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SUBJECT: Forwards evaluation of procurement issues,per 890912 mgt meeting,per IRs 50-528,529,530/89-38.

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Arizona Public Service Company

PALO VERDE NUCLEAR GENERATING STATION
P.O. BOX 52034 • PHOENIX, ARIZONA 85072-2034

229-00342-PJC/JNB/TDS
September 22, 1989

Mr. John B. Martin, Regional Administrator
U. S. Nuclear Regulatory Commission
Region V
1450 Maria Lane, Suite 210
Walnut Creek, CA 94596-5368

Dear Sir:

Subject: Palo Verde Nuclear Generating Station (PVNGS)
Units 1, 2, and 3
Docket No. STN 50-528 (License No. NPF-41)
STN 50-529 (License No. NPF-51)
STN-50-530 (License No. NPF-74)
Evaluation of Procurement Issues
File: 89-001-503

During the APS/NRC management meeting held in your offices on September 12, 1989, APS committed to evaluate concerns identified by members of your staff. The concerns dealt primarily with the process currently in place at PVNGS to dedicate commercial grade items for use in safety-related systems, components, or structures. The evaluation has been completed and a copy is attached for your review.

If you have any questions or I can provide any additional information concerning this issue, please contact me.

Very truly yours,

J. N. Bailey, Vice President
Nuclear Safety & Licensing

JNB/TDS/kj

Attachment

cc: F. R. Huey
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M. J. Davis
NRC Document Control Desk

IE01
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RESPONSE TO NRC INSPECTION REPORT
Nos. 50-528/89-38, 50-529/89-38, 50-530/89-38
Commercial Grade Procurement

EXECUTIVE SUMMARY

The NRC Inspection Report dated 8-21-89 identified one unresolved item regarding dedication of commercial grade items for intended safety-related applications. In the management meeting held on September 12, 1989, with Region V representatives in Walnut Creek, the NRC requested additional information regarding commercial grade procurement activities related to the specific safety function of certain replacement parts. The following response is provided as additional information over that previously given to Region V inspection team personnel.

With efforts beginning 1984, PVNGS has been an industry leader in the development and implementation of the commercial grade dedication process. The program fully complies with regulatory requirements and has evolved consistently with changes driven by NRC, industry initiatives, and sound engineering practices. Development of industry guidelines in 1988, under the sponsorship of EPRI/NCIG, has provided specific direction for the industry in the dedication and use of commercial grade items in safety related applications. The established PVNGS program is consistent with the guidelines provided in the EPRI NP-5652 report; Guidelines for the Utilization of Commercial Grade Items in Nuclear Safety Related Application (NCIG-07), which has been endorsed by the NRC.

The specific NRC concern identified in the Inspection Report has to do with the verification method used to assure that critical characteristics had been met. The eight (8) items identified in the Inspection Report have been reviewed in detail by PVNGS. The review consisted of a three step evaluation.

(1) Review the dedication documentation to determine if it is acceptable. Provide additional documentation and/or justification to support acceptable items.

(2) Take additional steps to disposition those items without acceptable dedication. Additional steps should verify that installed items are acceptable for use.

(3) Make provisions to replace items and prepare a Justification for Continued Operation (JCO) if required for items that cannot be dispositioned as acceptable.

This evaluation process is documented in the following pages for each of the eight items in the inspection report. In each case the evaluation has concluded that the items are acceptable for use in the intended safety-related application and no further action is considered necessary.

Although this evaluation has demonstrated the effectiveness of the commercial grade dedication program, PVNGS recognizes that the area of commercial grade item dedication has been and continues to be an evolving and improving technology. PVNGS is committed to responding to these changes to assure that the plants operate safely and reliably and recognizes that improvements to this program can and should be made. The following enhancements to the commercial grade dedication program are in the process of being implemented.

- Procedures are being enhanced to provide additional guidance and training will be given to the engineers on the selection of verification methods.

- On-site capabilities for special tests and inspections will be enhanced through implementation of the use of equipment such as the alloy analyzer.

- Commercial grade surveys of selected vendors for placement on the Commercial Grade Approved Vendors List will be implemented.

