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

Inspection Report

Docket:	72-1004
Report:	72-1004/98-210
Licensee:	Transnuclear West, Inc. 39300 Civic Center Drive, Suite 280 Fremont, California 94538
Inspection Dates:	November 2–6, 25 and December 23 and 29, 1998
Inspection Teams:	Yakima Precast, Inc., Yakima, Washington K. Lathrop, Team Leader, SFPO C. Johnson, DRS, RIV American Boiler Works, Everett, Washington T. Matula, Team Leader, SFPO J. Pearson, SFPO
Approved by:	Susan F. Shankman, Deputy Director Licensing and Inspection Directorate Spent Fuel Project Office, NMSS

Enclosure

EXECUTIVE SUMMARY

NRC Inspection Report 72-1004/98-210

On November 2–6, 1998, the U.S. Nuclear Regulatory Commission (NRC) performed announced inspections of Yakima Precast, Inc. (YPI), Yakima, Washington, and American Boiler Works (ABW), Everett, Washington. YPI is a vendor to Transnuclear West, Inc. (TN West) for the fabrication of concrete TMI-2 precast horizontal storage modules (HSMs). ABW is also a vendor to TN West for the fabrication of Model NUHOMS-12T System dry shielded canisters (DSCs). The HSMs and DSCs are being fabricated for the U.S. Department of Energy (DOE) Independent Spent Fuel Storage Facility (ISFSI) located at the Idaho National Engineering and Environmental Laboratory (INEEL) in Idaho Falls, Idaho. The DSCs will provide dry storage for core debris from the Three Mile Island Unit 2 reactor.

The purpose of the inspections was to determine whether the HSMs and DSCs are being fabricated in compliance with the requirements of 10 CFR Parts 21 and 72. The teams also inspected TN West's oversight of YPI's and ABW's fabrication activities to determine the effectiveness of TN West's surveillances.

Yakima Precast, Inc.

- YPI Fabrication Controls

  YPI did not have a quality assurance (QA) program for its fabrication activities. To address the applicable fabrication requirements of 10 CFR Part 72, Subpart G, YPI prepared a QA Plan which was reviewed and accepted by TN West for the fabrication of HSMs. The team focused on the implementation of this QA plan for YPI's fabrication activities.

  YPI had implemented detailed procedures for HSM construction. The pre-placement inspection and concrete placement activities were acceptably performed. Several poor work practices were observed which were promptly addressed by YPI. Material storage was generally good, with some minor discrepancies noted in the rebar laydown area. Construction records were generally complete and accurate, although some minor procedural and administrative errors were noted. YPI's problem identification/corrective action program was effectively implemented. Control of the nonconformance report (NCR) process was good and received strong management support.

  Concrete testing activities were done in accordance with appropriate industry standards. YPI test personnel were well trained and performed concrete testing in a precise and professional manner. The inspectors observed a number of tests, all of which were conducted properly. TN West management responded appropriately to a YPI-identified issue involving perceived inconsistencies in controlled documentation.

YPI had implemented an effective calibration control program, with no discrepancies noted by the inspectors.

The team concluded that YPI had implemented an adequate quality assurance program with effective oversight by TN West.

- TN West Oversight of YPI

TN West conducted a thorough and continuous overview of YPI's fabrication activities. An audit of YPI by TN West in 1998 was detailed and demonstrated that YPI met the necessary requirements to be placed on TN West's approved suppliers list (ASL). The good communications developed between YPI and TN West were considered a strength.

American Boiler Works

ABW implemented a QA program which addressed all of the requirements of 10 CFR Part 72, Subpart G. TN West audited the adequacy and implementation of ABW's QA program in January 1998. TN West identified shortcomings in ABW's QA program and issued six audit findings to ABW. At the time of the inspection, ABW had corrected four of the findings, with the completion of the remaining two findings anticipated by the end of 1998. On December 23 and 29, 1998, TN West provided status updates for these corrective actions. The team inspected both management controls and fabrication controls at ABW. On November 25, 1998, TN West provided additional information to the team regarding ABW welder qualifications. On December 23 and 29, 1998, TN West provided additional information on the status of corrective actions.

- ABW Management Controls

ABW's QA policies were documented, approved, and implemented; QA personnel authorities and responsibilities were defined and the QA organization functioned as an independent group. QA personnel had sufficient freedom and authority to identify and resolve quality problems.

ABW had QA procedures in place to identify and control materials, parts, or components that did not conform to requirements. However, these procedures were not clear, resulting in improper documentation of apparent nonconforming material. ABW documented the QA procedural deficiencies in corrective action requests (CAR) and planned to complete the revisions by February, 1999.

ABW controlled its documents. However, TN West had identified earlier instances where ABW's test reports were not complete and that ABW's control of QA records was not adequate. At the time of the inspection, ABW had corrected these deficiencies. ABW's use of travelers in the fabrication process was a strength.

TN West previously identified weaknesses in ABW's internal and vendor audits. Specifically, TN West found that ABW did not perform the 1997 audits as scheduled, did not document 1997 audit results properly, and did not close 1997 audit findings in a timely manner. ABW also did not document TN West's audit findings in its corrective action program. During the NRC inspection, ABW took corrective action to ensure that QA program deficiencies and audit findings would subsequently be documented in the corrective action program.

- ABW Fabrication Controls

ABW's documentation for the procurement and testing of steel plate material and weld filler material was complete and acceptable.

ABW's QA Program lacked adequate specifications for: (1) the frequency for updating the welder maintenance log; (2) the frequency and review of the welder maintenance log by the QA Manager to ensure welder continuity; and (3) actions to be taken when a welder is disqualified. ABW revised its procedure during the NRC inspection to address these issues. TN West found ABW's revised procedure acceptable. The team also concluded that ABW's actions were acceptable.

ABW did not record all required information regarding measuring and test equipment on its Calibration Report Forms; however, ABW initiated corrective actions to address this issue during the inspection.

- TN West Oversight of ABW

TN West was aggressive in its oversight of ABW's DSC fabrication activities to assure that all requirements were being met. TN West's surveillance personnel were qualified and knowledgeable of all aspects of the fabrication effort. There were good communications between TN West surveillance personnel and ABW staff.

