable events since the last meeting were discussed.

n. TS 3.7.1.7 Deviations from TS 3.7.1 Access Control Requirements

All deviations generated in 2007 were reviewed prior to implementation.

**2.1.4 DECOMMISSIONING PLANNING ACTIVITIES**

The following significant activities were completed in CY 2007:

- The Engineering Management and Oversight Services (EMOS) contract was awarded to AREVA NP (later novated to AREVA Federal Services, LLC); and,
- The FY '09 budget was developed and submitted.

**2.1.5 DECOMMISSIONING FUNDING STATUS**

The following is intended to meet the reporting requirement of 10 CFR 50.75(f)(1). The N.S. *Savannah* and its nuclear reactor are federally owned facilities, represented by the United States Department of Transportation, acting by and through the Maritime Administration. As such, funding for the decommissioning and disposal of the NSS reactor and nuclear systems components and waste must be provided by appropriations from the United States Congress. MARAD maintains no funding reserve, nor does it accumulate or collect funds. As allowed by 10 CFR 50.75(e)(1)(iv), MARAD will obtain funds for decommissioning when necessary. Appropriated funds for FY 2008 are \$4.7 million and are sufficient to support long-term layberthing following the current dry-docking. In 2009, \$3.0 million is requested to continue activities required to bring the nuclear facilities into compliance with current SAFSTOR standards as compared to the Mothballed standards of 1974-1976. At the \$3.0 million level, SAFSTOR preparation work will extend to 2011. Thereafter and until 2023, funding can be reduced to a level commensurate with maintaining the facility and license in a SAFSTOR condition.

**2.1.6 SAVANNAH EMERGENCY RADIOLOGICAL ASSISTANCE TEAM (SERAT)**

The SERAT Team conducted a training exercise on July 20, 2007. Training included a ship tour and hands-on equipment re-familiarization.

**2.2 RADIATION SURVEYS AND MONITORING STATION DOSIMETER READINGS**

A routine radiological surveys program was implemented. Radiological survey measurements were taken in various non-Radiological Controlled Areas and Radiological Controlled Area. All non-Radiological Controlled Areas were insignificant as compared to background radiation levels except as described in 2.1.3.i.

**2.2.1 2007 RADIATION SURVEY RESULTS IN RADIOLOGICALLY CONTROLLED AREAS**

Area	General Area Radiation levels $\mu\text{R/hr}$ (micro-R/hr)	Highest Radiation Level $\mu\text{R/hr}$ (micro-R/hr)	General Area Contamination Level (DPM/100cm <sup>2</sup> )	Highest Contamination Level (DPM/100cm <sup>2</sup> )
Reactor Compartment Cupola Level	1.0	1.0	<1000	<1000
Reactor Compartment Upper Level	1.0	15 at open hatch to Reactor vessel	<1000	<1000

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Area	General Area Radiation levels $\mu\text{R/hr}$ (micro-R/hr)	Highest Radiation Level $\mu\text{R/hr}$ (micro-R/hr)	General Area Contamination Level (DPM/100cm <sup>2</sup> )	Highest Contamination Level (DPM/100cm <sup>2</sup> )
Reactor Compartment Forward Middle Level	1.0 -1.5	1.5	<1000	<1000
Reactor Compartment Aft Middle Level	<1.0	1.0	<1000	<1000
Reactor Compartment Lower Level	0.2	120,000 on contact with pipe 7 ft in overhead; 10,000 @ 30 cm.	<1000	4041 inside drum
Reactor Vessel 1 <sup>st</sup> Level	0.3 -2.5	2.5	<1000	<1000
Reactor Vessel 2 <sup>nd</sup> Level	0.6 -1.5	2.5 along Steam Drum	<1000	<1000
Reactor Vessel 3 <sup>rd</sup> Level	0.7 - 2.0	7.3 on contact with Port Steam Generator	<1000	<1000
Reactor Vessel 4 <sup>th</sup> Level	0.7 - 1.8	1.8 along Port side of Reactor	<1000	<1000
Port Charge Pump Room	5.0 - 35	250 on contact with pump suction line	<1000	<1000
Starboard Charge Pump Room	6.0 - 20	100 on contact with pump suction line	<1000	<1000
Hot Chemistry Lab	1.5	25 on contact with sink drain trap	<1000	<1000
Health Physics Lab	3.0	30 on contact with Steam Generator Primary Side Samples	<1000	<1000
Port Stabilizer Room	1.0 - 4.5	6.0 Knee level	<1000	<1000

