NRC FORM 591S PART 1
(8-2002)
10 CFR 2.201

U.S. NUCLEAR REGULATORY COMMISSION

SAFETY INSPECTION REPORT AND COMPLIANCE INSPECTION

1. LICENSEE/CERTIFICATE HOLDER	2. NRC/REGIONAL OFFICE
Transnuclear Incorporated 7135 Minstrel Way Columbia, MD 21045 REPORT NUMBER(S)	U. S. Nuclear regulatory Commission Mail Stop: 6003 3D-02M Washington, DC 20555-0001

3. LICENSEE/CERTIFICATE NUMBER(S)	4. INSPECTION LOCATION	5. DATE(S) OF INSPECTION
72-01004	Bayshore Concrete, Products Corp. Cape Charles, VA	05/14-18/2007

The inspection was an examination of the activities conducted under your license as they relate to radiation safety and to compliance with the Nuclear Regulatory Commission (NRC) rules and regulations and the conditions of your license or Certificate of Compliance (CoC). The inspection consisted of selective examinations of procedures and representative records, interviews with personnel, and observations by the inspector. The inspection findings are as follows:

[X] 1. Based on the inspection findings, no violations or nonconformances were identified.

[ ] 2. Previous violation(s) or nonconformance(s) closed.

[ ] 3. The violation(s), specifically described to you by the inspector as non-cited violations, are not being cited because they were self-identified, non-repetitive, and corrective action was or is being taken, and the remaining criteria in the NRC Enforcement Policy, NUREG-1600, to exercise discretion, were satisfied.

_____ Non-Cited Violation(s) was/were discussed involving the following requirement(s) and Corrective Action(s):

[ ] 4. During this inspection certain of your activities, as described below and/or attached, were in violation or nonconformance of NRC requirements and are being cited. This form is a NOTICE OF VIOLATION OR NONCONFORMANCE, which may be subject to posting in accordance with 10 CFR 19.11.

(Violations, Nonconformances, and Corrective Actions)

STATEMENT OF CORRECTIVE ACTIONS

[ ] I hereby state that, within 30 days, the actions described by me to the inspector will be taken to correct the violations identified. This statement of corrective actions is made in accordance with the requirements of 10 CFR 2.201 (corrective steps already taken, corrective steps which will be taken date when full compliance will be achieved). I understand that no further written response to NRC will be required, unless specifically requested; **OR**

[ ] Written Response requested in 30 days [ ] YES [ ] NO

TITLE	PRINTED NAME	SIGNATURE	DATE
LICENSEE	William R. Sutherland	W R Sutherland	5/31/07
NRC INSPECTOR	James J. Pearson	James J Pearson	5/25/07

NRC FORM 591S PART 1 (8-2002)

INSPECTOR NOTES COVER SHEET

Licensee/Certificate Holder (name and address)	Transnuclear Incorporated 7135 Minstrel Way Columbia, MD 21045
Licensee/Certificate Holder contact and phone number	William Sutherland, Quality Assurance Manager 1-410-910-6862
Docket No.	72-1004
Inspection Report No.	07201004/2007201
Inspection Date(s)	May 14-18, 2007
Inspection Location(s)	Bayshore Concrete Products Corporation, Cape Charles, VA
Inspectors	James Pearson/NRC, Norma Garcia Santos/NRC, Paul Bialowas/Contractor, Conrad Landry/Contractor
Summary of Findings and Actions	No violations or nonconformances were identified.
Lead Inspector Signature/Date	James J. Pearson James J Pearson 6/20/07
Inspector Notes Approval Section Chief Signature/Date	Kevin Williams K Williams 6/28/07

INSPECTOR NOTES: SECTIONS 02.01 THROUGH 02.08 OF IP 60852 WERE PERFORMED DURING THE INSPECTION WITH RESULTS DOCUMENTED BELOW:

02.01 Determine whether the fabrication specifications are consistent with the design commitments and requirements documented in the SAR, and, as applicable, the CoC or the site-specific license and technical specifications.

The inspectors noted that Transnuclear, Inc. (TN) has committed in its Final Safety Analysis Report (FSAR), updated documentation submitted to the NRC, and technical specifications to industry codes and standards such as the American Concrete Institute (ACI) and the American Society of Testing Materials (ASTM), among others, to build NUHOMS concrete modules and associated supporting components that will house spent fuel casks. The inspectors also recognized that Bayshore Concrete Products, Inc. (BCP) is contracted to TN to build NUHOMS concrete modules. The inspectors verified that fabrication specifications were consistent with the design commitments through observations of work activities and interviews with various TN and BCP personnel responsible for those activities that occurred at the BCP facility during the course of May 14th through 18th of 2007. Additional supporting documentation by sections of the codes and standards follow below and are also included as data pages with these notes.

ACI 318 Section 4.2.1 "Concrete Air Content"

The NRC inspector observed the collection of a composite sample and the air content testing. The air content testing appeared to be conducted in agreement with the ACI standards. The results of the air content test are recorded in multiple locations and reported to the appropriate personnel. It was noted by the NRC inspector that this test is one acceptance criterion of the concrete to be used in TN work. The inspector verified that the testing laboratory of BCP uses calibrated equipment that has traceability records for at least the past several years for testing equipment in conjunction with serial numbers to verify the identity of individual pieces of equipment.

ACI 318 Section 4.2.2 "Water/Cement Ratio"

Requirements of the contract between TN and BCP states that at no time shall BCP provide a plastic concrete for production with a water to cement ratio higher than 0.45. The ratio is present through the batch weights of the batch plant placed on each and every ticket used for production. The NRC inspector verified that, during the week of the inspection, the ratio never exceeded a water to cement ratio of 0.437 (as designed and specified in contract documents).

ACI 318 Sections 4.1, 5.6.2.1 & 5.2.3 "Composite Sampling Requirements"

The NRC inspector observed BCP field personnel collecting a composite concrete sample by using two wheelbarrows and having the "sidewinder" passing concrete into one and then into the other (back and forth) until both were full. The NRC inspector also observed field personnel performing a series of tests including temperature, slump, unit weight, air content, and cast two sets of six cylinders each (within the allotted 15 minute time frame). The samples were taken very near the point of placement and from the point of deposition (for the piece of equipment used to place the concrete into the forms).

ACI 318 Section 5.6.1.1 & 5.6.2.2 "Making and Curing Required Number of Strength Samples"

The NRC inspector observed BCP field personnel executing casting cylinders, using a spherical ended tamping rod, by placing concrete into the cylinders molds in thirds by volume tamping each layer 25 times with the spherical ended tamping rod, then tapping each of the four directions 3 times for a total of 12 taps per lift. The first set of cylinders (4" by 8" cylinders 6 in count) are placed in the steam tent with the piece cast that date to experience the same conditions to verify minimum strength of the conditions the concrete was exposed to, for stripping and lifting purposes. The second set of cylinders (6" by 12" cylinders 6 in count) was taken back to the laboratory, directly after being cast by the same process described above, and allowed to remain in the molds for the initial cure (out of direct exposure to the elements).

After initial cure has taken place, the second set of cylinders are stripped and placed in lime solution temperature controlled baths until the time frame for compressive strength testing is achieved. The time frame is divided into first cylinder at 3 days old, second cylinder at 7 days old, and third and forth at 28 days old. The last two are discarded if all rupture tests are within tolerance; if not, the last two cylinders are tested at/or before 56 days old. A formal report is generated with regard to the cylinders cast as well as secondary acceptance criteria from the TN Engineer. A report to the client is generated with the findings of these ruptures tests. According to conversations with laboratory personnel, at this point, the client determines whether the piece will be accepted or not.

The inspector noted that the ACI standard only requires two cylinders to be cast and those two be broken at 28 days to qualify the material for strength by an average of those breaks not to exceed a difference in strengths of 500 psi. The ACI standard does not require a specific size cylinder, only that the opening of the cylinder be three times the diameter of the largest aggregate contained in the material. In these procedures, the combined BCP and TN procedures appear to be in agreement with the necessary standards.

ACI 318 Section 5.6.2.3 "Concrete Strength Requirements"

The NRC inspector noted that BCP casts two sets of six cylinders as part of concrete testing. This step is done with the purpose of continually qualifying the strip strength requirements as they use a steam bath procedure to hasten the curing process. The first set of cylinders (4-inch by 8-inch cylinders) are cast and left with the cast piece to experience the steam bath for a field cure method qualification. The second set (6-inch by 12-inch cylinders) are quickly taken to the laboratory after being cast for their initial cure period, in which they are stripped and placed in a lime solution bath. The bath is monitored temperature to simulate ideal laboratory conditions until time to test for compressive strength. The inspector noted that ACI standards only requires one set of two cylinders to be cured under laboratory conditions. Then, these cylinders are broken at 28 days from date of batch for a mean composite of the materials strength to qualify.

ACI 318 Section 5.7.1 (f) "Water Removal"

Water collection in the forms did not often happen, as these forms were most often perched on pedestals above the ground, but when it did, due to rain or sea mist after a

storm, the reinforcing steel cage was untied and removed and two individuals would enter the form. One individual would use a "wet/dry" vacuum to remove the water and the other would use a leaf blower to push the water towards the vacuum. After foreign material were removed, the form was recoated with releasing agent and reassembled. This process was not witnessed by the NRC inspector, but described by Bayshore's QC inspector, after the question was posed to him.