In addition to the above enhancement activities, PVNGS has reviewed all ECEs and MEEs to identify the population of those which provide for commercial grade item dedications. The review resulted in the identification of 417 such dedications. PVNGS intends to perform an evaluation of a select sample of the 417 dedications to identify whether issues raised by the NRC inspection or other questions regarding the adequacy of the PVNGS commercial grade program exist. The results of this evaluation will be summarized and subsequently factored into the enhancement activities discussed above.

DISCUSSION OF CURRENT PROGRAM

The essential elements of the PVNGS commercial grade program include the determination of commercial grade applicability; identification of the critical characteristics, acceptance criteria and verification method for dedication; and final acceptance as further discussed below:

(a) Commercial Grade Applicability

An item is reviewed for commercial grade applicability based on the three criteria provided in 10CFR21:

- the item is not subject to nuclear unique design or specification requirements.
- the item is used in application other than nuclear power plants.
- the item can be ordered on the basis of specifications set forth in the manufacturer's published literature.

If the answer to these three questions is yes, then the item may be procured commercial grade and dedicated for safety related use. The evaluation for commercial grade applicability is performed and documented using any of the following three procedures:

12DP-0MC06	: Material Engineering Evaluation (MEE)
81DP-4EQ01	: Equipment Change Evaluation (ECE)
12DP-0MC09	: Item Procurement Specification (IPS)

(b) Identification of Critical Characteristics, Acceptance Criteria and Verification Method

The PVNGS program considers the identification of critical characteristics, acceptance criteria and verification methods to be the most critical elements of the commercial grade item procurement and dedication process. The program employs two specific processes:

1) The procurement process assures that the item procured is specified properly and in accordance with plant design requirements; and

2) The dedication process assures that critical characteristics are properly established and verified via selected acceptance methods to provide a technical basis for ensuring that the item received is the item specified and hence, will perform its intended safety function.

As previously stated, PVNGS commercial grade item procurement and dedication program is currently modeled after the industry guidelines as specified in EPRI NP-5652. The essential approach established by this guideline is the establishment of critical characteristics, which once

verified, will provide reasonable assurance that the commercial grade item received is consistent with the item specified during the procurement process,and hence will perform its safety function once installed in a safety-related application.

Determination of critical characteristics is performed by review of design documents such as drawings and vendor technical manuals. Once the critical characteristics are identified, acceptance criteria methodology is established along with the verification methods. The current program at PVNGS utilizes two specific methods for verification. These methods are (1) special tests and inspection (including post installation tests) and (2) source verification. Special tests and inspections are used whenever the verification can be done during normal receiving at PVNGS. Source verification is frequently used when characteristics must be verified during manufacture or when acceptance criteria are not known. In such cases, PVNGS Engineering specifies the characteristics to be verified based on vendor provided acceptance criteria. The inspector witnesses verification and ensures that acceptance criteria are related to approved design documents.

Acceptance of items based on the vendors commercial QA program is not currently done but is planned for the near future. This will be accomplished based on the development of a Commercial Grade Approved Vendors List.

(c) Final Acceptance

Final acceptance is provided during the receiving process either by performing and documenting the special tests and inspections or by accepting the documentation provided by the source surveillance. In either case, this becomes the point of dedication and Part 21 reportability applies.

Occasionally, PVNGS utilizes post-installation testing as the method of verification. When specified, the item is quarantined upon receipt. When requested for installation, the item is conditionally released for completion of the dedication requirements. Successful completion of the post installation testing completes the dedication process.

RESPONSE TO UNRESOLVED ITEM

The Inspection Report concluded that the PVNGS procurement program was "weak in the way commercial grade items are dedicated for safety-related use in that the critical characteristics of the items are not fully verified by testing or inspection". The specific concern has to do with the verification methods used to assure that critical characteristics had been met.

