



SPECTRUM TECHNOLOGIES®
UTILITIES SERVICES U.S.A., Inc.

October 21, 1996

Mr. Leif J. Norrholm
Chief of Vendor Inspection Branch
United States Nuclear Regulatory Commission
Washington, DC 20555
Attn: Mr. William Rogers



Subject: **JOINT NUPIC AUDIT OF SPECTRUM TECHNOLOGIES UTILITIES SERVICES (USA), INC. - RESULTS IN NO FINDINGS**

Dear Bill:

We want to take this opportunity to advise you that we have recently come through our third joint NUPIC audit. This audit was conducted between August 13-16, 1996; and was lead by Wisconsin Electric Power Corporation assisted by Northern States Power Company and Consolidated Edison Company. The audit evaluated the full scope of our product and services for compliance with 10CFR50, Appendix B and 10CFR21. As with the previous two joint NUPIC audits, this one resulted in no findings.

One minor observation was made requiring no response from us. This observation involved individually marking fuses prior to shipment to customers. Spectrum's practice has been to place markings on the outside of each box of fuses identifying that the fuses within had been dedicated and providing traceability to the specific customer purchase order. The boxes are then sealed; however, we had not been marking the individual fuses contained within the boxes. We have been relying on the quality assurance programs in place at the nuclear utilities to control the traceability, as necessary, of each fuse once it is removed from the box in which it was received. The auditors requested and we agreed to mark each individual dedicated fuse with an "ST" standing for Spectrum Technologies, once the fuse(s) have been successfully dedicated. We will continue to provide the same information on the boxes in which the fuses are packaged.

As you'll note in the subject line, our company name has changed slightly. Over the years, we have entered into a number of business ventures that are not related to our service provided to the Nuclear Utilities. The change in our company's name constitutes the formation of a new corporation so that we can maintain proper focus on our nuclear work in order to continue to provide the high quality service for which we have become known, keeping our business ventures not related to the Nuclear Utilities completely separate in another corporation. This approach does not effect any of our work and the support that we have been providing and will continue to provide to our Nuclear Utility customers. The ownership of the company remains the same, and there have been no personnel changes among those personnel that have been supporting the Nuclear Utility work as a result of this new corporation. The only difference that our customers will experience is a different name on our letterhead. The name change situation was discussed in detail with the joint NUPIC audit team, and the conduct of the audit confirmed that nothing has changed in our quality assurance program or its implementation.

We are attaching for your information, a copy of the NUPIC audit report, and trust that you will find this information useful. We consider that having been audited three times over the past six years by teams of auditors representing nine different utilities resulting in not one finding is sufficient evidence to conclude that we have not just been lucky during the audits, but rather our quality assurance program is strong and effective. We will continue to do our part, working hard to maintain the highest standards of quality possible to keep our utilities operating safely.

If you have any questions, please don't hesitate to call.

Very truly yours,

Brij M. Bhartey
President & CEO

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PDR QA999 EMVSPECU
99901119 PDR

070086

Attachment: As stated

Spectrum Sets Standards Above The Standards



231 W Michigan, PO. Box 2046, Milwaukee, WI 53201-2046

(414) 221-2345

NPL 96-0276

September 3, 1996

Mr. William R Willis
Vice President, Quality Assurance
Spectrum Technologies USA Inc.
133 Wall Street
Schenectady, N.Y. 12305

Dear Mr. Willis:

NUPIC AUDIT OF SPECTRUM TECHNOLOGIES USA INC., SCHENECTADY, NY
WISCONSIN ELECTRIC AUDIT NO. 96-055

This is the report of the utility audit lead by Wisconsin Electric of your facility. The audit was performed in accordance with the Wisconsin Electric QA Program, following the guidelines of the Nuclear Procurement Issues Committee (NUPIC). This audit, performed at your facility between August 13-16, 1996, was for the purpose of verifying implementation of your QA Program for products provided as nuclear safety-related to the commercial nuclear power industry.

There were no findings, and one observation identified during the audit. No response is required for the identified observation. Details of this observation can be found in the body of the report. Wisconsin Electric considers the audit closed.

