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## **SUMMARY OF PROPOSED CHANGES (SOPC)**

### **LAR 9261-10, Revision 0**

#### **LIST FOR MAJOR TECHNICAL TOPICS AND KEYWORDS**

1. HI-STAR 100 Version HB GTCC Package (referred to as HI-STAR HB GTCC Package) consisting of HI-STAR HB GTCC Overpack and GWC-HB containing Humboldt Bay Reactor-Related Non-Fuel Waste in solid form.
2. HI-STAR 100 Package with Diablo Canyon MPC-32 (a shortened version of the generic MPC-32) containing moderate burnup fuel only.
3. HB Impact Limiter for HI-STAR HB and HI-STAR HB GTCC Package (Improved aluminum crush material design similar to the standard impact limiter).
4. MPC Spacer Ring
5. MPC-32 authorized contents and requirements including maximum allowable burnup.
6. Non-fuel hardware and neutron sources
7. Burnup credit evaluation and burnup verification for MPC-32 and Diablo Canyon MPC-32 based on ISG-8 Revision 3.
8. Composition of Thoria Rods
9. Humboldt Bay fuel assembly minimum enrichment
10. HI-STAR 100 structural vs non-structural welds
11. HI-STAR 100 Cask intermediate shell weld optimization
12. HI-STAR 100 containment boundary brittle fracture clarifications
13. HI-STAR 100 code alternatives for post weld heat treatment
14. HI-STAR 100 containment boundary component brittle fracture test -40F temperature option.
15. HI-STAR 100 and MPC lifting structural acceptance criteria
16. Partially loaded MPCs (i.e. partially loaded transport packages)
17. Weld inspection requirements
18. MPC Closure Lid minimum material yield strength
19. MPC vent and drain ports
20. DFC mesh size
21. MPC Closure Ring leakage test penetrations and set screws (generic and Diablo MPCs).
22. MPC basket sheathing weld size and sheathing weld minimum length
23. MPC enclosure vessel (EV) shell thickness
24. MPC Closure Lid lift holes (or lift points)
25. ITS Categorization
26. MPC cavity average helium temperatures and internal pressures
27. Gas release from ruptured non-fuel hardware
28. Metamic average B<sub>4</sub>C particle size

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**ABOUT THIS SOPC**

The summary of proposed changes (PCs) pertaining to LAR 9261-10, including reason and justification for change, is presented in three parts as follows:

- A. Proposed Changes to Certificate of Compliance
- B. Proposed Changes to the Safety Analysis Report
- C. Proposed Changes to the Licensing Drawing Package

In general, editorial changes and certain minor changes are not summarized in the SOPC. The SAR's revision summary log contains additional change description information on a section by section basis for all SAR chapters.

SAR supporting documents supplied with this LAR are listed in the LAR submittal letter document ID 5014799. Submittal of supporting documents with this LAR may comprise of both revised and newly generate documents.

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**A. PROPOSED CHANGES TO CERTIFICATE OF COMPLIANCE**

**Proposed Change No. A1**

The CoC has been changed to add new overpack and canister versions, namely HI-STAR 100 Version HB GTCC (also referred to as HI-STAR HB GTCC) and GWC-HB containing fissile exempt reactor-related non-fuel waste in solid form. The HI-STAR HB GTCC Package is a Type B(U) fissile-exempt package. The drawing package includes HI-STAR HB GTCC Overpack, GWC-HB and HB Impact Limiters. The HB Impact Limiters are qualified for use with HI-STAR HB GTCC and also HI-STAR HB packages. The packaging is described in CoC Condition 5(a). The content type, form and quantity of material is provided in CoC Condition 5(b). Package gross weights for HI-STAR HB and HI-STAR HB GTCC are provided in CoC Condition 7. The HI-STAR HB GTCC does not require a personnel barrier as indicated in CoC Condition 9.

Reason for Change

The HI-STAR HB GTCC overpack is a variant of the HI-STAR HB overpack that is already approved in the HI-STAR 100 CoC.

Justification for Change

The necessary safety evaluations have been performed in support of the new hardware options containing the specified allowable contents. Supplement II of the safety analysis report presents the evaluations and results. Supplement I addresses the HB Impact Limiters for the HI-STAR HB Package and HI-STAR HB GTCC Packages. New licensing drawings reflect the new hardware options.