ACI 318 Section 5.8.2 "Ready Mix Concrete"

In addition, the NRC inspector noted that the material used at this facility was classified as a ready mixed commercial grade concrete, mixed at the batch plant which was located within this facility's limits of the construction yards. BCP Concrete Materials Manager, mentioned that the batch plant at BCP holds certifications with both the state of New York and Virginia Department of Transportation with regard to aggregate classification, cement classification, and water qualification procedures and results. The concrete is delivered to the point of placement with the use of "sidewinders" which are off-roads converted Lulls that have a six cubic-yard hopper with a 15 feet Telebelt delivery arm extending from the base of the hopper to a shoot that delivers the concrete to the forms at the point of placement.

ACI 318 Section 5.10.1 "Concrete Deposition"

The NRC inspector observed that the concrete deposition was performed by the "sidewinders" which use a telebelt system with the attachment of a vertical funnel at the end. The concrete was deposited in lifts to avoid cold joints, and promote fusion of the plastic layers of material with the assisted use of mechanical vibrators. On one occasion, the concrete appeared to be dropped into the form in which the piece was being cast from more than 5 feet in height from the shoot/funnel to the casting surface as required by the concrete placement standard. The inspector also observed that the design required the finished piece to contain an upper and lower layer of reinforcing steel creating a grid. The concrete was dropped over the upper layer of the reinforcing steel grid and allowed it to fall an additional three feet to its final resting place, which could promote segregation. The NRC inspector could not verify whether the above took place however, the NRC inspector asked the TN representative about the tasks previously described and he provided more closely supervised concrete placement observations and directions to the equipment operators. This appeared to be an isolated event.

ACI 318 Section 5.10.2 "Concrete Placement Rate"

The NRC inspector observed, over the course of the inspection, that concrete seemed to be placed as close (and continuously) as possible to avoid any chance of creating cold lapping in the pieces being produced. In addition, the aforementioned task was one of the requirements of TN's "prepour" inspections to ensure adequate equipment was available to continuously place concrete through the completion of the pour of each piece cast. The dimensions and counts of embed components and reinforcing steel were verified and clearances of reinforcing steel and the removal of all foreign material including scraps of tie wire less than 1 inch in length were performed. At the completion of the form work and assembly of the reinforcing steel configurations, the Quality Assurance (QA)/ Quality Control (QC) personnel of Bayshore and TN would not

permit the placement of concrete until equipment was secured to promote the timely completion of the pour.

ACI 318 Section 5.10.3 "Foreign Material in Concrete"

The NRC inspector also observed that foreign material in the concrete was absolutely not permitted by BCP personnel, even without prompting the concrete finishers would remove even the slightest amount of foreign material.

ACI 318 Section 5.10.4 "Retempered Concrete"

As previously observed by the NRC inspector, the equipment used in the production of these HSMs does not have the ability to adjust the water content of concrete used in the production of these modules as well as having no water available to the workers in this area. Retempering concrete as observed on this site is difficult and was not observed at any time during this inspection.

ACI 318 Section 5.11.1 "Other than High-Early- Strength Concrete"

The NRC inspector verified with the on-site TN Project Engineer that the composite cementitious material used in BCP is a Type III cement and also that this material is qualified as a Type II cement through additional testing (sulfides and chlorides). The inspector also verified this material was qualified as standard weight concrete versus light weight and/or High-Early High strength material. The NRC inspector observed that BCP used a steam bath curing method for the modules built for TN for a time of roughly 12 to 16 hours. After the first 4-6 hours of post placement, attention was focused to not exceed 190 degrees Fahrenheit (ºF), at a rate of less than 50 ºF per hour per testing, and observations of each piece by using internal heat couplings (observed and recorded each hour during the steaming process).

ASTM C 94 Sections 6.1.1 & 6.1.2 "Slump Tolerances"

The NRC inspector observed that even the slightest variation from the given acceptance criteria was given adequate attention, including but not limited to the rejection of given materials. The given tolerances for Pennsylvania Power and Light (PP&L) piece placements observed was "not to exceed" eight inches and the inspector verified that the criteria was satisfied as noted on associated data sheets.

ASTM C 94 Section 8.3 "Measurements of Aggregate Materials"

The NRC inspector observed that a hopper scale, used to weigh the cumulative weight of all aggregates, was used as each aggregate was added individually to the hopper, and it is used to batch each load of concrete compared to the weight of the aggregates of that given mix design. For qualifying purposes, the on site materials laboratory (from time to time) acquires a composite sample of each of these aggregates and performs a sieve. The sieve serves to verify that these materials meet the standards of nominal size for the application of each concrete mix design.

ASTM C 94 Section 8.3 "Measurement of Mixing Water"

The mixing water at the batch plant is placed into a tank sitting above the operations house on top of a scale. The scale can give the operator of the batch plant a "read out" for the weight of the water compared to the weight of the water of that given mix design. The batch plant operator has the ability to retain a portion of the water in case any BCP or TN quality oversight personnel are not satisfied with the product requirements. In addition, the NRC inspector reviewed documentation related to the calibration of the scale used to measure the water's weight. The documentation indicated that the calibration contained a correction factor on the scale of minus two pounds from actual at 400 and 500 pound loads, which was well within the required ± 2 % of water from actual water amounts required per batch design.

ASTM C 94 Section 11.5 "Concrete Mixing Revolutions"

The NRC inspector noted that the "sidewinders" used to carry concrete from the batch plant have no rotating drum nor an axial agitator to continually mix the concrete after uniformity of this material is achieved at the batch plant. The only means of manipulating the concrete, after receiving it from the plant, is stationary vibration motors fixed to the framework of the hoppers on the "sidewinders," and the telebelt used for discharge. In addition, the batch plant uses a formula to ensure that each load of concrete is:

(1) uniformly mixed throughout its contents, and
(2) as closely uniform to the previous load as possible.

ASTM C 94 Section 11.7 "Addition of Job Site Water"

The NRC inspector observed that the "sidewinders," previously described, are the only pieces of equipment used to carry concrete from the batch plant to the point of placement (during the term of inspection). Understanding this fact, the inspector noted that these pieces of equipment do not have the ability to carry additional water since they have no tank for transporting water. In addition, BCP has dedicated a specific area to the construction of TN related work (i.e., HSMs) with no obvious water supplies available in this general area. With this in mind, during the term of inspection, addition of job site water was not observed and the ability to add job site water is unlikely due to the type of transport vehicle used which would not have allowed for proper mixing after the addition of water.

No violations or nonconformances were identified.

02.02 Determine whether corrective actions for identified fabrication deficiencies have been implemented in a time frame commensurate with their significance, and whether nonconformance reports documenting the deficiencies have been initiated and resolved.

The inspector reviewed BCP's nonconformance report (NCR) log for the Limerick project, Job:3824-28 which identified seven (7) NCRs. The NCRs identified honeycombing, voids, spalling, and embedment tolerances as the primary areas of

nonconformance. The inspector determined from the review of the "Bayshore Project Quality Plan for Transnuclear NUHOMS Projects," Revision 17, effective date: 7/18/06, Section 9 "Control of Nonconforming Items" that the NCRs reviewed during the inspection were adequately documented according to significance and resolved adequately, for those NCRs which were closed.

The inspector determined that BCP is required to acquire Transnuclear's approval for NCR disposition. The inspector noted that establishment and closure of NCRs was being performed according to the associated BCP Project Quality Plan and that resolution to NCRs were being adequately implemented for resolution.

No violations or nonconformances were identified.

02.03 Determine whether individuals performing quality-related activities are trained and certified where required.

At the time of the inspection, the staff was informed that BCP QC Clerk was keeping a log or list of the certifications of BCP personnel. This list included BCP personnel with certification on the American Concrete Institute (ACI), Virginia Department of Transportation, among others. The information in the table below is based on the completion certificates that are kept in one of the binders for the TN projects performed at BCP and it is not all inclusive. The staff reviewed the list of certifications and determined that it was in need of updating to be current with the existing personnel certifications. BCP QC personnel updated the information on ACI qualified personnel and agreed to update as needed.

American Concrete Institute (ACI) Certifications (Partial Listing)

BCP Personnel	Certification Description	Expiration Date
Materials Laboratory Foreman	Field Testing Technician - Grade I	05/24/2011
QC Clerk	Field Testing Technician - Grade I	11/16/2007
Concrete Materials Manager	Field Testing Technician - Grade I	06/01/2010
QA-QC Corporate Manager	Field Testing Technician - Grade I	08/19/2008
Materials Laboratory Technician	Field Testing Technician - Grade I	11/16/2007
Materials Laboratory Technician	Field Testing Technician - Grade I	05/02/2010
Materials Laboratory Foreman	Field Testing Technician - Grade I	05/24/2011

The BCP Concrete Materials Manager, explained to the inspector that he performed informal training sessions to prepare personnel for the ACI examination. Even though he does not keep an attendance log, by the end of the inspection, he agreed to keep an attendance log of subsequent training sessions in BCP. This requirement was added to the draft of Section 17, "Quality Training." The passing grade of the examination is 70%. For any deficiencies in any area, the employees are retrained by BCP personnel.

