



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

July 28, 1997

71-018
72-1015

MEMORANDUM TO: William F. Kane, Director
Spent Fuel Project Office, NMSS

FROM: Timothy J. McGinty, Project Manager
Spent Fuel Licensing Section
Spent Fuel Project Office, NMSS *Timothy J. McGinty*

SUBJECT: MEETING WITH NAC INTERNATIONAL TO DISCUSS THE ACTIONS TAKEN
TO RESOLVE THE ISSUES WITH CONFIRMATORY ACTION LETTER NO.
NMSS 96-01

A meeting was held between representatives of NAC International, Inc. (NAC) and the Nuclear Regulatory Commission on July 10, 1997. The meeting's primary purpose was for NAC to discuss the actions taken or planned to resolve the issues associated with Confirmatory Action Letter (CAL) No. NMSS 96-01. CAL 96-01 documented the actions that NAC would take in response to safety concerns identified during an NRC inspection conducted at NAC on September 23-26, 1996. Attachment 1 is an attendance list. Attachment 2 is the slides presented by NAC and NRC. This meeting was noticed on June 11, 1997.

After opening remarks, NAC's President and Chief Executive Officer presented an overview of the Quality Assurance (QA) Program improvements and the status of actions taken in response to the CAL. NAC has successfully completed design revalidation activities for each licensed packaging and completed all required maintenance of licensed transportation packagings prior to the next use. NAC has not identified any safety issues or Safety Analysis Report (SAR) changes as a result of CAL actions. NAC anticipates documenting the completion of all CAL action items by August 31, 1997.

Following the overview, NAC's Vice President, Quality, presented the status of the QA Program. NAC has implemented several enhancements to the QA Program, including (1) issuing a revised QA Manual, (2) issuing a new set of Quality Procedures, (3) accelerating QA audits, and (4) conducting personnel training in QA, project management, engineering analysis, maintenance, and records. NAC has also increased QA staffing, enhanced the corporate standing of QA leadership, and taken several actions to improve the corporate quality culture.

NAC's Senior Vice President, Engineering, discussed the design revalidation and control actions taken in response to the CAL. NAC conducted a design documentation review of the NAC-LWT, NAC-S/T, NLI-1/2, NAC-STC and NAC-1 cask designs to verify accuracy and completeness. The documentation review included the re-performance or verification of 25 design calculation packages. The review did not identify any safety issues or necessitate any SAR changes. The review has been documented in the form of a revalidation report which augments the original design documentation.

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ATTENDANCE LIST
Meeting Between
NAC International and NRC Staff
July 10, 1997

Timothy J. McGinty	USNRC/NMSS/SFPO
Robert E. Sweeney	IBEX
William Kane	USNRC/NMSS/SFPO
Charles Haughney	USNRC/NMSS/SFPO
Henry Lee	USNRC/NMSS/SFPO
Joe Shea	USNRC/NMSS/SFPO
Mike Waters	USNRC/NMSS/SFPO
David Tang	USNRC/NMSS/SFPO
Stephen O'Connor	USNRC/NMSS/SFPO
John Jankovich	USNRC/NMSS/SFPO
Eric Leeds	USNRC/NMSS/SFPO
Steve Hogsett	USNRC/NMSS/SFPO
Sue Gagner	USNRC/OPA
Len Tremblay	Yankee Atomic
Ed Davis	NAC International
Howard Smith	NAC International
Jim Viebrock	NAC International
Charles Pennington	NAC International
Tom Thompson	NAC International
Tim Smith	GSI
Tom Harrison	McGraw-Hill
Peter Holland	Com Ed
Dave Foss	PECO Nuclear
Vik Gupta	Holtec International
William Eckina	PECO Nuclear

NAC International Quality Assurance Program Enhancements

Presentation to The U.S. Nuclear Regulatory Commission

**Edward Davis, President & CEO
Howard Smith, Vice President, Quality
Charles Pennington, Group Senior Vice President, Engineering & Design Services
Jim Viebrock, Senior Vice President, Site & Transportation Services**