As a result of an NRC observation, TN West corrected eight of its quality source surveillance checklists (QSSC) to require visual inspection of DSC welds. As a result of a second NRC observation, TN West revised its surveillance procedures to assure that the TN West surveillance inspectors completing sections in QSSCs record their identities as required by 10 CFR 72.174, "Quality Assurance Records."

TN West recognized that the issues identified by the team during the inspection could have been identified and resolved by ABW through ABW's internal and vendor audit programs had the audits been completed. As a result, TN West issued a letter to ABW on November 5, 1998, encouraging ABW to: (1) complete its internal and vendor audits without delay; (2) identify areas of nonconformance; and (3) take the necessary corrective actions to resolve identified issues.

Overall Conclusions

With some minor discrepancies, both ABW and YPI had implemented acceptable QA programs. Fabrication activities at both fabrication facilities were conducted using

approved procedures and qualified personnel. TN West had implemented effective oversight at both facilities. The good communications developed at both sites between TN West on-site personnel and its contractors was a strength which contributed to the successful fabrication of DSCs and HSMs.

LIST OF ACRONYMS USED

ABW	American Boiler Works
AFR	Audit Finding Report
ASL	Approved Suppliers List
CAR	Corrective Action Report
CFR	Code of Federal Regulations
DOE	U.S. Department of Energy
DSC	Dry Shielded Canister
FITP	Fabrication, Inspection and Testing Plan
HSM	Horizontal Storage Module
INEEL	Idaho National Engineering and Environmental Laboratory
ISFSI	Independent Spent Fuel Storage Installation
NCR	Nonconformance Report
NRC	U.S. Nuclear Regulatory Commission
PO	Purchase Order
QA	Quality Assurance
QAP	Quality Assurance Procedure
QSSC	Quality Source Surveillance Checklist
SER	Supplier Evaluation Report
TMI	Three Mile Island
TN West	Transnuclear West, Inc.
YPI	Yakima Precast, Inc.

INSPECTION PROCEDURE USED

60852, "ISFSI Component Fabrication by Outside Fabricators"

PERSONS CONTACTED

The team held entrance meetings with representatives from TN West, YPI, and ABW on November 2, 1998, to present the scope and objectives of the NRC inspections. On November 6, 1998, the team held exit meetings with representatives from TN West, YPI, and ABW to present the preliminary results of the inspections. The individuals present at the entrance and exit meetings are listed in the following table.

	Yakima Precast Inspection	
**	R. Albert	NRC, SFPO, Safety Inspector
**	R. Ayres	TN West, Quality Assurance Manager
**	D. Campbell	TN West, Senior Quality Assurance Engineer (DSC)
	T. Chen	TN West, Senior QA Engineer
	B. Conway	YPI, President
**	P. Eng	NRC, SFPO, Section Chief
**	R. Grenier	TN West, President
***	D. Hauft	YPI, QA Representative
	R. Hollingbery	YPI, Project Manager
	C. Johnson	NRC, DRS RIV
	K. Lathrop	NRC, SFPO, Team Leader
	D. Lines	TN West, HSM QA Surveillant
**	T. Matula	NRC, SFPO, Inspection Team Leader
**	J. Pearson	NRC, SFPO, Safety Inspector
**	L. Peterson	TN West, Oversight Manager
	S. Shakir	TN West, HSM Component Manager
***	B. Thompson	Lockheed/Martin, Quality Engineer
	American Boiler Works Inspection	
**	R. Albert	NRC, SFPO, Safety Inspector
	R. Ayers	TN West, Quality Assurance Manager
	B. Bogue	ABW, General Manager
	J. Bundy	ABW, Quality Assurance Manager
	D. Campbell	TN West, Senior Quality Assurance Engineer (DSC)
*	D. Coburn	Lockheed/Martin
	D. DaGrave	ABW, Quality Assurance Auditor
**	P. Eng	NRC, SFPO, Section Chief
**	R. Grenier	TN West, President
	F. Grygorcewicz	TN West, Surveillance
**	R. Hudelson	TN West, Quality Assurance Engineer
	T. Matula	NRC, SFPO, Team Leader
	J. Pearson	NRC, SFPO
	L. Peterson	TN West, Oversight Manager
	N. Thurman	TN West, Surveillance
	G. Wegrich	ABW, Project Manager
**	B. Yee-Joe	TN West, Quality Assurance Engineer

* Present at exit meeting only
** Present at exit meeting only - via telephone conference
*** Present at entrance meeting only

REPORT DETAILS

INSPECTION SCOPE (GENERAL)

On November 2–6, 1998, the U.S. Nuclear Regulatory Commission (NRC) performed announced inspections of Yakima Precast, Inc. (YPI), Yakima, Washington, and American Boiler Works (ABW), Everett, Washington. YPI is a vendor to Transnuclear West, Inc. (TN West), for the fabrication of concrete TMI-2 precast horizontal storage modules (HSMs). ABW is also a vendor to TN West for the fabrication of Model NUHOMS-12T System dry shielded canisters (DSCs). The HSMs and DSCs are being fabricated for the U.S. Department of Energy (DOE) Independent Spent Fuel Storage Facility (ISFSI) located at the Idaho National Engineering and Environmental Laboratory (INEEL) in Idaho Falls, Idaho. The DSCs will provide dry storage for core debris from the Three Mile Island Unit 2 reactor.

The team inspected TN West's oversight of its two vendors, ABW and YPI to determine whether TN West's oversight program was effective. The team focused on ABW's management and fabrication controls and YPI's fabrication controls, as these were the only areas where performance could be assessed.

1. YAKIMA PRECAST, INC.

1.1 Inspection Scope

The team inspected YPI's fabrication controls to determine whether they were executed in accordance with the requirements of 10 CFR Parts 21 and 72. The team reviewed documentation, interviewed personnel, and observed activities and facility areas. The areas of management, design, and maintenance controls were not assessed as YPI performed no activities in these areas.

