September 25, 2005

Mr. Stefan Anton, Licensing Manager
Holtec International
Holtec Center
555 Lincoln Drive West
Marlton, NJ 08053

SUBJECT: CERTIFICATE OF COMPLIANCE NO. 9261 FOR THE HI-STAR 100 SYSTEM

Dear Mr. Anton:

As requested by your application dated December 30, 2004, as supplemented June 17, July 26, and September 9, 2005, enclosed is Certificate of Compliance No. 9261, Revision No. 4, for the Model No. HI-STAR 100 System. This certificate supersedes, in its entirety, Certificate of Compliance No. 9261, Revision No. 3, dated February 18, 2004. Changes made to the enclosed certificate are indicated by vertical lines in the margin.

Holtec International has been registered as a user of the package under the general license provisions of 10 CFR 71.17. The approval constitutes authority to use the package for shipment of radioactive material and for the package to be shipped in accordance with the provisions of 49 CFR 173.471.

If you have any questions regarding this certificate, please contact me or Meraj Rahimi of my staff at (301) 415-8500.

Sincerely,

/RA/

Robert J. Lewis, Section Chief
Licensing Section
Spent Fuel Project Office
Office of Nuclear Material Safety
and Safeguards

Docket No. 71-9261
TAC No. L23796

Enclosures: 1. Certificate of Compliance
No. 9261, Rev. No. 4
2. Safety Evaluation Report
3. Registered Users

cc w/encls 1 & 2: R. Boyle, Department of Transportation
James M. Shuler, Department of Energy
RAMCERTS
Registered Users

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NAME	MRahimi*		GHornseth*		JChuang*		SHelton*	
DATE	9/14/05		9/15/05		9 /15/05		9 /15/05	

OFC	SFPO	C	SFPO		SFPO		SFPO	
NAME	MDebose		LCampbell		GBjorkman		RLewis	
DATE	09 / 20 /05		09 / 21 /05		09 / 21 /05		09 / 29 /05	

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SAFETY EVALUATION REPORT

Docket No. 71-9261
Model No. Hi-STAR 100
Certificate of Compliance No. 9261
Revision 4

SUMMARY

By application dated December 30, 2004, as supplemented June 17, July 26, and September 9, 2005, Holtec International (the applicant) requested an amendment to Certificate of Compliance (CoC) No. 9261 for the Model No. HI-STAR 100 system.

The applicant requested approval of the following changes to the SAR:

1. clarifying the discussion in the SAR on the hydrogen gas generation during loading,
2. describing the conditions of some Trojan spent fuel assemblies with minor impairments on some grid straps which were loaded as intact fuel assemblies,
3. changing the design basis fuel assembly for the "MPC Density and Heat Capacity" in the MPC-68/68F to "Dresden 6x6,"
4. adding alternative material entry to Table 1.3.2 of the SAR for MPC-68 Closure Ring material for serial #1021-023, -036, and -037,
5. revising, adding to, and deleting from the list of "MATERIALS AND COMPONENTS OF THE HI-STAR 100 SYSTEM" in Table 1.3.3,
6. making changes to Drawings 3913, 3923, 3925, 3928, and C1765,
7. adding an alternative leakage test method for the welded MPC closure lid,
8. permitting local grinding of the MPC lid below the minimum diameter on the drawing to alleviate interference with the MPC shell in areas of localized contact, and
9. using a combination of examinations and test in lieu of a visual examination for the containment boundaries after fabrication of each unit as part of acceptance criteria.

Based on the statements and representations in the application, as supplemented, and Revision 11 of the SAR, the staff concludes, per its evaluation described in Chapter 2 through Chapter 8 of this Safety Evaluation Report (SER), that the requested changes do not affect the ability of the package to meet the requirements of 10 CFR Part 71.

1.0 GENERAL INFORMATION

The following sections summarize the applicant's change requests with respect to the packaging and its contents.

1.1 Packaging

With respect to the packaging, the applicant is proposing to:

- clarify the discussion in the SAR on the hydrogen gas generation during loading.

The hydrogen gas generation results from interaction of the Boral neutron absorbers in the MPC and the spent fuel pool water during loading and unloading operations. The applicant has indicated due to numerous variables (i.e., aluminum particle size, pool temperature, pool chemistry, etc.) which influence the extent of the hydrogen produced, it is impossible to predict the amount of hydrogen that may be generated during MPC loading or unloading at a particular plant. Therefore, due to the variability in hydrogen generation, monitoring for combustible gases and either exhausting or purging the space beneath the MPC lid during loading and unloading operations is performed.