This report will be distributed to those members of NUPIC who have your company listed on their Approved Suppliers List. It is the responsibility of each of these members to determine the acceptability of this report in accordance with the requirements of their own QA Programs. At their discretion they may elect to substitute this report for the performance of their own audit.

Thank you for your assistance and cooperation provided to the audit team. If you should require additional information or clarification, please do not hesitate to contact me or any member of the audit team.

Sincerely,

Richard Callahan
Audit Team Leader

kmc

Attachment

cc: NUPIC Membership (Per identified
distribution)
Arthur Ng (Con ED)

Spectrum Technologies USA, Inc.
133 Wall Street
Schenectady, N.Y. 12305

AUDIT NUMBER: 96-055

AUDIT DATES: August 13-16, 1996

AUDIT TEAM: R. Callahan, Audit Team Leader
Wisconsin Electric Power Company
R. Bosnjak, Team Member
Wisconsin Electric Power Company
J. Phelps, Team Member
Northern States Power Company
A. Ng, Team Member
Consolidated Edison Company
T. Dykstra, Technical Specialist
Wisconsin Electric Power Company

PERSONNEL CONTACTED: B. Bharteey, President
W. Willis, Vice President QA
M. Pudlo, Qualification Engineer
A. Meehan, Manager Contracts
G. Gauss, Verification/Validation Engineer
T. Burns, Manager Computer Services
P. Ableman, Inspector
M Sweet, Inspector
S. Hipp, Inspector
B. Amell, Inspector
D. Osterhoit, Inspector Trainee
P. Tracy, Inspector Trainee
J. Cestra, President, Sunset Engineering

REFERENCE DOCUMENTS:

- 1) Spectrum QA Manual Rev. 4. dated 3/22/1992
- 2) NUPIC Checklist, Rev. 7
- 3) NUPIC Joint Audit Procedure, Rev. 11
- 4) NUPIC PBSA Guidelines, Rev. 9
- 5) 10CFR50, Appendix B
- 6) 10CFR21

AUDIT STATUS: Closed. 1 Observation (No Response Required)

NUREG 0040 / PREVIOUS NUPIC AUDITS:

During the last NUPIC audit, no finding or unresolved open items were identified, therefore no follow-up action was performed during this audit. In addition no new items were identified through NUREG 0040 search, NRC Bulletins, or Notices, since the last NUPIC Audit. The vendor also confirmed that they have had no interface with the NRC since the last NUPIC audit was performed in 1994.

AUDIT PURPOSE:

The purpose of this audit was to evaluate the adequacy and effectiveness of the Spectrum Technologies Quality Assurance Program as applicable to the requirements of 10CFR50, Appendix B, 10CFR21, and other reference documents.

AUDIT SCOPE:

The scope of the audit included an assessment of the adequacy and implementation of the Spectrum Technologies QA Program for supply of safety related products and services. The assessment was performed by reviewing a sampling from the product lines Spectrum provides, including electrical/mechanical dedications, software, and services.

AUDIT SUMMARY:

This audit was performed using the NUPIC Checklist, Revision 7. In addition the team used NUPIC Document NO. 18 "Guidelines for section III supplemental checklist for software development" revision 1. Specific PBSA submittals, from some utilities, were also utilized by the team during the course of the audit.

The audit determined that Spectrum Technologies has established, and is effectively implementing a quality program that is meeting the applicable provisions of 10CFR50, Appendix B, and ANSI N45.2. As a result of the audit no audit findings, and 1 observation, not requiring a written response, were issued. Spectrum is committed to providing products, and services that meet established quality standards and customer requirements. The management at Spectrum took a proactive approach to answering, and acting on any comments or minor concerns the audit team identified. The strong quality philosophy of the Spectrum upper management was shown throughout the entire organization.

The audit team did identify and document the following observation.

OBSERVATION 96-055A While reviewing a job in progress at Spectrum, for supply of fuses, the audit team noted that a unique marking on the box was not applied to each fuse within the box, even though the fuses were of sufficient size to be marked. Spectrum places a label on the outside of each fuse box. The label contains the part number with a unique identifier of "ST" signifying Spectrum Technologies. The "ST"

was not applied to the part number on the fuse label. The team recommended that Spectrum uniquely identify any items with sufficient surface area to accommodate. Spectrum stated that this became their standard practice with fuses because many types of fuses are too small to mark. Spectrum did agree in the future to review each fuse order on a case by case basis to see if a unique identifier will fit on the surface area of the fuses. Based on the receptive/proactive actions by Spectrum no written response was requested to this observation.