It is PVNGS's position that the program and the implementation of it is adequate in establishing the necessary level of assurance (reasonable assurance) that appropriate critical characteristics are identified; that appropriate acceptance methods are determined; and that adequate verification methods are established to verify that the critical characteristics are satisfied. This position is based on the following:

(1) The PVNGS program for commercial grade dedication has been patterned after the guidelines in EPRI NP-5652 and is intended to provide reasonable assurance "that a commercial grade item received is the item specified". The basic premises of the guidelines are addressed in section 1.3 of the guideline and provide the basis for what follows. This is important for establishing the context of a procurement program which utilizes these guidelines. The first two paragraphs are of particular importance:

> "1.3.1 Design of Commercial Grade Items
>
> This guideline assumes that the design requirements of the item have been satisfactorily translated into specification requirements as reflected in the procurement document. The purpose of the technical evaluation is to assure that the specification requirements are correct. The acceptance process reasonably assures that an item received is the item which was specified in the procurement document.
>
> 1.3.2 Equivalent Performance
>
> Equivalent performance is confirmed by conducting the technical evaluation to ensure the item specified meets design requirements. Acceptance assures that the item received is the item which was specified in the procurement document. The combination of the two activities, therefore, assures that the item received and accepted will perform in an equivalent fashion to the item being replaced. Neither activity need be conducted with the intention of improving the expected performance of a replacement commercial grade item."

The PVNGS program is based on selecting critical characteristics that are identifiable and verifiable and will provide reasonable assurance that the item received is the item which was specified and that it will perform its intended safety-related function.

The program relies on engineering expertise in the determination of critical characteristics as well as to satisfy the requirement of 10CFR50 Appendix B Criterion III. In cases where exact material composition is identified as a critical characteristic, then a material test must be performed to verify material. Exact material composition is often not a critical characteristic and the material

properties important to the function of the item can be determined by other means such as a magnet test to verify whether it has austenitic or ferritic grain structure or hardness tests that can be correlated to tensile properties.

(2) Neither 10CFR21, Generic Letter 89-02, EPRI NP-5652, NRC Inspection Procedure 38703 or the PVNGS program address verification methods at the level of detail identified in the inspection report. The EPRI report identifies the four acceptance methods as:

Method 1 - Special Tests and Inspections
Method 2 - Commercial Grade Survey of Supplier
Method 3 - Source Verification
Method 4 - Acceptable Supplier/Item Performance Record

The PVNGS program uses methods 1 and 3 or a combination thereof at the present time. Method 1, Special Tests and Inspections, is broken down into five (5) verification methods that can be specified by the engineer for each item.

V01 - Verify critical characteristics by visual inspection.
V02 - Verify critical characteristics by measurement.
V03 - Verify critical characteristics by lab test.
V04 - Verify critical characteristics by special instruction.
V05 - Verify critical characteristics by post installation testing.

Beyond this level of detail, it is up to the judgement of the engineer to determine what specific inspection or test to use for each characteristic to provide a reasonable level of assurance for acceptance of the item.

PVNGS ACTIONS TAKEN AND RESULTS

(a) Eyebolts (ECE-RC-A033)

(1) Existing Dedication

Revision 0 of ECE-RC-A033 was issued on 12/09/87 to provide commercial grade dedication requirements for eyebolts used in safety-related, non-ASME Code (i.e., non-pressure boundary) applications. The eyebolts, to be supplied by Borg-Warner Industrial Products, Inc., were originally specified as ASTM A564 Type 630 (Condition H1075) material. Revision 1 to ECE-RC-A033 was issued on 02/09/88 to also allow for the use of AMS 5643 (Condition H1075), thereby closing Supplier Deviation Disposition Request #N-0588 (received 01/27/88). ASTM A564 Type 630 (Condition H1075) and AMS 5643 (Condition H1075) materials are identical.

Both revisions of ECE-RC-A033 identified those critical characteristics which required verification upon receipt inspection, to provide reasonable assurance that the item received was the item specified and would function in its intended safety-related application. More specifically, the critical characteristics and verification methods included the following:

* Part Number - As indicated on the tag affixed to the bag containing the bolts.

* Configuration - Measurement and verification of eyebolt nominal diameter; eyebolt hole diameter; and thread pitch. Every bolt to be tested.

* Material Hardness - Either by Rockwell hardness test with acceptable hardness equal to or greater than 32; or by Brinell hardness test with an acceptable hardness between 311 and 375. Every bolt to be tested.

* Chemical Composition - Use of a magnet to verify that the material is martensitic. Every bolt to be tested.