William Sayers performs on-the-job training with new personnel. Per the BCP Concrete Materials Manager, the success rate of BCP personnel on ACI examinations has been "85%-90%."

For training required as part of a "non-conformance" action, BCP keeps track (training log) of re-trained personnel. Re-trained personnel sign at the bottom of the form which contains a brief description of the topics covered during the training session. This information is archived in the project file, but not in the individual's personal file.

The training requirements for BCP's personnel were not clearly documented at BCP. However, BCP updated a procedure that they prepared but not yet implemented because it was found to be too complex by BCP personnel. The QC manager mentioned that he had been updating the "Quality Manual," but he had not completed the updating of Section 17 yet. During the inspection, the QC manager and his staff expedited the development of the updated Section 17, "Quality Training," of BCP's Quality Manual to delineate the training requirements for BCP's personnel. The inspector reviewed this update prior to the completion of the inspection. This updated document is planned to be approved through an internal process established at BCP.

The following procedures apply to TN personnel and not to BCP personnel:

1. TIP 2.1, "Indoctrination Training," Rev. 6

    a. This procedure includes the training requirements for TN personnel and subcontractors.

    b. "This procedure does not cover specific personnel training, qualification, or certification requirements, such as those required for non destructive examination personnel and auditors."

    c. Training reports can be created to know the training status of TN personnel. Per conversations with TN, these reports are circulated to all TN employees and subcontractors.

2. TIP 7.5, "Source Surveillance," Rev. 2

    a. This procedure is intended for TN personnel or contractors performing oversight activities as TN representatives performing field activities such as at BCP.

The inspector noted that responsibilities of the BCP training program could be better defined. However, the updated section (Section 17) of BCP's Quality manual (provided to the inspector during the inspection) should be effective, if properly implemented, in improving training documentation and the delineation of responsibilities of BCP personnel regarding training.

No violations or nonconformances were identified.

02.04 Determine whether the offsite fabricator's personnel are familiar with the specified design, designated fabrication techniques, testing requirements, and quality controls associated with the construction of the DCSS.

See attached data pages from various concrete codes. These data pages were completed from witnessing performance of various BCP personnel fabricating multiple NUHOMS storage module components and provide verification of the design, fabrication testing, and quality familiarity required above. In addition the inspectors noted various times throughout the inspection that TN's oversight was significant during the fabrication activities.

No violations or nonconformances were identified.

02.05 Determine whether:

a. Materials, components, and other equipment received by the fabricator meet DCSS design procurement specifications.

The inspector verified that DCSS design procurement specifications were met through observation and comparison of materials and components, used during the inspection, to Certificate of Compliance drawings, field fabrication drawings, and specifications. See associated data sheets completed during the BCP inspection (attached).

No violations or nonconformances were identified.

b. The procurement specifications conform to the design commitments and requirements contained in the SAR and, as applicable, the CoC or the site-specific license and technical specifications.

The inspector determined that Transnuclear has a procedure in place to perform changes following 10 CFR 72.48. This procedure is identified as Transnuclear Implementing Procedure (TIP) 3.5, "Licensing Reviews." The inspector also noted that TN has a document control administrator (DCA) who maintains the controlled copies of documentation. The TN DCA is located in TN's headquarters offices in Columbia, MD.

The inspector discussed with the TN Project Manger changes made to design documents, such as drawings, and determined that the changes are sent to BCP for use during fabrication activities. Changes to the Final Safety Analysis Report (FSAR), including design drawings in the FSAR, are documented on forms called "FSAR Change Notices or FCNs." (E.g., some changes to drawing 10494-72-103 were documented in FCN-72030-016.) After a drawing change is documented in a FCN, TN distributes this change to the utilities within 60 of the change(s) being made. FCNs are accumulated for two years; then, all the changes are incorporated into the FSAR for submission to the NRC.

The inspector questioned the TN Project Manager in regard to docket numbers 72-1004 and 72-1030, differences in the HSM-H models, and the heat loads under the two dockets. The inspector noted that there are two heat shields options:

1. Aluminum shields, and
2. Stainless steal heat shields (Top and Side)

The Inspector interviewed the TN Project Engineer and determined that the different concrete modules models under 72-1004 are identified as follows: HSM-80, HSM-102, HSM-152, and HSM-H. The first three follow ACI 318-83 while HSM-H follows ACI 318-95. Appendix P of the updated FSAR describes the requirements for the HSM-H model. (24PTH canisters fall under HSM-H.)

Attached data sheets from the application of various codes act as a supplement to this section (02.05.b) of the inspection notes.

02.06 Determine whether DCSS components are being fabricated per approved QA and 10 CFR Part 21 implementing procedures and fabrication specifications.

Attached data sheets from the application of various codes provide verification that fabrication of DCSS components occurred according to an approved QA program, associated implementing procedures and the requirements of 10 CFR Part 21.

No violations or nonconformances were identified.

02.07 With regard to fabrication activities, determine whether:

a. They are conducted under an NRC-approved QA program (10 CFR 72.140).

The inspector reviewed multiple samples of procedures, drawings, and quality plans, all examples of the development associated with the implementation of the approved quality assurance program. The inspector also interviewed various personnel during the inspection and noted the general description of the following process for revision major job specific and controlling document (the PQP):

Change Order from TN → BCP Chief Engineer changes PQP →
QC Manager reviews changes PQP → BCP Chief Engineer reviews the PQP →
General Manager or BCP President reviews the PQP →
BCP Chief Engineer distributes new PQP to TN and BCP QC Manager →
QC Manager provides PQP to BCP QC Supervisor →
QC Supervisor provides PQP to TN by end of project

No violations or nonconformances were identified.

b. The provisions of 10 CFR Part 21, "Reporting of Defects and Noncompliance," for reporting defects that could cause a substantial safety hazard have been implemented.

The inspector verified that Transnuclear has implemented a procedure for the evaluation of reportability of defects under 10 CFR Part 21. The inspector also verified that any need for Part 21 reporting as associated to BCP activities for TN would be the responsibility of TN. The inspector noted that in instances where BCP needs to make Part 21 evaluations the procurement documents specify that all supplier nonconformances associated with the purchase order be reported to Transnuclear Incorporated for evaluation of Part 21 reportability.

No violations or nonconformances were identified.

c. The fabricator's personnel are familiar with the reporting requirements of 10 CFR Part 21.

As noted above Bayshore's responsibility for reporting is assumed by Transnuclear. However from discussions with some Bayshore staff some level of awareness is evident in addition to adequate awareness by the supporting Transnuclear organization.

No violations or nonconformances were identified.

d. The fabricator has complied with 10 CFR 21.6, "Posting requirements."

The procedure, Part 21 Requirements, and Energy Reorganization Act were posted on a bulletin board accessible to all employees at the Bayshore Concrete Products Corporation.

No violations or nonconformances were identified.

02.08 With regard to quality assurance activities, determine whether:

a. The fabricator has been audited by either the licensee or CoC holder.

The inspector reviewed the various TN audits and surveillance documents and noted that in the case of the TN audit of BCP there was an indication in an observation that BCP had training deficiencies/weaknesses. The inspector also reviewed the 2007 supplier audit/survey and evaluation schedule (ASL, Revision 41) dated 4/27/07, and none of the suppliers listed were overdue for audit or supplier survey.

No violations or nonconformances were identified.

b. For selected audits and inspection findings from (as applicable) QA audit or surveillance and/or inspection reports issued in the previous 2 years, the findings were appropriately handled with corrective actions implemented in a time frame commensurate with their safety significance.

The inspector reviewed samples of findings at BCP associated with TN fabrication activities. All results of the review were acceptable.

No violations or nonconformances were identified.

c. Supervision and quality control/quality assurance personnel perform appropriate oversight during fabrication activities.

The inspector noted that TN utilized a full time on-sight person to provide oversight of the BCP activities associated with the fabrication of TN's Part 72 storage modules. In addition the inspector noted that TN utilized a Quality Assurance specialist and Project Manger as needed to provide oversight. The inspector also noted that TN's personnel as well as BCP's Quality Assurance personnel provided a strong presence as fabrication activities occurred.

The NRC inspector observed that even the slightest variation from the given acceptance criteria was given a lot of attention including but not limited to the rejection of given materials. The given tolerances for Pennsylvania Power and Light (PP&L) piece placements observed was "not to exceed" eight inches. Upon observation of plans for PP&L pieces being cast, it appeared no other requirements on the specifications with regard to other slump specifications were noted.

The TN QA Manager indicated to the inspector that, per the TN Oversight Plan, "TN should oversee 50% of Bayshore's activities, but in reality, TN observes around 90% of BCP's activities related to TN."

No violations or nonconformances were identified.