1.2 Management Controls

The team did not assess this area directly, as the only area where YPI's performance was concentrated was fabrication. The majority of management activities was performed by TN West, and the team's inspection and conclusions concerning their effectiveness is detailed in Section 1.4 of this inspection report.

1.3 Fabrication Controls

The team reviewed fabrication controls to determine whether all phases of the fabrication process were properly controlled and implemented. The team evaluated the fabrication process to determine whether it was controlled and verifiable from the onset of design through the completion of the manufacturing process. The team focused its evaluation of fabrication controls in the areas of material procurement, fabrication and assembly, test and inspection, and tools and equipment.

1.3.1 Material Procurement

1.3.1.1 Scope

The team determined whether materials were controlled, verifiable, and traceable from the time of purchase through the life of the horizontal storage module (HSM). The scope of the inspection of material procurement included the review of procurement documents, material traceability documentation, drawings and procedures, and the receipt inspection program.

1.3.1.2 Observations and Findings

The inspectors found that YPI had implemented detailed procedures for the construction of the steel-reinforced concrete horizontal storage modules (HSMs). The principal procedures used were the "Project Quality Assurance Plan," Revision 1, dated July 21, 1998, and the "Fabrication, Inspection and Testing Plan (FITP)," Revision 4, dated August 17, 1998. The inspectors noted that YPI, as a contractor to TN West, did not have an NRC-approved QA Plan, but had developed a QA plan to cover their procurement and fabrication activities, which had been reviewed and approved by TN West.

YPI obtained concrete from a local supplier who was subject to periodic surveillances by YPI to assure conformance with the appropriate specifications. Additionally, each truck-load of concrete arriving at YPI for placement forming the HSM was rigorously tested per the FITP. The inspectors noted that YPI test personnel were well trained and performed their tests in a precise and professional manner. Reinforcing steel was appropriately identified, segregated, and stored. However, the inspectors noted that there were several material identification and green acceptance tags loose in the rebar laydown area. After the inspectors brought this observation to YPI's attention, YPI was able to demonstrate that the loose tags had come from already installed material and that the tags had not been improperly removed. YPI took prompt action to correct this work practice.

1.3.2 Fabrication and Assembly

1.3.2.1 Scope

The team determined whether fabrication procedures were documented, approved, and implemented for each step of the fabrication process. The team verified that appropriate codes, standards, and drawings were identified and implemented. The scope of the inspection of fabrication and assembly activities included the review of activities concerning fabrication travelers; assembly, including structural dimensions, embedments, reinforcing bar size, location, and clearances; cleaning; deficiency identification and corrective action; and storage.

1.3.2.2 Observations and Findings

By direct field observation, the inspectors determined that, overall, the pre-placement inspection and concrete placement activities associated with HSM Nos. 16 and 17 were acceptably performed. However, several poor work and personnel safety practices were noted:

- Workers placing the concrete for HSM No. 16 did not maintain an adequate distance between the tremie (rubber chute) and the fresh concrete surface. The tremie was embedded 3-4 feet into the concrete, which could potentially cause segregation of the aggregate and cement, forming layers which could potentially reduce concrete strength.

- Personnel safety: safety glasses were not worn during concrete mixing and pouring, the safety chain at top of the ladder accessing the top of the HSM was frequently not secured, and personnel were walking on the wet treads of a crane without being tethered or otherwise restrained from slipping while transporting a completed HSM to its storage location.

When informed of these observations, YPI took immediate corrective action, and the inspectors did not note any recurrence during the remainder of the inspection.

The inspectors observed concrete placement activities for the side shield wall for HSM No. 2. Quality control technicians appropriately verified concrete slump, unit weight, and air entrainment prior to concrete placement. The inspectors verified that concrete test results met the acceptance criteria. The inspectors noted similar work practices with activities associated with the roof slab of HSM No. 24 and four HSM doors. No deficiencies were identified.

The inspectors reviewed a sampling of the fabrication records for both previously constructed and under construction HSMs (17 total), and found that each record reviewed contained the required documentation. However, the inspectors noted a number of minor procedural and administrative errors with entries in several FITPs. These included the use of superseded revisions, a lack of page identification or some other method of ensuring FITP completion, inappropriate strike-outs, apparently inadvertent step deletion, and procedure changes of intent without prior review and approval by either YPI or TN West. None of these deficiencies affected the quality of the fabricated components. The inspectors discussed these observations with TN West and YPI management. TN West stated that YPI did not yet completely understand some of the conventions and subtleties found in nuclear quality work, as this was YPI's first exposure to such work. The inspectors noted that a number of deficient documents covered work that was currently in progress and had not yet received a QA closure inspection by either YPI or TN West. YPI revised the FITP twice during the inspection to incorporate corrective actions for these deficiencies. The inspectors reviewed the final version of the revised FITP (Revision 6, dated 11/04/98) and found it acceptable.

The inspectors noted that TN West reviewed each nonconformance report (NCR) generated by YPI and, for those YPI NCRs whose disposition was either "repair" or "use-as-is", generated a TN West NCR for tracking and trending purposes. TN West also tracked "reject" and "rework" NCRs using a less-formal, but appropriate, approach. The inspectors determined that all NCRs reviewed were appropriately reviewed and dispositioned by either YPI, TN West, or both, as applicable. Control of the NCR process was good and received strong management support from both YPI and TN West. The inspectors noted, however, that YPI's QA program was silent on the identification of defects and the reporting requirements of 10 CFR Part 21, "Reporting of Defects and Noncompliance," and, that YPI personnel were generally unfamiliar with those requirements. TN West stated that they had not delegated this responsibility to YPI. TN West noted that it had instructed YPI to inform the on-site TN West personnel of any nonconformance or defect, documenting it with an NCR. TN West would then perform the 10 CFR Part 21 reportability evaluation. The inspectors verified that TN West had placed the appropriate postings in YPI's facility, thereby meeting the requirements of 10 CFR § 21.6(a)(1). 21 potential deficiencies had been identified by YPI personnel and were reviewed by the on-site TN West engineers for Part 21 applicability as of the date of the inspection. None were evaluated as being reportable under 10 CFR Part 21. The inspectors reviewed several of the evaluations and observed that they had been appropriately dispositioned by YPI and TN West.