Spectrum will be maintained on the Wisconsin Electric Qualified supplier System with its current status. The following P.O. recommendation will be added to the purchasing considerations screen of the database. This recommendation is not based on concerns observed at Spectrum during the audit, but rather to ensure proper end product use at PBNP is accounted for.

NOTE: It is each utility's responsibility to ensure testing performed by Spectrum will encompass all critical items for their application.

A. All purchase orders should request a copy of the Spectrum dedication plan be submitted to Wisconsin Electric for review and approval prior to the start of work. This review should be performed to ensure all critical characteristics, based on our unique end use, are being addressed in the dedication performed at Spectrum.

The audit team was informed by the President of Spectrum Technologies USA Inc. that the nuclear portion of the business has changed its name to "Spectrum Technologies Utilities Services, (USA) Inc." The audit team confirmed that this change has had no effect on the QA program, or personnel supporting nuclear work. It is a name change only, with no change in address associated with the change. A copy of the Spectrum letter addressing the name change is attached to this report. This change has no effect on order entry.

The audit included the review and evaluation of the following activities and program elements:

I. Order Entry

The process of order entry is described and controlled by Section 1.0 of the QA manual and procedure QAP 5/001. Purchase orders received from customers are sent to the Qualification Engineer. He reviews the order requirements both technical and quality and translates them to internal documents. He develops the purchase order for all materials and services. The customer requirements are passed on to each supplier. The vendor purchase orders are also reviewed by the QA manager and the company president prior to approval and distribution. The Qualification Engineer also develops a component or part qualification procedure, acceptance test procedures and internal memos for dedication of the items. Each of these documents state what technical and quality requirements are necessary for complete qualification of the items. Inspection and test personnel use these

documents to perform the necessary tests, inspections and create the documentation necessary for these items.

When order requirements are not clear, or deviation/nonconformance occurs or any technical or quality requirements differ, the customer is notified. I observed several correspondences in job folders which indicated a well documented process of customer notifications relating to this. It is each utility's responsibility to ensure Spectrum addresses critical characteristics for their own use.

This area was found satisfactory.

II. Design Control

Spectrum provides a variety of products and services to the nuclear utilities including third part commercial grade dedication of items, Failure Modes and Effects analysis for specific components, as well as digital plant monitor and control systems. The design control process was reviewed for the Main Steam and Feedwater Isolation Actuation System (MSFIS) project at the Union Electrical Callaway Plant, purchase order 092709, job JN9400700. This project required Spectrum to design an integrated software and hardware control system.

Spectrum initiated the design process for this project by creating a "System Requirements Document," a design report that referenced all of the codes and specifications that were required for the project and also defined the system operating parameters. Spectrum then created the System Requirements Specifications and the Hardware Requirements Specification which define the sections of the project implemented by hardware and the sections implemented with software. All parts, including hardware and fasteners, of a safety related system are classified as safety related and dedicated prior to use.

Spectrum performs design verification with a combination of design reviews and qualification testing. For the MSFIS project Spectrum held design review meetings and issued reports that documented the results of the design review. These design reviews were by individuals who had not participated in the design of the project. In addition Spectrum had seismic testing and electromagnetic interference testing performed on a prototype unit. If a project requires it, Spectrum also can contract for environmental testing to be performed. Spectrum also verified the system performed as required with a Software/Hardware Acceptance Test (SHAT) in which the developed software was run on the hardware created for the project. This test verifies the system provides the correct output to a set of inputs.

Design changes are documented with Engineering Change Notices (ECNs). These forms describe the documents to be revised, the description of the change, and approvals by the Project Manager and the Verification & Validation Engineer. Once the document has been revised, the signature of the Project Manager, the Vice President QA and the President are required to release the document. A revision to a controlled document may

incorporate more than one ECN so there is not necessarily a one to one correspondence between the number of revisions to a controlled document and the number of ECNs written on the controlled document.

This area was acceptable.