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CONCRETE STANDARDS FOR ISFSIs

Sheet # 4

Category	Concrete Placement Prep. **Topic** Removal of Debris
Requirement	Preparation before concrete placement shall include that all debris and ice shall be removed from spaces to be occupied by concrete.
Source Document	ACI 318, Sect 5.1.1 (b) **Rev. or Date** 1983
Acceptance Criteria	Verify that all debris has been removed from the area within the concrete forms. This includes sawdust, nails, wood pieces and other debris that could collect inside the forms. During cold weather conditions, the Inspector must also verify that there is no ice present .
Documents Reviewed	Bayshore Concrete Products Fabrication Plan for NUHOMS Horizontal Storage Modules, Revision 0
Persons Contacted	Transnuclear Oversight Representative Wayne Bell (BCP)
Finding	The inspector verified that debris found in forms were removed by hand. The inspector noted that Bayshore craft persons do not work below 26 degrees F and that the associated fabrication plan requires adherence to PCI MNL 116 for cold weather concreting when concrete temperature is less than 60 degrees F.

Note: Document the requirement reviewed and your findings on the appropriate data sheet in the database that will be used to generate the inspection report

☐ Holtec ☑ Transnuclear ☐ NAC

Name Paul Bialowas **Date** 05/17/2007 Complete ☑

CONCRETE STANDARDS FOR ISFSIs

Sheet # 5

Category	Concrete Placement Prep. **Topic** Formwork
Requirement	Preparation before concrete placement shall include that forms shall be properly coated.
Source Document	ACI 318, Sect 5.1.1 (c) **Rev. or Date** 1983
Acceptance Criteria	Verify that the licensee has coated the inside of the forms with a release agent. Typically, the inside face of the concrete forms will be coated with a concrete release agent to enable form removal.
Documents Reviewed	Bayshore Concrete Products Fabrication Plan for NUHOMS Horizontal Storage Modules, Revision 0
Persons Contacted	Wayne Bell (BCP)
Finding	The inspector verified that forms had been properly coated prior to concrete placement.

Note: Document the requirement reviewed and your findings on the appropriate data sheet in the database that will be used to generate the inspection report

☐ Holtec ☑ Transnuclear ☐ NAC

Name Paul Bialowas **Date** 05/15/2007 Complete ☑

CONCRETE STANDARDS FOR ISFSIs

Sheet # 6

Category	Concrete Placement Prep. **Topic** Masonry Units
Requirement	Preparation before concrete placement shall include that masonry filler units that will be in contact with concrete shall be well drenched.
Source Document	ACI 318, Sect 5.1.1 (d) **Rev. or Date** 1983
Acceptance Criteria	Verify that masonry filler units (if utilized) have been well drenched prior to concrete placement. The licensee may elect to utilize masonry filler units (pieces of concrete blocks) as supports for the reinforcement. The masonry filler units will soak up available water from the concrete, if not "soaked" with water prior to concrete placement. If the licensee has elected to utilize masonry filler units, they should be "drenched" or adequately sprayed with water prior to concrete placement.
Documents Reviewed	Bayshore Concrete Products Fabrication Plan for NUHOMS Horizontal Storage Modules, Revision 0
Persons Contacted	Bayshore QC Inspection Personnel
Finding	The Inspector verified that no masonry filler units are being utilized as chairs. The inspector also noted that chairs used were either metal or plastic.

Note: Document the requirement reviewed and your findings on the appropriate data sheet in the database that will be used to generate the inspection report

☐ Holtec ☑ Transnuclear ☐ NAC

Name Paul Bialowas **Date** 05/15/2007 Complete ☑

CONCRETE STANDARDS FOR ISFSIs

Sheet # 7

Category	Concrete Placement Prep. **Topic** Reinforcement
Requirement	Preparation before concrete placement shall include that reinforcement shall be thoroughly clean of ice or other deleterious coatings.
Source Document	ACI 318, Sect 5.1.1 (e) **Rev. or Date** 1983
Acceptance Criteria	Verify that the reinforcement is clean from contaminants and ice prior to concrete placement. Reinforcement must be thoroughly cleaned of any ice, dirt, loose rust, loose mill scale, or other contaminants that could interfere with the bond between the reinforcement and the concrete.
Documents Reviewed	Bayshore Concrete Products Fabrication Plan for NUHOMS Horizontal Storage Modules, Revision 0
Persons Contacted	Bayshore QC Inspection Personnel
Finding	The inspector verified that no contaminants (Ice, dirt, loose rust, and loose mill scale) were found in the associated formwork prior to placement of concrete.

Note: Document the requirement reviewed and your findings on the appropriate data sheet in the database that will be used to generate the inspection report

☐ Holtec ☑ Transnuclear ☐ NAC

Name Paul Bialowas **Date** 05/15/2007 Complete ☑

CONCRETE STANDARDS FOR ISFSIs

Sheet # 9

Category	Concrete Placement Prep. **Topic** Laitance Removal
Requirement	Preparation before concrete placement shall include that all laitance and other unsound material shall be removed before additional concrete is placed against hardened concrete.
Source Document	ACI 318, Sect 5.1.1 (g) **Rev. or Date** 1983
Acceptance Criteria	Verify that all laitance and other unsound material has been removed from the existing concrete, prior to allowing fresh concrete to be placed. Prior to placing additional concrete against hardened concrete (a cold joint or construction joint) any laitance and other unsound material (unusually removed by bush-hammering) shall be removed. If this method is utilized, the concrete must typically be soaked with water for a minimum time period prior to the addition of fresh concrete. An alternate method (when approved by the engineer) is to remove the laitance and apply an approved concrete epoxy bonding compound prior to the addition of fresh concrete. If the epoxy is utilized, follow the manufacturer's recommendations. See ACI 318, Section 6.4 for additional requirements relating to construction joints.
Documents Reviewed	Bayshore Concrete Products Fabrication Plan for NUHOMS Horizontal Storage Modules, Revision 0
Persons Contacted	Transnuclear Oversight Personnel
Finding	The inspector verified that all laitance and other sound debris were removed from existing concrete prior to placement of any fresh concrete adjacent to hardened concrete.

Note: Document the requirement reviewed and your findings on the appropriate data sheet in the database that will be used to generate the inspection report

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Name Paul Bialowas **Date** 05/15/2007 Complete ☑

CONCRETE STANDARDS FOR ISFSIs

Sheet # 24

Category	Cold Weather Requirements **Topic** Protection During Cold Weather
Requirement	Adequate equipment shall be provided for heating concrete materials and protecting concrete during freezing or near-freezing weather.
Source Document	ACI 318, Sect 5.6.1 **Rev. or Date** 1983
Acceptance Criteria	Verify that if the licensee has adequate equipment available to keep the concrete heated to the prescribed temperature for the specified duration, if so required by ACI 306 "Cold Weather Concreting." ACI 306 "Cold Weather Concreting" has specific requirements for placing and curing concrete during cold weather. Minimum temperature requirements are specified for the minimum concrete dimension as well as the forecast minimum ambient air temperature. The requirement as specified above relates to specific equipment necessary to heat the concrete or provide insulation to retain the heat of hydration during the first several days after concrete placement when the concrete is most susceptible to damage from freezing. Under most circumstances the concrete would be required to be maintained at or above 50 degrees F. The inspector should refer to ACI 306 for additional details.
Documents Reviewed	Bayshore Concrete Products Fabrication Plan for NUHOMS Horizontal Storage Modules, Revision 0
Persons Contacted	Transnuclear Oversight Personnel Wayne Bell (BCP)
Finding	The inspector verified that adequate equipment was availble for use for any cold weather concreting. The inspector verified availability of hot water at the Bayshore batch plant and that numerous rubberized tarps were availble and used during the inspection for the steam curing process.

Note: Document the requirement reviewed and your findings on the appropriate data sheet in the database that will be used to generate the inspection report

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Name Paul Bialowas **Date** 05/16/2007 Complete ☑

CONCRETE STANDARDS FOR ISFSIs

Sheet # 25

Category	Cold Weather Requirements. **Topic** Inspection for Frost
Requirement	All concrete materials and all reinforcement, forms, fillers, and ground with which concrete is to come in contact shall be free from frost.
Source Document	ACI 318, Sect 5.6.2 **Rev. or Date** 1983
Acceptance Criteria	Verify prior to concrete placement that the sub grade is not frozen, and all reinforcement, forms, fillers and ground is free from ice or frost. ACI 306 "Cold Weather Concreting" has specific requirements for placing and curing concrete during cold weather. The inspector should refer to ACI 306 for additional guidance.
Documents Reviewed	Bayshore Concrete Products Fabrication Plan for NUHOMS Horizontal Storage Modules, Revision 0
Persons Contacted	Bayshore QC Inspection personnel
Finding	The inspector verified that placement for the application intended did not include contact with frozen sub grade and that concrete is only placed in steels forms which have been cleared of any deleterious debris and appropriately pre-coated.

