U.S. DEPARTMENT OF ENERGY
OFFICE OF CIVILIAN RADIOACTIVE WASTE MANAGEMENT
OFFICE OF QUALITY ASSURANCE

AUDIT REPORT

OF

GENERAL ATOMICS (GA)

SAN DIEGO, CA

AUDIT HQ-93-06

JULY 19-22, 1993

Prepared by: Marlin L. Horseman Date: 8-11-93
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Approved by: R.W. Cole Date: 8/31/93
for Donald G. Horton
Director
Office of Quality Assurance

1.0 EXECUTIVE SUMMARY

As a result of Quality Assurance Audit HQ-93-06, the audit team determined that GA is satisfactorily implementing an effective QA program in accordance with the GA "QA Program Document for the GA-4 and GA-9 Legal Weight Truck (LWT) Cask Development" and the associated implementing procedures for QA Program Elements 1 and 3 through 19.

The audit team concluded that the implementation of QA Element 2, QA Program, was marginally satisfactory.

The audit team identified four deficiencies during the course of the audit. Two of these deficiencies, requiring only remedial actions, were corrected during the course of the audit. One deficiency, requiring only remedial action, was corrected on July 26, 1993. One Corrective Action Request (CAR HQ-93-029) was written because the GA Topical Report has not been upgraded to reflect actual practices, organizations, and responsibilities.

Additionally, seven recommendations were offered for GA management consideration.

The audit team found that GA demonstrated exceptional practices in working as a team, QA participation in the design process, qualification of Lead Auditors, and retrievability of documents.

2.0 SCOPE

The audit team evaluated the GA QA Program as described in their QA Program Document GA-4 and GA-9, LWT Cask Development, QAPD, issues G and H for adequacy, compliance, and effectiveness.

2.1 QA Program Elements

The QA program elements evaluated during the audit are in accordance with the published audit plan and are as follows:

- 1.0 - Organization
- 2.0 - Quality Assurance Program
- 3.0 - Design Control
- 4.0 - Procurement Document Control
- 5.0 - Instructions, Procedures, Plans, and Drawings
- 6.0 - Document Control
- 7.0 - Control of Purchased Items and Services
- 8.0 - Identification and Control of Items

9.0 - Control of Special Processes
10.0 - Inspection
11.0 - Test Control
12.0 - Control of Measuring and Test Equipment
13.0 - Handling, Storage, and Shipping
14.0 - Inspection, Test, and Operating Status
15.0 - Control of Nonconforming Items
16.0 - Corrective Action
17.0 - Quality Assurance Records
18.0 - Audits
19.0 - Computer Software

Requirements were drawn from the GA QA Topical Report, Amendment 11; GA QA Program Document, GA-4 and GA-9 LWT Cask Development, QAPD 3462, issues G and H; GA Quality Assurance Manual, Revision B and the associated Quality Procedures (QP); applicable Quality Division Instructions (QDI); Program/Resource Procedures Manual (PRPM) and the associated Engineering Procedures (EP).

2.2 Technical Activities

A Technical Specialist was used to review the design process, testing, handling, storage and shipping, and computer software programs. The technical review included compliance to NRC regulations and guidance documents, and industry standards.

3.0 AUDIT TEAM AND OBSERVERS

The following is a list of audit team members (with their assigned area of responsibility) and observers:

Name	Organization	QA Program Element/Requirement
Marlin Horseman, ATL	QATSS/CER	1, 2, 16
Ray Hahn, Technical Specialist	Weston	3, 11, 13, 19
Tom Swift, Auditor	QATSS/CER	3, 11, 13, 19
Fred Bearham, Auditor	QATSS/CER	4-10, 12, 14-18
Hugh Lentz, Auditor	QATSS/CER	4-10, 12, 14-18
Bob Clark, Audit Team Mgr.	HQAD	
Bob Morgan, Observer	M&O	
Jim Wilburn, Observer	EG&G	
Susan Zimmerman, Observer	State of NV	
Tom Colandrea, Observer	EEI	

4.0 AUDIT MEETING AND PERSONNEL CONTACTED

The preaudit meeting was held at GA offices in San Diego, CA on July 19, 1993. The audit team met daily to discuss audit activities. Daily debriefings were held with GA management and their staff. The postaudit meeting was held at GA offices on July 22, 1993.

Personnel contacted during the audit are listed in Attachment 1. The list also indicates personnel who attended the preaudit and postaudit meetings.

5.0 SUMMARY OF AUDIT RESULTS

5.1 Program Effectiveness

The audit team concluded that, in general, GA is satisfactorily implementing an effective QA Program.

Eighteen QA Program Elements were determined to be implemented in a satisfactory manner.

QA Program Element 2 was determined to be marginally satisfactory, since the GA Topical Report has not been maintained to reflect current practices, organizations, and responsibilities.

5.2 Stop Work or Immediate Corrective Actions or Additional Actions

No Stop Work Orders nor any immediate corrective actions were necessary during the audit.

5.3 QA Program Audit Activities

Details of the QA Program audit activities are provided in Attachment 2. A list of objective evidence reviewed during the audit is provided in Attachment 3.

5.4 Technical Activities

5.4.1 Design

A detailed review was performed of the GA LWT Cask design specification and included compliance to contract, NRC, and industry standards. The classification and the resulting Quality Categories List were reviewed to ensure proper assignment of Quality Assurance Levels

(QAL). Design Analyses were spot-checked for technical adequacy, assumptions, and proper independent review. The technical design implementation was determined to be satisfactory, with one deficiency (see 5.5.2) corrected during the audit.

5.4.2 Test Control

The neutron shield and closure seal tests were reviewed and found to be properly performed and evaluated.

5.4.3 Handling, Storage, and Shipping

Compliance to NRC Codes and Regulations, ANSI Standards, and contract requirements were reviewed and found acceptable. Also, non-LWT cask maintenance documentation was reviewed since they could be adapted or referenced for use on the LWT casks.

5.4.4 Computer Codes

Two computer codes were reviewed for the adequacy of software validation, documentation, independent review, and control for their specific applications. One code was rerun to verify that the test case was correct and generated the same results.

5.5 Summary of Deficiencies

The audit team identified four deficiencies during the audit, three of these were corrected by GA.