1.3.3 Test and Inspection

1.3.3.1 Scope

The team determined whether tests and inspections were controlled, verifiable, and traceable. The team reviewed procedures and inspection records, observed work practices, and interviewed personnel to evaluate YPI's compliance with the YPI test and inspection program. The team determined whether the procedures controlling testing and inspection were documented, approved, and implemented. The assessment of test and inspection activities included the review of inspection requirements, acceptance criteria, test conditions, test documentation, nondestructive examination controls, and QA hold points.

1.3.3.2 Observations and Findings

The inspectors determined that concrete testing activities were done in accordance with Specification 219-02-114, "Specification for Concrete Construction of TMI Precast Horizontal Storage Module," Revision 1, and applicable ASTM standards. The technicians performing the testing were both knowledgeable and experienced.

The inspectors observed three compressive strength tests of two cylinders each for HSM No. 15 floor slab (14 day) and HSM Nos. 8 and 9 base units (28 day). For the 28-day cylinders, the compressive strengths obtained exceeded the minimum acceptance criteria of 5000 psi, and were, therefore, acceptable.

The inspectors also observed the concrete moisture, sieve analysis, and gradation tests for the sand, and 3/8-inch and 1-inch aggregate used for the concrete mix for the side wall of HSM 2, and determined that the test results met the ASTM acceptance criteria.

The inspectors noted some confusion among the quality control inspectors concerning reinforcing steel minimum spacing requirements during HSM component pre-placement inspection activities. The confusion resulted from apparent inconsistencies between the design specification and installation drawing notes. TN West halted the inspection of the pre-placement activity and held several meetings with the appropriate personnel to explain the design requirements and eliminate the confusion as to which documents were controlling. The inspectors noted that the quality control inspectors received detailed instruction on the spacing requirements and were shown how to reconcile the apparent inconsistencies, which, in fact, did not exist. The inspectors considered the issue to be an illustration of a good questioning attitude on the part of the quality control inspectors and good management control by TN West of quality-related activities.

1.3.4 Tools and Equipment

1.3.4.1 Scope

The team determined whether procedures for the control of tools and equipment were documented, approved, and implemented. The team evaluated the use of tools and equipment to determine whether proper ranges and sensitivities were maintained, and if the tools and equipment used were traceable to specific tests and inspections. The scope of the inspection of tool and equipment activities included the review of physical controls, testing methods, and the calibration program.

1.3.4.2 Observations and Findings

The inspectors verified that YPI had implemented a calibration control program covering the applicable equipment and instrumentation used at the facility. Equipment such as slump cones, tape measures, and unit weight buckets, which could not be "calibrated", were visually checked for damage prior to use. The inspectors did not identify any discrepancies in YPI's calibration control program.

1.3.5 Conclusions Regarding YPI's Fabrication Controls

In the area of fabrication controls, the team concluded that YPI had implemented an adequate quality assurance program with effective oversight by TN West. YPI had implemented detailed procedures for HSM construction. YPI test personnel were well trained and performed their tests in a precise and professional manner. Material storage was generally good, with some minor discrepancies noted in the rebar laydown area.

Overall, the pre-placement inspection and concrete placement activities were acceptably performed. Several poor work practices were observed which were promptly addressed by YPI and did not recur. Construction records were complete and accurate, although some minor procedural and administrative errors were noted. YPI's problem identification/corrective action program was effectively implemented. Control of the NCR process was good and received strong management support.

Concrete testing activities were done in accordance with appropriate industry standards. The inspectors observed a number of tests, all of which were conducted properly. TN West management responded appropriately to an issue involving apparent inconsistencies in controlled documentation.

YPI had also implemented an effective calibration control program, with no discrepancies noted by the inspectors.

1.4 TN West Oversight of YPI

1.4.1 Scope

The team reviewed the scope of TN West's and YPI's surveillance programs and their respective management's involvement with the oversight of activities conducted at YPI's facility. Qualifications of surveillance personnel were verified, procedures and checklists were reviewed, and observation of surveillance activities were performed to determine whether both the requirements of 10 CFR Part 72 and the YPI Quality Assurance Program were met by YPI. TN West's management oversight of YPI was also assessed to determine its effectiveness.

1.4.2 Observations and Findings

The inspectors found that TN West conducted a thorough, continuous, and effective overview of YPI's fabrication activities utilizing two quality control/surveillance inspectors and two engineers, the TN West program manager for the HSMs and the senior quality assurance engineer/lead auditor. Additional oversight was provided on a periodic basis by the customer operating the independent spent fuel storage installation (ISFSI) for the TMI-2 core debris.

YPI and TN West personnel interviewed were knowledgeable of program requirements and their application to individual tasks. YPI management was closely involved in all aspects of HSM fabrication and had good communications with the TN West personnel performing oversight of YPI's activities. The inspectors considered this relationship a strength in that YPI received the benefit of TN West's nuclear quality experience while TN West, with YPI's complete cooperation, could assure itself that all appropriate regulatory commitments and requirements were being met.

The inspectors reviewed the QA audit and supplier evaluation report (SER) performed by TN West of YPI in 1998. The audit (TN West Audit No. YPI.001) utilized a detailed checklist specifying, for each performance element, the method of verification to be used and provisions for recording assessments and results. The inspectors found that the audit was detailed, contained appropriate assessment of each element, and that the assessments adequately supported the results obtained. The SER (TN West File No. QA001.YPI.001) conditionally approved YPI as a TN West supplier on July 7, 1998. The conditions applied were the required presence of TN West personnel on-site during fabrication and the use of only certain concrete batch trucks. By a review of applicable documentation and field observation, the inspectors verified that YPI had consistently met both conditions.

The inspectors verified by a review of training records and interviews that TN West and YPI personnel performing audit, inspection, and surveillance activities were appropriately qualified and experienced to perform their assigned activities.

1.4.3 Conclusions Regarding TN West's Oversight of YPI

TN West conducted a thorough, continuous, and effective overview of YPI's fabrication activities. An audit of YPI by TN West in 1998 was detailed and demonstrated that YPI met the requirements necessary in order to be placed on TN West's ASL. The good communications between YPI and TN West were considered a strength.