Commercial Grade Dedication

Spectrum has developed a commercial grade dedication process structured around EPRI 5652. For several classes of items they have developed generic Acceptance Test Procedures that list the critical characteristics for the part and the acceptance methods. If spectrum receives an order for an item that does not fit into one of these classes, they will develop a specific Acceptance Test Procedure for that item.

Spectrum does not make a determination of the safety function of the item because they often do not know the end use of the items. Spectrum selects critical characteristics for acceptance they feel are appropriate for end uses of the items. Customer review of the Spectrum dedication plan (Acceptance Test Procedure) would ensure appropriate characteristics are being verified.

If Spectrum procures additional components of a type they have previously dedicated, they will disassemble the components and perform an analysis of the parts to determine if they were the same as those in the dedicated components. This analysis includes a spectrum analysis of the material from the new part and the previously dedicated part. If there have been any changes to the parts, Spectrum will perform an analysis to determine if the changes have any effect on the previous qualification, and if additional qualification tests are required.

This area was acceptable.

III. Software QA

Spectrum has supplied digital control systems to nuclear power plants and has written the software that controls these systems. Spectrum has implemented a Software Quality Assurance system structured around IEEE 730.1-1989 and other software QA standards. A review was performed on the implementation of Spectrum's software QA program on the Main Steam and Feedwater Isolation Actuation System (MSFIS) project.

Spectrum's software QA procedure defines the software life cycle as:

1. Defining software requirements
2. Functional software design where the modules are defined
3. Detailed software design where the algorithms and equations are defined
4. Coding and software generation
5. Verification and validation testing

Spectrum does not include the operations and maintenance phase because Spectrum has turned the software over to the customer at this point. Spectrum does supply an instruction manual for their software and will perform modifications to the software if contracted by the customer.

Independent reviews performed by individuals other than the software preparer are performed throughout the software development cycle. The documentation created during the software development cycle includes:

1. Software Requirements Specification which defines what the software does.
2. Software Design Document which shows the software design.
3. Software Verification and Validation Plan, which shows the reviews and tests performed throughout the development cycle what assures the software quality.
4. Software Configuration Management plan which shows the development tools and storage medium to be used.
5. The Software Verification and Validation Report which shows the results of the reviews and tests.
6. Software Certificate of Conformance is the spectrum certification that the software meets the requirements.

All of the above documents have the signatures of the Project Manager, the Verification and Validation Engineer, the Vice President QA, and the President.

Spectrum combines the planning for verification and validation into one document, the Software Verification and Validation Plan. The verification consists of the independent reviews that are conducted on the documents generated for the different phases of the software development. The validation consists of Walkthrough Verification, the Software Unit Testing (SUT), and the Software/Hardware Acceptance Testing (SHAT).

The Walkthrough Verification consists of a qualified engineer who did not write the software, stepping through a hard copy of the software and reviewing it for adequacy. The SUT verifies that each module of the software program provides the correct set of outputs for a set of inputs. The SHAT consists of testing the software in the hardware being sold to the customer and determining if the system operates properly. All of the reviews and testing are performed by individuals who did not write any part of the software. The results are documents in controlled reports.

The Preparer is responsible to make all changes to the software until the software is baselined. Once the software is baselined, an Engineering Change Request is required to approve any changes to the software. The Project Manager, the Verification and Validation Engineer, the Vice President QA, and the President are required to approve the Engineering Change Request. The baselining occurs once the software has passed the Verification and Validation Testing. The baseline of the software is defined in a hard copy printout of the source code maintained in a controlled document. Once the software

has been baselined, any revision to the software requires that the affected portions of the software undergo new Walkthrough and Software Unit Tests.

Software errors are handled with the same corrective action process as other Spectrum nonconformances, except there is a separate "Software Non-Conformance Report" (SNCR) used to document the error. This form documents the nonconforming condition, the action to be taken, the parties responsible to take the action, the required testing, and the documents to be updated. The SNCRs are approved by the Project Manager and the Vice President QA.

Spectrum does perform commercial grade dedication of some procured software. For the MSFIS project Spectrum dedicated the firmware in the Allen Bradley PLCs and the ICOM programming software. Spectrum defined the critical characteristics for the software and performed commercial grade surveys of the suppliers' software QA program to verify the characteristics. Because Spectrum found deficiencies in the suppliers' software QA program, they performed additional tests on the software to verify the characteristics. The steps taken by Spectrum ensured this software did not introduce any errors into the MSFIS project.