A synopsis of identified deficiencies documented as Corrective Action Requests (CARs) and those corrected during the audit are detailed below. An informational copy of the CAR is included in Attachment 4.

5.5.1 Corrective Action Request (CAR)

CAR HQ-93-029

The GA Topical Report, approved by the NRC, has not been maintained to reflect current practices, organizations, and responsibilities.

5.5.2 Deficiencies Corrected During the Audit

Deficiencies which are considered isolated in nature and only require remedial action can be corrected during the audit. The following deficiencies were identified and corrected during the audit:

1. Paragraph 4.2.2 of QAPD-3462, issue H, required that a "Q" List identifying the QAL for safety-related structures, systems and components be prepared using the guidelines in paragraph 4.1. The drain valve assembly and its associated components on page 6 of PC-000365 were classified as a QAL-III when, in fact, these items are QAL-1A. The "Q" List was upgraded during the audit to a formal design document, independently reviewed and formally issued and controlled. No activities had been performed that required further corrective action.

2. Supplier's Disposition Request, SDR 13684, did not state the disposition of the item, although the Nonconformance Report Log indicated that the disposition was to reject. The SDR was revised to indicate that the item was scrapped.

3. Amendment 3 to EP-4020, missing from PRPM number 061, was replaced during the audit. The manual was completely reviewed by GA and contained all the proper procedures and amendments.

6.0 RECOMMENDATIONS

The following recommendations are offered by the audit team. They do not reflect deficiencies and are intended to provide GA management with possible opportunities for improving QA program implementation.

6.1 Modify the quality assurance manual to include the escalation of disputed issues to management.

6.2 Review QAPD Table 1 (Index) to include appropriate PRPMs.

6.3 Verify certificates and diplomas of GA employees that are used as a basis for promotion or change in assignments.

6.4 Prepare Record of Training for manual holders to document completion of reading assignments.

6.5 Revise 1993 Nuclear Waste Management Training Schedule to include changes to quality documents (similar to the way PRPMs are handled).

6.6 When alternate calculations are used as part of an independent review, these calculations should be included in the review package.

6.7 Modify QP-7, paragraph 2.4.2 to require documentation of the rationale for waiving supplier evaluations.

ATTACHMENT 1

Personnel Contacted During the Audit

NAME	ORGAN.	TITLE	PRE	CONTACT	POST
K. Asmussan	GA	Director, Licensing Safety, Nuclear Compliance		X	
F. Bearham	QATSS/CER	Auditor	X		X
J. Boshovan	GA	Associate Staff Engineer		X	
R. Clark	RW-3.1	Director, HQAD	X		X
T. Colandrea	EEI	Observer			X
B. Coleman	GA	Director, QA	X	X	X
M. Dunlap	GA	Manager, Quality Systems	X	X	X
S. Felix	GA	Manager, Human Resources		X	
L. Gaeth	GA	QA Representative		X	
R. Grenier	GA	Project Manager, Division Director	X	X	X
R. Hahn	Weston	Technical Specialist	X		X
M. Horseman	QATSS/CER	Audit Team Leader	X		X
E. Isordia	GA	Engineering Records Controller	X	X	X
T. Juarez	GA	QA Records Administrator	X	X	
M. Koploy	GA	Test Engineer Supervisor		X	
L. Lansville	GA	Supervisor, Configuration Management	X	X	X
H. Lentz	QATSS/CER	Auditor	X		X
R. Maxwell	GA	Project Engineer, QA	X	X	X
R. Meyer	GA	Project Engineer	X	X	X
R. Morgan	M&O	Observer	X		X
D. Richard	GA	Engineering Manager	X	X	X
D. Roberts	GA	Senior Vice President	X		
T. Swift	QATSS/CER	Auditor	X		X
J. Wilburn	EG&G	Observer	X		X
A. Zimmer	GA	Principal Engineer		X	X
S. Zimmerman	State of NV	Observer	X		X

ATTACHMENT 2

Audit Details

The following is a summary of the QA Program activities covered during the audit. A list of objective evidence reviewed, by program element, is given in Attachment 3.

1.0 ORGANIZATION

The audit team reviewed the GA organizational interfaces and responsibilities. The organizations identified in the Topical Report and QP-1 are not current. The organization depicted in the QAPD 3462 Issue H is correct. The responsibilities identified for the Project Quality Engineer (PQE) are adequate and are being fulfilled. Quality Assurance performs PQE overview audits; looks for trends; and prepares quality status and problem reports for both internal and external distribution. Five files of personnel performing quality activities were reviewed and all met position requirements. The reporting levels and authority of the PQE and the QA Director were reviewed and found to be adequate. Recommendation 6.1 is for GA management consideration.

Implementation of QA Program Element 1 was determined to be satisfactory.

2.0 QUALITY ASSURANCE PROGRAM

The audit team reviewed the flowdown of requirements from the GA Topical Report to the GA QA Manual and implementing procedures. Changes have been made to the QA Manual and implementing procedures to reflect current practices. The Topical Report has not been upgraded to reflect actual practices, organizations, and responsibilities. See CAR HQ-93-029 for details regarding the identified deficiencies.

The identification of the applicability of various documents to the OCRWM scope of work was reviewed. Specific references are identified in the QAPD. See Recommendation 6.2 for management consideration. Also, the audit team reviewed the GA internal process for reviewing and incorporating applicable NRC Regulatory Guides. This process was determined to be satisfactory.

The hierarchy of QA documents was reviewed. The QA Topical Report is not being maintained, (See CAR HQ-93-029), however, the specific QAPD (3462 Issue H) does reflect current activities and is considered by GA as the top level QA document for the OCRWM scope of work. QAPD 3462, Issues G and H, were reviewed for evidence of approval by DOE-ID. Both revisions have been approved. The QA

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manual and Quality Division Instructions (QDIs) are being adequately maintained and controlled.

Three types of monthly reports reflecting quality issues, status, and problems were reviewed by the audit team.

The audit team reviewed the GA process for the verification of education and experience. The records of three GA personnel were reviewed for evidence of adequate background verification. Verifications included direct contact with former employees, stated references, and educational institutions. All verifications were satisfactory, however, Recommendation 6.3 is provided to management for enhancement of the process.

