January 17, 2006

Southern Nuclear Operating Company, Inc.
ATTN: Mr. H. L. Sumner
Vice President - Hatch Plant
P.O. Box 1295
Birmingham, AL 35201-1295

SUBJECT: EDWIN I. HATCH NUCLEAR POWER PLANT - NRC MATERIAL CONTROL AND ACCOUNTING PROGRAM INSPECTION REPORT 50-321/2005-201, 50-366/2005-201

Dear Mr. Sumner:

On November 11, 2005, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at the Edwin I. Hatch Nuclear Plant, Units 1 and 2. The inspection was conducted under Phase III of Temporary Instruction 2515/154, "Spent Fuel Material Control and Accounting at Nuclear Power Plants." The enclosed inspection report documents the inspection findings, which were discussed during an exit meeting on November 11, 2005, with Mr. George Frederick and other members of your staff. A meeting by telephone was conducted on December 19, 2005, and January 17, 2006, to re-exit the inspection.

The inspection examined activities conducted under your license as they relate to safety and compliance with the Commission's rules and regulations and with the conditions of your license. The inspectors reviewed selected procedures and records, observed storage of special nuclear material in the spent fuel pool, and interviewed personnel. Areas examined during the inspection included physical inventory and accounting records, with an emphasis on the discrepancy your staff identified regarding spent fuel rod pieces that could not be located.

Based on the results of this inspection, the NRC has determined that Unresolved Item (URI) 05000321, 366/2005003-02, Special Nuclear Material Control and Accountability, will remain open pending the results of the evaluation of the fragments and the licensee's determination of the extent, if any, of additional special nuclear materials in the spent fuel pool. The URI and the circumstances surrounding it are described in the enclosed inspection report.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter, its enclosures, and your response (if any) will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of the NRC's document system (ADAMS). ADAMS is accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html (the Public Electronic Reading Room).

Should you have any questions concerning this report, please contact Stephen Caudill at (404) 562-4741 or Dori Votolato at (301) 415-7633.

Sincerely,

/RA/

Barry C. Westreich, Chief
Security Oversight Section
Division of Nuclear Security
Office of Nuclear Security and Incident Response

Docket Nos. 50-321, 50-366
License Nos. DPR-57 and NPF-5

Enclosure:
Inspection Report 05000321/2005201, and
05000366/2005201
w/Attachment: Supplemental Information

cc w/encl: (see page 3)

cc w/encls:

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U.S. NUCLEAR REGULATORY COMMISSION

OFFICE OF NUCLEAR SECURITY AND INCIDENT RESPONSE

Docket Nos:	50-321, 50-366
License Nos:	DPR-57, NPF-5
Report Nos:	05000321/2005201 and 05000366/2005201
Licensee:	Southern Nuclear Operating Company, Inc.
Facility:	Edwin I. Hatch Nuclear Plant
Location:	P.O. Box 2010 Baxley, Georgia 31515
Dates:	November 7 - 11, 2005
Inspectors:	Stephen Caudill, Senior Fuel Facilities Inspector Dori Votolato, MC&A Physical Scientist
Approved by:	Barry Westreich, Chief Security Oversight Section Division Nuclear Security Office of Nuclear Security and Incident Response

Enclosure

SUMMARY OF FINDINGS

IR 05000321/2005-201, 05000366/2005-201; 11/07/2005 - 11/11/2005; Edwin I. Hatch Nuclear Plant - Unit 1 and Unit 2; Material Control and Accounting Program.

This inspection examined the adequacy of measures taken by the licensee to control the risk of loss, theft, or diversion of special nuclear material (SNM). The inspection was conducted under Phase III of NRC Temporary Instruction (TI) 2515/154, "Spent Fuel Material Control and Accounting at Nuclear Power Plants."

Based on the results of this inspection, one Unresolved Item (URI) with respect to unaccounted for spent fuel rod pieces was identified. With the exception of the unaccounted for spent fuel rod pieces, the inspectors determined that the licensee had adequately accounted for and controlled its remaining SNM.