July 10, 1997



ATTACHMENT 2

Contents

- Overview (Ed Davis)
 - NAC QA Past & Present
 - QA Event Timeline
- NAC QA Program Status (Howard Smith)
- Design Revalidation & Control (Charlie Pennington)
- Packaging License Compliance (Jim Viebrock)
- Fabrication Planning (Howard Smith)
- CAL Status (Howard Smith)
- Summary (Ed Davis)



Overview

- NAC has made dramatic quality improvement progress during the past year
- Many actions implemented to improve internal quality culture
- CAL design revalidation activities successfully completed for each licensed packaging
- CAL maintenance actions completed for each licensed packaging put back into service and will be completed for others prior to next use

Ed Davis, President & CEO



Overview *(cont'd)*

- Records to substantiate CAL action completion will be finalized and filed by Aug. 31, 1997
- No safety issues identified
- No SAR changes necessary
- Recognize need for continuous improvement in pursuit of quality excellence
- Goal: Quality leadership recognized industry-wide



NAC QA Past and Present

- **NAC International has a 25-year record of safe radioactive material shipments and technology design**
- **Evolution of the formal NAC Quality Program fell behind pace of changing industry and regulatory requirements and expectations**
- **Current management recognizes the critical nature of achieving and maintaining an effective quality program**
- **NAC Board of Directors, management and each employee have documented their commitment to quality**



QA Event Timeline

- **New CEO appointed in Aug. 1994**
 - Existing QA staff of one full-time (equivalent) person

- **Hired full-time QA Director in Dec. 1994 to replace departing part-time QA Director**

- **Recognizing need to accelerate progress and promote strong QA leadership and direction, hired Howard Smith in April 1996 to replace previous QA Director**



QA Event Timeline *(cont'd)*

In April 1996, Initiated Numerous Program Enhancements:

- **QA program description revision**
- **QA manual rewrite**
- **Quality procedure revisions**
- **Enhanced personnel training**



QA Event Timeline *(cont'd)*

Personnel Enhancements Starting June 1996:

- **Removed all non-QA responsibilities from “QA and Purchasing Clerk”**
- **Redefined responsibilities for “Quality Assurance Coordinator”**
- **Hired experienced full-time QA Engineer in July 1996**



QA Event Timeline *(cont'd)*

NAC Self Assessment:

- **Initiated comprehensive internal audit in late July 1996**
 - **NAC results very similar to subsequent NRC findings**
 - **Current projects (Yankee Atomic NAC-MPC, Universal MPC System [UMS]) were determined to be significantly improved over past projects**
- **NAC initiated appropriate corrective actions in Aug. 1996, resulting in several Corrective Action Reports**
- **In conjunction with self assessment, NAC has also initiated a top-to-bottom self-correction program**



QA Event Timeline *(cont'd)*

NRC Assessment:

- NRC Inspection Sept. 1996—numerous issues noted resulting in a Confirmatory Action Letter and later, a Notice of Nonconformance
- NAC responded to CAL Oct. 7, 1996, committing to:
 - Remove all NAC casks from active service until QA and cask operations concur with corrective action adequacy
 - “Revalidate” (confirm adequacy of) all licensing actions since last NRC inspection (Dec. 1989)
 - Perform cask maintenance, replacing any improperly procured seals and gaskets
 - Perform leak test on each cask, using properly approved supplier and enhanced leak test procedure
 - Enhance our quality assurance program
 - Increase dedicated quality staffing



QA Event Timeline *(cont'd)*

NRC Assessment *(cont'd)*:

- Received Notice of Nonconformance on Nov. 18, 1996.
- Replied to Notice of Nonconformance on Dec. 18, 1996.
- Received NRC acceptance of adequacy of committed nonconformance report corrective actions on Dec. 23, 1996.
- Added full time QA Manager on Jan. 1, 1997
- Developed commitment tracking program and proceeded with specified corrective actions
 - Anticipated corrective action completion is Sept. 97