Training records of personnel performing activities affecting quality were reviewed along with 1993 Project and QA training schedules. All records indicated satisfactory training completion. Recommendation 6.4 is provided for management consideration. Recommendation 6.5 is provided to GA management in the training scheduling area.

Implementation of QA Program Element 2 was determined to be marginally satisfactory.

3.0 DESIGN CONTROL

3.1 Program

QA Program Element 3 verification was performed using a Technical Specialist and by reviewing design specifications, calculations, drawings, the Project Engineering Data Base, and evaluating compliance to regulatory and GA program documents.

The design control system is described in the QAM Quality Procedure No. 3 (QP-3). The QP references the PRPM Engineering Procedures (EPs) which the design groups use for implementation of the program. A PRPM manual was found to be missing one addendum. This condition was corrected during the audit. See item 5.5.2(3), *Deficiencies Corrected During the Audit.*

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A review was done of the GA Topical Report to verify incorporation of requirements into the QAM and PRPM procedures. CAR-HQ-029 documents two inconsistencies. The inconsistencies do not affect compliance to 10CFR71.

Licensing and engineering organizational functions were reviewed to ensure they implement a system to obtain and review NRC and industry documents that may affect the cask design or licensing. GA maintains files of codes, standards, regulations and industry documents.

3.2 Design Specifications

Design Specification for the GA-4/GA-9 Spent Fuel Truck Shipping Cask was reviewed in detail. As part of this review, selected requirements from the design requirement section of the contract and the RFP were reviewed to ensure that all applicable requirements were included in the document. The review process met all the procedural requirements including the verification that all reviewer comments were identified and properly resolved. Also, it was verified that the revision was approved by the same level of management as the original document and that the Engineering Data Base had been updated. Discussions were held with the Lead Engineer to determine the adequacy of the inclusion of NRC and DOT requirements. All requirements reviewed were satisfactorily included.

3.3 Quality Assurance Levels (QAL)

The "Q" List for the GA-4/GA-9 LWT Cask Development Project (PC-000365) was reviewed in detail. This document establishes and identifies the Quality Assurance Levels (QAL) assigned to cask structures, systems and components. Although QALs are assigned to major assemblies as part of the design drawing process, this document is the only source where QALs are identified at the component level. During the review, an error was identified in the Drain Valve Assembly and components for the GA-4 cask. This item was identified in the document as a QAL III. Since it is part of the primary containment system it should have been designated as QAL IA. Discussions were held with the Lead Engineer who described the process by which the components were classified. The "Q" List was a Project Control (PC) document and did not require the standard procedural design controls. The "Q" List was upgraded during the audit to a formal design document which is independently reviewed,

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formally issued, and controlled. See 5.5.2(1), *Deficiencies Corrected During the Audit.*

3.4 Design Analysis

GA-4/GA-9 Final Shielding Design Analysis, GA-9 Cask Weight Calculations, and *Fuel Support Structure Stress Analysis* were spot checked to identify the technical adequacy and reasonableness of the assumptions used in the analyses. In addition, the adequacy of the independent review was also evaluated based upon discussions with each independent reviewer. This activity also included the appropriateness of alternate calculations. A recommendation was made to improve the documentation of alternate calculations. See Recommendation 6.6 for management consideration.

3.5 Design Drawings

The *Intermodal Skid GA-4 and GA-9 Cask* drawing 031612, was evaluated to verify that additional parts of the cask system had been analyzed to determine the QAL. The proper QAL was assigned to the drawing.

Implementation of QA Program Element 3 was determined to be satisfactory.

4.0 PROCUREMENT DOCUMENT CONTROL

The audit team reviewed purchase orders for Wyle Labs, Parker Seals, General Tractor, Omega Labs, and Precision Components Corporation. The purchase orders addressed technical requirements such as drawings and specifications, QA requirements, and 10 CFR 21 requirements. The purchase orders were properly approved.

The P.O.s and applicable purchase requisitions were reviewed and stamped by the QAE. The audit team compared the P.O.s with the purchase requisition requirements and determined that the purchase order reflected the requisition requirements.

Implementation of QA Program Element 4 was determined to be satisfactory.

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5.0 INSTRUCTIONS, PROCEDURES, AND DRAWINGS

The audit team verified that instructions and procedures were available to personnel performing activities affecting quality. The QA Manual, QAPD, QDIs, inspection plans, and test procedures were verified to be properly prepared, approved, and distributed. The QAPD has been revised annually, as required, and identifies the procedures used to implement the LWT Cask program. Program distribution lists, logs, and acknowledgement cards are used to control the distribution of documents.

Implementation of QA Program Element 5 was determined to be satisfactory.

6.0 DOCUMENT CONTROL

The audit team verified the adequacy of the document review and control process by evaluating release authorities, comment documents, distribution lists, and the related records packages. The Quality Assurance Records Center maintains the QA procedures, inspection plans, and manufacturing travelers, while Configuration Management maintains the technical documents. The use of document control numbers, cards, and stamps adequately controls the issue of QA program documents. The audit team verified the release authority to disposition obsolete and suspended documents and found it to be adequate.

Implementation of QA Program Element 6 was determined to be satisfactory.

7.0 CONTROL OF PURCHASED ITEMS AND SERVICES

The audit team reviewed the records of six suppliers: Wyle Labs, Parker Seals, Anmar Labs, General Tractor, Omega Labs, and Precision Components Corporation. Procurement planning, supplier selection, and supplier performance evaluations for the selected suppliers were in compliance with QP-7. Procurement planning is adequately addressed in QP-7 and Quality Division Instructions 7.1 and 7.2.

Anmar Labs, General Tractor, Omega Labs, and Precision Components Corporation were approved by audit of their facilities. Wyle Labs and Parker Seals were not on Approved Supplier List and the rationale was documented by the QAE on the purchase requisition. See Recommendation 6.7 for management consideration. The work performed by Wyle was effectively controlled by source inspection and engineering monitoring. The seals purchased from Parker were independently tested.

Implementation of QA Program Element 7 was determined to be satisfactory.