REPORT DETAILS

1. Background

In May 2004, the licensee initiated a review of fuel reconstitution records in response to industry-wide spent fuel material control and accounting (MC&A) problems. In this review, the licensee found that a number of spent fuel assembly reconstitution records from the 1980s made reference to broken fuel rod segments placed into cans or buckets at the bottom of the licensee's two spent fuel pools (SFPs). The licensee found that the inventory records were inadequate to account for the fragments referenced in these reconstitution records. On May 10, 2005, in response to requested actions in NRC Bulletin 2005-01, "Material Control and Accounting at Reactors and Wet Spent Fuel Storage Facilities," and in preparation for an SFP cleanup campaign, the licensee identified what appeared to be fragments of spent nuclear fuel rods in a bucket in the Unit 1 SFP. The issue was tracked as **Unresolved Item (URI) 05000321, 366/2005003-02**, Special Nuclear Material Control and Accountability, pending the results of the evaluation of the fragments and the licensee's determination of the extent, if any, of additional special nuclear materials in the spent fuel pool. The issues tracked by this URI will continue to be open until the licensee has completed their spent fuel pool evaluation and root cause analysis.

The licensee's initial review of MC&A records indicated that the inventory records did not track separated fuel rod pieces or fragments. The licensee hired contractors to characterize the fragments found in the bucket and search the fuel racks and floors in both SFPs for other SNM items. In a document dated October 26, 2005, the primary contractor for spent fuel characterization efforts reported to the licensee that 21 fragments of spent fuel rods ranging in lengths from 59.5 inches to less than an inch were recovered.

Three of these fragments contained the lower end plugs in which rod serial numbers were inscribed. The rod serial numbers were traced to the three subject assemblies and the rod locations were inspected to determine the amount of the rod remaining in the assembly location. The length of rod remaining in the bundles plus the amount of SNM collected by the contractor was compared to the length of SNM in three full rods. The comparison resulted in a discrepancy of SNM.

Also, a records review revealed that two fragments (3 inches and 10 inches) from a reconstitution effort in 1981 were placed into a disposal can. The licensee was unable to confirm that those two fragments were included in the inventory of fragments recovered by the contractor in the May 2005 campaign. On November 10, the licensee notified the NRC, per 10 CFR 20.2201(a)(1)(ii), of 68 inches of unaccounted for SNM (Event Notification 42135). During the week of November 14, the licensee informed the NRC Senior Resident Inspector that a later inspection of a skeleton assembly containing spent fuel rod fragments found an additional discrepancy of missing spent fuel rod fragments. On December 19, 2005, the licensee reported that additional fragments of SNM were collected by the contractor and that the inventory discrepancy of special nuclear fuel had decreased.

2. MC&A Management Structure (TI 2515/154, Section III.a)

a. Inspection Scope and Observations

The inspectors reviewed licensee documentation for MC&A activities, including the written MC&A procedures, organization charts, and written fuel handling and reactor engineering procedures relating to MC&A. The inspectors also interviewed licensee staff concerning the definition of roles and responsibilities for controlling SNM.

The licensee's MC&A program was subject to the requirements of 10 CFR 50, Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants." Activities conducted under this program were conducted using the following five primary MC&A procedures, subject to the requirements of 10 CFR 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings." These procedures were as follows:

- 40AC-ENG-007, "Control of Special Nuclear Material," Revision (Rev.) 4.0;
- 42FH-ENG-030, "Special Nuclear Material Inventory & Transfer Control," Rev. 9.1;
- 42FH-ERP-012, "New Fuel & New Channel Handling," Rev. 9.3;
- 42FH-ERP-014, "Fuel Movement," Rev. 15.2; and
- 62RP-RAD-055, "Underwater Storage and Inventory of Radioactive Materials in the Spent Fuel Pools," Rev. 1.1.

Procedure 42FH-ENG-030, "Special Nuclear Material Inventory & Transfer Control," described the requirements, overall responsibilities, and program for nuclear material control at all sites under the licensee's control. The licensee's site specific program for controlling receipt, transfer, storage, inventory, and shipment of SNM was also described in Procedure 40AC-ENG-007, "Control of Special Nuclear Material." Responsibilities for MC&A activities were clearly defined in these procedures, the fuel handling procedures, and other reactor engineering procedures.

Earlier revisions of Procedure 42FH-ENG-030 required physical inventory of all SNM. However, those versions only addressed inventory of intact fuel assemblies, and there were no instructions which specifically addressed inventorying separated rods or the SNM fragments in the SFP. The current procedure revision is 9.1, which was updated in October 2005 to include instructions for the storage and inventory of individual fuel rods, fuel rod pieces, and other SNM fuel parts.