NAC QA Program Status

- QA Program Enhancements
- Staffing Enhancements
- Elevating Quality Awareness
 - QA Task Force and Quality Champions
 - Annual Quality Awareness Month

Howard Smith, Vice President, Quality



QA Program Enhancements

- Submitted revised Quality Program Description to the NRC in Oct. 1996
 - Reflect realistic commitments
 - Take advantage of current industry experience
- Completely revised QA Manual Sept. 13, 1996, replaced existing one
- Developed and issued complete new set of Quality Procedures on Oct. 31, 1996, building on best industry practices
 - 34 new quality procedures
 - Covers all applicable 10 CFR 71/72 QA criteria
 - Existing NAC practices were included whenever practical



QA Program Enhancements *(cont'd)*

- Accelerated QA audits, in advance of annual commitment
- Since revised quality procedures issued Oct. 31, 1996, NAC has conducted approximately 70 training sessions, including:
 - QA orientation
 - Project management
 - Engineering analysis
 - Cask maintenance
 - Records
- Annual QA summary report to be issued mid-July 1997
 - Include initial root cause trending of noted issues



Staffing Enhancements

- **Augmented QA staff**
 - Hired QA Manager
 - Hired QA Engineer
- **Significant personnel hires and upgrades**
- **Removed all non-QA functions from QA Coordinator**
- **Elevated QA leadership to vice president level**
- **Reorganized engineering and appointed Charlie Pennington as Engineering Vice President**
- **Created Records Management function**
 - Full-time administrative manager
 - Full-time records coordinator
 - Several part-time records technicians



Elevating Quality Awareness

QA Task Force and Quality Champions:

- **Established a standing Quality Assurance Task Force (QATF) to meet weekly for discussion of quality considerations:**
 - **Chaired by president, directed by Quality vice president, Members include vice presidents and chief deputies of engineering and cask operations**
- **Established a representative from each business unit to serve as “Quality Champion”**
 - **Facilitates quality interface with each group**



Elevating Quality Awareness (cont'd)

Annual Quality Awareness Month:

- **Quality Awareness Month: Oct. 1996 and May 1997 (process continues throughout year)**
 - **Training Workshops**
 - **Project planning**
 - **Computer code verification and use**
 - **Purchasing**
 - **Quality drivers**
 - **Quality records**
 - **Guest speakers at all-hands meetings**
 - **Quality mission, quality pledge, quality awards**
 - **Implementation of quality performance evaluation during employee annual review, tied to compensation**



Action Plan

- **NAC developed Action Plan to address concerns about accuracy and completeness of design analyses and documentation**
- **Submitted Action Plan to NRC on Oct. 7, 1996 with objectives, actions and milestones**
- **Objective: Assure accuracy and completeness of NAC analytical documents which support cask design and licensing**
- **Actions: Conducted a thorough review of all affected cask design analytical documentation to verify and ensure accuracy and completeness**



Implementation Approach

- Assembled dedicated, qualified, experienced review team
- Conducted special training of review teams in acceptable methods for design preparation, documentation, checking, verification, change reconciliation, and record keeping
- Conducted special training of NAC Engineering and Design staff in same areas
- Review team developed procedure and checklist based on NAC Quality Assurance Program (QAP) to review and verify design documentation is consistent with QAP and regulations
- Reviewed all licensed cask design documentation on prioritized basis: NAC-LWT, NAC-S/T, NLI 1/2, NAC-STC, and NAC-1
- Process all nonconformances in accordance with QAP and reconcile with existing licensing documents...none required



Design Revalidation Results

Casks	Review Team Formation	Review Team Training	NAC Staff Training	Procedure and Checklist	Review of Cask Documentation	Nonconformance Reconciliation with SARs
LWT	9/27/96	done	10/01/96*	done	11/18/96	None required
NLI 1/2	12/18/96	done	↓	done	2/27/97	None required
S/T	11/18/96	done		done	11/21/96	None required
STC	3/07/97	done		done	6/27/97	None required
NAC-1	5/27/97	done		7/2/97	done	7/02/97