* Cleanliness - Visual inspection to verify the bolts are clean and free of grease. Every bolt to be inspected.

The NRC Inspection Report questions this evaluation because (a) PVNGS did not conduct an audit of Borg-Warner's commercial grade QA program; (b) physical properties such as tensile strength, yield strength, and impact strength are missing from the list of critical characteristics; and (c) the magnetic test could not verify the actual, elemental chemical composition of the material received.

As noted in Marks' Standard Handbook for Mechanical Engineers (ninth edition), material hardness "... may not be a fundamental property of a material but rather a composite one including yield strength, work hardening, tensile strength, modulus of elasticity, and others..." Indeed, there is a very good correlation between the tensile and yield strengths of ASTM A564 steels and their respective Rockwell and Brinnell hardness values. For example, minimum tensile strength may be estimated from hardness values as:

Tensile Strength = (5.1941 X R.H.) - 18.4115; correlation coefficient = 0.9673

or:

Tensile Strength = (0.5905 X B.H.) - 33.9433; correlation coefficient = 0.9600

where R.H. is the Rockwell hardness and B.H. is the Brinell hardness. Using the minimum hardness values specified in ECE-RC-A033, the curve fits predict minimum tensile strengths of 147.8 ksi (Rockwell) and 149.7 ksi (Brinell), which compare favorably to the 145 ksi minimum tensile strength value specified in ASTM A564 for Type 630 (Condition H1075) steel.

Verification of the hardness of every bolt, as called for by ECE-RC-A033, therefore provides reasonable assurance that no bolts would be issued to the field with inadequate tensile or yield strengths. Furthermore, most grades of steel (with yield strengths below about 140 ksi) would fail. This provides additional protection against the use of inadequate products in safety related applications, and provides added assurance that those bolts passing the hardness tests, are indeed, the items specified.

The hardness tests and dimensional checks together provide enough information to successfully complete the dedication process for these eyebolts. The magnetic test is a simple and easy test that provides added assurance that the material is martensitic and supplements the other data gathered, thereby providing greater assurance of product acceptability. ECE-RC-A033 conservatively applies this additional test to every eyebolt.

(2) Additional Steps to Disposition Items

EER 87-RC-189 approves a change in material for the eyebolts to resolve corrosion problems from boric acid leakage. The new material is more corrosion resistant. The magnet test provides some indication that the material is martensitic as specified in the ECE Form D. This test however, does not distinguish between the original material (A540, Gr. B23) and the replacement material approved on EER 87-RC-189 (ASTM A564, Gr 630, H1075).

In order to confirm the adequacy of the dedication regarding correct bolting material had been received and installed, a sample of the bolts still in inventory was selected and sent out for testing. Mil Spec. 105D was used to select a sample size of 5 bolts from the 51 in inventory. All five bolts tested were within specification for material properties and chemical composition. The results of the testing are documented in MEE-00402. No further action was deemed necessary.

(b) Barksdale Pressure Switches (ECE-DG-A026)

(1) Existing Dedication

Revision 0 of ECE-DG-A026 was issued on 1/16/87 to document the evaluation, inspection and commercial grade dedication requirements for Barksdale pressure switches to be used in the

diesel generator system. Three pressure switches were furnished by the original specification vendor as commercial grade under PO #F-186178 dated 4/8/86. The inspector (an engineer) performed a comparison of the commercial grade switches to an existing qualified switch, as well as to the vendor's standard published literature and information, to establish that the commercial grade switches were the same model as the qualified switch.

A review of the working file for this ECE indicates that several design requirements were checked (such as voltage, current, pressure, and contact ratings), and that several characteristics (such as pressure line size [3/8" npt], marking [UL, pressure, and voltage], and mounting details) were checked or compared for these switches. The ECE documents the inspection and dedicates the items for a safety related application. (Although EPRI NP-5652 was not in existence at the time of this dedication, many of the characteristics identified in the ECE now appear in the EPRI guide.) This provided reasonable assurance that the switches met the design requirements for the specific applications.

The inspector concluded that verification of model number, pressure rating, contact rating, mounting detail, and physical and electrical interfaces must be performed to properly dedicate these pressure switches.