**Proposed Change No. A2**

The CoC has been changed to add a new canister version of the MPC-32, namely Diablo Canyon MPC-32 with Diablo Canyon moderate burnup intact fuel assemblies with non-fuel hardware and neutron sources as authorized contents. The drawing package includes HI-STAR 100 Overpack, Diablo Canyon Enclosure Vessel, Diablo Canyon MPC-32 Fuel Basket, MPC Spacer Ring and HI-STAR 100 Impact Limiter. The packaging is described in CoC Condition 5(a). The content type, form and quantity of material is provided in CoC Condition 5(b). CoC Condition 5(b)(1)(i), refers to safety analysis report Section 1.2.3.7.2 regarding burnup verification methods to be applied. CoC Table A.1 Part VII specifies the fuel assembly limits for Diablo Canyon MPC-32 including maximum initial enrichment. CoC Table A.10 and Table A.11 specify cooling time, burnup and minimum initial enrichment limits. CoC Table A.12 specifies burnup curves as a function of initial enrichment. CoC Table A.14 specifies burnup and cooling time limits for non-fuel hardware and neutron sources.

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Reason for Change

Diablo Canyon MPC-32 is a variant of the standard MPC-32 that is already approved in the HI-STAR 100 CoC. The revised burnup credit and burnup verification approach reflects the latest USNRC guidance contained in ISG-18 Revision 3.

Justification for Change

The necessary safety evaluations have been performed in support of the new hardware options containing the specified allowable contents. Supplement III of the safety analysis report presents the evaluations and results. New licensing drawings reflect the new hardware options.

**Proposed Change No. A3**

The CoC has been changed to update the standard MPC-32 authorized contents, specifically non-fuel hardware and neutron sources. Other limits are revised including maximum initial enrichment. CoC Table A.1 Part VI specifies the fuel assembly limits for the standard MPC-32. CoC Table A.10 and Table A.11 specify cooling time, burnup and minimum initial enrichment limits. CoC Table A.12 specifies burnup curves as a function of initial enrichment. CoC Table A.14 specifies burnup and cooling time limits for non-fuel hardware and neutron sources. CoC Condition 5(b)(1)(i), refers to safety analysis report Section 1.2.3.7.2 regarding burnup verification methods to be applied. The standard MPC-32 authorized contents include the contents authorized for the Diablo Canyon MPC-32.

Reason for Change

The proposed change expands the authorized contents for MPC-32. The revised burnup credit and burnup verification approach reflects the latest USNRC guidance contained in ISG-18 Revision 3.

Justification for Change

The necessary safety evaluations have been performed in support of the revised allowable contents and burnup credit evaluation. The main chapters of the safety analysis report presents the evaluations and results.

**Proposed Change No. A4**

The CoC has been changed to reflect the latest licensing drawings of previously licensed equipment. The drawings include HI-STAR 100 Overpack, MPC Enclosure Vessel, MPC-24 Fuel Basket Assembly, MPC-68/68F/68FF Fuel Basket, HI-STAR 100 Impact Limiter, and HI-STAR HB Overpack. Furthermore, the HI-STAR 100 Impact Limiter is no longer used with the HI-STAR HB Package.

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Reason for Change

Licensing drawings for HI-STAR 100 equipment have been revised to incorporate design and/or editorial changes. HB Impact Limiters are qualified for use with the HI-STAR HB Package. These drawing changes and justifications for the changes are described in more detail in Attachment 2 of this letter. Where necessary the SAR has been updated to include evaluation of these changes.

Justification for Change

See Attachment 2 of this letter.

**Proposed Change No. A5**

The CoC has been changed to update the composition of Thoria Rods placed in Dresden Unit 1 Thoria Rod Canisters as specified in CoC Table A.1 (Part II and Part III).

Reason for Change

The update is required to ensure conformity with authorized contents.

Justification for Change

The necessary safety evaluations have been performed in support of the change. The main chapters of the safety analysis report presents the evaluations and results as applicable.

**Proposed Change No. A6**

The CoC has been changed to update the minimum enrichment of the authorized fuel assembly array/classes for MPC-HB as specified in CoC Table A.1 (Part VIII, previously Part VII).

Reason for Change

The update is required to ensure conformity with authorized contents.

Justification for Change

The necessary safety evaluations have been performed in support of the change. Supplement I of the safety analysis report presents the evaluations and results as applicable.