The subject of virus protection was discussed with the supplier. They did not have any formal virus protection process at the start of this audit. Spectrum installed Norton Anti-Virus detection software on all of their computers which run windows. This software scans all of the computer disks upon start-up, and also scans any floppy inserted into the computer.

The Spectrum Software QA program was considered to be very thorough and effective.

IV. Procurement

A review of supplier purchase orders was performed to assess this area. Customer requirements were properly communicated to the supplier and Spectrum Technology test and inspection personnel. QA manual section 4.0, 7.0 and 10.0 along with procedures QAP 4/001, 7/001 and 10/001 describe and control these activities. The body of each purchase order and the attached "Terms and Conditions for Purchase Order for Goods Requiring Traceability" contains the necessary requirements. Receipt along with visual inspection verify that the item received is what is required for the purchase order. Results of these inspections are documented and filed in the job folder. Items initially received are identified for receipt inspection and labeled "hold for inspection" until visual inspection occurs. After visual inspection is complete the items are forwarded for further testing as required.

Spectrum Technology maintains two qualified supplier lists. One for Class 1E 10CFR50 Appendix B suppliers and the second for commercial suppliers. The Appendix B suppliers are qualified by audit. The commercial suppliers are either qualified by

commercial grade survey or inspection and test of the items occurred. Each of the suppliers reviewed were properly qualified.

This area was satisfactory.

V. Material Control and Handling, Shipping & Storage

The QA manual section 8.0 and 13.0 along with procedure QAP 8/001 and 13/001 describe and control this area. Each item or its container is marked with a label. This label contains the purchase order number, job number, line item and when applicable, the item number. The label stays with the item until shipped. After receipt inspection a job traveler is developed and it identifies which inspection, test or other activity is required for the item. The traveler shows which of these is required to be performed and when the activity is complete. After qualification of the item is complete, the final acceptance stamp is applied by the inspector over the label on the item or its container. Observation #96-055A was written to suggest improvement to some items large enough to receive the label and only marked on its container. Such was the case with fuses containing the original manufacturer part number directly on the fuse and the Spectrum Technology label was on the box. Subdivided items are labeled just like the original item.

Spectrum Technologies does maintain some inventory which was previously qualified in a storage area where temperature and humidity is recorded and maintained. When an item is released from this storage it is fully tested for qualification. The normal package and shipping practice was rewritten to comply with ANSI N45.2.2 (1972). All items are stored and packaged under level B requirements. All packages are foam packed and shipped by UPS.

This area was found satisfactory.

VI. Fabrication/Assembly/Special Processes

Spectrum Technology performs no fabrication. Some assembly is performed on control panels (FW isolation actuation system and DG load sequence). I reviewed the controls and procedures for this area in QA manual section 9.0 and QAP 3/003, 9/001 and 9/002. The procedures developed for assembly adequately controlled the assembly of these panels along with drawings.

Only two special processes are used at Spectrum Technologies. They are soldering and thermal aging. Thermal aging is performed today with no specific personnel qualifications. Soldering has not been performed over the last three years but personnel are qualified by performance demonstration and these qualifications are current. Equipment and materials used for these processes are acceptable.

This area is satisfactory.

VII. Tests and Inspections

In review of this area QA manual sections 10.0 and 11.0 along with procedure QAP 10/001, 11/001 and Policy memorandum #96-3 apply. Inspections and tests are described in acceptance test procedures, generic test procedures, and memo for dedications. The required test and inspections are described along with the acceptance criteria. The procedures provide for recording results of these activities on pre-designed forms. Each of these documents can be found in the job folder. The procedures identify what critical characteristics are required to be verified. Generic test procedures provide for consistency of the criteria chosen.

Sample plans are used only on a few items. Spectrum Technologies need 100% test and inspection in most cases. Sampling is based on Mil-STD-105E normal inspection level II. When any one rejection is found, 100% inspection/test is performed until 5 consecutive acceptable lots of the same material is received. At that time sampling can resume.