Notes contained in the ECE working file show that the engineering inspection verified:

* Model number (CD2S-M1590SS-S1) - verified by nameplate data.

* Pressure rating (adj. range 1.5-150 psi., proof pressure 300 psi) - verified by name plate data.

* Contact rating/electrical interface (DC amps: 0.5A @ 125V, .25A @ 250V; AC amps: 60hz/10A @ 125V/250V; 3A @ 480V) - verified by nameplate data.

* Mounting detail - verified by comparison to qualified pressure switch and EQ report picture.

* Mechanical interface (markings at interface point of pressure line, and dimensions).

The Engineering Change Evaluation summarized the results of the inspection. It is important to note that the model number is a key item since the number configuration (characters) describe the design requirements of the switch, (i.e. proof pressure). Therefore, the verification and comparison performed provides reasonable assurance that these items are acceptable for their intended application and that the safety function, namely the pressure boundary of the diesel generator air system, can also be reasonably assured.

(2) Additional Steps to Disposition Items

The activities performed are considered to be adequate under the PVNGS program to provide assurance that the item received was the item specified and would perform its intended safety-related function. The proof pressure of 300 psi was verified by nameplate data, however, a pressure test was not performed. To provide further assurance of the acceptability of this item in service, a review of post-installation testing and operation has been performed.

The pressure switches were calibrated upon installation utilizing a variable pressure source as prescribed in the approved work document. This calibration procedure ensures that the switch is capable of performing its safety related function for its intended application. (In the Equipment Identification Numbers referenced, the design set point is 100 ± 2 psig/accuracy ± 0.5 pct). Additional verification of operability occurs during the 18 month diesel generator surveillance test where the system is tested at or near operating pressures.

The use of bench testing for future procurements will be evaluated and incorporated into the PVNGS program as necessary. These items are considered acceptable and no further action is considered necessary.

(c) Journal Bearing and Throat Bushing (ECE-AF-A011/MEE-0053)

(1.a) Existing Dedication (ECE-AF-A011)

Revision 0 of ECE-AF-A011 was issued on 03/06/87 to evaluate Bingham-Willamette Co.'s position statement pertaining to 10CFR21 reporting requirements for certain parts procured for use in safety related Auxiliary Feedwater Pumps. More specifically, PVNGS Purchase Orders (PO's) #60108557 (dated 11/01/85) and #60109446 (dated 11/13/85) were issued to obtain a journal bearing and a throat bushing, respectively. Both POs enforced the requirements of PVNGS project specification 13-MM-021 (Rev. 13) as well as 10CFR21 reportability requirements. The POs also required Bingham-Willamette to provide a Certificate of Conformance (CofC) with each shipment of material under the orders.

The CofCs, dated 01/06/86 and 01/16/86 for the bushing and bearing respectively, clearly state that "... the Customer's Purchase Order requirements have been complied with and the materials used in the construction of the above product(s), pump(s) and/or part(s) are in accordance with the Specifications... We certify that the part(s) are new and unused and are equivalent and/or interchangeable in form, fit and function with original parts as

supplied on the original pump/product order..." The CofC for the bearing was signed by a Bingham-Willamette Senior QA Engineer whereas the CofC for the bushing was signed by supplier's QA Supervisor.

The Material Receiving Report (MRR) for the bearing indicates that the shipment was received on 02/10/86 and inspected by QC on 02/21/86. The MRR for the bushing indicates it was received on 02/05/86 and inspected by QC on 02/14/86; however, the vendor failed to obtain PVNGS QA's authorization to ship, so a Nonconformance Report (NCR #0-098-86-4) was issued on 02/10/86 and dispositioned on 02/14/86.

Five months later, on 07/17/86, Bingham-Willamette notified PVNGS that the POs referenced above had been reviewed; that, in Bingham-Willamette's opinion, "...the overall operation of the pump would not be critically affected if the items identified on subject P.O. were not produced under our Safety Related Parts Program..."; and that it was recommended the parts be reclassified as commercial with 10CFR21 reporting requirements removed. ECE-AF-A011 was later initiated to evaluate this position statement.