Note: Document the requirement reviewed and your findings on the appropriate data sheet in the database that will be used to generate the inspection report

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Name Paul Bialowas **Date** 05/18/2007 Complete ☑

CONCRETE STANDARDS FOR ISFSIs

Sheet # 27

Category	Hot Weather Requirements **Topic** Protection During Hot Weather
Requirement	During hot weather, proper attention shall be given to ingredients, production methods, handling, placing, protection, and curing to prevent excessive concrete temperatures or water evaporation that may impair required strength or serviceability of the member or structure.
Source Document	ACI 318, Sect 5.7 **Rev. or Date** 1983
Acceptance Criteria	The inspector should verify that the licensee is implementing necessary controls to protect the concrete during hot weather. A precise temperature is not specified in ACI 305 for the definition of hot weather. Instead the influences of ambient temperature, concrete temperature, wind, and relative humidity are discussed. For practical purposes, if the licensee is planning to place concrete when the ambient temperatures are forecast to rise above 90 degrees F during the concrete placement operation, the licensee should evaluate methods to control the concrete temperature. ACI 305, "Hot Weather Concreting" provides specific requirements for placing and curing concrete during hot weather. Ice or chilled water is typically added at the concrete batch plant to keep the concrete water temperature as low as possible. The placement operations may begin early in the morning to take advantage of the cooler temperatures. The batch plant may utilize admixtures to prolong the workability of the concrete.
Documents Reviewed	Bayshore Concrete Products Fabrication Plan for NUHOMS Horizontal Storage Modules, Revision 0
Persons Contacted	Wayne Bell (BCP)
Finding	The inspector verified that a process was in place to introduce ice into the concrete mix for conditions where form temperatures achieve 120 degrees F. The inspector also verified that a process was in place to ice forms or cool them with water under high temperature conditions.

Note: Document the requirement reviewed and your findings on the appropriate data sheet in the database that will be used to generate the inspection report

☐ Holtec ☑ Transnuclear ☐ NAC

Name Paul Bialowas **Date** 05/18/2007 Complete ☐

CONCRETE STANDARDS FOR ISFSIs

Sheet # 28

Category Cold Weather Requirements **Topic** Concrete Temperature

Requirement
Concrete delivered in cold weather shall have a minimum temperature of 50 degrees F . The maximum temperature of concrete produced with heated aggregates, heated water, or both, shall at no time during its production or transportation exceed 90 degrees F.

Source Document ASTM C 94, Sect 11.8 **Rev. or Date** 2000

Acceptance Criteria
Verify by a review of concrete temperature measurements at the batch plant and at the placement site that the concrete temperature is less than 90 degrees when it leaves the batch plant and is above 50 degrees at the time of placement during cold weather. Note: the 90 degree limitation applies only when heated aggregates or water are added to the batch. The test lab personnel or licensee QC personnel should be utilizing calibrated thermometers to measure the concrete temperatures.

Documents Reviewed
Bayshore Concrete Products Fabrication Plan for NUHOMS Horizontal Storage Modules, Revision 0

Persons Contacted
Transnuclear Oversight Personnel

Finding
The inspector verified that heated water was available for conditions where ready mixed concrete would need to be controlled to meet the ASTM requirements of >50 degrees F. and <90 degrees F. to control concrete batch temperatures.

Note: Document the requirement reviewed and your findings on the appropriate data sheet in the database that will be used to generate the inspection report

☐ Holtec ☑ Transnuclear ☐ NAC

Name Paul Bialowas **Date** 05/17/2007 Complete ☑

CONCRETE STANDARDS FOR ISFSIs

Sheet # 29

Category	Concrete Placement Prep. **Topic** Formwork
Requirement	Forms shall be substantial and sufficiently tight to prevent leakage of mortar.
Source Document	ACI 318, Sect 6.1.2 **Rev. or Date** 1983
Acceptance Criteria	Verify that the forms appear to be sufficiently tight to prevent leakage of mortar.
Documents Reviewed	Bayshore Concrete Products Fabrication Plan for NUHOMS Horizontal Storage Modules, Revision 0
Persons Contacted	Bayshore QC Personnel
Finding	The inspector verified that all formwork used during the inspection was acceptably fabricated to together and included an acceptably tight fit such as not to allow leakage of mortar.

Note: Document the requirement reviewed and your findings on the appropriate data sheet in the database that will be used to generate the inspection report

☐ Holtec ☑ Transnuclear ☐ NAC

Name Paul Bialowas **Date** 05/17/2007 Complete ☑

CONCRETE STANDARDS FOR ISFSIs

Sheet # 30

Category	Concrete Placement Prep. **Topic** Construction Joints
Requirement	Immediately before new concrete is placed, all construction joints shall be wetted and standing water removed.
Source Document	ACI 318, Sect 6.4.2 **Rev. or Date** 1983
Acceptance Criteria	Verify that prior to placement of new concrete, construction joints are wetted and large amounts of standing water (that would change the water/cement ratio of the freshly placed concrete) have been removed. Small amounts of water remaining on the concrete are acceptable.
Documents Reviewed	Bayshore Concrete Products Fabrication Plan for NUHOMS Horizontal Storage Modules, Revision 0
Persons Contacted	Wayne Bell (BCP)
Finding	The inspector verified that prior to placement all joints are wetted and standing water is removed.

Note: Document the requirement reviewed and your findings on the appropriate data sheet in the database that will be used to generate the inspection report

☐ Holtec ☑ Transnuclear ☐ NAC

Name Paul Bialowas **Date** 05/17/2007 Complete ☑

CONCRETE STANDARDS FOR ISFSIs

Sheet # 31

Category	Concrete Reinforcement **Topic** Field Bending of Bars
Requirement	Reinforcement partially embedded in concrete shall not be field bent, except as shown on the design drawings or permitted by the engineer.
Source Document	ACI 318, Sect 7.3.2 **Rev. or Date** 1983
Acceptance Criteria	Verify that bending of partially embedded reinforcement is not performed by the licensee contractor, unless approved by the design engineer. Construction conditions may make it necessary to bend bars that are partially embedded in concrete. Field bending of bars in concrete should not be done without authorization of the licensee design engineer. The design engineer must determine whether the bars should be bent cold or heated for the bending operation.
Documents Reviewed	
Persons Contacted	Wayne Bell (BCP)
Finding	The inspector verified that field bending is not performed for any reinforcement, if the reinforcement is partially embedded in placed concrete. Cold bending can be performed by the Bayshore bend shop if necessary and prior approval is provided by engineering.

Note: Document the requirement reviewed and your findings on the appropriate data sheet in the database that will be used to generate the inspection report

☐ Holtec ☑ Transnuclear ☐ NAC

Name Paul Bialowas **Date** 05/18/2007 Complete ☑

CONCRETE STANDARDS FOR ISFSIs

Sheet # 32

Category	Concrete Placement Prep. **Topic** Reinforcement Conditions
Requirement	At time concrete is placed, reinforcement shall be free from mud, oil, or other nonmetallic coatings that adversely affect bonding capacity.
Source Document	ACI 318, Sect 7.4.1 **Rev. or Date** 1983
Acceptance Criteria	Verify that the reinforcement is free from mud, oil, grease and other nonmetallic coatings that would decrease the bond prior to the concrete placement. A layer of rust or mill scale on the reinforcing bars is acceptable and generally increases the bond.
Documents Reviewed	Bayshore Concrete Products Fabrication Plan for NUHOMS Horizontal Storage Modules, Revision 0
Persons Contacted	Bayshore QA Personnel Transnuclear Oversight Personnel
Finding	The inspector verified that the place reinforcement was clean prior to placement. Bayshore QC inspection personnel perform inspections prior to placement to verify no mud, ice, oil and nonmetallic coating is present prior to performing any placement.

Note: Document the requirement reviewed and your findings on the appropriate data sheet in the database that will be used to generate the inspection report

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Name Paul Bialowas **Date** 05/18/2007 Complete ☑

CONCRETE STANDARDS FOR ISFSIs

Sheet # 33

Category	Concrete Reinforcement **Topic** Reinforcement Cover 1
Requirement	For Concrete permanently exposed to earth or weather, a minimum concrete cover of 2 inches shall be provided for number 6 through 18 reinforcement. For number 5 bar, W31 or D31 wire, and smaller, 1 1/2 inches of cover shall be provided.
Source Document	ACI 318, Sect 7.7.1 (b) **Rev. or Date** 1983
Acceptance Criteria	Verify that the licensee has provided a minimum of 2 inches of clear cover between the outside edge of the reinforcing bars and the formwork, where the formed concrete surface will later be permanently exposed to earth or weather. As the top surface is typically difficult to inspect, the inspector should visually look over the pad area and pick out several of the areas that appear to have the least amount of cover for the measurements located around the perimeter of the vertical forms.
Documents Reviewed	Bayshore Concrete Products Fabrication Plan for NUHOMS Horizontal Storage Modules, Revision 0
Persons Contacted	Wayne Bell (BCP)
Finding	The inspector verified that a level is used as a straight edge across sections of the form work to help determine whether the required clearances have been allowed for the upper surface of the prepared form. For the placement of reinforcement for sides and bottom of storage module components, chairs are used to maintain required clearances.

Note: Document the requirement reviewed and your findings on the appropriate data sheet in the database that will be used to generate the inspection report

☐ Holtec ☑ Transnuclear ☐ NAC

Name Paul Bialowas **Date** 05/18/2007 Complete ☑

CONCRETE STANDARDS FOR ISFSIs

Sheet # 34

Category	Concrete Reinforcement **Topic** Reinforcement Cover 2
Requirement	For Concrete cast against and permanently exposed to earth, a minimum concrete cover of 3 inches shall be provided for reinforcement.
Source Document	ACI 318, Sect 7.7.1(a) **Rev. or Date** 1983
Acceptance Criteria	Verify that the licensee has provided a minimum of 3 inches of clear cover between the outside (bottom) of the reinforcing bars and the earth. The inspector should visually look over the pad area and pick out several of the areas that appear to have the least amount of cover to conduct measurements.
Documents Reviewed	
Persons Contacted	Transnuclear Oversight Personnel Wayne Bell (BCP)
Finding	The inspector verified that the concrete is not exposed to earth when placed as the forms are raised on a pedestal base off the ground. The inspector verified prior to numerous pours that the appropriate dimensions existed prior to placement. The inspector also noted that these same dimensions are checked on a pre-pour checklist by Bayshore QC Personnel and also verified by Transnuclear Oversight Personnel before concrete is allowed to be placed into he forms.

