June 14, 2001

Mr. Edward M. Davis
President and CEO
NAC International, Incorporated
655 Engineering Drive
Norcross, GA 30092

SUBJECT: NRC INSPECTION REPORT NOS. 72-1015/01-202, 71-0018/01-201

Dear Mr. Davis:

This letter is in reference to the Nuclear Regulatory Commission (NRC) inspection conducted on May 14-18, 2001, of safety related activities conducted at your offices in Norcross, Georgia. The purpose of the inspection was to examine NAC International Incorporated (NAC) design, procurement, and Quality Assurance (QA) activities as well as fabrication records for Part 71 and Part 72 equipment. Enclosure 1 presents the results of this inspection.

This inspection was an examination of activities as they relate to safety and compliance with the Commission's rules and regulations and with the conditions of your certificate of compliance. Within these areas, the inspection consisted of selected examination of procedures and representative records, observations of activities, and interviews with personnel.
On May 18, 2001, the team presented the preliminary results of the inspection at an exit meeting conducted at your office.

Based on the results of this inspection, the inspection team determined that NAC had performed activities in accordance with 10 CFR Part 71 and Part 72, and the QA program was adequately implemented. The team identified one unresolved item regarding a calculation that had nonconservative engineering judgments or assumptions that did not have adequate documented technical bases as required by NAC procedures.

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this letter and its enclosure(s) will be made available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of NRC's document system (ADAMS). ADAMS is accessible from the NRC Web site at http://www.nrc.gov/NRC/ADAMS/index.html (the Public Electronic Reading Room).

Sincerely,

/s/ /RA/

Charles L. Miller, Deputy Director
Licensing and Inspection Directorate
Spent Fuel Project Office
Office of Nuclear Material Safety
and Safeguards

Docket Nos. 72-1015, 71-0018

Enclosure: Inspection Report Nos. 72-1015/01-202,
71-0018/01-201

cc: Service List

Docket Nos. 72-1015, 71-0018

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71-0018/01-201

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*see previous concurrence

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U.S. NUCLEAR REGULATORY COMMISSION
Office of Nuclear Material Safety and Safeguards
Spent Fuel Project Office

Inspection Report

Docket Nos.:	72-1015, 71-0018
Report Nos.:	72-1015/01-202, 71-0018/01-201
Certificate Holder:	NAC International, Incorporated 655 Engineering Drive Norcross, GA 30092
Dates:	May 14-18, 2001
Inspection Location:	NAC International, Incorporated Norcross, GA
Inspection Team:	Paul Narbut, SFPO, Team Leader Rebecca Karas, SFPO, Project Manager Robert Temps, SFPO, Inspector Bernard H. White IV, SFPO, Nuclear Engineer
Approved by:	Charles L. Miller, Deputy Director Licensing and Inspection Directorate Spent Fuel Project Office, NMSS

EXECUTIVE SUMMARY

NAC International
NRC Inspection Report No. 72-1015/01-202, 71-0018/01-201

The U.S. Nuclear Regulatory Commission (NRC) performed a team inspection at NAC International Incorporated (NAC) in Norcross, GA, to examine NAC design, procurement, and Quality Assurance (QA) activities as well as fabrication records for Part 71 and Part 72 equipment. The objective of the inspection was to verify that activities were performed in accordance with 10 CFR Parts 71 and 72, and NAC's NRC-approved QA program.

Design Controls
The team concluded that, overall, design control met regulatory requirements. However, the team identified two weaknesses that were not violations of regulatory requirements. One weakness involved lack of systematic training and training records in standard practices for engineers. The second weakness involved the lack of a procedure for making reportability determinations.

The team also identified a potential issue involving a criticality calculation that had nonconservative engineering judgments and assumptions that did not have adequate documented technical bases as required by NAC procedures. Resolution of the issue is planned in the near future.

Management Controls
The team concluded that, overall, management controls and implementation of the QA program met regulatory requirements.

Fabrication Controls
Overall, the team determined that procurement, fabrication, quality control, and nondestructive examination records met regulatory requirements.

Maintenance Controls
Overall, the team determined that maintenance controls and records met regulatory requirements.