The ECE concluded that the items did perform a safety related function and could not be downgraded to commercial grade. However, since the vendor would no longer accept 10CFR21 reportability responsibilities, the ECE constituted the vehicle whereby PVNGS took on this responsibility. In support of the ECE, PVNGS Vendor Quality audited proprietary manufacturing drawings to establish that no material or major physical revisions had taken place since the original pump assembly had been qualified and shipped. Additionally, between 02/06/87 and 02/11/87, a visual inspection of the items was performed at the PVNGS warehouse. The items were found to be marked and etched in agreement with the proprietary drawings.

ECE-AF-A011 was then issued on 03/06/87, accepting 10CFR21 responsibilities for the parts procured under the two subject POs only. The basis for this "dedication" included the originally supplied CofCs (which predate Bingham-Willamette's position statement), audit of the proprietary manufacturing drawings, QA inspection, and the ECE itself.

The evaluation performed in ECE-AF-A011 is considered adequate for the specific items identified and provides for PVNGS acceptance of Part 21. No further action is considered necessary.

(1.b) Existing Dedication (MEE-0053)

The MEE was prepared to support commercial grade procurement and dedication of the journal bearing (C/I 4560-37) on P.O. 33603108 for use in the Auxiliary Feedwater Pumps. To utilize these Journal Bearings in a safety-related application, reasonable actions were taken by ANPP to ensure the item is appropriate for

its intended application as follows: (1) Marking and identification by verifying P/N 3034-K10007-03. This P/N is traceable to the Bingham-Williamette drawing which describes the design requirements. (2) Dimensions were identified by contacting Bingham Willamette and determining the O.D., bore and width with their respective tolerances and verify by performing an inspection for each item. (3) The magnetic test provided some indication that the material was cast iron/cast steel.

Correspondence received from Bingham-Willamette and attached to the ECE indicates that the bearing may be either cast iron or cast steel. Precise material composition is not critical. The cast iron material specified for the AFW pump journal bearings is ASTM A48, class 30. This material specification covers gray iron castings intended for general engineering use.

Casting classes are assigned on the basis of the tensile strength of the iron. Compositions vary with the class or grade. Standard gray cast iron grades include class 20, 25, 30, 35, 40, 45, 50, and 55. High alloy gray cast iron grades include class 1, 2, 4, and 5. The magnetic proper- ties of standard grades are classified as ferromagnetic and high alloy grades are classified as nonmagnetic. The magnetic testing of the AFW pump journal bearing is considered an effective means of distinguishing standard grades from high alloy grades. Addition- ally, the magnetic testing of the nickel-babbit liner also determines whether the liner material is nonferrous.

Tensile strength cannot be correlated with hardness, with any reasonable degree of assurance for gray iron. Therefore, a hardness test would have been irrelevant and was neither specified nor performed.

(2) Additional Steps to Disposition Items

The dedication performed verified part identification, critical dimensions and that the bearing shell material and babbit liner were or were not magnetic. The magnetic check does not however, verify that the bearing shell is ASTM A48, class 30 or that the babbit liner is 12X nickel. In order to provide additional assurance that the dedication was adequate and the bearing shell and liner is the specified material, a sample was selected from stock inventory that was supplied under the subject P.O. These bearings were sent off for testing and results will be forwarded to the NRC under separate cover when received.

Six of the bearings that were dedicated using MEE-0053 are installed in the units in pumps 1MAFBP01, 1MAFNP01 and 3MAFAP01. The test results will be received and evaluated prior to placing any of these pumps in service.

(d) Control Valves (MEE-0026)

(1) Existing Dedication

MEE-0026 provided the dedication requirements for the subject control valves referenced in the inspection report.

The MEE specified that the items, for the purpose of dedication, should undergo a material check (brass), marking and identification, and performance characteristic check. Chemical composition and strength of the item were not specified as critical characteristics. The control valves serve a passive function and are only actuated during maintenance operations. The use of a magnetic test combined with visual inspection does provide the necessary level of assurance that the valves received are brass.

Verification of marking and identification of the valve is the next critical characteristic for dedication. The MJV-3 identification number controls the configuration of the valve. Verifying that the valves are marked MJV-3 assures correct configuration.