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**B. PROPOSED CHANGES TO SAFETY ANALYSIS REPORT**

**Proposed Change No. B1**

Changes have been made to the SAR and the Licensing Drawings to add HI-STAR HB GTCC Package with GWC-HB containing fissile-exempt reactor-related non-fuel waste in solid form. The required acceptance criteria, safety evaluations and results are summarized in new Supplement II of the SAR. The drawing package is provided in Supplement II of the SAR.

Reason for Change

The HI-STAR HB GTCC Package is a variant of the HI-STAR HB Package that is already approved in the HI-STAR 100 CoC.

Justification for Change

Supplement II of the safety analysis report presents the evaluations and results as applicable.

**Proposed Change No. B2**

Changes have been made to the SAR and the Licensing Drawings to add Diablo Canyon MPC-32 with Diablo Canyon fuel and non-fuel hardware and neutron sources as allowable contents.

Reason for Change

Diablo Canyon MPC-32 is a variant of the standard MPC-32 that is already approved in the HI-STAR 100 CoC. The revised burnup credit and burnup verification approach reflects the latest USNRC guidance contained in ISG-18 Revision 3.

Justification for Change

The Diablo Canyon MPC-32 is qualified for transportation in the standard HI-STAR 100 Cask with standard HI-STAR 100 Impact Limiters. Since the Diablo Canyon MPC-32 is slight shorter than the standard MPC-32, an MPC Spacer Ring of the appropriate height is used to fill the remaining empty space in the HI-STAR 100 cask cavity above the MPC. Supplement III of the safety analysis report presents the evaluations and results as applicable.

**Proposed Change No. B3**

Changes have been made to the SAR to update the standard MPC-32 authorized contents, specifically non-fuel hardware and neutron sources. Other limits are revised including maximum initial enrichment. Supplement 1.III of the SAR specifies the allowable

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contents. The standard MPC-32 authorized contents also include the contents authorized for the Diablo Canyon MPC-32.0612

Reason for Change

The proposed change expands the authorized contents for MPC-32. The revised burnup credit and burnup verification approach reflects the latest USNRC guidance contained in ISG-18 Revision 3.

Justification for Change

The main chapters of the safety analysis report presents the evaluations and results.

**Proposed Change No. B4**

Changes have been made to the SAR to reflect the latest licensing drawings of previously licensed equipment. HB Impact Limiters are qualified for use with the HI-STAR HB Package. The drawings include HI-STAR 100 Overpack, MPC Enclosure Vessel, MPC-24 Fuel Basket Assembly, MPC-68/68F/68FF Fuel Basket, HI-STAR 100 Impact Limiter, and HI-STAR HB Overpack.

Reason for Change

Licensing drawings for HI-STAR 100 equipment have been revised to incorporate design and/or editorial changes. These drawing changes and justifications for the changes are described in more detail in Attachment 2 of this letter. Where necessary the SAR has been updated to include evaluation of these changes. Furthermore, the HI-STAR 100 Impact Limiter is no longer used with the HI-STAR HB Package.

Justification for Change

See Attachment 2 of this letter.

**Proposed Change No. B5**

Changes have been made to the SAR to update the composition of Thoria Rods placed in Dresden Unit 1 Thoria Rod Canisters. The composition is specified in Table 1.2.21.

Reason for Change

The update is required to ensure conformity with authorized contents.

Justification for Change

The main chapters of the safety analysis report presents the evaluations and results as applicable.

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**Proposed Change No. B6**

Changes have been made to the SAR to update the minimum enrichment of the authorized fuel assembly array/classes for MPC-HB. The minimum enrichment is specified in Table 1.I.6.

Reason for Change

The update is required to ensure conformity with authorized contents.

Justification for Change

The necessary safety evaluations have been performed in support of the change. Supplement I of the safety analysis report presents the evaluations and results as applicable.

**Proposed Change No. B7**

Changes have been made to the SAR to update the HI-STAR 100 cask and MPC lifting structural acceptance criteria for interfacing lift points (ILPs), specifically, Cask Trunnions and threaded anchor locations (TALs) on the cask cover plate and MPC lid. The new structural acceptance criteria in the SAR for ILPs are consistent with NUREG 0612 and Reg. Guide 3.61. Discussions are provided in Paragraph 1.2.1.5, Section 1.3, Table 1.3.3, Subsection 2.1.1, Paragraph 2.1.2.2, Table 2.1.24, Subsection 2.5.1, Paragraph 2.5.1.1, Subparagraph 2.5.1.2.1, Paragraph 2.5.1.3 and Subsection 2.I.5.1.