The MC&A program in place as of the exit meeting on November 11, complied with regulatory requirements. However, a full assessment of the program was not possible because the licensee had not finished characterizing all SNM in the SFP, and had not completed its review of all accounting records.

b. Findings

The issues tracked by **Unresolved Item (URI) 05000321, 366/2005003-02**, Special Nuclear Material Control and Accountability, will continue to be open pending the NRC's inspection of the licensee's investigation and resolution of the discrepancies between the records and the spent fuel pool inventory, the results of the complete evaluation of the spent fuel rod fragments and the root cause analysis.

3. Rod Activities, “Orphan” Rods, and Movements of Spent Fuel (TI 2515/154, Sections III.b,c,d)

a. Inspection Scope and Observations

The inspectors reviewed the licensee’s written procedures covering movement of spent fuel, documentation of movements of spent fuel, and documentation of select spent fuel bundle disassembly operations. Requirements for movements of fuel were described in Procedure 42FH-ENG-030, Special Nuclear Material Inventory & Transfer Control and Procedure 42FH-ERP-014, Fuel Movement. As directed by these procedures, the licensee tracked material movement through Item Control Area (ICA) Transfer Authorization forms and Fuel Movement Sheets. All fuel movements were approved by a Reactor Engineer Supervisor, a SNM Cognizant Engineer, or a designated alternative before a fuel movement was completed. Information concerning the material identification, the location moved from, the location moved to, and initials of the individuals who completed the move were required to be recorded on each document. Fuel Movement Sheets and ICA Transfer Authorization forms included a place for the initials of the person moving the fuel and the person checking the work. The licensee’s procedures, prior to October 2005, did not address the possibility of movement of individual fuel rods, fuel pieces, or other SNM fuel parts. Procedure 42FH-ENG-030 was revised in October 2005 and the licensee added a reference section to proceduralize requirements for storage and inventory of individual fuel rods, fuel rod pieces, and other SNM fuel parts.

In addition to the use of fuel movement forms, the licensee used a SNM database to record all fuel and rod movements during a campaign. This SNM database was used to generate the SFP maps. Procedures 42FH-ERP-014 and 42FH-ENG-030 directed the licensee to update all re-locations in the database.

The inspectors reviewed the licensee’s documentation to track individual fuel rods from the point at which they were removed from the parent assembly to their final destination. During the 1980s, the licensee experienced crud induced localized corrosion (CILC), which caused fuel rods to fail. The licensee undertook many campaigns to inspect the assemblies, to characterize the problem, and to reconstitute the damaged assemblies. Generally, the licensee had conducted inspections of fuel at the end of each operating cycle since the 1980s. These inspections were conducted by a contracted vendor. The inspectors reviewed a selection of licensee records which documented campaigns in which rods were removed from their parent assembly. Orphan rods which resulted from reconstitution efforts were stored onsite in eight donor or skeleton assemblies. In 1996, during fuel inspection, a rod was broken and pellets became separated from the rod. Three to six pellets which had separated from the failed rod lodged in the bundle. Additional pellets fell out of the bundle, were collected, and placed into a capsule for storage. A 21-inch rod piece from the failed rod and the capsule were stored in a water rod in one of the skeleton bundles. The skeleton assemblies and the assemblies affected by CILC were stored in Rack 26 of the Unit 1 SFP, separate from non-damaged fuel.

The inspectors reviewed licensee documentation of receipts and shipments off-site, including reports to the national Nuclear Materials Management and Safeguards System (NMMSS) using NRC/DOE Forms 741 and 742. Reports from NMMSS indicated that the licensee had two open transactions. The licensee indicated their intent to resolve these open transactions with NMMSS.

b. Findings

The issues tracked by **Unresolved Item (URI) 05000321, 366/2005003-02**, Special Nuclear Material Control and Accountability, will continue to be open pending the NRC's inspection of the licensee's investigation and resolution of the discrepancies between the records and the spent fuel pool inventory, the results of the complete evaluation of the spent fuel rod fragments and the root cause analysis.

4. Self-Assessment Program (TI 2515/154, III.e)

a. Inspection Scope and Observations

The inspectors reviewed the licensee's self-assessment program for the SNM Inventory and Control program. The licensee's MC&A program was subject to the requirements of 10 CFR Part 50, Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants." The licensee staff annually performed audits of the MC&A program in accordance with Criterion XVIII, "Audits." The inspectors reviewed the following audits of the MC&A program:

- Audit No. 99-SNM-1, March 15, 1999;
- Audit No. 00-SNM-1, January 8, 1999;
- Audit No. 01-OUTAGE-1, December 17, 2001;
- Audit No. 02-OUTAGE-1, June 11, 2002;
- Audit No. 03-OUTAGE-1, June 23, 2003; and
- Audit No. H-RFO-2004, May 21, 2004.