TN West personnel who performed surveillances, audits, and inspections at YPI were well-qualified, appropriately trained, and knowledgeable concerning QA program requirements.

2. AMERICAN BOILER WORKS

2.1 Inspection Scope

The team inspected American Boiler Works' (ABW) management and fabrication controls to determine whether they were executed in accordance with the requirements of 10 CFR Parts 21 and 71. The team reviewed documentation, interviewed personnel, and observed activities and facility areas. The team reviewed ABW's QA Program and implementing procedures regarding fabrication of dry shield casks (DSC). The areas of design and maintenance controls were not assessed as ABW performed no activities in these areas.

2.2 Management Controls

The team reviewed ABW's practices and procedures, and their implementation, to determine the effectiveness of management controls. The team assessed the adequacy of management controls based on the requirements in ABW's QA program.

The team focused on ABW's QA program implementation, nonconformance controls, documentation controls, and audit programs.

2.2.1 Quality Assurance Program

2.2.1.1 Scope

The team reviewed ABW's QA program to determine the effectiveness of implementing plans and procedures. The team focused on QA program goals, objectives and practices, personnel responsibilities, QA organizational independence, delegations of authority, management involvement, and staffing levels.

2.2.1.2 Observations and Findings

The team determined whether ABW's QA policies were documented, approved, and implemented. QA personnel authorities and responsibilities were defined and the QA organization functioned as an independent group as depicted by ABW's organization chart. The team verified that ABW's QA personnel had sufficient freedom and authority to identify and resolve quality problems. The team also noted that ABW recently hired a full time QA auditor to assure full implementation and effectiveness of its QA program.

2.2.2 Nonconformance Control

2.2.2.1 Scope

The team reviewed ABW's nonconformance control program to assess the effectiveness of measures established to control materials, parts, or components that did not conform to requirements. The inspection of nonconformance controls focused on how ABW identified, segregated, tracked, and controlled nonconforming items and any program deficiencies. The team looked at nonconformance reports, nonconforming items, and measures used to keep track of the status of nonconforming items.

The team also reviewed training and implementing procedures, internal postings, supplier notifications, reporting processes, and program controls in accordance with the provisions of 10 CFR Part 21, "Reporting of Defects and Noncompliance."

2.2.2.2 Observations and Findings

The team observed that ABW did not complete Nonconformance Reports (NCRs) for nonconformances identified in DSC steel plate material at the time of the receiving inspection. Specifically, ABW procured steel plate material for the DSC from American Alloy, Houston, Texas, through Purchase Order (PO) 6217. During the receipt inspection on September 9, 1998, ABW indicated on six Receiving Reports that the steel plate surfaces were nonconforming. Paragraph 3.3 in ABW Procedure QAP 15.01, "Control of Nonconforming Items," Revision 5, September 15, 1997, states

"The QA Manager shall prepare a[n]...NCR...fully describing applicable requirements and the nonconforming condition." However, ABW did not initiate NCRs for the nonconformances identified and there was no indication of either the evaluation or disposition of the nonconformances on the Receiving Reports. This material was used in the fabrication of DSC No. DOE 12T-001.

On November 4, 1998, TN West and ABW management staff interviewed all of the ABW personnel involved in the receipt inspection of the steel plate material to determine what happened regarding the identification and disposition of nonconformances. As a result of the interviews, TN West and ABW found that the ABW receiving inspector had indicated the presence of apparent nonconformances on the Receiving Report to bring them to the attention of the ABW QA Manager who reviewed and signed all Receiving Reports. The ABW QA Manager stated that he reviewed the apparent nonconformances, determined that the nonconformances were not valid, and signed the Receiving Reports as being acceptable; therefore, NCRs were not required.

ABW determined that its Procedure QAP 8.01, "Identification and Control of Material, Parts, and Components," Revision 6, April 4, 1994, was not clear on how to document apparent nonconformances and when NCRs should be initiated. ABW took immediate corrective action by initiating Corrective Action Report (CAR) No. 10 on November 4, 1998. ABW's recommended corrective action was to revise ABW Procedure QAP 8.01 and provide training to QA personnel, to be completed by February, 1999. TN West and ABW also stated that the steel plate material would be re-inspected to assure that the material was acceptable. The team concluded that ABW's corrective actions were acceptable.

The team found that ABW's training and implementing procedures, internal postings, supplier notifications, reporting processes, and program controls regarding 10 CFR Part 21 were acceptable.

2.2.3 Documentation Controls

2.2.3.1 Scope

The team reviewed ABW's documentation control program to assess the effectiveness of the QA program in controlling quality-related documentation. The inspection team reviewed instructions, procedures, and drawings, including revisions to those documents, for adequacy, approval signatures, release by authorized personnel, and availability. The team reviewed documents such as fabrication travelers, inspection and test procedures, maintenance and test results, nonconformance reports, QA procedures, and component drawings.

2.2.3.2 Observations and Findings

The team found that the ABW document control process was controlled. ABW reviewed its procedures, drawings, and fabrication travelers, as well as changes to those documents, for adequacy. ABW assured that all required procedures, drawings, and travelers were approved and located in the areas where prescribed activities were performed.

The team considered ABW's use of fabrication travelers in the fabrication process a strength. ABW had comprehensive travelers that described each fabrication step, identified applicable fabrication documentation, and prescribed inspection and hold points. ABW had instructed all its personnel that no fabrication activity was to be performed without having an approved traveler along with the required procedures and drawings.

2.2.4 Audit Program

2.2.4.1 Scope

The team reviewed ABW's audit program to determine whether plans, procedures, and records were available. The inspection of the audit program focused on determining whether ABW scheduled and performed internal QA audits and vendor audits in accordance with approved procedures or checklists; whether qualified, independent, personnel performed the audits; whether ABW management reviewed audit results; and whether ABW took appropriate and timely follow up actions in those areas found deficient.