INSPECTION PROCEDURES USED

60851, “Design Control of ISFSI Components”
60852, “ISFSI Component Fabrication by Outside Fabricators”
60857, “Review of 10 CFR 2.48 Evaluations”
86001, “Design, Fabrication, Testing, and Maintenance of Transportation Packagings”

LIST OF ACRONYMS USED

APS	Arizona Public Service Company
ASME	American Society of Mechanical Engineers
BWR	boiling water reactor
CEO	Chief Executive Officer
CFR	Code of Federal Regulations
CoC	certificate of compliance
CR	corrective action report
EDR	engineering disposition request
ISFSI	independent spent fuel storage installation
K_{eff}	effective neutron multiplication factor
LWT	legal weight truck
MPC	multi purpose cannister
MYAPC	Maine Yankee Atomic Power Company
NAC	NAC International Incorporated
NCR	nonconformance report
NDE	nondestructive examination
NMSS	Office of Nuclear Material Safety and Safeguards
NRC	Nuclear Regulatory Commission
QA	quality assurance
QC	quality control
QP	quality procedure
SAR	safety analysis report
SBU	strategic business unit
SFPO	Spent Fuel Project Office
SIN	self identification notice
UMS	Universal MPC System
VP	vice president

PERSONS CONTACTED

The team held an entrance meeting on May 14, 2001, to present the scope and objectives of the NRC inspection. On March 18, 2001, the team held an exit meeting at NAC to present the preliminary findings of the inspection. The people present at the meetings are listed in Table 2.

Table 2
Entrance/Exit Meeting Attendees

Name	Title	Organization	Entrance 5/14/01	Exit 5/18/01
B. Auvil	VP Utility Site Services	NAC	x	x*
R. Bass	QA Manager	NAC	x	x*
W. Bell	Manager of Projects	MYAPC		x
D. Blee	Executive VP	NAC		x*
J. Bourassa	Manager, Nuclear Safety	Connecticut Yankee		x
T. Danner	Director, Design and Analysis	NAC	x	x
E. Davis	CEO	NAC	x	x*
N. Eng	Project Manager	NAC		x
B. Greene	QC Manager	NAC	x	x
B. Hansen	Section Leader	Arizona Public Service		x
K. Hoedeman	Director, Fabrication and Construction	NAC		x
R. Karas	Project Engineer	USNRC	x	
D. Kierpa	Fabrication Manager	NAC	x	x
W. Lee	VP Engineering and Chief Engineer	NAC	x	x
M McGough	Sr VP Marketing and Business Development	NAC	x	x
P. Narbut	Team Leader	USNRC	x	x
B. Palmer	VP Administration	NAC	x	
C. Pennington	VP Engineering Product Development	NAC	x	x
T. Shelton	VP, Site Technical Services	NAC	x	x
T. Shippee	Quality Programs Manager	MYAPC		x
R. Smith	VP Quality	NAC	x	x
R. Temps	Inspector	USNRC	x	x
T. Thompson	Director, Licensing	NAC	x	x
J. Viebrock	VP Site and Transportation	NAC	x	x
E. Wallace	Project Manager	NAC		x
B. White	Nuclear Engineer	USNRC	x	x

*Attended by telephone

REPORT DETAILS

1. Inspection Scope

The team inspected activities associated with the design, fabrication, and maintenance of spent fuel dry storage components and radioactive material transportation packages to determine if they were performed in accordance with the requirements of 10 CFR Parts 21, 71, and 72, the applicable safety evaluation reports, and the NRC-approved QA program.

The team examined applicable procedures, drawings, and records. The team also interviewed personnel responsible for selected activities. Additionally, the team examined personnel training and qualifications.

2. Management Controls

2.1 Scope

To determine the effectiveness of the management controls, the team reviewed practices, procedures, and related documentation regarding QA program implementation, nonconformance controls, documentation controls, and audit programs.

2.2 Observations and Findings

The team determined that overall, management controls and implementation of the QA program met regulatory requirements.

3. Design Controls

3.1 Scope

The team reviewed the design controls to determine whether the design control processes, including design development and modifications, were properly controlled and performed in accordance with procedures. The team inspected design activities to determine whether appropriate controls were implemented for QA documentation, deviation control, design interfaces, and design changes. The team focused on the review of design development and modifications. The team reviewed selected calculations for reasonableness of assumptions, methods, and results.

3.2 Observations and Findings

The team determined that overall design controls met regulatory requirements. However, one unresolved item and two weaknesses were identified.

The Basis for Calculation Assumptions Was Not Adequate

The team reviewed a criticality calculation, for fuel in a cask, that had nonconservative engineering judgments and assumptions that did not have adequate documented technical

bases as required by NAC procedures. Additionally, through technical discussions with NAC, the team considered that the calculation assumptions had not been thoroughly evaluated.

Calculation EA790-5206, "3-D Fuel Assembly Data for use in UMS Criticality Evaluations," Revision 0 is used as input to calculation EA790-5208, "UMS Criticality Safety Evaluation-Axial Shifting of Components During Hypothetical Accident Conditions of Transport," Revision 0. In the second calculation, the calculated maximum k_{eff}, for the limiting boiling water reactor (BWR) fuel assembly type was 0.9497, which is very close to the allowable maximum of 0.95. In the first calculation, NAC assumed that the upper hold-down springs for the fuel assemblies did not compress under top-drop accident conditions. Compression of the springs would increase k_{eff}. The calculation did not include an engineering justification for this assumption and, through technical discussions with NAC, the team considered that the calculation assumptions had not been thoroughly evaluated. As a result of the team's observation, NAC wrote Engineering Disposition Request, EDR 01-001 to track completion of an evaluation of the assumption, document any necessary revisions to the basis for the assumption and determine the effect on the criticality calculation.