The third critical characteristic identified verifying performance characteristic of the 1/8" minimum stem travel. Verifying this performance parameter provided assurance that the item supplied can perform the operational requirements per vendor drawing KSV-55-4 and Section 8.2.19 of Surveillance Test Procedure 73ST-1DG01.

The existing documentation of MJV-3 valves (C/I 4500-2595) is acceptable. No further action is considered necessary.

(e) Gear Reducers (ECE-CH-A055)

(1) Existing Dedication

PVNGS procured charging pump gear reducers as safety-related commercial grade from American Export Trading Company on Purchase Order 33504702. To provide the dedication requirements ECE-CH-A055 was generated which identified the critical characteristics necessary to provide reasonable assurance that the item received was the item specified. Input/output shaft diameter, shaft configuration, shaft extension dimensions, and unit size were verified upon receipt inspection: gear reducer overall gear ratio, input/output shaft speed, horsepower transmitted, and model number were verified by nameplate data; and a visual inspection of the gear box internals was made to verify acceptable condition (e.g. no metal shavings or chipped gear teeth). The metal casing was magnetically tested to provide some assurance that it was ferritic steel. The actual chemical composition was neither desired or tested for.

Additionally, a documentation package was received with the gear reducers that provides traceability and certification from the original manufacturer. American Export Trading is the sales agent for Washington Public Power Supply System (WPPSS) and purchased the subject gear reducers from WNP-5 under contract AETC-87-5071. Likewise, WNP-5 procured this material as part of the original charging pump skid from Combustion Engineering under contract 0174.

Combustion Engineering purchased this material from Gaulin on P.O. 9601057, who in turn, procured these gear reducers from Falk on Purchase Order 15013, MO. 7-666155-01.

This item is considered acceptable as dedicated and no further action is required.

(f) Terminal Boards (ECE-PB-A038)

(1) Existing Dedication

Revisions 0 and 1 of ECE-PB-A038 were issued 01/23/87 and 06/26/87, respectively, to provide guidance for the dedication of commercial grade General Electric (GE) EB-1 one-piece molded terminal blocks. These terminal blocks were dedicated for use in 4.16kV Class 1E electrical switchgear in mild environment. Their function is to maintain circuit integrity. The 4.16kV switchgear are required for the electrical distribution to safety related loads.

ECE-PB-A038 identified the critical characteristics which were to be verified upon receipt inspection to provide reasonable assurance that the item received was the item specified and was acceptable for the intended safety-related application. More specifically, the critical characteristics and verification methods included the following:

* Physical dimensions - verified by measurements.

* Phenolic material - verified by visual inspection, ensuring color, shape, and texture are the same as for a qualified terminal board.

* Electrical characteristics - verified by either the labeling on the terminal board box, or by direct measurement of dimensions (distance between terminals as well as height of barrier between terminals).

* Mounting - verified by direct measurement of mounting hole locations and diameters.

The ability of the EB-1 terminal boards to function properly under the electrical characteristics (e.g. voltage, amperage) of the circuits in which they are installed and their ability to maintain circuit integrity is dependent upon the material of construction and dimensions, which establish the dielectric strength and conductivity characteristics of the final product. Visual inspection of the material and dimensions provides reasonable assurance that the terminal boards will perform their intended function without the necessity for verification testing.

There are additional reasons for believing that the products provided by GE are the items specified. First, GE was the original

manufacturer and supplier to PVNGS of qualified EB-1 terminal boards. Second, GE is an established manufacturer of terminal boards for both the nuclear power and other industries and their products are manufactured in accordance with industry standards (UL). GE's continued advertisement of their terminal boards as being recognized under the "Component Program of Underwriters' Laboratories, Inc." provides assurance that GE's products meet or exceed stated requirements for electrical characteristics. (EPRI NP-5652, Appendix E provides guidance on UL listed products.)

When the commercial grade boards were received, PVNGS questioned the use for their white marking strips. GE was contacted for information on the marking strip material. Their response was consistent with the observations made at the PVNGS warehouse, where the material was described as a "cardboard" fiber type of material with a rough finish. (GE responded that the material was vulcanized fiber, partially regenerated cellulose in which the fibrous structure was retained.)