Reason for Change

HI-STAR 100 cask and MPC lifting structural acceptance criteria for interfacing lift points (ILPs) is currently over conservative (specified according to ANSI N14.5 special lifting devices for critical loads). The proposed change eliminates the need for specifying minimum material yield strength that is more stringent than the minimum required by the ASME code.

Justification for Change

NUREG 0612 provides structural acceptance criteria for interfacing lift points (ILPs) on casks. Reg. Guide 3.61 provides the structural acceptance criteria consistent with 10CFR71.45. ANSI N14.6 provides structural acceptance criteria on special lifting devices (such as lift yokes) and therefore does not apply to ILPs.

**Proposed Change No. B8**

Changes have been made to the SAR to provide guidance and/or requirements for the partial loading of MPCs. Discussions are provided in Paragraph 1.2.3.10, Paragraph 2.1.2.6, Subsection 7.1, Table 7.1.1, Paragraph 7.I.1.3.1 and Table 7.I.1.



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Reason for Change

The partial loading of an MPC may lead to an unbalanced MPC/Cask (i.e. lifting) and/or an exceedance of the performance range of the Impact Limiter design and crush material and the acceptance criteria of the package as a whole (i.e. insufficient crush depth and/or exceedance of maximum allowable G load).

Justification for Change

Same as the reason for the change.

**Proposed Change No. B9**

Changes have been made to the SAR to provide guidance and/or requirements for the partial loading of MPCs. Discussions are provided in Paragraph 1.2.3.10, Paragraph 2.1.2.6, Subsection 7.1, Table 7.1.1, Paragraph 7.I.1.3.1 and Table 7.I.1.

Reason for Change

The partial loading of an MPC may lead to an unbalanced MPC/Cask (i.e. lifting) and/or an exceedance of the performance range of the Impact Limiter design and crush material and the acceptance criteria of the package as a whole (i.e. insufficient crush depth and/or exceedance of maximum allowable G load).

Justification for Change

Same as above reason.

**Proposed Change No. B10**

Changes have been made to the SAR and the cask, MPC enclosure vessel, basket, and impact limiter licensing to optimize and clarify various design and fabrication requirements. The main changes includes clarification of structural vs non-structural welds, reduction of oversize welds on the cask (e.g. intermediate shell welds), containment brittle fracture clarification and incorporation of criteria for -40F as an option, containment code alternative for post weld heat treatment, weld inspection requirements, Basket sheathing weld size and sheathing weld minimum length, MPC enclosure vessel shell thickness. Corresponding changes are reflected in the licensing drawing package as applicable (See Part C of this SOPC for addition information). The ITS categorization of components has been revised to indicate whether the component is ITS or NITS for the purposes of the safety analysis report.

Reason for Change

The changes enhance the design and the fabricability of the equipment.

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Justification for Change

The changes enhance the design and the fabricability of the equipment while maintaining the effectiveness of the packaging.

**Proposed Change No. B11**

Limited changes have been made to the SAR format and content on par with more recently approved Holtec SARs. For example, tables from Chapter 1 on code applicability and code alternatives have been moved from Chapter 1 to Chapter 8 and tables from Chapter 2 on brittle fracture testing have been moved to Chapter 8. Chapter 8 has been re-written in a manner that makes it independent from other chapters in the SAR.

Reason for Change

The changes improve the usability of the HI-STAR 100 SAR.

Justification for Change

Requirements in the SAR that are COC conditions are more centrally located.

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**C. PROPOSED CHANGES TO THE LICENSING DRAWING PACKAGE**

Changes have been made to the licensing drawing package in Section 1.4 of the SAR. Only the latest revision of the drawing is provided in the SAR even if there was more than one revision since the last approval. This section details the changes made to the drawings from one revision to the next, and provides justifications as necessary. The complete drawing package is provided with Revision 16 of the SAR.

**Changes to Drawing 3913: HI-STAR 100 Overpack**

1. The welds on the HI-STAR 100 overpack licensing drawing have been explicitly labeled as code or non-code welds to clarify requirements. This change allows for clear manufacturing requirements, and also clarifies the structural analysis basis for these welds.
2. Many of the welds on the HI-STAR 100 overpack licensing drawings have been reduced in size. These reduced sizes allows for increased flexibility in manufacturing. The reduced sizes have been structurally evaluated and shown to be acceptable with no change to the safety conclusions for the HI-STAR 100 system.
3. Additional editorial changes to the notes and callouts on the drawing have been made. These changes are to align the drawing with Holtec's newer drawing practices and notes. All changes to the HI-STAR 100 Overpack drawing are identified with revision 11 triangles.