Area	General Area Radiation levels $\mu\text{R/hr}$ (micro-R/hr)	Highest Radiation Level $\mu\text{R/hr}$ (micro-R/hr)	General Area Contamination Level (DPM/100cm <sup>2</sup> )	Highest Contamination Level (DPM/100cm <sup>2</sup> )
Port Booster Pump Area	15 - 35	100 on contact with piping	<1000	<1000
Starboard Stabilizer Room	1.5	2.5 Walkway	<1000	<1000
Stateroom B-1 Rad Waste Storage Area	5.0	8.0	<1000	<1000
Fan Room B Deck	1.0 - 2.0	2.0	<1000	<1000
Cold Chemistry Lab Area C Deck	2.0- 5.0	35 on contact with the floor	<1000	<1000
Sample Room D-Deck	25 - 150	4000 on contact with overhead line	<1000	5139 inside sample sink
Gas Absorber Room D-Deck	6.0 - 25	150 on contact with Rad monitor	<1000	<1000
Cargo Hold D Deck	<1.0 – 6.0	150 on contact behind aft deck plates along Port side	<1000	<1000
Hold Deck Aft of Reactor space port side (see Item 2.1.3.i)	5.0 - 7.0	50 on contact with piping under the deck plate	N/A	N/A

### 2.2.2 MONITORING STATION DOSIMETER RESULTS

In addition, thirty-six (36) permanently placed thermoluminescent dosimeter (TLD) monitoring stations are dispersed throughout the non-radiological controlled areas of the NSS and in those areas of the NSS that are routinely occupied. Fixed point radiation surveys are performed during TLD change outs. Results from the TLDs from all monitoring stations indicated that readings were insignificant as compared to the background radiation levels. No fixed point radiation dose rate exceeded 5  $\mu\text{R/hr}$  (micro-R/hr).

### 2.3 ENVIRONMENTAL SAMPLE ANALYSIS SURVEYS

Environmental water and sediment samples were taken adjacent to the ship at various times during the calendar year as required by TS and ship's movement. These samples were sent to the off-site laboratory facilities of GEL Laboratories LLC, Charleston, SC for analysis. In addition as a comparison, a water and sediment sample was taken prior to the ship arrival at

the BAE shipyard berth. The environmental sample results indicate that the radiological conditions in the environment surrounding NSS are insignificant as compared to expected background conditions. Therefore, based on the results of the radiological environmental monitoring program, NSS operations did not have any adverse effects on the health and safety of the public or on the environment in 2007.

**2007 RADIOLOGICAL ENVIRONMENTAL SAMPLING RESULTS**

<b>Sample Location</b>	<b>Sample Date</b>	<b>Type of sample</b>	<b>Co-60</b>	<b>Cs-137</b>
NSS Port Side 23 <sup>rd</sup> Street Newport News, VA	05/30/2007	Sediment (A)	4.95E-02 pCi/g (B)	4.48E-02 pCi/g (B)
BAE Shipyard Norfolk, VA Pre-arrival	05/30/2007	Sediment (A)	6.53E-02 pCi/g (B)	6.00E-02 pCi/g (B)
BAE Shipyard Norfolk, VA NSS Port side	10/02/2007	Sediment (A)	6.99E-02 pCi/g (B)	7.84E-02 pCi/g (B)
BAE Shipyard Norfolk, VA NSS Stbd side	10/02/2007	Sediment (A)	5.97E-02 pCi/g (B)	5.69E-02 pCi/g (B)
BAE Shipyard Norfolk, VA Pier 6 Pre-arrival	5/30/2007	Water	4.15E+00 pCi/L (B)	3.72E+00 pCi/L (B)
BAE Shipyard Norfolk, VA NSS Port Side	10/02/2007	Water	2.33E+00 pCi/L (B)	2.26E+00 pCi/L (B)
BAE Shipyard Norfolk, VA NSS Stbd Side	10/02/2007	Water	2.18E+00 pCi/L (B)	2.05E+00 pCi/L (B)
BAE Shipyard Norfolk, VA NSS Port Side	10/02/2007	Liquid (C)	3.93E+00 pCi/L (B)	4.15E+00 pCi/L (B)
BAE Shipyard Norfolk, VA NSS Stbd Side	10/02/2007	Liquid (C)	4.05E+00 pCi/L (B)	3.88E+00 pCi/L (B)

- (A) Sediment samples are reported on a dry weight basis and are decay corrected to the Sample Collect date
- (B) Calculated MDA as an a-posteriori values at the 95% confidence Level
- (C) Water was decanted off of sediment samples

**2.4 QUARTERLY INTRUSION ALARM SYSTEM CHECKS**

Routine security surveillances were conducted as required and the Key and Seal log was reviewed on a quarterly basis. No deficiencies were noted.