Revision 2 of ECE-PB-A013 refers to an PVNGS QA audit that included an evaluation of GE's safety-related commercial grade program. This ECE established well defined methods for dedicating parts that G.E. considers commercial grade and will not accept Part 21 responsibility.

These items are considered acceptable and no further action is considered necessary.

(g) Integral Motor Pinion Shaft Assembly (MEE-0128)

(1) Existing Dedication

This item is for the auxiliary hoist 225/35 ton reactor room bridge crane. This item was evaluated by the Revision 1 of MEE-0128 issued on 4-22-89 and identified as a safety-related commercial grade item. The assembly was bought commercial grade from Whiting Corporation, and the MEE specifies that each item for the purpose of dedication should undergo a material, physical properties, dimensions and marking and identification check.

To utilize these motor pinion shaft assemblies in a safety application, reasonable actions were taken by PVNGS to ensure the item is appropriate for its intended application. (1) Marking and identification was verified by verifying part number (P/N 571291) on the assembly tag or package. This is an important identification characteristic since the number is traceable to the design requirements for the shaft assembly. (2) Dimensions were verified utilizing the drawings provided by Whiting Corporation. This verified proper fit-up and interferences. (3) Material physical properties were verified by measuring the shaft BHN at 190-230 and pinion BHN at 200-280. Hardness is deemed an acceptable method of verification which provides close correlation to key physical properties. As noted in the Nature and Properties

of Engineering Material (Second edition), "There is a close connection between the yield strength of metals and their hardness". Also, as noted in Mark's Standard Handbook for Mechanical Engineers (Ninth edition), material hardness "... may not be a fundamental property of a material but rather a complete one including yield strength, work hardening, the tensile strength, modulus of elasticity, and others..." (4) Verification that material was ferritic was performed using a magnetic test. The magnet test was determined to be a simple and easy test which supplements the other critical characteristics verified above, thereby providing additional assurance of product acceptability. MEE-0128 conservatively applies this additional test to each shaft motor pinion.

The primary design requirement for the motor pinion shaft assembly is that the parts withstand the loading applied. The hardness test verifies this attribute, as well as, detect abnormally hard material which will be brittle and unacceptable for use. The magnetic test serves only as a "screen" to identify immediately those materials which are "non-magnetic" prior to proceeding with hardness testing. The hardness tests verified the strength of the material present - strength being a function of material chemistry, heat treatment, and fabrication.

Based on the above actions, there is reasonable assurance that the item received is the item specified and the motor pinion shaft assemblies will perform their intended safety function. No further action is required.

(h) Camshaft Hub Drive

(1) Existing Dedication

The part in question is a splined steel ring that mounts inside one end of the valve camshaft on the diesel generator engine. Cooper drawing No. KSV-16-9, Rev. 4 categorizes the part as "non-critical" and shows that the part mates with the starting air distributor shaft. Further, it is locked in place inside the camshaft with a set-screw.

The MEE defined the critical characteristics as spline configuration, spline dimensions, O.D. for part, Mfr. P/N and steel material. The primary characteristics for proper functions of the part are spline configuration and part dimensions which were verified acceptably; O.D. for fit inside camshaft, spline configuration and dimensions for mate-up with starting air distributor shaft, and part number to assure like-for-like replacement per original specification.

Based on the methodology presented in the dedication, the dedication is considered to be adequate and no further action is considered necessary.

CONCLUSION

PVNGS has developed and implemented a commercial grade item procurement and dedication program that satisfies the requirements specified in 10CFR21 and consistent with the guidelines established in the EPRI NP-5652 guideline document. The program, as previously described, evolved from the period of 1984, which PVNGS believes was an industry precedent, to the level of sophistication that currently exists today. The PVNGS program has been demonstrated to be effective through re-evaluation of the eight dedications from the Inspection Report. PVNGS, however, recognizes that the area of commercial grade item dedication has been and continues to be an evolving and improving technology. PVNGS is committed to responding to these changes to assure that its plants operate safety and reliably and recognizes that improvements to this program can and should be made. In fact, actions have been in place for such improvements. These improvements were discussed in the EXECUTIVE SUMMARY.