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8.0 IDENTIFICATION AND CONTROL OF ITEMS

The only hardware items available for review at GA were the closure seals for the cask. The seals were stored in a designated storage area in sealed boxes and each seal was individually wrapped, color coded, and identified with the part number, P.O. number, and the chemical compound. These details were checked against the inspection plan and the P.O. and found to be satisfactory. Shelf life requirements for seals were acceptable and are noted on the Parker Certification of Conformance.

Implementation of QA Program Element 8 was determined to be satisfactory.

9.0 CONTROL OF SPECIAL PROCESSES

NDE and welding procedures and operator certifications were reviewed and found to be acceptable. NDE technicians were certified in accordance with ASNT-TC-1A. Welding procedures, performance testing, and personnel qualifications were in accordance with ASME Section IX. Welding procedures and qualification records for the trailer fabricator were reviewed and were satisfactory. Quality Engineering performs reviews of the welding procedures and the welder performance qualification records as well as the review and acceptance of the NDE records. All documents were prepared and approved in accordance with QA Manual procedures. A special NDE Operations Book is used to control the NDE activities.

Implementation of QA Program Element 9 was determined to be satisfactory.

10.0 INSPECTION

Inspection plans for witnessing the testing of seals at Wyle Labs and welding at General Trailer were prepared by the GA representative and approved by the Quality Engineer. The inspection plans were prepared, approved, and executed adequately. All attributes were specified and the results evaluated and properly documented. Inspection plans were used for the inspection of the seals, nozzles, and molds. The required stamps were used to note acceptable inspections. Calibrated equipment, inspection plans, and completed records were evaluated to verify the adequacy of inspection activities. In particular, two inspection records for the magnetic particle inspection of welds on the trailer assembly were reviewed. The inspections were documented according to the plan.

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Manufacturing "Hold Points" are stipulated within procurement documents. A Supplier Deviation Record (SDR) was issued by GA against a supplier for passing a stipulated "Hold Point".

Implementation of QA Program Element 10 was determined to be satisfactory.

11.0 TEST CONTROL

11.1 Program

QA Program Element 11 was verified by the use of a Technical Specialist and the review of test plans, data, and nonconformance processing in compliance with QP-3, 11, and 15.

11.2 Tests

The neutron shield and the closure seal test plans, test procedures, and evaluation reports were reviewed for proper test requirements, prerequisites, personnel qualifications, acceptance criteria, documentation and evaluation of the results. Nonconformance Reports (NCRs) had been initiated for the polypropylene combustion and smoke emission problem and the test plan modifications for the elastomeric seal leakage test. The NCRs had been properly prepared, evaluated, and processed.

The GA-4 Half-Scale Model Test Plan correctly applied the use of the Buckingham II theorem to develop scaling laws.

Implementation of QA Program Element 11 was determined to be satisfactory.

12.0 CONTROL OF MEASURING AND TEST EQUIPMENT

The audit team evaluated the M&TE lab for the adequacy of M&TE calibration controls. M&TE due for calibration is recalled to the lab and calibrated using traceable standards and qualified personnel under controlled conditions. Calibration stickers are used to identify equipment calibration status and dates. Data is recorded and maintained in both a computer and a manual records system. Recall and calibration of equipment was verified to be completed in a timely manner. The audit team reviewed ten pieces of inspection equipment to verify calibration, type, and the adequacy of the calibration. GA conducts adequate audits of subcontractors who perform calibration services.

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Implementation of QA Program Element 12 was determined to be satisfactory.

13.0 HANDLING, STORAGE, AND SHIPPING

13.1 Program

QA Program Element 13 verification included the use of a Technical Specialist. The LWT and Fort Saint Vrain (FSV) engineering, procurement, manufacturing, and maintenance specifications were reviewed for compliance to QP-13.

13.2 Specifications

The *Design Specification for the GA-4/GA-9 Spent Fuel Truck* requires that the cask lifting yoke and attachments be designed per ANSI N14.6 and 10CFR71.45a which is acceptable since it is compatible with NUREG 0612 for the lifting and movement of heavy loads at nuclear power plants.

The GA specification for the procurement and fabrication of the GA-4 Half-Scale Test Article includes adequate packaging, shipping, material storage, cleaning, and handling requirements.

13.3 FSV Specifications

The *FSV-1 Cask Maintenance Specification, Annual Inspection Plan,* maintenance records, Source Inspection Plan and reports were properly prepared and approved. Also, a NDE report for magnetic particle inspection of a yoke was reviewed and found to be acceptable. The bolt torquing pattern was not specified, however, this will be done for the LWT Casks.

Implementation of QA Program Element 13 was determined to be satisfactory.

14.0 INSPECTION, TEST, AND OPERATING STATUS

Inspection plans, travelers, and tags were evaluated by the audit team to verify the adequacy of the inspection, test, and operating status processes. The use of "Hold" and "Notice of Discrepancy" tags was verified. Appropriate inspection and status stamps were identified on these documents. The pertinent stamps were adequately controlled by Quality Systems.

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Implementation of QA Program Element 14 was determined to be satisfactory.

15.0 CONTROL OF NONCONFORMING ITEMS

The audit team reviewed QA Division Activity Reports for May, June and July, 1993 which included the status of NCRs and SDRs. Activity Reports are reviewed by the GA Vice Chairman and Sr. Vice President which verifies that senior management is kept aware of quality issues. Twenty Supplier Disposition Requests (SDRs) were reviewed. SDRs are generated by the supplier to request a deviation from a technical or programmatic requirement. When it is determined that a deviation constitutes a nonconforming condition, the SDR is processed to control the nonconformance. The audit team verified that SDRs dispositioned "use as is" or "repair" were reviewed by the Materials Review Board. (See Element 16 for more details.)

Implementation of QA Program Element 15 was determined to be satisfactory.

16.0 CORRECTIVE ACTION

Of the 20 SDRs reviewed, several had been escalated to nonconformances and dispositioned by the MRB. NCR #13684 identified a poly block test piece which shattered upon testing due to low temperature brittleness. The MRB disposition was to modify or replace the material. Since the test piece was tested to destruction, the disposition should have included a "scrap" option. The NCR was revised during the audit to indicate that the test piece had been scrapped. See Deficiencies Corrected During the Audit, 5.5.2(2).