The team further noted that calculation EA790-5206 included a second assumption with an incomplete justification. The BWR assembly discussed above includes a plenum spring several inches in length. NAC assumed the spring would allow a reduction in the distance between the rod end cap and the fuel pellets by a factor of two, but did not provide a thoroughly evaluated basis for that nonconservative assumption. Again, further compression of the spring would increase k_{eff}. NAC included the problem in EDR 01-001 for evaluation and tracking.

NAC quality procedure QP 3-2, "Preparation and Checking of Design Calculations," Revision 4, paragraph 2.2.2.b requires verifying that the basis for engineering judgements is adequately documented.

The failure to document the basis for engineering judgements is considered an unresolved item. NRC policy defines an unresolved Item as a matter about which more information is required to determine whether the issue in question is an acceptable item, a deviation, a nonconformance, or a violation. The unresolved item will be considered a violation of 10 CFR 72.150 "Instructions, procedures, and drawings," if the results of the recalculation of k_{eff}, prove to be unacceptable.
(Unresolved Item 72-1015/01-202-01)

Training for Engineers

The team noted that some training for engineers was not being performed as specified in NAC standard practice document SP-113, "SBU Training Programs," Revision 0. The standard practice documents are described by NAC procedures as not being requirements but rather as guidance documents. However, the team noted that SP-113 described a reasonable process for ensuring engineering was adequately trained in standard practice procedures and changes thereto. The team noted that SP-113 provides administrative guidance for training programs such as specifying that each strategic business unit (SBU) establish a formal training program in an annual memorandum, establish an appropriate schedule and specify a tracking method to be used for completed training. The team noted that memoranda outlining training were issued in 1998 and 1999, but no such memorandum was issued in 2000 or to date in 2001. Additionally, NAC engineering could not produce records to demonstrate that training for new standard practice documents or for changes was performed. NAC engineering management

stated the training had generally been done, but acknowledged that the failure to follow their standard practice document was not proper, nor their intent. The team considered the failure to follow the guidance of SP-113 to be a weakness that was not a violation of regulatory requirements. NAC wrote self identification notice SIN 01-001 to track corrective actions for the failure to train on standard practices. In response to the identified weakness, NAC also issued the 2001 memorandum outlining training on June 1, 2001.

Reportability Procedure

The team identified a weakness that was not a violation of regulatory requirements involving the lack of a procedure for making reportability determinations for reports required by 10 CFR Part 72.242 or 71.95. The team identified the weakness when reviewing a calculation, EA790-4004, which had results that were less favorable than those addressed in the Safety Analysis Report (SAR). NAC took immediate corrective action and wrote Revision 4 to procedure QP 16-2, "Reporting of Potential Significant Deficiencies and Defects and Regulatory Reporting," to add a reportability process for both 10 CFR 71.95 and 72.242. Additionally, NAC wrote SIN 01-002, to track their evaluation of the problem. NAC subsequently concluded that the change in calculation results was minor and not reportable. The team reviewed and agreed with the NAC conclusions. Additionally, NAC performed a review for other calculation results that might have been reportable and found none.

4. Fabrication Controls

4.1 Fabrication and Assembly

The team reviewed NAC's controls on fabrication activities. This included a review of the applicable quality procedures governing fabrication specifications, inspection and verification, quality source verification, and acceptance of subcontracted services. The team also reviewed NAC's qualified vendors list as well as purchase orders for materials associated with the NAC-LWT shipping cask. Lastly, the team reviewed fabrication specifications and completed data packages related to the NAC-UMS design.

4.2 Observations and Findings

By reviewing the fabrication records at NAC, the team determined that, overall, the fabrication records met regulatory requirements. The team determined that the 10 CFR Part 21 controls, including postings, procedures, purchase orders, and personnel familiarity with Part 21, met regulatory requirements.

5. Maintenance Controls

5.1 Scope

The team reviewed the maintenance controls to determine whether required maintenance was identified and performed. The team inspected maintenance records to assure that: (1) appropriate materials were used; (2) maintenance personnel were trained and qualified; (3) appropriate tools and equipment were used; (4) failure trending analysis was performed; and (5) hold points were established. The team focused on the review of maintenance activities, and tools and equipment.

5.2 Observations and Findings

By reviewing the maintenance records at NAC, the team determined that, overall, the maintenance records met regulatory requirements.

6. Exit Meeting

On May 18, 2001, at the conclusion of the inspection, the team held an exit meeting with NAC management representatives to present the preliminary inspection findings. NAC management acknowledged the inspection findings presented by the team.