*Training initiated this date; continued throughout duration of revalidation



Results

- Some calculations reperformed or verified
 - NAC-LWT (2)
 - NLI 1/2 (17)
 - NAC S/T (0)
 - NAC-STC (4)
 - NAC-1 (2)
- Administrative record corrections were made:
 - Made review copy of calculations and supporting documentation
 - Reviewed for technical, administrative anomalies
 - Anomaly disposition noted on review copy or report
 - Review package made a lifetime record to augment existing records
- NO SAFETY ISSUES IDENTIFIED
- NO SAR CHANGES NECESSARY



Quality Records Practice

- Dispositioned records as discussed above
- For each packaging, developed a Revalidation Report to augment original documentation
- Revalidation Report prepared by review team
- Report approved by review team Project Manager
- Report reviewed by Engineering, Site & Transportation Services, and QA senior management
- Report results presented to president for review and concurrence
- All documentation is complete, logged and available



Conclusion

- **NO SAFETY ISSUES IDENTIFIED, NO SAR CHANGES**
- **Identified significant areas for improvement in packaging design control**
- **Responded quickly with Action Plan and obtained NRC concurrence with plan**
- **Conducted thorough review of all licensed packaging documentation since 1990**
- **Reperformed/verified some calculations**
- **Corrected numerous administrative anomalies in accordance with QAP**



NAC Design Control Enhancements

- **Design control enhancements:**
 - **More formalization in control of design input and output**
 - **Project Plans and controls**
 - **Reorganized staff to include a Chief Engineer**
 - **Facilitates management oversight of design process**
 - **Expanded use of design verification**
 - **Perform detail checking of individual design documents and comprehensive design review of completed component**
 - **Improved records management system**
 - **Improved system for computer verification**
 - **Expanded training of all personnel**
 - **Corporate (orientation)**
 - **Divisional (quality practices and personal responsibility for compliance)**



Packaging License Compliance

- Enhanced NAC-LWT & NLI-1/2 Annual Maintenance
- Enhanced NAC-LWT & NLI-1/2 Handling Procedures
- Improved Spare Parts Inventory/Purchasing
- Enhanced Personnel Training
- Annual Cask Maintenance Before Return to Service

Jim Viebrock, Senior Vice President, STS



Enhanced NAC-LWT & NLI-1/2 Annual Maintenance

- Using a formal project plan to control all work and procedure implementation in accordance with NAC quality procedures
- Using the services of highly qualified, QA-approved helium leak test vendor for NDE Level III services and leak testing
- Implemented improved helium leak test procedures
- Completed replacement of all primary seals and gaskets prior to returning each cask to service



Enhanced NAC-LWT & NLI-1/2 Handling Procedures

- Requiring each cask user to obtain an NAC certification letter stating the cask complies with all NRC and NAC requirements and is ready for use
- Included controls for handling casks during maintenance activities



Improved Spare Parts Inventory/Purchasing

- Thoroughly reviewed all spare parts and records in the inventory
- Audited and approved the metallic seal manufacturer
- Commercially dedicated seals from the applicable non-metallic seal manufacturer in accordance with the NAC QAP
- Revised and upgraded the spare parts inventory control procedure



Upgraded Personnel Training

- Training on new NAC Quality Procedures
- Specific training on verbatim procedure compliance
- Specific training for NAC project management
- Specific training on annual maintenance procedures
- Specific training on cask handling procedures



Annual Cask Maintenance Before Return to Service

- Implementation of annual maintenance practices and procedure enhancements identified above
- Performed QA surveillance during all annual maintenance activities
- Annual maintenance activities for all five NAC-LWT casks were successfully completed in Nov. 1996
- Following senior management review of the revalidation package and cask specific annual maintenance documentation packages, all five NAC-LWT casks were authorized to be returned to service



Annual Cask Maintenance Before Return to Service *(cont'd)*

- Annual maintenance activities for the first NLI-1/2 cask was successfully completed in April 1997
- Following senior management review of the revalidation package and cask specific annual maintenance documentation packages, NLI-1/2 -5462-4 was authorized to be returned to service
- All remaining NLI-1/2 casks and all NAC-1 casks will follow the same approach and undergo the same management scrutiny before returning them to service on an as needed basis.