Inspection and test personnel were knowledgeable of their responsibilities and familiar with equipment, prerequisites for tests and recording requirements. No indirect controls are necessary for tests or inspections. When required, source inspections at suppliers are performed to assure monitoring occurs to verify characteristics not appropriate at Spectrum Technologies. No firmware is used in inspection or test equipment at present.

This area is satisfactory.

VIII. Calibration

Measures to control calibration of measuring and test equipment were verified to be in compliance with QA manual section 12.0. Compliance with implementing procedure QAP/12/001 "Control of Measuring and Test Equipment," was verified for both primary and secondary standards as appropriate. The audit verified programmatic controls are effectively being implemented to provide for:

1. Unique identification of test equipment.
2. Accurate and appropriate status indicators.
3. Proper calibration intervals.
4. Calibration history and records.
5. Positive controls.

Spectrum utilizes outside contract agencies exclusively to perform all calibrations. Calibrations are primarily performed by either General Electric, or Upstate Metrology Labs. These vendors are maintained on the Spectrum approved supplier list, or in the case of Upstate, are controlled under the Spectrum QA program while performing work on site at Spectrum. Equipment found out of calibration is properly tagged and segregated in a hold area pending resolution. Spectrum does perform an evaluation of all

M&TE found out of tolerance to determine affects on prior orders. All calibration records provided a statement of traceability to NIST.

Overall, the handling of measuring and test equipment was considered satisfactory.

IX. Document Control

Spectrum has properly established and implemented measures to control the review/approval, and issuance/distribution of procedures and/or instructions as defined in Section 6.0 of the QA manual. Both the QA manual, and the Quality Assurance Procedures manual were the primary basis for review in this area. the two documents are the primary basis for performing/controlling work at Spectrum. Additional documents reviewed by the audit team included purchase orders, test procedures, certification, test reports, qualification reports, etc. Spectrum maintains a central document folder for each job they perform. This folder contains all documents/records related to that job. As applicable all documents reviewed included quantitative/qualitative acceptance criteria. This area is considered acceptable.

X. Program Compliance

Spectrum Technologies' quality program is summarized in their QA manual, rev. 4, dated 3/22/92. It has not changed since the last Joint NUPIC Audit back in May of 1994. The Vice President of Quality Assurance has the overall responsibility for establishing the QA program. Although the present edition of the QA manual states that the overall responsibility for the QA program falls on the QA Manager, that title has been elevated to VP of QA. In an internal memorandum from the President, B. Bharteey to W. Willis, dated 1/4/93, the title of QA Manager has been elevated to VP of QA. His responsibilities remain the same as the QA manager stated in the QA manual and QA Procedures. Spectrum is slowing putting this position change when a QA procedure is revised and eventually the QA manual will be revised to reflect this change.

The VP of QA is responsible for the QA program and is authorized by the Statement of Policy, signed by the President of the company. The VP of QA has direct access to the President and he is independent of production pressure. The VP of QA reports regularly on the QA program by means of monthly topical audits. Each topical audit is a limited scope audit covering all areas of the QA program. The results are given to the President monthly. In addition to the monthly topical audits, a comprehensive audit of the complete QA program is performed biennially by an independent auditor. These results are also presented to the President.

At the end of the year, the President assesses and evaluates the effectiveness of the Spectrum QA program by review of the topical and biennial audits and issues his own "President's Evaluation of Spectrum Technology's QA Program."

The nature of Spectrum's business is to dedicate commercial grade items. Maintenance/service manuals would be whatever the OEM of the CGI supplies. The CGI OEM would not normally be obligated to forward any design changes and any associated change to maintenance/service if required to Spectrum. Of course, if Spectrum is aware of any such changes, they can notify their customers.

Returns from customers are handled by a Policy Memorandum 92-3. This memorandum defines how the returned item is to be identified. The returned item is given a "customer return authorization number" and upon receipt, the item is inspected and the "customer return authorization form" is filled out identifying what the problem is. Upon determining what action is to be taken, the VP of QA evaluates the resolution to determine if the repair is adequate and to determine if necessary if the problem is a potential Part 21 issue. The VP of QA also interfaces with the customer.