SDR E206401-12 dated 6/23/92 indicated that the trailer manufacturer, General Trailer, had performed welding without qualifying the weld procedure nor the welder. The GA disposition was to qualify the procedure and welder performance and backfit the qualification. The welder failed the performance test and GA decided to scrap all material and restart fabrication with established GA inspection and witness points. This activity was fully documented and demonstrated control of the nonconformance process.

CARs are issued for deficiencies that require elevation to management plus deficiencies not covered by another reporting mechanism, such as an audit finding or nonconformance report. The audit team evaluated three CARs for proper issuance, control, and closure. The Trend Report identified CARs, NCRs, and SDRs, plus it categorized the dispositions as rework, use as is, repair, or scrap. All verifications were satisfactory.

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The audit team reviewed the status of corrective actions pertaining to the NRC audit of 11/12/92, including both the NRC Notice of Violation and the NRC Notice of Nonconformance. All GA committed corrective actions are being tracked and the completion is being documented. Not all actions have been completed (GA commitment date was 3/31/93) but most actions have been done. The completed corrective actions have been well documented and appear to be effective. Corrective actions verified by the audit team include the handling of 10CFR Part 21 requirements; classification of materials and components consistent with the importance to safety; the use of suppliers that had not been formally approved; the lack of material identification and traceability markings; the improper storage and segregation of nonconforming items; and missing quality records. All actions taken appear to be effective.

Implementation of QA Program Element 16 was determined to be satisfactory.

17.0 QUALITY ASSURANCE RECORDS

Record packages for purchase orders M212101, M216201, M315204, and SC 135323 were reviewed in the QA Records Center (QARC). It was established that all records for project #3462 are microfilmed and processed as lifetime records. The auditors reviewed hard copies of selected NCRs, SDRs and P.O.s and viewed the referenced microfilms and determined that the film was legible and accurate.

The auditors reviewed activities performed by the Document Records Center and determined that selected Project specifications were of the correct revision; that access was properly controlled; and that documents were properly logged in and out.

Implementation of QA Program Element 17 was determined to be satisfactory.

18.0 AUDITS

The audit team verified the adequacy of the audit process by reviewing the audit schedule and three audit records packages. The packages contained the audit plan, checklists, findings, and report. The audit plan and checklists were satisfactory and the related report complete. Findings and observations were consistent with checklists. Four auditor/lead auditor qualification/certification records were reviewed in the QARC. The audit log identified a management assessment of the QA Program, performed in 1992, thereby meeting the requirements of QP-2. CAR HQ-029 documents a deficiency with respect to approval of audit checklists.

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Implementation of QA Program Element 18 was determined to be satisfactory.

19.0 COMPUTER SOFTWARE

There are 16 existing scientific and engineering computer codes that are applicable to the GA-4/GA-9 LWT Cask Design. There have not been any new GA codes developed for this contract, therefore, compliance was verified to EP-4070 only, for the existing codes.

The audit team reviewed the adequacy of software validation, documentation, independent review, and control for ORIGEN 2 and SCALE. The SCALE code was retrieved from configuration management tape files and a test case was run to verify that the output agreed with the validation report. A SCALE program error documentation report which included assessment and notification was reviewed and found to be acceptable. The validation of the personal computer ORIGEN 2 code for future use in burnup credit analysis was based on comparing the code results to measured laboratory data. The validation report was independently reviewed and found acceptable. The preparer and reviewer training records were reviewed and found to be properly documented.

Implementation of QA Program Element 19 was determined to be satisfactory.

ATTACHMENT 3

List of Objective Evidence Reviewed During the Audit

1.0 ORGANIZATION

Procedures

- Statement of Authority, Revision B, 4/1/92
- QP-1, Revision B, "Organization", 4/1/92
- QAPD-3462, Issue G, DOE approved 11/24/92
- QAPD 3462, Issue H, DOE approved 7/9/93

Plans

- PC-000329, Rev. 3, "Quality Inspection and Test Plan for GA-4 Half-Scaled Test Article"
- E206401/1 9/10/92 Source Inspection Plan

2.0 PROGRAM

Procedures

- QDI 2-8, 11/28/90, Issue A, "Stop Work Order Preparation and Processing"
- QP-2, Revision B, "Quality Assurance Program", 4/1/92

Reports

- Monthly Status Report to DOE/ID (May 1993), "GA-4 and GA-9 LWT Cask Development Monthly QA Status Report", dated 7/2/93

Correspondence/Miscellaneous

- Letter, (M. Dunlap) describing verification that new employees receive copy of the QA brochure, dated 4/19/93.
- Personnel performing quality activities listing and training requirements matrix - final 1992, dated 3/24/93, latest 1993 dated 4/22/93
- Annual Assessment of lead auditor certifications (M. Dunlap), dated 1/8/93
- Letter, (M. Dunlap) to Quality Managers to review inspector performance, dated 1/5/93
- Letters, indicating DOE-ID approval of GA QAPD 3462 (Issues G and H)

ATTACHMENT 3

List of Objective Evidence Reviewed During the Audit

Training Records

- General

J. Hopf	C.T. Beal
J.L. Pickering	B.L. Coleman
M.A. Koploy	A. Fudel
A. Zimmer	W.H. Funke
J. Boshoven	C.M. Miller
D. Aguirre	V. Nicolayeff
R. Maxwell	R.G. Patterson
D. Pethy	

- NDE Training Packages and Inspector Qualification Packages for:

  D. Aguirre
  C.T. Beal
  L. Gaeth (Inspector only)

- Technical Specialist orientation on Audit 92012 (Brian Laney, Technical Specialist)

- Demonstration Audit file, (C.T. Beal), Audit 92018

- Inspector Qualification

3.0 DESIGN CONTROL

Procedures/Plans

- QAPD-3462, Issue G and H
- QAM, QP-3 Rev. B
- Program/Resource Procedure Manual (PRPM)
  Design Control System Description, EP-4020, Rev. B-1
  Information Issue of Design Documents, EP-4030, Rev. E
  Release of Design Document Documents, EP-4040, Rev. 1
  Foreign Design Document Control, EP-4050, Rev. 1
  Release of R&D Design Documents, EP-4060, Rev. A