The audits covered topics such as SNM receipts, internal transfers, physical inventories, storage, procedural adherence, and records. The auditors based their evaluations only on the licensee's procedural requirements which were in place at the time of the audits. The licensee procedures only addressed inventory and control of intact fuel assemblies, and there were no instructions which specifically addressed inventorying separated rods or the SNM fragments in the SFP. The licensees audits, therefore, only addressed MC&A of intact fuel assemblies. Within this context, the audits were adequate.

b. Findings

No findings of significance were identified.

5. Configuration Control Over MC&A Procedures (TI 2515/154, III.f)

a. Inspection Scope and Observations

The inspectors reviewed the licensee's program for keeping the MC&A written procedures current and ensuring the use of the most recent revision. All of the five primary MC&A procedures, as listed in Section 2 of this report, were subject to the requirements of 10 CFR 50, Appendix B, Criterion VI, "Document Control." Changes to procedure were reviewed in accordance with the licensee's Procedure 10AC-MGR-003, "Administrative Control Procedure," (Version 22). Vendor procedures were also subject to the same reviews as site procedures before they are approved for use or when a change is made to a previously approved vendor procedure.

b. Findings

No findings of significance were identified.

6. Management Oversight of Spent Fuel Pool Operations (TI 2515/154, III.g)

a. Inspection Scope and Observations

The inspectors reviewed documentation of spent fuel pool operations and written procedures to determine if the licensee provided management oversight of all spent fuel pool operations. The inspectors also evaluated, by direct observation, the degree of management oversight of vendors performing work in the spent fuel pool.

Procedures for movements of fuel assemblies, including the skeleton assemblies, required a senior reactor operator, reactor operator, and additional verifier to be present. Reactor engineering (RE) staff were not required to be present, but RE reviewed fuel movements both before and after they were made.

The inspectors noted that there were no licensee policies or procedures that required constant licensee management supervision of the contractor employees working with the Unit 1 SFP fuel preparation machines to inspect the spent fuel and characterize the fuel rod fragments. The contractor employees were using an underwater camera to visually confirm that the physical conditions of fuel assemblies subject to reconstitution work matched the historical records. In some instances, the contractors were extracting and replacing fuel rods using the fuel preparation machines. The fuel preparation machines moved the fuel assemblies up or down in a vertical direction while the required rod was held in place by a special gripping tool. Management oversight for this work included the licensee staff holding an Infrequently Performed Test and Evolution briefing with the vendors on their first day of work, and conducting daily pre-job and post-job briefs with the vendors. If time permitted, or if a problem arose, a member of the RE staff or the Refuel Floor Supervisor would observe and/or direct the vendors' work on the refuel floor. However, there were no policies or procedures requiring constant licensee management supervision of the contractors working with SNM in the SFPs.

The inspectors reviewed the licensee's procedure for contractor oversight, AG-MGR-58-0295N, "Control and Administration of Onsite Contractors," Rev. 0, and determined that the licensee was in compliance with this procedure. Condition Report (CR) 2005105177,

written on May 10 to document the unexpected discovery of fuel rod fragments in the Unit One SFP, listed inadequate contractor oversight during the 1980s fuel reconstitutions as a possible cause for the failure to account for the spent fuel rod fragments. The licensee's policies and procedures required management oversight of SNM fuel movements. However, the licensee did not provide oversight of other work performed by the contractors in the SFPs.

b. Findings

No findings of significance were identified.

7. Physical Inventory and Verification of Inventory (TI 2515/154, III.h,i)

a. Inspection Scope and Observations

The inspectors reviewed physical inventory reports for the years 2000 - 2005. Physical inventories were conducted within 12 months in accordance with regulatory requirements, with the most recent physical inventory completed on June 3, 2005. The procedure for conducting inventories, 42FH-ENG-030, did not require a verification of assemblies by serial number, but was only visual comparison that the SFPs' racks matched the map. However, Procedure 42FH-ERP-014, required the verification of serial numbers all the fuel assemblies' in an SFP rack which was involved in a core unload, reload or shuffle.