Nonconformances are addressed in Sec. 15 of the QAM and procedure QAP/15/001. Nonconforming items are immediately segregated and tagged. A nonconformance report is generated and dispositioned by the Manager of Inspection and Test. The disposition is reviewed by the Qualification Engineer if the disposition is "accept-as-is" or "repair/rework" to determine if further testing is required and the VP of QA would notify the customer if required. Once all parties have concurred with the disposition, and the repair/rework is completed, the VP of QA removes the hold tags, signs off and files the NCR report. NCR reports are maintained by QA.

Latest copies of 10CFR21, as well as copies of Section 206 of the Energy Reorganization Act of 1974 and Spectrum Policy memorandum 92-2 are posted on a bulletin board outside of the VP of QA office and on a bulletin board in the Laboratory. All employees are also trained on the 10CFR21 Reporting Procedure QAP/19/001. If it is determined a 10CFR21 condition report exists, the President notifies the NRC.

Internal audits are covered under Section 18 of the QAM and Procedure QAP/18/001. As stated earlier, internal audits consist of both topical audits, which are limited in scope, covering one specific area of Spectrum's QA program such as control of design drawings, receiving materials, etc., and a comprehensive biennial audit by an outside consultant of the whole QA program. All the topical audits are done by the VP of QA. All audits are well documented and results are presented to the President for review. Corrective actions are normally taken during the audit, if it can't be done quickly, then it's handled as part of the corrective action procedures.

External audits are also covered under Section 18 of the QAM and procedure QAP/18/001. Safety related suppliers are audited biennially, and these suppliers' audits have been kept current. A review of a couple of audits indicate the use of checklists, documented evidence and findings as a result of the audits are followed up and closed.

Commercial surveys are also performed by Spectrum of DGI used. All surveys are performed initially when the DGI supplier are considered to provide the items. Once the

CGI supplier has been approved, they are evaluated annually to determine if they should be maintained on the Approved Suppliers List. This evaluation consists of either a telephone call, mail survey and Spectrum's experience with the product. Of course if the product is not performing, it is possible a new survey be done.

Conditions adverse to quality are handled by their corrective action process as defined in section 16 of their QAM and procedure QAP/16/001. Conditions are identified in Corrective Action Requests and is processed to determine the cause, action to be taken to preclude recurrence, review and approval of corrective action and finally, closeout.

Indoctrination and training of personnel is covered under procedure QAP/2/001. All employees are trained in the requirements of the Spectrum QA program, 10CFR50 App. B, and 10CFR21. This training is documented in each individual personnel qualification files. Any additional training such as technical training or procedure training are noted in the personnel qualification files.

The only personnel requiring any certification are the inspection and test personnel and solderers. Qualification requirements are specified in Spectrum procedures. Certifications are located in individual personnel files.

Spectrum properly maintains records as defined in their procedures. They create a job folder for each purchase order which then becomes the permanent place to file all records related to that purchase order. These folders are maintained in a central file area as jobs are in progress. Upon completion of the purchase order, the file is reviewed and then sent to be microfilmed, both a microfiche and microfilm copy is made. Spectrum then maintains both the paper and microfiche copies on site at Spectrum. The microfilm copy is sent to the local bank where it is maintained in a safe deposit box. Records maintained job folders included inspection and test records, qualifications and certifications, calibration records, nonconformance reports, etc. Records area is considered acceptable.

Technical Specialist Summary

The technical specialist evaluated the capabilities and practices of Spectrum Technologies in the areas of 1) Seismic Testing, 2) Environmental Testing (Humidity and Temperature), 3) Environmental Testing (Irradiation), 4) Physical and Chemical Testing of Metallic & Elastomer Materials, 5) Material Aging Database (Elastomer Materials), 6) Mechanical Testing (Functional/Operability) and 7) Pressure Testing (Hydrostatic/Pneumatic) as listed on the PBSA Worksheet.

Seismic Testing

Spectrum Technologies does not have an in-house capability to perform seismic testing. They contract out the testing to Ontario Hydro Technologies of Ontario Canada who is on their qualified supplier list. As part of this audit one seismic testing package was reviewed (Spectrum Technologies JN 9500080) in detail. The seismic testing was a portion of the qualification testing for a series of pressure and temperature switches. The

testing was performed per IEEE 344-1975. The testing performed was random multiple frequency independent simultaneous tri-axial testing. The testing adequately monitored the function of the switches both during and after the simulated seismic input motion.