2.2.4.2 Observations and Findings

TN West performed an audit of ABW's internal audit program in January 1998. In that audit, TN West found that ABW did not have any audit plans for the internal and vendor audits performed in 1997. TN West also found that ABW's audit reports did not contain the identification of persons contacted during the audit, a summary of the audit results, or a statement on the effectiveness of the QA program elements audited. For two external audits performed by ABW in 1997, TN West found that there were no audit finding responses from the suppliers, no acceptance or rejection letters from ABW to the suppliers, and no evidence of follow-up action, if required, by ABW. On March 13, 1998, ABW replied to TN West that it had updated its internal audit procedure to incorporate the necessary controls. On March 24, 1998, TN West informed ABW that its response to the audit finding reports (AFR) was acceptable. The team reviewed the revised ABW procedure regarding internal audits and also found it acceptable.

TN West also performed an audit of ABW's vendor audit program in January 1998. In that audit, TN West found that ABW had not completed sufficient evaluations of eight vendors to adequately substantiate calibration certifications or test reports used for

acceptance of ABW fabrication. On March 13, 1998, ABW stated that it had updated its vendor evaluation procedure to incorporate the necessary controls. On March 24, 1998, TN West informed ABW that its response to the AFR was acceptable. The team reviewed ABW's revised procedure regarding vendor evaluations and also found it acceptable.

As a result of the audit, TN West placed ABW on the TN West Approved Suppliers List (ASL) on February 10, 1998, with the restriction that ABW was required to procure important-to-safety material only from vendors on the TN West ASL and only after receiving approval from TN West for each procurement.

The team reviewed ABW's internal audit program and found that audit schedules, plans, checklists, and records for 1998 audits were available. The team found that 1998 audits were performed by qualified and independent personnel, that ABW management reviewed audit results, and that ABW took appropriate follow up actions in those areas found deficient.

The team observed that ABW did not document failures in its QA program in its corrective action program. Specifically, TN West performed an audit of ABW's QA program implementation in January 1998. In that audit, TN West identified six findings requiring corrective action from ABW. ABW implemented corrective actions regarding the findings identified by TN West and documented the corrective actions taken on TN West AFRs; however, ABW also did not document the six findings in the ABW internal corrective action program.

Paragraph 3.1 in ABW Procedure QAP 16.01, "Corrective Action," Revision 3, April 9, 1997, states "The Project Manager shall prepare a corrective action report fully describing the condition and reference all applicable contract specifications and drawings." ABW took immediate action to correct this issue by initiating CAR No. 9 on November 2, 1998. ABW's recommended corrective action was to retrain the ABW Project Manager regarding the completion of CARs in the ABW internal corrective action program when failures in the QA program are identified by any source. The team considered the corrective actions acceptable.

Also during the January 1998, TN West found that ABW's QA Program did not specify that test reports include item tested, test date, tester identification, type of observation, test results, actions taken regarding deviations, and the identification of the test results evaluator. On March 13, 1998, ABW stated that it had updated its procedure for test control to include the missing items in the test report. On March 24, 1998, TN West informed ABW that its response to the AFR was acceptable. The team reviewed ABW's revised procedure regarding test control and also found it acceptable.

During the audit of ABW's QA program in January 1998, TN West also found that ABW had no records index, no records access control procedure, and requirements for the handling of superseded records were not specified. On March 13, 1998, ABW stated

that it had updated its procedure for document control. On March 24, 1998, TN West informed ABW that its response to the AFR was acceptable. The team reviewed the revised ABW procedure regarding document control, document indexing, and document access and found it acceptable.

2.2.5 Conclusions on ABW Management Controls

Regarding ABW's QA program, the team found that ABW's QA policies were documented, approved, and implemented; QA personnel authorities and responsibilities were defined; the QA organization functioned as an independent group; and QA personnel had sufficient freedom and authority to identify and resolve quality problems.

Regarding nonconformance controls, the team found that ABW had QA procedures to identify and control materials, parts, or components that did not conform to requirements. However, these procedures were not clear, resulting in not properly documenting apparent nonconforming material. ABW took corrective measures to revise the procedures and clarify the requirements.

Regarding documentation controls, the team found that ABW controlled its documents. However, TN West had identified earlier instances where ABW's test reports were not complete and that ABW's control of QA records was not adequate. ABW corrected these deficiencies prior to the NRC inspection. The team determined that ABW's use of fabrication travelers in the fabrication process was a strength. The travelers were comprehensive in that they described each fabrication step, identified applicable fabrication documentation, and prescribed appropriate inspection and hold points.

Regarding the audit program, TN West identified earlier weaknesses in ABW's internal and vendor audits. The 1997 audits were not performed as scheduled, not documented properly, and audit findings were not closed. The team found ABW's revised internal audit program for 1998 acceptable. The team observed that ABW did not document failures in its QA program in its corrective action program. ABW took appropriate corrective action to ensure that QA program deficiencies would subsequently be addressed by the corrective action program. The team found ABW's corrective actions acceptable.

2.3 Fabrication Controls

The team reviewed ABW's fabrication controls to determine whether all phases of the fabrication process were properly controlled and implemented. The team evaluated the fabrication process to determine whether it was controlled and verifiable from the onset of design through the completion of the manufacturing process. The team focused its evaluation of fabrication controls in the areas of material procurement, fabrication and assembly, test and inspection, and tools and equipment.

2.3.1 Material Procurement

2.3.1.1 Scope

The scope of the inspection of material procurement included the review of procurement documents, material traceability documentation, drawings and procedures, shelf life for safety-related components, and the receipt inspection program.

2.3.1.2 Observations and Findings

The team inspected documentation for the procurement and testing of steel plate material for use on the DSCs procured from American Alloy, Houston, Texas, under purchase order (PO) 6217. The team also inspected documentation for the procurement, testing, and inspection of weld material procured from ESAB Welding Products, Hanover, Pennsylvania, under POs 6064, 6366, and 6367 for weld filler wire; and PO 6348 for weld stick electrodes. All documentation appeared to be complete.

2.3.2 Fabrication and Assembly

2.3.2.1 Scope

The team determined whether ABW's fabrication procedures were documented, approved, and implemented for each step of the fabrication process. The team verified that appropriate codes, standards, and drawings were identified and implemented. The scope of the inspection of fabrication and assembly included the review of activities concerning fabrication travelers, special processes including welding and foam filling, machining, assembly, cleaning, storage, and personnel qualification and certification.