## **2.5 RADIOACTIVE MATERIALS REMOVED BY RELEASES, DISCHARGES AND WASTE SHIPMENTS**

No radioactive materials were removed from the ship as described below:

### **2.5.1 RELEASES**

There were no releases.

### **2.5.2 DISCHARGES**

There were no discharges.

### **2.5.3 SHIPMENTS**

There were no shipments.

## **2.6 PRINCIPAL MAINTENANCE PERFORMED**

Principal NSS maintenance activities performed during the period included the following:

- Installed a new security gate system at the top of the gangway;
- Added ADT security equipment to the existing security system as detailed in 2.1.3.d above;
- Sampled ballast tank water in all tanks except those in the lower reactor compartment, frames 99 - 126;
- Painted numerous interior areas of the ship
- Removed oil from cargo machinery Deck Houses
- In order to facilitate emergency personnel egress from the Reactor Compartment (RC), changed the locking mechanisms for RC doors from a lock and chain to an inside chain secured by a threaded chain link instead of a lock. Locking mechanisms for the B - deck RC door and deck hatches were not changed.
- Throughout the accommodation spaces, removed un-encapsulated asbestos found in overhead ceiling panels, joiner bulkheads and pipe insulation.

## **2.7 UNAUTHORIZED ENTRY INTO RADIATION CONTROL AREAS AND CORRECTIVE ACTIONS TAKEN TO IMPROVE ACCESS CONTROL**

No unauthorized entries were made into any Radiation Control Area in the previous year.

### **2.7.1 EVENT DISCUSSION**

None

### **2.7.2 IMPROVEMENTS TO ACCESS CONTROL**

None

## **2.8 INSPECTION OF BOUNDARIES CONTAINING RADIOACTIVE MATERIALS**

The results of the annual inspections required by Technical Specification 3.7.6 was conducted in December 2007.

There was no notable change in the condition of the primary and auxiliary systems since the last inspection.

## **2.9 SUMMARY OF 2007 OCCUPATIONAL EXPOSURE**

As a result of the N.S. *Savannah* being in the Mothballed state of protective storage, no individual is expected to receive in one year from sources external to the body, a dose in excess of 10% of the limits specified in 10 CFR 20.1201. Twenty individuals were monitored with TLD and Self reading dosimetry

during their entries into radiological controlled area. All personnel received zero dose from occupational sources during the monitoring period. Therefore, MARAD has no requirement under 10 CFR 20.1502, "Conditions requiring individual monitoring of external and internal occupational dose" to reasonably anticipate that there is a need to "monitor exposure to radiation and radioactive materials at levels sufficient to demonstrate compliance with the occupational of dose limits." Likewise, MARAD has no requirement under 10 CFR 20.2106, "Records of individual monitoring results" to maintain records of doses when an individual is not required to be monitored.

### **3.0 SUMMARY OF OCCUPATIONAL EXPOSURE 2004 AND 2005**

As noted in Inspector Follow-up Item (IFI) 50-238/2006-201-01 (Reference c), occupational exposure data for 2004 and 2005 was not submitted in their respective Annual Reports. Two other deficiencies noted in the IFI, Radiation Survey Results for 2005 and Quarterly Intrusion Alarm System Checks for 2004 and 2005, were reported as required in the 2006 Annual Report.

In 2004, no activities were conducted that required an individual to be monitored.

In 2005, the Scoping Characterization Project was the only activity conducted that would require individuals to be monitored. During that activity, seventeen (17) individuals were monitored. Seven (7) individuals received zero (0) to one (1) mR, six (6) individuals received 40 to 85 mR and four (4) individuals received 130 – 220 mR. The highest dose was 217 mR received by one individual. The exposure to all individuals was significantly less than 10% of the limits in 10 CFR 20.1201.

Reporting the summary of occupational exposure for 2004 and 2005 addresses the remaining deficiency noted in IFI 50-238/2006-201-01.

### **4.0 REFERENCES**

- a. Regulatory Guide 1.86, Termination of Operating Licenses for Nuclear Reactors, June 1974
- b. Letter from Mr. Robert W. Reid (NRC) to U.S. Department of Commerce, Maritime Administration, dated May 19, 1976, No Title [Issuance of Amendment 8, Possession-only License]
- c. Letter from Mr. J. H. Eads (NRC) to Mr. E. W. Koehler (MARAD), dated October 19, 2006, NRC Inspection Report No. 50-238/2006-201