Environmental Testing (Humidity and Temperature)

Spectrum Technologies has the capability to performed high temperature and high humidity harsh environment testing. To date, Spectrum Technologies has performed one harsh environment qualification test for a series of pressure and temperature switches. As part of this audit that qualification package (Spectrum Technologies JN 9500080) was reviewed in detailed. The testing was performed in accordance with IEEE 323-1974. The baseline functional testing of the switches was adequately performed at each stage of the testing. The temperature aging limiting components were appropriately identified and the thermal aging temperatures and times correctly determined. Spectrum Technologies' standard practice is to break down one test specimen into its piece parts and verify the material composite using IR spectroscopy. The material activation energies are then determined using published industry information and in-house thermogravimetric testing using the TGA 51 Thermogravimetric Analyzer. The harsh environment qualification testing was performed test chamber in-house which has a limited pressure capability. Spectrum Technologies does not have the capability to perform harsh pressure or chemical spray testing in-house. This would be sub-contracted out to a qualified test lab.

Environmental Testing (Irradiation)

Spectrum Technologies does not have the capability to perform irradiation testing in-house. They contract out the testing to Lowell University Gamma Cave Operation of Lowell, MA. who is on their qualified supplier list. To date, Spectrum Technologies has performed one harsh environment qualification test for a series of pressure and temperature switches. As part of this audit that qualification package (Spectrum Technologies JN 9500080) was reviewed in detailed. The qualification testing included radiation aging of the test specimen and Design Basis Accident radiation qualification testing per IEEE 323-1974.

Physical and Chemical Testing of Metallic & Elastomer Materials

Spectrum Technologies has the capability to perform hardness testing for metallic materials and non-metallic material composition testing using IR Spectroscopy. As part of the audit hardness testing results performed on the body of solenoid valves (Spectrum Technologies JN 9400580) were reviewed. Material hardness was identified as a critical characteristic to verify the valve body pressure boundary characteristic. Hardness testing was performed at various points on the test specimens to obtain representative results.

The technical specialist also witnessed the IR Spectroscopy testing process performed on the Perkin Elmer 1600 Series FTIR Spectrum Analyzer. Spectrum Technologies has the capability to identify a material type by comparison to known compositions in a materials database or to do material comparisons between multiple test specimens. The testing was done as per the analyzer manufacturers guidance.

Material Aging Database (Elastomer Materials)

Spectrum Technologies determines material aging characteristics (i.e. activation energies) on a job specific basis using industry published data and in-house thermogravimetric analysis (TGA). The age limiting part for the test specimen is determined by evaluating the activation energy and service temperature data for the various parts. The material aging characteristics are used in conjunction with environmental qualification testing as described above. Spectrum Technologies has conducted an Internal Audit 94-05 dated 1/27/95 to verify the activation energy determination techniques that are used. EPRI TR-100516, "Nuclear Power Plant Equipment Qualification Reference Manual," provides some discussion on the use of TGA for determining activation energies. In conclusion it states "Before an activation energy value based on TGA is used in a particular application, some assurance must be developed that the value represents a meaningful correlation for use in aging analysis." Spectrum Technologies does compare TGA values to existing published industry information, however, they do not do activation energy testing via other methods.

Critical Characteristics / Mechanical Testing (Functional/Operability)

Spectrum Technologies identifies critical characteristics per the EPRI NP-5652 guidelines. As part of this audit work packages JN 9500080, JN 9400580 and JN 9400330 were reviewed. The critical characteristics based on the intended equipment function were properly identified. Spectrum Technologies verifies critical characteristics using testing. Functional testing (i.e. cycling) was performed as required to verify proper operation of the components as directed in each of the job acceptance plans. The acceptance plans received the customer's prior approval prior to the testing. The component performance characteristics were adequately monitored during the performance of the testing.

Pressure Testing (Hydrostatic/Pneumatic)

Spectrum Technologies has the capability to perform pressure testing using gas (air, nitrogen) or liquid (water) as the pressurizing fluid. As part of the audit work packages JN 9501148 and JN 9501140 for the lift and leakage testing of two relief valves were reviewed. The testing was performed as directed by the acceptance plan.

Overall, from a technical standpoint, Spectrum's capabilities and practices were found acceptable.