Fabrication Planning

- Fabrication experience
 - Two NAC S/T Casks built for Virginia Power
 - Several hundred fuel stabilization canisters for use in North Korea
 - Third party inspection of Japanese casks built by a U.S. Vendor
- Work closely with audited/approved fabricators during design development
 - Fabricability reviews
- Detailed fabrication planning
 - Formal project plan
 - Formal QA plan

Howard Smith, Vice President, Quality



Fabrication Planning (Cont'd)

- **NAC QA review/approval of subcontractor fabrication control documents**
 - Welding procedures
 - Nondestructive examination procedures
 - Production travelers
- **Assign hold/witness points to confirm adherence to requirements**
 - Inspect prior to shipping release
 - Review all fabrication documentation



Fabrication Planning *(cont'd)*

- Will establish a Fabrication Task Force to evaluate fabrication control enhancements by items such as:
 - Evaluating industry trends, incorporating best practices
 - Prototype development and testing
 - Dedicated fabrication manager
 - Integrating utility (customer) input



CAL Status

Action Plan 1: Transportation Packaging (Cask) Maintenance

ACTION DESCRIPTION	STATUS 7/3/97
<p>1. Perform Cask annual maintenance prior to next use. Maintenance is to include:</p> <p>A. Performance or supervision by at least one qualified operator.</p> <p>B. Perform leak testing prior to fuel shipment and annually.</p> <p>C. Replace Category A and B O-rings and seals with new components from qualified suppliers.</p> <p>D. Confirmation that each spare part used was properly procured, installed and tested.</p> <p>E. Control any noted nonconforming items per NAC QA Program.</p>	<p>A. Qualification done 10/29/96</p> <p>B. Five LWT casks done 11/15/96 One NLI cask done 04/15/97 Four NLI casks and six NAC-1 casks to be done prior to next use</p> <p>C. Same as B. above</p> <p>D. Verified 11/15/96</p> <p>E. None needed to date</p>

Howard Smith, Vice President, Quality



CAL Status

Action Plan 1: Transportation Packaging (Cask) Maintenance (cont'd)

2. Review/revise cask maintenance procedures prior to next use.	LWT done 9/25/96 NLI done 2/21/97 Others to be revised prior to next use
3. Verify and document current valid calibration of M&TE used in cask maintenance. Others to be done prior to next use.	LWT done 11/15/96 NLI done 4/15/97
4. Provide enhanced training for all personnel involved in cask maintenance. Others to be done prior to next use.	LWT done 11/01/96 NLI done 4/07/97
5. Verify cask Helium leak testing personnel are properly trained and qualified and use approved leak testing procedures.	Qualifications verified 10/15/96. Procedures approved prior to use: MSLT-NAC-1 11/13/96; MSLT-NAC-3 4/14/97
6. Develop shipping release document to show review and approval by STS VP and VP, Quality for each cask per the above criteria.	Done 11/01/96



CAL Status

Action Plan 2: 10 CFR Part 71 and 72 Design Analysis & Documentation

ACTION DESCRIPTION	STATUS 7/3/97
1. Assemble NAC review team of qualified engineers for review of conformance for all transportation packaging and dry storage systems for the time period of 1990 to Sept. 1996.	LWT done 9/27/96 S/T done 11/18/96 NLI done 12/16/96 STC done 3/07/97 NAC-1 done 5/27/97
2. The VP, Quality will train NAC review team(s) in acceptable methods for design preparation and documentation, checking, verification, change reconciliation, records development and correction.	LWT done 9/27/96 S/T done 9/27/96 NLI done 1/06/97 STC done 3/25/97 NAC-1 done 6/16/97
3. The VP, Quality will train NAC Engineering staff in acceptable methods for design preparation and documentation, checking, verification, change reconciliation, records development and correction.	Done 10/01/96