Based on the statements and representations in the application, as supplemented, and Revision 11 of the SAR, the staff concludes that Holtec has described the change in the HI-STAR 100 overpack and MPC designs in sufficient detail to provide an adequate basis for the acceptance of the change per 10 CFR Part 71.

1.2 Contents

The applicant has requested the following additions or changes to the contents:

- describing the conditions of some Trojan spent fuel assemblies with minor impairments on some grid straps which were loaded as intact fuel assemblies,

- changing the design basis fuel assembly for the “MPC Density and Heat Capacity” in the MPC-68/68F to “Dresden 6x6.”

This revision is to indicate that Trojan fuel assemblies with minor impairments on some grid straps does not reduce the structural integrity of the assemblies as long as no grid spacers are missing and there is no impairment that impacts the integrity of the fuel cladding. The proposed revision to the definition of intact fuel is aligned with the staff's guidance in the current Interim Staff Guidance - 1, "Damaged Fuel," and will not impact the capability of the HI-STAR 100 to meet the requirements of 10 CFR Part 71.

Changing the design basis fuel assembly for the “MPC Density and Heat Capacity” in the MPC-68/68F to “Dresden 6x6" from “GE 7x7" in Table 1.2.12 was largely editorial and provides consistency with Chapter 4 of the SAR. This fuel assembly type is bounded by prior analyses and will not impact the capability of the HI-STAR 100 to meet the requirements of 10 CFR Part 71.

1.3 Materials

The applicant has proposed the following changes with respect to materials:

- adding alternative material entry to Table 1.3.2 of the SAR for MPC-68 Closure Ring material for serial #1021-023, -036, and -037,

- revising, adding to, and deleting from the list of “MATERIALS AND COMPONENTS OF THE HI-STAR 100 SYSTEM” in Table 1.3.3.

During the fabrication of the MPC's used at the Trojan ISFSI, the stainless steel plate used to make the closure rings for the three MPC's was procured in accordance with the provisions of the ASME Code, Section III, Subsection NG. Subsection NB is more applicable to this component. Subsection NB requires a straight beam ultrasonic test (UT) of all plate material, whereas Subsection NG does not.

The potential consequences of the omitted Subsection NB UT were considered with regards to the structural and confinement capability of the overall MPC and the affected component (closure ring). Since the closure plate is a non-structural part, there is no adverse effect upon the structural capability of the MPC.

With respect to confinement, the omitted UT examination has no significance. This is because the straight beam UT is designed to detect lamellar (plate-like) flaws that are within the plate material but parallel to the surfaces of the plate. These kinds of flaws are the primary types that may exist within rolled plate material. Existence of such flaws would not hamper the confinement capability of the material since such flaws do not connect to the top or bottom surfaces of the plate, and thus, would not constitute a leak path. Also, with contemporary steel-making practice, the potential for the existence of any significant lamellar or other flaw is very low. Further, there is no credible flaw type that would be produced during the manufacture of rolled plate that would result in a leak path through the plate material. Thus, the confinement capability is not likely to be impaired as a result of any kind of realistic, postulated flaw that could exist in the un-examined plate used for the three closure rings used at Trojan The staff finds that the absence of the required UT for the 3 pieces of plate material used in the fabrication of the 3 closure rings poses an extremely low risk for there being a flaw in the plate material that would compromise the confinement ability of the MPC's in question.

The changes to the list of materials and components in Table 1.3.3 includes changing the materials for closure bolt washer, pocket trunnions, and relief device plate.

In Revision 10 of the SAR, the closure bolt washers were specified to be made from austenitic stainless steel. Field experience with these washers revealed that this material had insufficient strength and were susceptible to galling during torquing of the bolts. A change to a harder material was indicated. The applicant chose to substitute a 17-4 PH (precipitation hardening) stainless steel to eliminate the previously experienced problems. This material is compatible with the other materials of construction (overpack body and bolt materials) and is of sufficient hardness to provide the needed strength and resistance to galling.

The applicant requested expansion of the pocket trunnion material specification to include SA-564, type 630 in addition to the originally specified SA-705, type 630. SA-564 is a specification that covers steel bars and shapes of type 630 stainless, a 17-4 PH material. SA-705 is a specification for forgings of the same type of 17-4 PH stainless. Due to the geometry of the pocket trunnions, and their intended service, there is no appreciable affect from substituting one material specification for the other.

The applicant requested expansion of the relief device plate material to be SA-516, gr. 70 in addition to the originally specified A-569 material. Both of these materials are carbon steel. The staff finds that substitution of the SA-516 material is acceptable.

1.4 Drawings

The applicant has requested approval of changes to Drawings 3913, 3923, 3925, 3928, and C1765.