ATTACHMENT 3

List of Objective Evidence Reviewed During the Audit

- Project Management Plan GA-4/GA-9 LWT Cask Development, Document PC000279, Rev. 5

Design Documents

- Design Specification for the GA-4 and GA-9 Spent Fuel Truck Shipping Casks, Document 909777, Rev. B; Change Notice 005976 for Rev. B; Document Review Report, 4/26/91; Review Transmittal, 3/5/91; Comment/Disposition Summary Reports, Rev. B
- "Q" List for GA-4/GA-9 LWT Cask Development Project, Document PC-000365, Rev. 0
- "Q" List for GA-4/GA-9 LWT Cask Development Project, Document 910630, Rev. N/C
- Drain Plug Assembly, Document 031217, Rev. 0; Document Review Report, 9/26/91; Review Transmittal, 6/17/91; Comment/Disposition Summary Reports, Rev. 0
- *Intermodal Skid GA-4 & GA-9 Cask*, Drawing 031612, Rev. A
- *Gas Sample Port Cover*, Document 031214, Rev. 0; Document Review Report, 9/24/91; Review Transmittal, 6/17/91; Comment/Disposition Reports, Rev. 0
- Cask Weight Calculation; Document 9104550, Rev. N/C
- Engineering Data Base, dated 7/19/93

4.0 PROCUREMENT DOCUMENT CONTROL

- QP-4, Rev. B

- Purchase Orders / Purchase Requisitions

Purchase Orders	Purchase Requisitions
M 208601	PR 166204
M 212101	PR 169883
SC 135323	PR 169894
M 305204	PR 135323

5.0 INSTRUCTION, PROCEDURES, AND DRAWINGS

- QP-5, Rev. B
- Letter to Rod Maxwell from Theresa A. Juarez, QAPD, Annual Update, dated 2/11/92

ATTACHMENT 3

List of Objective Evidence Reviewed During the Audit

- Letter to Holders of Manuals from C. Dryer, Revisions to the GA Quality Assurance manual, dated 4/1/92
- Standard QAM Distribution, 4/1/92
- QAPD-3462, Quality Assurance Program Document - GA-4 and GA-9 LWT Cask Development, Issue H, dated 6/18/93
- QDI-5-1, QA Program Documents Issue D, dated 12/17/90
- Quality Assurance Manual, General Atomics, dated 9/1/92

6.0 DOCUMENT CONTROL

- QP-6, Rev. B
- Transmittal Sheet for Conducting Changes to QDIs - QDI #17-3, Rev. J, dated 5/12/93
- GA-4/GA-9 Final Shielding Design Analysis, Doc # 910204N/C, Review Package
- Change Notice (CN 005976); release Stamp dated 4/26/91 - Title: Design Specifications for the GA-4 and GA-9 Spent Fuel Truck Shipping Casks, Issue A (Doc #909777)
- Release authority for Pyramid Granite Co. QA Manual, Rev. II, Rev. III, dated 7/29/91
- Controlled Document Transmittal Acknowledgement, dated 5/7/93 - GA91GA4 Fuel Support Structure Stress Analysis

7.0 CONTROL OF PURCHASED ITEMS AND SERVICES

- QP-7, Rev. B
- Conformance Certificate of Materials Shipped - "O-rings", Parker Seal Co. Shipped 7/31/92 - Inspected 8/4/92
- Wyle Lab Task - Test of Seals - "O- rings", Parker Seal Co.
- Traveler 80074, Emitter Bus Connection, S/C 3670-032 - 2, Rev C
- Letter to distribution from M. G. Dunlap, QA Approved Suppliers List (ASL) Third Quarter-1993, dated 7/6/93
- 1993 Supplier Audit/Evaluation Frequency Chart, dated 7/93
- Work Release, PO# SC-142175, Manufacturing Science, 11/9/91
- Supplier Data Transmittal, Manufacturing Sciences Corp., PO # SC-142175, dated 6/17/91 (identifies 5 procedures for special process for GA Review - cleaning, handling, packaging, shipping, & NDE for depleted uranium)
- Supplier Evaluation Records, Precision Components, dated 3/2/93

ATTACHMENT 3

List of Objective Evidence Reviewed During the Audit

- Supplier Evaluation Record, Anmar Metrology, dated 6/28/91, dated 6/26/92, QA Audit No 93015, dated 7/12/93 (report), actual audit conducted 6/11/93
- Supplier Evaluation Record, Omega Point Lab, dated 3/6/92
- Source Inspection Plan Number 142175

8.0 IDENTIFICATION AND CONTROL OF ITEMS

- QP-8, Rev. B
- Accept Tag (Proj. # 3426), Parker Seals, PO# M212101 Item #10
- Receiving Inspection Instruction Plan (8/4/92), 0 - Rings

9.0 CONTROL OF PROCESSES

- QP-9, Rev. B
- NDE Qualification Folder for D. Aguirre - Level II, SNT-TC-1A Qual/ Certificate - dated 10/6/90, Level III Examiner - C.T. Beal
- NDE Qualification Folder for C.T. Beal - Level III, Letter of Certification signed by B.L. Coleman, Director, QA, 1/2/92
- Manual GTAW of Stainless Steel (P8) to Incoloy 800 (P40), Spec WS-182, issue B, dated 6/1/81
- NDE Operations Book - Copy I-89, assigned to Clint Harris, ANI/AI, dated March 31, 1992, approved by M.G. Dunlap, Mgr, Quality Systems, Issue I, dated 3/11/92, certified by NDE Level III, C. Beal, 3/31/92
- (Non ASME Code) Welding Operator Qualifications for A. Lucerno to Distribution from M.G. Dunlap, dated 5/17/93
- ASME Code Welder Qualification Status Report for A. Lucerno to distribution from M.G. Dunlap, dated 7/19/93
- Welder Daily Log (A. Lucerno), dated 5/28/93
- Inspection Plan for Record Verification of Welding by A. Lucerno, Weld Stamp H, inspected and approved by C. Beal (GA45) 12/18/91
- Letter from ASME - This Interim Letter accepts the QA System described in QA Manual, dated 5/22/92 - renewal 5/22/93
- WS-47, Manual GTAW of INCONEL 800, P45, Materials, Issue D, dated 3/16/81
- Non Destructive Examination Report, Report No. GA 92-020, 9/29/92, Inspector - D. Aguirre (GA-1)
  Trailer Assy. Part #031512, Proc. No. QDIMT 3801F, Mag Particle Inspection
- Report No. GA 92-048 - Trailer Assy 031500, Magnetic Particle Procedure No. QDIMT3801F, Inspector - D. Aguirre, GA-1, dated 11/19/92
- General Trailer Weld Procedures WPS, 5, 6, & 7