Note: Document the requirement reviewed and your findings on the appropriate data sheet in the database that will be used to generate the inspection report

☐ Holtec ☑ Transnuclear ☐ NAC

Name Paul Bialowas **Date** 05/18/2007 Complete ☑

CONCRETE STANDARDS FOR ISFSIs

Sheet # 36

Category Concrete Sampling **Topic** Field Technician Requirements

Requirement
The field technicians making and curing specimens for acceptance testing shall be certified ACI Field Testing Technicians, Grade I or equivalent. Equivalent personnel certification programs shall include both written and performance examinations, as outlined in ACI CP-1.

Source Document ASTM C 31, Section 5.3 **Rev. or Date** 2000

Acceptance Criteria
Verify that the Field Testing Technicians performing the casting of cylinders are certified as ACI Level I or equivalent. If the testing lab provides alternate certification for the technicians, verify that the program includes both written and performance examinations as outlined in ACI CP-1.

Documents Reviewed

Persons Contacted

Finding
The inspector verified by review of training, test results, and completed certification documentation that field technicians were acceptably ACI certified.

Note: Document the requirement reviewed and your findings on the appropriate data sheet in the database that will be used to generate the inspection report

☐ Holtec ☑ Transnuclear ☐ NAC

Name Paul Bialowas **Date** 05/18/2007 Complete ☑

CONCRETE STANDARDS FOR ISFSIs

Sheet # 1

Category	Concrete Sampling **Topic** Required Number of Strength Samples
Requirement	Samples for strength tests of each class of concrete placed each day shall be taken not less than once a day nor less than once for each 150 cubic yd of concrete, nor less than once for each 5000 square ft of surface area for slabs or walls.
Source Document	ACI 318, Sect 5.6.1.1 **Rev. or Date** 1995
Acceptance Criteria	Verify that the licensee has obtained the minimum number of strength samples as specified above (1 set for each 150 cubic yards or 5000 square feet, or portion thereof). Note: The sampling requirements typically specify that several cylinders and tests be performed for each sample set.
Documents Reviewed	daily pour sheets from work occurring 5/14-18/07
Persons Contacted	various Bayshore lab. Personnel
Finding	The inspector observed Bayshore personnel perform ACI/ASTM testing. The testing included Temperature, Slump, Unit Weight, Air Content (Pressure Vessel) and collection of 2 sets of compressive strength samples per series of testing. One set of cylinders were taken to secure the curing method and the other set of cylinders to ensure a quality concrete at 28 days with an acceptable average break strength for the given material.

Note: Document the requirement reviewed and your findings on the appropriate data sheet in the database that will be used to generate the inspection report

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Name Conrad Landry **Date** 05/16/2007 Complete ☑

CONCRETE STANDARDS FOR ISFSIs

Sheet # 2

Category	Concrete Sampling **Topic** Composite Sampling Requirement 2
Requirement	The elapsed time shall not exceed 15 min. between obtaining the first and final portions of the composite sample.
Source Document	ASTM C 172, Sect 4.1 **Rev. or Date** 1999
Acceptance Criteria	Verify that the time between obtaining the initial portion of the composite concrete sample and obtaining the final portion of the concrete sample does not exceed 15 minutes.
Documents Reviewed	ACI recommendations
Persons Contacted	Bayshore Lab Foreman and Bayshore Assistant Inspector
Finding	The inspector witnessed the activity of collecting a composite sample from the first through the final portions of the composite sample collection process. The inspector verified that the time was 14 minutes.

Note: Document the requirement reviewed and your findings on the appropriate data sheet in the database that will be used to generate the inspection report

☐ Holtec ☑ Transnuclear ☐ NAC

Name Conrad Landry **Date** 05/15/2007 Complete ☑

CONCRETE STANDARDS FOR ISFSIs

Sheet # 3

Category	Concrete Sampling **Topic** Composite Sampling Requirement 1
Requirement	Samples for strength tests shall be taken in accordance with "Method of Sampling Freshly Mixed Concrete" (ASTM C 172).
Source Document	ACI 318, Sect 5.6.2.1. **Rev. or Date** 1995
Acceptance Criteria	Verify that the licensee is obtaining composite concrete samples as prescribed by ASTM C 172. The composite or combined sample must be obtained from two or more portions of the discharge of the concrete truck. Typically, the sample should be obtained from the "point of placement". The process of pumping concrete alters the air content and slump, therefore the strength sample should be obtained from the end of the pump truck hose. Reference requirements included in ASTM C 172 and additional datasheets for information.
Documents Reviewed	
Persons Contacted	Bayshore Lab Foreman
Finding	The inspector observed the following process for composite sample test collection: 1) Sidewinder vehicle hauls roughly 4 cubic yards of concrete to the placement area. 2) Sidewinder operator places sample material in two wheel barros in one continuous motion, moving back & forth between the two wheelbarrows until both are filled. 3) Wheelbarrow #1 is dumped into the form work at the placement location. 4) Wheelbarrow #2 is mixed until uniform and the test materials are extracted from the total amount of concrete in the 2nd wheelbarrow. Note: Document the requirement reviewed and your findings on the appropriate data sheet in the database that will be used to generate the inspection report

☐ Holtec ☑ Transnuclear ☐ NAC

Name Conrad Landry **Date** 05/16/2007 Complete ☑

CONCRETE STANDARDS FOR ISFSIs

Sheet # 4

Category	Concrete Placement Prep. **Topic** Removal of Debris
Requirement	Preparation before concrete placement shall include that all debris and ice shall be removed from spaces to be occupied by concrete.
Source Document	ACI 318, Sect 5.7.1 (b) **Rev. or Date** 1995
Acceptance Criteria	Verify that all debris has been removed from the area within the concrete forms. This includes sawdust, nails, wood pieces and other debris that could collect inside the forms. During cold weather conditions, the Inspector must also verify that there is no ice present .
Documents Reviewed	
Persons Contacted	Transnuclear QA/QC Oversight Representative
Finding	The inspector verified that Transnuclear uses fabricated steel forms to fabricate the storage module pieces. These forms are often suspended above ground level on pedestals. Due to the form positioning on the pedestals, water deposition is rarely an issue. The inspector inquired of the action(s) taken in regard to placement and water deposition and was told that squeeges are availble for use on the forms to control standing water.

Note: Document the requirement reviewed and your findings on the appropriate data sheet in the database that will be used to generate the inspection report.

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Name Conrad Landry **Date** 05/16/2007 Complete ☑

CONCRETE STANDARDS FOR ISFSIs

Sheet # 10

Category	Concrete Sampling **Topic** Making & Curing Test Specimens
Requirement	Cylinders for strength tests shall be molded and laboratory-cured in accordance with "Practice for Making and Curing Concrete Test Specimens in the Field" (ASTM C 31).
Source Document	ACI 318, Sect 5.6.2.2. **Rev. or Date** 1995
Acceptance Criteria	Verify that the Licensee is making cylinders that will be laboratory-cured in accordance with the requirements of ASTM C 31, "Practice for Making and Curing Concrete Test Specimens in the Field". This includes verification that 1) test information is obtained for the slump, air content and temperature of the fresh concrete and 2) the slump, air content and concrete temperature measurements obtained meet the project specifications. Reference ASTM C 31 and the remaining C 31 datasheets for additional information.
Documents Reviewed	Certification Card
Persons Contacted	Bayshore Field Technician
Finding	The inspector verified that the Bayshore Field Technician's Certification card was valid through 11/16/2007. The inspector verified ASTM testing (including sampling) was properly completed and within speicification limits. Concrete cylinders were tested during the inspection and verified by the inspector to be acceptable.

Note: Document the requirement reviewed and your findings on the appropriate data sheet in the database that will be used to generate the inspection report

☐ Holtec ☑ Transnuclear ☐ NAC

Name Conrad Landry **Date** 05/15/2007 Complete ☑

CONCRETE STANDARDS FOR ISFSIs

Sheet # 11

Category	Concrete Quality **Topic** Concrete Strength Requirements
Requirement	Strength level of an individual class of concrete shall be considered satisfactory if both of the following requirements are met: (a) Every arithmetic average of any three consecutive strength tests equals or exceeds f'c (required 28 day concrete compressive strength) and (b) no individual strength test (average of 2 cylinders) falls below f'c by more than 500 psi.
Source Document	ACI 318, Sect 5.6.2.3 **Rev. or Date** 1995
Acceptance Criteria	Verify that the minimum results of the 28 day concrete strength tests meet the requirement specified above. Note that some 28 day concrete compressive strength requirements may have both a minimum and maximum compressive strength requirement, such as for the Holtec system. The requirements of Section 5.6.2.3 apply to the minimum concrete strength requirements.
Documents Reviewed	
Persons Contacted	Transnuclear QA Oversight QA/QC Representative and Bayshore Lab Foreman
Finding	The inspector verified for the following two break tests witnessed on 5/16/07, that the 28 day break test results averaged at least the minimum (5000 psi) test strength according to ACI requirements. Both cylinders were 6 X 12 sizes and broke at the following pressures: One R-B9 cylinder sheared at 6835 PSI, while the other R-B9 cylinder sheared at 7036 psi.