The changes to Drawing No. 3913 consist of adding Note 5 to Sheet 2 and Notes 1, 2, and 3 to Sheet 6. Note 5 on Sheet 2 provides a general repair provision for the impact Limiter attachment and alignment holes. Note 1 on Sheet 6 allows a specific unit to have a slightly smaller thickness of Holtite compared to that in the current drawing. However, the reduced thickness of 4-9/32" is still larger than the thickness of 4.1875" used in the supporting analyses for HI-STAR SAR. Note 2 on Sheet 6, added for this amendment, indicates a missing 4-inch fillet weld (out of a total weld length of 6880 inches) which attaches the radial Channel #18 and the 5th intermediate channel of the overpack serial # 1020-006. Note 3 is a clarification on tolerance stack up. The staff agrees with the changes proposed by the applicant.

The proposed changes to Drawing No. 3923 include revising and adding notes for clarifications, changing the profile of the MPC lid to have a tapered edge, reducing the groove weld between the port cover plates and the MPC lid from 3/16" to 1/8", providing penetrations in closure ring to allow helium leakage testing of the MPC lid-to-shell and vent/drain port cover plate weld during a single test, and reduced thickness of the MPC lid for Serial #1021-040 by 1-1/2" and adding 1-1/1/2"-thick shield disk instead.

The proposed change on Drawing No. 3925, Sheet 2 is adding Note 5 as a result of installing cell plates between cell number 11 and 17 in Trojan MPC-24 Serial #1022-029 upside down. These plates have no Boral panels. This error has resulted in the bottom semicircular shape mouse-holes to be located in the top and the rectangular slot mouse-hole to be in the bottom. The applicant has demonstrated that there are no criticality and structural consequences. With respect to thermal consequences, only the bottom mouse-holes are credited, which in the case of these two plates the rectangular mouse-holes have larger flow area than the semicircular ones. The staff agrees with the conclusion.

The changes on Drawing No. 3928 pertain to deviation from the required dimensions for three units pertaining to the cell openings, minimum width for Boral panel, and the basket cell height. The applicant has demonstrated that there are no criticality, shielding, or structural consequences. The staff agrees with the applicant's conclusion.

The significant proposed change on Drawing No. C1765 is the specification on the shims used between the overpack outside diameter and the impact limiters inside diameter. Other changes are proposed for the purpose of consistency and clarification. The staff agrees with the changes proposed by the applicant.

The staff reviewed the revised set of licensing drawings and finds that the information on the drawings provides an adequate basis for its evaluation against 10 CFR Part 71 requirements. The information on the drawings is consistent with the package as described and evaluated in the SAR.

2.0 STRUCTURAL

The staff reviewed the evaluations on the maximum bending moment in the fuel basket angle support subjected to an applied load of 6,151 lbs documented in Page 2-AD-11 of the "STRUCTURAL CALCULATION PACKAGE FOR MPC," Report No.: HI-2012787. Assuming the single fillet weld joint at the base is hinged, the applicant calculated the maximum moment to be 173 in-lbs per inch. However, if the joint is assumed to be clamped, then the moment increases 21% to 210 in-lb/in based on the staff's calculations. The real situation most likely lies somewhere in between. The NRC staff considers the higher magnitude of bending moment to be more appropriate for the SAR. Nevertheless, the staff agrees that the current design base of the angle supports still meet the safety requirements in structural performance.

The material of the closure bolt washer was changed from stainless steel to ASTM A564, 17-7 PH. Since the strength of the new material is stronger than the old one, and their densities are comparable, the staff determined that this change won't compromise the washer's structural performance.

To make the insertion process of the MPC lid to the MPC shell easier, local grinding of the lid below the minimum diameter is performed. Since the lid is structurally robust, a slight reduction in diameter will not influence its structural performance. The staff determined that the local grinding will not adversely affect the structural integrity of the MPC as a whole.

There is a one-time change in Series #1020-006 regarding welding requirement between a radial channel and the intermediate shell of the overpack. This change reduces the length of fillet weld by 4" from a total length of 6880". Since this reduction amounts to only 0.56%, this change is insignificant, and will not compromise the structural integrity of the attachment of the radial channel.

The groove weld in Sheet 2 of Drawing No. 3923 between the port cover plate and the MPC lid is changed from 3/16" to 1/8". This reduction increases the stresses in the weld. However, the reduced weld size still maintains the associated weld stress below allowable levels. Stress calculations show that, with an MPC internal pressure of 200 psi under accident conditions, the tensile stress in the cover plate fillet weld amounts to 7,544 psi, assuming a quality factor of 0.3. According to Section NF of the ASME Code, the allowable stress intensity of Level A weld stress limit is 30% of the ultimate strength at 550°F or 18,990 psi, exceeding the weld stress more than a factor of two. Hence, this change will not affect the structural integrity of the port cover plate welded to the MPC lid under normal, off-normal, and accident conditions.