CAL Status

Action Plan 2: 10 CFR Part 71 and 72 Design Analysis & Documentation (cont'd)

<p>4. NAC review teams will develop a procedure and a checklist for review and verification of design documentation per commitments of the QA Program and related regulations.</p>	<p>LWT done 11/13/96 S/T done 11/13/96 NLI done 1/06/97 STC done 3/25/97 NAC-1 done 6/16/97</p>
<p>5. Transportation packaging will be reviewed on a prioritized basis beginning with the NAC LWT casks. Each transportation cask system will in turn be reviewed and the adequacy and completeness of its documentation verified prior to placing the individual casks in service.</p>	<p>LWT done 11/18/96 S/T done 11/21/96 NLI done 03/19/97 STC done 6/26/97 NAC-1 done 7/03/97</p>
<p>6. Nonconformances identified during the review activities will be processed in accordance with the NAC International Quality Assurance Program and reconciled with existing licensing documents. Licensing reconciliation (if required) will be coordinated with the NRC Spent Fuel Project Office.</p>	<p>None required.</p>



CAL Status

Action Plan 3: QA Program Compliance Issues Identified in 1996 NAC Audit Findings

ACTION DESCRIPTION	STATUS
1. Revise the NAC Quality Assurance Manual to more clearly state the NAC International quality programmatic commitments.	Done 9/13/96
2. Develop revised Quality Program description, to more clearly state how NAC complies with the applicable regulatory requirements and submit for NRC approval.	Done 10/04/96
<p>3. Establish a program to completely revise and reissue the NAC International Quality Procedures (QP's) used to implement the requirements of our Quality Assurance Manual. The revised QP's will provide significantly enhanced implementation instruction. Milestones include:</p> <p>A. Issuance of revised Quality Procedures.</p> <p>B. Training of personnel in new Quality Procedures.</p> <p>C. Revise Project Planning documents to reflect new QP requirements.</p> <p>D. Implement new Quality Procedures (Effective Date).</p>	<p>A. Done 10/31/96</p> <p>B. Done 11/15/96</p> <p>C. Done 11/15/96</p> <p>D. Done 11/15/96</p>
4. Increase Quality Assurance staff by hiring a QA Manager. A Manager of Project Support and a Records Administrator were also hired to provide needed QA Program support.	Done 2/03/97
5. Add additional persons from other NAC departments to assist with status and tracking of identified corrective actions.	Done 9/27/96

CAL Status



NAC INTERNATIONAL

Summary

- Past QA program reflected inconsistent management focus and continuity
- Problems self recognized, initiated appropriate corrective actions
- Corrective action efforts revealed no hardware deficiencies and resulted in correction of noted documentation anomalies
- Improvement process well under way at time of NRC inspection; NRC inspection accelerated progress
- NRC involvement was welcome and confirmed NAC's own assessment
- No safety issues identified, no SAR changes necessary

Ed Davis, President & CEO



Summary *(cont'd)*

- Client oversight frequent, intense and helpful
- Yankee Atomic performed detailed audit on October 8/10, 1996
- Yankee Atomic performed 5 surveillance visits (essentially same as audits but with a definite technical overtone) on:
 - Oct. 29-30, 1996
 - Nov. 19-20, 1996
 - Dec. 10-11, 1996
 - Jan. 28-29, 1997
 - Feb. 25-26, 1997
- Arizona Public Service performed an “assist visit” by seven persons (2 QA, 2 project management, 3 engineering) on June 3-6, 1997
- Real and sustained quality improvements being made
- Current management committed to achieving and maintaining an effective quality program



NAC-STC Amendment

- December 1996 Application Received
- February 1996 NRC Requests Information
Prior to Beginning Application
Review
- May 1997 NAC Responds
- June 1997 NRC Begins Application
Review

Potential Near-Term, New ISFSI Sites