Note: Document the requirement reviewed and your findings on the appropriate data sheet in the database that will be used to generate the inspection report

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Name Conrad Landry **Date** 05/16/2007 Complete ☑

CONCRETE STANDARDS FOR ISFSIs

Sheet # 12

Category Concrete Quality **Topic** Concrete Air Content

Requirement
Normal weight concrete exposed to freezing and thawing shall be air-entrained with air content indicated in Table 4.2.1. Tolerance on air content as delivered shall be +/- 1.5 percent. For specified compressive strength greater than 5000 psi, reduction of air content indicated in Table 4.2.1 by 1.0 percent shall be permitted.

Source Document ACI 318, Sect 4.2.1 **Rev. or Date** 1995

Acceptance Criteria
Verify 1) that the licensee has specified an appropriate air content requirement for the concrete mix in use from ACI 318 Table 4.2.1 and that the tolerance is within +/- 1.5 percent and 2) that the concrete as placed meet these requirements. Review the total air content requirements from Table 4.2.1 for the nominal maximum aggregate size and exposure level specified. [As a guide, ACI 318 defines severe exposure as where the concrete, in a cold climate, may be in almost continuous contact with moisture prior to freezing and lists pavements (slabs) as an example. For practical purposes northern states would typically be classified as severe exposure where southern states would fall under moderate exposure. Additional guidance may be found in ACI 211.1] The air measurement is made at the same time as the concrete strength samples are obtained and should be from the point of placement.

Documents Reviewed
Calibration documentation for Air Pot

Persons Contacted
Bayshore Lab Foreman, Senior Field Technician

Finding
The inspector witnessed multiple air tests for various pours through out the week of inspection. The inspector noted that both Bayshore and Transnuclear oversight personnel were sensitive to specifcation requirments for air acceptance. The inspector also witnessed some concrete batches rejected for out of tolerance conditions.

Note: Document the requirement reviewed and your findings on the appropriate data sheet in the database that will be used to generate the inspection report

☐ Holtec ☑ Transnuclear ☐ NAC

Name Conrad Landry **Date** 05/18/2007 Complete ☑

CONCRETE STANDARDS FOR ISFSIs

Sheet # 14

Category	Concrete Quality **Topic** Concrete Aggregates
Requirement	Concrete aggregates shall confirm to "Specification for Concrete Aggregates" ASTM C 33 or utilized by exception when shown by special test or actual service to produce concrete of adequate strength and durability and approved by the building official.
Source Document	ACI 318, Sect 3.3.1 **Rev. or Date** 1995
Acceptance Criteria	Verify that the concrete aggregates meet requirements as specified in ASTM C 33 or has been specifically exempted by special test or actual service with approval of the building official (Licensee Design Engineer). The licensee should be able to provide documentation that the aggregates meet ASTM C 33 requirements or that the aggregates are exempted by actual service records. Should the latter documentation be provided, the licensee design engineering organization should have approved the use of the aggregates.
Documents Reviewed	DOT pre-qualified course aggregate w/New York DOT and Virginia DOT qualified batching And materials.
Persons Contacted	Bayshore Concrete Materials Manager
Finding	The inspector verified that the stone used in supplied ready mix cncrete was DOT qualified 67 stone from stockpile #6, fine aggregate appeared to be crushed limestone sand used to help progression of concrete hydration and development. The inspector noted that the contract requirments between Bayshore and Transnuclear states that at no time shall Bayshore provide a plastic concrete for production with a water cement ration higher than 0.45, through the batch weights of the batch plant. The weights are documented on every batch ticket used for production and the ratio is avaialble for review prior to and during placement. The inspector verified that during the inspection the ratio never exceeded 0.437 as designed and specified in the contract documents.

Note: Document the requirement reviewed and your findings on the appropriate data sheet in the database that will be used to generate the inspection report

☐ Holtec ☑ Transnuclear ☐ NAC

Name Conrad Landry **Date** 05/15/2007 Complete ☑

CONCRETE STANDARDS FOR ISFSIs

Sheet # 15

Category	Concrete Mixing & Delivery **Topic** Ready Mixed Concrete
Requirement	Ready-mixed concrete shall be mixed and delivered in accordance with the requirements of "Specification for Ready-Mixed Concrete" ASTM C 94 or "Specification for Concrete Made by Volumetric Batching and Continuous Mixing" ASTM C 685.
Source Document	ACI 318, Sect 5.8.2 **Rev. or Date** 1995
Acceptance Criteria	Verify that the concrete meets the requirements of ASTM C 94 (see ASTM C 94 datasheets). Most licensees will utilize concrete from a Ready-Mix plant. Therefore they will be required to provide concrete that has been mixed and delivered in accordance with the requirements of ASTM C 94.
Documents Reviewed	
Persons Contacted	Bayshore Concrete Materials Manager
Finding	The inspector verified that mixing of concrete at the Bayshore batch plant and the transport of that concrete by an off-road Telabelt truck to the placement site to be poured into the appropriate form. The inspector also verified that all of the forms are located at the Cape Charles Bayshore facility. The inspector witnessed the transfer of the concrete from the Telabelt truck to the form and determined that ASTM C94 was satisfied due to the short time required to transport from the Bayshore batch plant and the RPM of the dispensing truck.

Note: Document the requirement reviewed and your findings on the appropriate data sheet in the database that will be used to generate the inspection report

☐ Holtec ☑ Transnuclear ☐ NAC

Name Conrad Landry **Date** 05/16/2007 Complete ☑

CONCRETE STANDARDS FOR ISFSIs

Sheet # 16

Category	Concrete Mixing & Delivery **Topic** Slump Tolerances 1
Requirement	Unless other slump tolerances are included in the project specifications, the following tolerances shall apply: When the slump specifications are written as a "maximum" or "not to exceed" amount and the specified slump is 3 inches or less the slump tolerance is +0/-1.5 inches. If the slump is specified is more than 3 inches the slump tolerance is +0/-2.5 inches.
Source Document	ASTM C 94, Section 6.1.1 **Rev. or Date** 2000
Acceptance Criteria	Verify that the concrete slump as measured at "point of placement" is within the tolerances listed above for slump specifications written as a "maximum" or "not to exceed" amount. Note: The inspector must first determine if the project slump requirements were written as a "maximum" or "not to exceed" amount. Additionally, the inspector must ensure that other slump tolerances were not included in the project specification. Either "Slump Tolerances 1" or "Slump Tolerances 2" will apply, but not both.
Documents Reviewed	
Persons Contacted	
Finding	The inspector observed the slump testing at the point of placement for the one of the PPL storage module components. The slump reading observed from the testing was as noted by the inspector as a maximum of 8 inches.

Note: Document the requirement reviewed and your findings on the appropriate data sheet in the database that will be used to generate the inspection report

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Name Conrad Landry **Date** 05/16/2007 Complete ☑

CONCRETE STANDARDS FOR ISFSIs

Sheet # 18

Category	Concrete Placement **Topic** Concrete Deposition
Requirement	Concrete shall be deposited as nearly as practical in its final position to avoid segregation due to rehandling or flowing.
Source Document	ACI 318, Sect 5.10.1 **Rev. or Date** 1995
Acceptance Criteria	Observe and verify that the licensee contractor is following good practices during the concrete placement operation. The intent of this requirement is to avoid segregation of the concrete. If the concrete is being placed by pump truck, chutes, conveyors or buckets, the concrete should be placed close to its final position. The concrete should not be piled up in localized areas or deposited away from its intended placement location where the workers would attempt to "drag" the concrete by use of vibrators to the final concrete placement location.
Documents Reviewed	
Persons Contacted	
Finding	The inspector observed the Telabelt truck dropping concrete vertically into a form, just before each 10 inch lift of concrete (PPL Roof Section) is vibrated into place w/caution not to flow the concrete laterally during the placement.

Note: Document the requirement reviewed and your findings on the appropriate data sheet in the database that will be used to generate the inspection report

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Name Conrad Landry **Date** 05/16/2007 Complete ☑

CONCRETE STANDARDS FOR ISFSIs

Sheet # 19

Category Concrete Placement **Topic** Concrete Placement Rate

Requirement Concreting shall be carried on at such a rate that concrete is at all times plastic and flows readily into spaces between reinforcement.

Source Document ACI 318, Sect 5.10.2 **Rev. or Date** 1995

Acceptance Criteria Observe and verify the concrete placement operations to ensure that the concrete remains in a plastic state and can be placed by the work crews. The intent of this requirement is to keep the concrete in a plastic state during placement operations. The concrete operations and equipment should be capable of continually placing the concrete within the acceptable slump requirements to allow placement (and subsequent vibration) of the concrete between the reinforcement.