The inspectors selected a random sample of ten assemblies from the current spent fuel pool map in Unit 1 and ten assemblies from Unit 2 and verified that they were located in the positions recorded on the licensee's spent fuel pool maps. A sample of ten assemblies stored in neighboring locations in both Units 1 and 2 were chosen in the spent fuel pool and their locations were verified on the spent fuel pool map. The total of 40 randomly selected assemblies that inspectors verified were recorded correctly in the records. The inspectors also noted, through interviews and observations, that the Unit 2 pool only contained discrete assemblies and Low Power Range Monitors. The assemblies with damage or corrosion, plus the eight skeleton assemblies holding fuel rod fragments, were stored in Rack 26 in the Unit 1 SFP.

At the time of the most recent inventory, there were 156 non-fuel SNM items stored in the pools, consisting of used in-core detectors. The MC&A requirements for these items were governed by procedure 62RP-RAD-055, "Underwater Storage and Inventory of Radioactive Materials in the Spent Fuel Pools," Rev. 1.1. These items were stored in containers at the bottom of the SFP. Each in-core detector had a corresponding yellow tag affixed to the side of the pool. The RE staff inventoried the non-fuel SNM by counting and verifying the information on the yellow tags, but was not required to visually confirm each non-fuel SNM item. Non-SNM radioactive items stored in the pools were identified with white tags and RE staff also conducted annual inventories for these items. The RE staff stated that for some of the in-core detectors stored in containers on the bottom of the pool, conducting visual verifications was not feasible. The amount of SNM contained in the in-core detectors was collectively less than one gram and therefore below the threshold for MC&A reporting requirements. The inspectors determined that

although RE staff did not visually confirm the presence of all the non-fuel SNM, inventories of the tags was adequate since the licensee had sufficient records to support the traceability of information on the yellow tags.

As noted in Section 2 of this report, the most recent revision of Procedure 42FH-ENG-030, had instructions to include in the physical inventories the spent fuel rod fragments. The inspectors observed that the pieces of SNM-bearing fuel rod fragments found since May 2005 were listed on the inventory records. As of the inspection exit meeting, the licensee was still searching for more fuel rod fragments in the SFP.

b. Findings

The issues tracked by **Unresolved Item (URI) 05000321, 366/2005003-02**, Special Nuclear Material Control and Accountability, will continue to be open pending the NRC's inspection of the licensee's investigation and resolution of the discrepancies between the records and the spent fuel pool inventory, the results of the complete evaluation of the spent fuel rod fragments and the root cause analysis.

8. Exit Meeting

On November 11, 2005, the inspectors presented the inspection results to Mr. George Frederick and other members of the licensee's staff. The inspectors confirmed that appropriate controls were implemented for all proprietary information provided to them. The NRC re-exited with the licensee by telephone on December 19, 2005, and January 17, 2006.

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee Personnel

R. Baker	Licensing, Manager
M. Brazell	Reactor Engineering Supervisor
N. Folk	Engineer, Sr.
G. Frederick	Plant General Manager
G. Griffis	Refueling Floor Team Leader
B. Hunt	Nuclear Fuel Manager
D. Madison	Assistant General Manager, Plant Operations
K. Underwood	Performance Analysis Supervisor
D. Williams	SNM Custodian

NRC Personnel

D. Simpkins	Senior Resident Inspector
J. Hickey	Resident Inspector

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened
NONE

Closed
NONE

Discussed
05000321, 366 /2005003-02 URI Special Nuclear Material Control and Accountability

LIST OF DOCUMENTS REVIEWED

Procedures
AG-MGR-58-0295N, “Control and Administration of Onsite Contractors,” Rev. 0
10AC-MGR-003, “Administrative Control Procedure,” (Version 22)
40AC-ENG-007, “Control of Special Nuclear Material,” Rev. 4.0
42FH-ENG-030, “Special Nuclear Material Inventory & Transfer Control,” Rev. 9.1
42FH-ERP-012, “New Fuel & New Channel Handling,” Rev. 9.3
42FH-ERP-014, “Fuel Movement,” Rev. 15.2
62RP-RAD-055, “Underwater Storage and Inventory of Radioactive Materials in the Spent Fuel Pools,” Rev. 1.1

Engineering Drawings
None

Photographs
Example of Crud Induced Localized Corrosion (2)
Assembly grid spacer with possible cladding or SNM
Fuel pellet and fuel pin in flow hole of SFP rack (3)

LIST OF ACRONYMS

CFR	Code of Federal Regulations
DOE	Department of Energy
MC&A	Material Control and Accounting
NMMSS	Nuclear Materials Management and Safeguards System
NRC	Nuclear Regulatory Commission
RE	Reactor Engineering
SNM	Special Nuclear Material
TI	Temporary Instruction
URI	Unresolved Item