ATTACHMENT 3

List of Objective Evidence Reviewed During the Audit

10.0 INSPECTION

- QP-10, Rev. B
- Qualification Folder for Dave Aguirre (GA-1), Inspection Qualifications, Annual Inspector Evaluation, 1/25/93
- Qualification Folder for Rod Maxwell (GA-7), Inspector Qualification, Annual Evaluation, 1/25/93
- Receiving Inspection Instruction Plan, 10 degrees, Lance Nozzle (P.O. M309702), Prepared by C.M. Miller (QE Stamp - GAQE25), dated 4/22/93 - PC 45619
- Receiving Inspection Instruction Plan, P.O. 146110, RIP PC-44118, Prototype model and mold, dated 2/25/91.
- *Quality Inspection and Test Plan for GA-4 Half-Scale Test Article*, PC-000329, Rev. 3, dated 6/11/91.
- SDR E206 401-12, Problems with Welding General Trailer, P.O. #E206401, dated 6/23/92

11.0 TEST CONTROL

- QP-11, Rev. B
- *Neutron Shield Test*, Document 910179, Series 2 Test
- *Evaluation of Series 2 Neutron Shield Test*, Document 910489
- *Closure Seal Leakage Test Plan*, document 910483
- *Test Procedure for Leakage Test*, Wyle procedure 4826, Rev. B; GA document 910527
- Test Report, Wyle document 54578; GA document 910576
- NCR 13811 for Leakage Test Plan
- *GA-4 Half-Scale Model Test Plan*, Document 910156

12.0 CONTROL OF MEASURING AND TEST EQUIPMENT

- QP-12, Rev. B
- Internal Correspondence to Sawyer from L. Gaeth, Instruments Due for Calibration, 6/29/93
  - Profilometer Standard
  - Height Indicator (12")
  - Height Gage
- QAM & TE Record Card: 2-3-3 - Heighth Gage
- QAM & TE Record Card: QC 155 = Gage Blocks Traceable Cert to: D. Z. Calibration, Certificate of Calibration #6395, dated 5/28/93

ATTACHMENT 3

List of Objective Evidence Reviewed During the Audit

- QA-10-14 Calibration Sticker 6/18/93 due 12/17/93
- QA-1-13 Suspended Calibration Sticker 1/10/92
- M&TE Record Card (micrometer) QC-1-27
- M&TE Record Card (Blade micrometer) QC-1-49
- Qualification Folder for Lyle Gaeth, Annual Evaluation, dated 1/6/93
- Qualification of Calibration Technicians Form for Lyle Gaeth - dated 3/1/89
- QDI-12-10, *Calibration Administration*, Issue A, dated 9/18/92

13.0 HANDLING, STORAGE, AND SHIPPING

- QP-13, Rev. B
- *Cask Maintenance Specification, FSV-1*, Document SPE 150104, Rev. D
- *Source Inspection Plan, FSV*, P/C 44939, Rev. N/C; Conducted 7/10/92
- NDE Report GA 92-015, Magnetic Particle Yoke, accepted 8/20/92
- Specification for Procurement of the GA-4 Half-Scale Test Article, Document 910120, Rev. C
- *Design Specification LWT Casks*, Document 909777, Rev. B

14.0 INSPECTION, TEST, AND OPERATING STATUS

- QP-14, Rev. B
- Stamp Check Card - R. Maxwell (Jan, 1992)
- Stamp List (July 7, 1993), Internal Correspondence to Distribution from T. Juavez, Revised Stamp List, dated 7/7/93
- Non Conformance Report 14024, Plate-side, Main Landing GR, dated 7/20/93
- RIP C190861-R, PO 790861, Part (as above), Inspector David Berry (GA-18), dated 7/20/93
- Hold Tag for above (Non Conformance Report 14024)
- Traveler PC-45520, Refurbish Electro - Pneumatic Transient Rod Drive Assembly, closed 3/16/93.
- Traveler PC-45523, Pick-up Assembly, Specimen Container Rotary Rack, closed 3/29/93

15.0 CONTROL OF NONCONFORMING ITEMS

- QP-15, Rev. B
- NCR Log, Polyblock (GA) (also Wyle Seal Leak Test)
  - 13684, 9/4/92, PO M214102

ATTACHMENT 3

List of Objective Evidence Reviewed During the Audit

- 13772, 11/27/92, PO M216201
- 13811, 1/13/93, PO M216201

- MRB Signature List, dated 10/27/92, identified 13 individuals as potential MRB members
- Memo dated 7/19/93 from Manager of Reactor QA indicated MRB chairmen. For project 3462 LWT Cask, R. Maxwell is identified as chairman and 6 individuals are identified with their special expertise.

16.0 CORRECTIVE ACTION

- QP-16, Rev. B
- To Distribution from M. L. Dunlap, Delinquent Trend Reports, dated 6/30/93
- To Distribution from M.G. Dunlap, Corrective Action Request (CAR) 158 - Final Report, 9/19/91
- CAR 158 dated 7/25/91
- To Distribution from M.G. Dunlap, Corrective Action Request (CAR) 157 - Final Report, dated 9/19/91
- CAR 157, dated 7/19/91
- To Distribution from M.G. Dunlap, Corrective Action Report (CAR) 159 - Final Report, dated 6/24/93
- CAR 159, dated 5/20/93
- CAR Records Package - GA Audit No. 93030, Audit of GA by PDCO, dated 5/19/93; CAR 93030-1 ref. PDCO Audit No. PDCO-108, dated 1/12/93
- QDI-16-8, *Maintenance of Corrective Action Request Assignment Log*, Issue A, dated 3/30/92
- QDI-16-4, *Classification of Conditions Adverse to Quality*, Issue D, dated 3/21/88
- To Distribution from M. Dunlap, Trend Report, dated 5/4/93