The thickness of the new MPC lid in Series #1021-040 is reduced from 10" to 8.5". A 1-1/2" thick shield disk is installed on top of this new lid. The structural performance of this new 8.5 inch thick lid is bounded by the previous stress calculations. Moreover, this combined thickness of 10" (8.5" lid plus 1.5" shield disk) provides essentially the same shielding effectiveness. Therefore, it is concluded that this change won't influence the structural performance of the MPC lid.

Based on the review of the statements and representations in the application, as supplemented and revised by the applicant, the staff concludes that the changes in the structural design of the package have been adequately described and evaluated, and the changes do not adversely

affect the ability of the package to meet the 10 CFR Part 71 structural requirements.

3.0 THERMAL

No changes have been made to this part of the SAR.

4.0 CONTAINMENT

The leakage test method for the MPC lid-to-shell closure welds was modified to allow a different sequence of the tests. The Certificate of Compliance requires leak testing of the MPC-68F and the MPC-24EF prior to shipment to show a leak rate of no greater than 5×10^{-6} atm*cm^3/sec (helium) with a sensitivity of 2.5×10^{-6} atm*cm^3/sec (helium).

Under Revision 10 of the SAR, the structural lid is welded to the loaded MPC and then subjected to a hydrostatic test and helium leak test. Then the vent and drain port cover plates are welded in place, examined by a penetrant test (PT), and then helium leak tested. The MPC closure ring is then welded on and inspected by PT.

The revised procedure provides for an alternative: the MPC structural lid to shell weld is initially hydrostatically tested. Then the vent and drain port cover plates are welded in place and examined by PT. A modified MPC closure ring is welded in place over the structural lid. This modified closure ring has openings over the vent and drain port cover plates, thereby allowing a helium leakage test to be performed which would detect a leak from both the structural lid weld (extremely unlikely) and the vent and drain line cover plate welds. Finally, the openings over the vent and drain line plates are covered with a welded plate and examined by PT.

The proposed change does not impact the requirements of the Certificate of Compliance, and uses leak-testing methods endorsed by the NRC. The staff reviewed this change and concluded that this change has no impact on the capability of the HI-STAR 100 to meet the containment requirements of 10 CFR Part 71.

5.0 SHIELDING

No changes have been made to this part of the SAR.

6.0 CRITICALITY

No changes have been made to this part of the SAR.

7.0 OPERATING PROCEDURES

The applicant has made changes to the appropriate sections of the Operating Procedures in order to incorporate the proposed alternative leakage test method.

In addition, the applicant has proposed to allow local grinding of the MPC lid below the minimum diameter on the drawing to alleviate interference with the MPC shell in areas of localized contact.

The staff believes grinding the MPC lid below the minimum diameter on the approved drawings would create an out-of-compliance situation. Therefore, grinding the MPC lid beyond the minimum diameter is not approved.

Based on the information regarding the requested change pertaining to the alternative leak test supplied by the applicant, the staff finds the change acceptable in accordance with the requirements of 10 CFR Part 71.

8.0 ACCEPTANCE TESTS AND MAINTENANCE PROGRAM

The applicant has proposed to use a combination of examinations and test in lieu of a visual examination for the containment boundaries after fabrication of each unit as part of acceptance criteria. The tests could be helium leak test, pressure test ultrasonic test, die penetrant, and/or magnetic test as applicable in order to verify that the containment boundary is free of cracks, pinholes, uncontrolled voids or other defects.

The staff believes replacing visual examinations with a combination of the above tests provide additional assurances on the effectiveness of each of the HI-STAR 100 production units with respect to the containment boundary.

Based on the information regarding the applicant's requested changes with respect to HI-STAR 100 package acceptance tests and maintenance program, the staff finds the proposed changes acceptable in accordance with the requirements of 10 CFR Part 71.

CONCLUSION

The staff has reviewed the requested amendment to Certificate of Compliance No. 9261. Based on the statements and representations in the application, as supplemented, and revision 11 of the SAR, the staff concludes that the requested changes do not affect the ability of the package to meet the requirements of 10 CFR Part 71. Certificate of Compliance No. 9261 for the HI-STAR 100 transport package has been amended as requested by Holtec International.

Issued with Certificate of Compliance No. 9261, Revision No. 4,
on September 29, 2005 .