Documents Reviewed

Persons Contacted

Finding The inspector observed placement of multiple Base components for St. Lucie storage modules as well as observing the concrete was placed in semi-continuous pour checking the previous lift for plasticity and workability.

Note: Document the requirement reviewed and your findings on the appropriate data sheet in the database that will be used to generate the inspection report

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Name Conrad Landry **Date** 05/16/2007 Complete ☑

CONCRETE STANDARDS FOR ISFSIs

Sheet # 20

Category	Concrete Placement **Topic** Foreign Material in Concrete
Requirement	Concrete that has partially hardened or been contaminated by foreign materials shall not be deposited in the structure.
***Source* Document**	ACI 318, Sect 5.10.3 **Rev. or Date** 1995
Acceptance Criteria	Observe concrete placement activities and verify that concrete that has begun to harden during the placement activities or that contains foreign material is rejected by the licensee contractor prior to placement. Normally, an individual will be observing the placement activities to ensure that the concrete remains plastic and does not contain foreign materials that were introduced during the mixing operations. Should this occur the individual in charge should stop the concrete placement operations and dispose of questionable concrete.
Documents Reviewed	
Persons Contacted	
Finding	The inspector noted that no partially hardened or contaminated concrete were observed being included in the placements.

Note: Document the requirement reviewed and your findings on the appropriate data sheet in the database that will be used to generate the inspection report.

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Name Conrad Landry **Date** 05/16/2007 Complete ☑

CONCRETE STANDARDS FOR ISFSIs

Sheet # 21

Category	Concrete Placement **Topic** Retempered Concrete
Requirement	Retempered concrete or concrete that has been remixed after initial set shall not be used unless approved by the engineer.
Source Document	ACI 318, Sect 5.10.4 **Rev. or Date** 1995
Acceptance Criteria	Observe and verify the licensee contractor is not retempering concrete and allowing placement into the ISFSI pad. Concrete that has already started to harden should not be retempered by adding water or admixtures. This does not include the addition of water or admixtures at the jobsite to bring the concrete up to the specified slump range prior to beginning the placement of the concrete from the individual truck that is within the time (1 1/2 hour) and revolution limits (300). Although this section of the ACI code allows use of retempered concrete when approved by the engineer, it is not a common or good practice and therefore should be questioned if it is observed.
Documents Reviewed	
Persons Contacted	
Finding	The inspector verified that neither retempered nor remixed concrete was placed and also no concrete in excess of 89 minutes was placed. The inspector noted an average of 20-40 minutes for relative batch placement time for any of the observed storage module components.

Note: Document the requirement reviewed and your findings on the appropriate data sheet in the database that will be used to generate the inspection report

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Name Conrad Landry **Date** 05/16/2007 Complete ☑

CONCRETE STANDARDS FOR ISFSIs

Sheet # 22

Category Concrete Curing **Topic** Other Than High-Early-Strength Concrete

Requirement Concrete (other than high-early-strength) shall be maintained above 50 F and in a moist condition for at least the first 7 days after placement, except when cured in accordance with 5.11.3

Source Document ACI 318, Sect 5.11.1 **Rev. or Date** 1995

Acceptance Criteria Verify 1) that the concrete temperatures will be above 50 degrees F and 2) that the concrete will be maintained in a moist condition for at least the first 7 days by an acceptable method. This requirement ensures that the concrete will cure properly. During periods of cold weather, the licensee may have to make provisions to keep the concrete warm in accordance with ACI 306 for Cold Weather Concreting. The concrete must remain moist for at least the first 7 days. There are several methods that are acceptable to accomplish this. The most common methods include: 1) keeping the concrete surface continuously wet by spraying water or utilization of wet burlap, 2) applying a membrane sealing compound. If a membrane sealing compound is utilized, it should meet the requirements of ASTM C 309. Additional information can be found in ACI 308, "Standard Practice for Curing Concrete".

Documents Reviewed

Persons Contacted

Finding The inspector verified through observation that heavy rubberized tarps were used to cover the freshly poured concrete to support the steam curing application for a minimum of 12-16 hours before ending the steam curing process, stripping the forms from the component, and placing the component in an assembly/laydown area.

Note: Document the requirement reviewed and your findings on the appropriate data sheet in the database that will be used to generate the inspection report

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Name Conrad Landry **Date** 05/16/2007 Complete ☑

CONCRETE STANDARDS FOR ISFSIs

Sheet # 23

Category	Concrete Curing **Topic** High-Early-Strength Concrete
Requirement	High-early-strength concrete shall be maintained above 50 F and in a moist condition for at least the first 3 days, except when cured in accordance with 5.11.3.
Source Document	ACI 318, Sect 5.11.2 **Rev. or Date** 1995
Acceptance Criteria	Verify 1) that the concrete temperatures will be above 50 degrees F and 2) that the concrete will be maintained in a moist condition for at least the first 3 days by an acceptable method. This requirement ensures that the concrete will cure properly. During periods of cold weather, the licensee may have to make provisions to keep the concrete warm in accordance with ACI 306 for Cold Weather Concreting. The concrete must remain moist for at least the first 3 days. There are several methods that are acceptable to accomplish this. The most common methods include: 1) keeping the concrete surface continuously wet by spraying or utilization of wet burlap, 2) applying a membrane sealing compound. If a membrane sealing compound is utilized, it should meet the requirements of ASTM C 309. Additional information can be found in ACI 308, "Standard Practice for Curing Concrete". High-early-strength concrete will seldom be utilized for an ISFSI pad, as the addition of cement or admixtures to obtain a high-early-strength are costly and would influence the 28-day compressive strength.
Documents Reviewed	
Persons Contacted	
Finding	The inspector verified through observation that heavy rubberized tarps were used to cover the freshly poured concrete to support the steam curing application for a minimum of 12-16 hours before ending the steam curing process, stripping the forms from the component, and placing the component in an assembly/laydown area. This type of curing satisfies the requirements for temperature and moisture.

Note: Document the requirement reviewed and your findings on the appropriate data sheet in the database that will be used to generate the inspection report

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Name Conrad Landry **Date** 05/16/2007 Complete ☑

CONCRETE STANDARDS FOR ISFSIs

Sheet # 26

Category	Concrete Mixing & Delivery **Topic** Concrete Mixing Revolutions
Requirement	Concrete that is completely mixed in a truck mixer will be mixed at 70 to 100 revolutions at the mixing speed designated by the manufacturer to produce the uniformity of concrete indicated in Annex A1. The mixing revolutions will begin after all ingredients including water, are in the drum. Additional revolutions by the mixer beyond the number found to produce uniformity of concrete shall be at a designated agitating speed.
Source Document	ASTM C 94, Section 11.5 **Rev. or Date** 2000
Acceptance Criteria	Verify that the concrete is being mixed between 70 to 100 revolutions at the batch plant after the addition of all the ingredients including water have been added to the drum at mixing speed. Note: that some older versions of ASTM C 94 started counting the mixing revolutions after the initial addition of water to the cement in the drum, effectively reducing the number of mixing revolutions allowed by the standard. Most sites utilize truck mixed concrete. Should the licensee utilize a central mix plant or a shrink-mix plant see ASTM C 94 for applicable requirements.
Documents Reviewed	
Persons Contacted	Transnuclear Oversight Representative
Finding	The inspector verified that rotating delivery trucks are not used to transport concrete batches from the Bayshore batch plant to the placement areas. Instead Bayshore Concrete uses "Sidewinders" (transport trucks) which hold four (4) yards (max.) of concrete. The Sidewinders do not have the capability to add water to the mixed batches. In addition the Inspector verified that the Sidewinders are not capable of additional mixing capabilities between the acceptance of premixed concrete at the batch plant and the placement area.

Note: Document the requirement reviewed and your findings on the appropriate data sheet in the database that will be used to generate the inspection report

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Name Conrad Landry **Date** 05/15/2007 Complete ☑

CONCRETE STANDARDS FOR ISFSIs

Sheet # 35

Category	Concrete Sampling **Topic** Composite Sampling Requirement 3
Requirement	Sample the concrete by collecting two or more portions taken at regularly spaced intervals during discharge of the middle portion of the batch. Do not obtain samples until after all the water has been added to the mixer; also do not obtain samples from the very first or last portions of the batch discharge.
Source Document	ASTM C 172, Section 5.2.3 **Rev. or Date** 1999
Acceptance Criteria	Verify that the licensee is obtaining composite concrete samples during discharge of the middle portion of the batch (truckload). The samples are not be obtained until all the water (and admixtures) have been added at the jobsite and the concrete has been approved for placement by the licensee contractor. The samples are not to be taken from the very first or last portions of the concrete discharge from the truck.
Documents Reviewed	
Persons Contacted	
Finding	The inspector verified that the trucks used for transporting the concrete batches from the batch plant to the placement location are not able to add water to the concrete batches. The inspector noted that since the concrete is batched and ready mixed and the type/method of transport, as well as the very short distance of transport, and the transport vehicle discharge capabilities, as well as the form locations, varied/multiple samples from the mix were typically obtained from the first yard of the batch then equally mixed prior to testing.

Note: Document the requirement reviewed and your findings on the appropriate data sheet in the database that will be used to generate the inspection report

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Name Conrad Landry **Date** 05/16/2007 Complete ☑