17.0 QUALITY ASSURANCE RECORDS

- QP-17, Rev. B
- Design Specifications for the GA-4 and GA-9 Casks, Document Number 909777
- QA Records Transmittal - List individual document by unique number, Proj. 6300, dated 7/9/93
- QA Records Center Access List, Approved M. Dunlap, dated 11/4/92.
- Design Change Documents CN-005793 & CN 005976

ATTACHMENT 3

List of Objective Evidence Reviewed During the Audit

18.0 AUDITS

- QP-18, Rev. B
- 1993 QA System Audit Schedule, dated 12/17/93
- Audit Package 93015, Anmar Metrology, Inc., conducted 6/11/93, Reported 7/12/93
- Independent Management Assessment of the General Atomics QA Program, dated 2/5/93 to L.S. Blue from F.S. Ople, 1992
- Audit Package 93004, Audit of Purchasing Department, conducted 2/26-3/9/93, reported 3/18/93
- Audit Package 93011, Audit of QA Division and Quality Systems, conducted 5/29-6/25/93, reported 6/29/93
- To Distribution from M.G. Dunlap, Annual Assessment of Lead Auditor Certifications, dated 1/8/93
- Auditor/Lead Auditor Qualification/Certification Records Packages:

Name	Initial Certification Dates
W.H. Funke	5/31/79
C. Dryer	9/30/85
S.D. Bresnick	2/7/79
B.L. Coleman	4/25/77

19.0 COMPUTER SOFTWARE

Procedures/Plans

- QAPD-3462, Issue G and H
- QAM, QP-3 & 11, Rev. B
- PRPM Procedure, EP-4070, Rev. E
- QAPD-3462 - SQAP, Rev. B
- Internal Correspondence, *Computer Codes Used for OCRWM Analysis*, J.K. Boshoven, 7/14/93

ATTACHMENT 3

List of Objective Evidence Reviewed During the Audit

Design Documents

- SCALE 4.1, PIN pg00013; Validation Document 910494, Rev. A; Independent Review, Rev. A
- SCALE, Internal Correspondence, GA Form 1076, Error Documentation, Assessment, and Notification, 6/5/93
- ORIGEN 2, PC (IBM), PIN pg000014; Validation Document 910348, Rev., N/C; Independent Review, 9/20/91; Manual RSIC, CCC-371

ATTACHMENT 4

Information Copy of Corrective Action Request

**OFFICE OF CIVILIAN
RADIOACTIVE WASTE MANAGEMENT
U.S. DEPARTMENT OF ENERGY
WASHINGTON, D.C.**

[8] CAR NO. HQ-93-029
DATE: 8-4-93
PAGE: 1 OF
QA

CORRECTIVE ACTION REQUEST

[1] Controlling Document
Contract No. DE-AC07-88ID12698

[2] Related Report No.
Audit Report: HQ-93-06

[3] Responsible Organization
General Atomics (GA)

[4] Discussed With
W. Coleman

[5] Requirement:

Paragraph 4.13.1 of the contract requires GA to establish, maintain, and implement an NRC-approved Quality Assurance Program prior to performing any contract work. 10 CFR 71.101b also requires the QA program be maintained. The "Topical Report" GA-A13010A, is the "NRC-approved" QA program.

[6] Adverse Condition:

Contrary to the above the GA "Topical Report" has not been maintained.

In addition to the obvious discrepancies involving organization and responsibilities, the following discrepancies are given as examples:

1. TR ¶ 17.3.4 last paragraph says "QA/QC provides review and approval of design documents to verify that....safety-related design characteristics can be inspected and controlled." This is not specifically reflected in QAM QP-3 or its implementing documents. (see continuation page).

[9] Does a significant condition adverse to quality exist? Yes__ No_X_
If Yes, Circle One: A B C

[10] Does a stop work condition exist?
Yes__ No__; If Yes - Attach copy of SWO
If Yes, Circle One: A B C D

[11] Response Due Date:
31
August 23, 1993

fax 8/5/93

[12] Required Actions: ☒ Remedial ☐ Extent of Deficiency ☒ Preclude Recurrence ☐ Root Cause Determination

[13] Recommended Actions:

1. Identify differences between the Topical Report and the QA program as implemented, evaluate the impact of these differences on licensing requirements and the final product, and communicate the results to the NRC, or (see continuation page)

[7] Initiator Marsha Horseman M. Horseman Date 8-4-93	[14] Issuance Approved by: QADD R. W. Cole Date 8/5/93
[15] Response Accepted QAR Date	[16] Response Accepted QADD Date
[17] Amended Response Accepted QAR Date	[18] Amended Response Accepted QADD Date
[19] Corrective Actions Verified QAR Date	[20] Closure Approved by: QADD Date

REV. 08/91

ATTACHMENT 4

Information Copy of Corrective Action Request

**OFFICE OF CIVILIAN
RADIOACTIVE WASTE MANAGEMENT
U.S. DEPARTMENT OF ENERGY
WASHINGTON, D.C.**

[8] CAR NO. HQ-93-029
DATE:
PAGE: 2 OF 2
QA

CORRECTIVE ACTION REQUEST (Continuation Page)

[8] **Adverse Condition:** (continued)

2. TR ¶ 17.3.8, 2nd paragraph says "This approval [by the QA representative] signifies that the necessary quality requirements associated with the change have been provided or planned for." This is not reflected in QAM QP-3 or its implementing documents.

3. TR ¶ 17.16, 3rd paragraph says, "Evaluation is performed jointly by senior QA personnel and the CAR initiator". This conflicts with QAM QP-16, ¶ 2.6 says that the evalution is performed by "Quality Systems and the manager of the function that originally identified the problem".

4. TR ¶ 17.18, 2nd paragraph requires that audits be performed to an approved checklist. QAM QP-18 does not require approval of the checklists.

[13] **Recommended Actions:** (continued)

2. Revise the Topical Report to reflect the actual GA QA program as implemented and submit the revision to the NRC for approval.

REV. 08/91