2.3.2.2 Observations and Findings

TN West performed an audit of ABW's QA program in January 1998. In that audit, TN West found that ABW's QA Program lacked adequate specifications for: (1) frequency for updating the welder maintenance log; (2) provisions for the ABW QA Manager's review of the welder maintenance log; (3) how often the ABW QA Manager evaluated the welder maintenance log to ensure welder continuity; and (4) actions to be taken when a welder was disqualified. On March 13, 1998, ABW stated that it had updated its procedure and log regarding welder certification. On March 24, 1998, TN West informed ABW that its response was acceptable. The team reviewed ABW welder qualification records, certification records, welder maintenance logs, and the associated revised ABW procedure, QAP 9.06, "Control of Special Process Welding Control," Revision 1, March 10, 1998, and found it acceptable. However, the team noted that some certification records appeared to be missing. The ABW QA manager explained that ABW certified welders to a specific welding process and the associated welding procedure. Once a welder was qualified to a welding process, the welder was then pre-qualified for certification on welding requiring the same process but using a different

welding procedure. The inspectors reviewed the standards referenced by QAP 9.06 and found that some flexibility was allowed in pre-qualifying welders. TN West had previously reviewed ABW's practice of pre-qualifying welders and found it acceptable. The inspectors concluded that the pre-qualification practice, as implemented, was acceptable.

2.3.3 Test and Inspection

2.3.3.1 Scope

The team determined whether tests and inspections were controlled, verifiable, and traceable. The team reviewed procedures and inspection records, observed work practices, and interviewed personnel to determine compliance with the ABW test and inspection program. The team verified that the procedures controlling testing and inspection were documented, approved, and implemented. The assessment of test and inspection activities included the review of inspection requirements, acceptance criteria, test conditions, test documentation, nondestructive examination controls, and QA hold points.

2.3.3.2 Observations and Findings

TN West performed an audit of ABW's QA program in January 1998. In that audit, TN West found that ABW's QA Program discussed monitoring and surveillance performance; however, ABW's QA procedures did not identify specific procedures or criteria for these two activities. On March 13, 1998, ABW stated that it had developed a procedure for monitoring and surveillance performance. On March 24, 1998, TN West informed ABW that its response was acceptable. The team reviewed ABW's revised procedure regarding monitoring and surveillance and also found it acceptable.

The team reviewed ABW's travelers for the fabrication of the DSCs and found them to contain many test, inspection, and hold points. All of the ABW fabrication travelers were reviewed by the TN West surveillance personnel. The surveillance personnel entered their hold points to assure that all critical activities were monitored by TN West. Also, ABW fabrication and QA personnel had been instructed to keep TN West surveillance personnel informed of the status of fabrication activities and not to bypass any hold points. The team did not identify any discrepancies in ABW's fabrication travelers.

2.3.4 Tools and Equipment

2.3.4.1 Scope

The team determined whether procedures for the control of tools and equipment were documented, approved, and implemented. The scope of the inspection of tools and equipment included the review of physical controls, testing methods, and the calibration

program, which included whether proper ranges and sensitivities were maintained, and if tools and equipment were traceable to specific tests and inspections performed.

2.3.4.2 Observations and Findings

The team observed that ABW did not record all required information regarding measuring and test equipment on its Calibration Report Forms. Specifically, Paragraph 3.5 in ABW Procedure QAP 12.01, "Control of Measuring and Test Equipment," Revision 7, June 10, 1998, states "Calibration records shall include...type, size, manufacturer and...percentage of accuracy." However, ABW's Calibration Report Form did not provide for the recording of this information.

ABW took immediate corrective action by initiating CAR No. 11 on November 5, 1998. The recommended action stated on the CAR calls for the review and update of the Calibration Report Form. ABW stated that, as a result of the inspection, it realized that other QA forms need updating. Therefore, the scope of the recommended corrective action on CAR 11 included the review and update of all ABW's QA forms to assure that they met the requirements of the QA program. The inspectors concluded that these corrective actions were acceptable.

2.3.5 Conclusions Regarding ABW's Fabrication Controls

Regarding material procurement, the team found ABW's documentation for the procurement and testing of steel plate material and weld filler material to be complete and acceptable.

Regarding fabrication and assembly, as a result of an earlier audit of ABW by TN West, the team found that ABW's QA Program lacked adequate specifications for: (1) frequency for updating the welder maintenance log; (2) when the QA Manager evaluates the welder maintenance log to ensure welder continuity; (3) provisions for the QA Manager review of the welder maintenance log; and (4) actions taken when a welder was disqualified. ABW's revised procedure was found acceptable by TN West. Following the review of both the revised procedure and ABW's practice of pre-qualifying welders, the inspectors concluded that ABW's actions were acceptable.

Regarding test and inspection, the team found that ABW's travelers for the fabrication of the DSCs contained many test, inspection, and hold points. All of the ABW fabrication travelers were reviewed by the TN West surveillance personnel who enter all required hold points. ABW fabrication and QA personnel were instructed to keep TN West surveillance personnel informed of the status of fabrication activities and not to bypass any hold points.

Regarding tools and equipment, the team found that ABW did not record all required information regarding measuring and test equipment on its Calibration Report Forms; however, ABW initiated immediate appropriate corrective actions to address this issue.

2.4 TN West Oversight of ABW

2.4.1 Scope

The team reviewed the scope of the TN West surveillance program. Qualifications of surveillance personnel were verified, procedures and checklists were reviewed, and observation of surveillance activities were performed to determine whether the requirements of 10 CFR Part 72 were met by TN West's fabrication vendor.

2.4.2 Observations and Findings

The team noted a strength in the effectiveness of the TN West's oversight of the ABW DSC fabrication. The TN West surveillance personnel were qualified and knowledgeable of all aspects of the fabrication effort. The quality source surveillance checklists (QSSC) reflected all aspects of the fabrication program and were kept current by the surveillance staff. There appeared to be a very close working relationship and a high level of communication between TN West surveillance personnel and ABW staff. Any issue that was identified during the inspection was acted upon immediately and appropriately resolved. Some of those issues are listed below.