**Changes to Drawing 3923: MPC Enclosure Vessel**

1. The requirement for the MPC lid strength has been clarified. This requirement is based on the structural evaluation of the MPC lid under transportation requirements.
2. The weld for the holes in the vent and drain port cover plates have been revised from an all-around weld to a plug weld. This change is made for fabrication considerations, and provides the same performance as the original weld design.
3. The PT/UT requirements on the MPC lid to shell weld were clarified to align with the information in the storage FSAR. The transportation SAR also contains the same requirements.
4. An optional new vent / drain port design was added to the drawing. This new design protects the threads on the plugs from debris. The optional new design provides equal seal and shielding performance.
5. The requirements for the base metal thickness have been clarified for each MPC design. These requirements have been structurally evaluated, and provide fabrication flexibility while maintaining the safety conclusions for the HI-STAR 100 system.

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6. Optional lifting hole designs have been added to the MPC Enclosure Vessel drawing. These lifting holes have been structurally evaluated and shown to be acceptable.
7. The fuel spacer design has been revised to eliminate possible fuel handling tool and MPC interface. The revised design has been structurally evaluated and shown to be acceptable. This change allows for better operations during fuel loading.
8. The revised MPC enclosure vessel drawing also shows the MPC-68M, but as noted on the drawing, this MPC is not yet certified for transportation, and is therefore not described or evaluated in the transportation SAR.
9. Additional editorial changes to the notes and callouts on the drawing have been made. These changes are to align the drawing with Holtec's newer drawing practices and notes. Some other minor changes address deviations that have occurred during MPC manufacturing, and have been evaluated and found to be acceptable under transportation conditions.

**Changes to Drawing 3926: MPC-24 Fuel Basket**

1. The shim thickness dimension was made nominal. This dimension is not used in any licensing basis analysis, and as such, nominal is the appropriate identification.
2. The drawing has been changed to allow small holes in the fuel basket cell or flux trap panels. This provides a method for successfully eliminating localized damage. These holes have been fully evaluated by criticality and structural and found to be acceptable under both storage and transportation conditions.
3. Tolerances on the basket dimensions have been increased. This change allows for more flexibility in fabrication, as well as allowing for the transportation of some MPCs that were found to be out of tolerance. These increased dimensions have been fully evaluated and found to be acceptable for both storage and transportation conditions.
4. The drawing has been revised to allow for shims to be used to maintain the flux trap gap within the basket. This change has been fully evaluated and found to be acceptable for both storage and transportation conditions.

**Changes to Drawing 3928: MPC-68/68F/68FF Fuel Basket**

1. The basket height dimension was revised. This change eliminates the potential for fuel handling tool interference. This revised height has been evaluated and shown to be acceptable by all technical disciplines.
2. The drawing has been changed to allow small holes in the fuel basket cell panels. This provides a method for successfully eliminating localized damage. These holes have been fully evaluated by criticality and structural and found to be acceptable under both storage and transportation conditions.
3. The basket support dimensions have been modified. This change ensures that the corners engage with the support shims to apply the forces on the basket corners. This change has been structurally evaluated and shown to be acceptable.

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4. Other editorial changes are made to the drawing including clarifying the optional support block, and revising the tolerances to fractions. These changes are to align the drawing with Holtec's newer drawing practices.

**Changes to Drawing 4082: HI-STAR HB Overpack**

1. A groove weld was added to the top ring plate. This weld existed in a previous revision of the drawing, and was inadvertently removed, although the weld was always indicated on the corresponding fabrication drawings. The weld size has been structurally evaluated and shown to be acceptable.
2. Other editorial changes are made to revise the title block of the drawing to correspond to Holtec's newest drawing practices.

**New Drawings Added to HI-STAR 100 Transportation License**

- Drawing 10341 Rev 0: MPC Spacer Ring
- Drawing 10447 Rev 0: HB Impact Limiters
- Drawing 10315 Rev 0: HI-STAR HB GTCC Overpack
- Drawing 10316 Rev 0: GTCC Waste Container
- Drawing 4458 Rev 11: Diablo Canyon MPC-32 Fuel Basket Assembly
- Drawing 4459 Rev 14: Diablo Canyon Enclosure Vessel