The team observed that the TN West QSSCs did not require visual inspection of DSC welds. Specifically, Paragraph 5.5.5.E, "Visual Inspection," of TN West Document 219-02R107, "Fabrication Specification For The NUHOMS-12T System Dry Shielded Canister," Revision 1, July 1998, states "All welds shall be visually examined in accordance with the requirements of paragraph NB-4424 of Section III, and Article 9, Section V, of the ASME Code and the additional requirements of paragraph 5.5.4 [Workmanship and Visual Quality] of this Specification." However, the team inspected all of the QSScs and found that the following QSSCs did not require TN West surveillance personnel to perform visual inspection of welds for quality:

- 219-02R1, "NUHOMS-12T System Dry Shielded Canister, Basket Assembly," Revision 1, states in Step 8, "Verify Welds - Verify the top and bottom retainer nuts are tack welded to Support Rods to Prevent rotation of sleeves."

- 219-02R7, "NUHOMS-12T Dry Shielded Canister, Grapple Ring and Support Plate," Revision 0, states in Step 1b, "Observe welding to assure compliance to approved procedure."

- 219-02R10, "NUHOMS-12T Dry Shielded Canister, Inner Bottom Cover," Revision 0, states in Step 4, "Verify inner cover to shell weld size."

- 219-02R18, "NUHOMS-12T Dry Shielded Canister, Outer Bottom Cover," Revision 0, states in Step 4, "Verify weld size."

- 219-02R28, "NUHOMS-12T Dry Shielded Canister, Purge and Vent Port Filter Assemblies," Revision 0, states in Step 4B, "Inspect welds and verify size."

- 219-02R32, "NUHOMS-12T Dry Shielded Canister, Support Ring," Revision 0, states in Step 4, "Observe inspection of welds for size and location."

- 219-02R40, "NUHOMS-12T Dry Shielded Canister, Lifting Lugs," Revision 1, states in Step 6, "Observe inspection of welds for size and location."

- 219-02R43, "NUHOMS-12T Dry Shielded Canister, Shell Assembly," Revision 0, states in Step 3, "Observe in process welding to assure compliance to approved procedures."

The team verified through interviews with TN West surveillance personnel and review of related inspection logs that, for welds that had already been inspected by TN West surveillance personnel, welds had been visually inspected for quality but had not been so documented on the associated QSSCs. To clarify the requirement for documenting the results of visual weld inspections, the TN West Manager of Supplier Oversight modified the above QSSCs on November 4, 1998, to explicitly include the requirement for visual inspection of welds.

The team noted that TN West had no specific procedure in place to assure that the TN West surveillance inspectors completing sections in QSSCs record their identities as required by 10 CFR 72.174, "Quality assurance records." TN West took immediate action to assure that surveillance personnel recorded their identities on QSSCs. Specifically, TN West issued a memorandum to all its surveillance personnel instructing them to record their identities in QSSC sections they completed if they participated in a surveillance activity. The memorandum would then be included in TN West's training and indoctrination program for surveillance personnel.

The team noted that the TN West Fabrication QA Plan, Document 101FQAP, required surveillance of QA program elements at ABW. The team reviewed the QSSCs for the surveillance of program elements and found that they addressed all criteria of 10 CFR Part 72, Subpart G. At the time of the inspection, TN West had performed surveillances of two of the 18 ABW QA program elements.

TN West recognized that the issues identified during the inspection could have been identified and resolved by ABW through its internal and vendor audit programs. As a result, TN West issued a letter to ABW on November 5, 1998, encouraging ABW to complete its internal and vendor audits without delay, to identify areas of nonconformance, and to take the necessary corrective actions. Specifically, TN West also stated that "TN West will evaluate the ABW internal and supplier audits at the end of 1998 to determine if TN West can remove the ABW procurement restriction on the TN West ASL. In addition, TN West will be performing its annual QA evaluation of ABW

performance at the beginning of 1999. At that time TN West will decide whether to perform [a] full criteria QA program audit of ABW."

2.4.3 Conclusions of TN West Oversight of ABW

TN West was aggressive in its oversight of ABW to assure that all requirements were being met. Both the TN West and ABW surveillance personnel were qualified and knowledgeable of all aspects of the fabrication effort. The QSSCs reflected all aspects of the fabrication program and were kept current by the surveillance staff. There were good communications between TN West surveillance personnel and ABW staff. Any issue that was identified during the inspection was acted upon by ABW and/or TN West immediately and resolved.

As a result of an NRC observation, TN West corrected eight QSSCs to require visual inspection of DSC welds. As a result of a second NRC observation, TN West revised its surveillance procedures assure that the TN West surveillance inspectors completing sections in QSSCs record their identities as required by 10 CFR 72.174, "Quality Assurance Records." TN West recognized that the issues identified by the team during the inspection could have been identified and resolved by ABW through ABW's internal and vendor audit programs. As a result, TN West issued a letter to ABW on November 5, 1998, encouraging ABW to complete its internal and vendor audits without delay, to identify areas of nonconformance, and to take the necessary corrective actions.

3. Overall Conclusions

Both ABW and YPI had implemented acceptable QA programs. Fabrication activities at both facilities were properly conducted using approved procedures and qualified personnel.

TN West provided effective oversight of all activities performed by ABW and YPI. The good communications developed at both sites between TN West on-site personnel and its contractors was a strength which contributed to the successful fabrication of DSCs by ABW and HSMs by YPI.

4. Exit Meeting

On November 6, 1998, at the conclusion of the inspections, the team held exit meetings with TN West, YPI, and ABW management to present the preliminary inspection results. Management representatives from TN West, YPI, and ABW acknowledged inspection results presented by the teams. TN West provided additional information to the team regarding ABW welder qualifications on November 25, 1998. On December 23 and 29, TN West provided details of corrective actions taken by both TN West and ABW to address a number of audit findings and to inform the NRC that all of the scheduled 1998 ABW internal audits had been completed.