Entergy

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Dale E. James
Acting Director,
Nuclear Safety Assurance

2CAN060702

June 13, 2007

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555

SUBJECT: Supplement to Amendment Request
To Support a Partial Re-rack and Revised Loading Pattern
in the Spent Fuel Pool
Arkansas Nuclear One, Unit 2
Docket No. 50-368
License No. NPF-6

REFERENCES: 1. Entergy letter dated March 30, 2007 to the U.S. Nuclear Regulatory Commission, "License Amendment Request to Support a Partial Re-rack and Revised Loading Patterns in the Spent Fuel Pool" (2CAN030706)

Dear Sir or Madam:

By letter (Reference 1), Entergy Operations, Inc. (Entergy) proposed a change to the Arkansas Nuclear One, Unit 2 (ANO-2) Technical Specifications (TSs) to support a planned modification to the ANO-2 Spent Fuel Pool (SFP) that will utilize Metamic™ racks in an area designated as Region 1. The change also requests a revision to the spent fuel loading pattern and other changes.

On May 11 and 13, and June 1, 2007, Entergy received requests for additional information. Entergy's responses are contained in Attachment 1.

The drawing included as Attachment 2, Holtec Drawing 4906 is considered to be proprietary in nature to Holtec. The accompanying Affidavit for withholding information is included as Attachment 5. One minor change to the drawing related to the Metamic Pocket Thickness is also included. The dimension for the Metamic™ pocket thickness is descriptive of the rack design.

The change to Holtec Drawing 4906 also affects Table 4.5.5 and Figure 4.5.6 of the Holtec International Licensing Report (Reference 1, Attachments 5 and 8). The revised information is included as Attachments 3 (non-proprietary) and 4 (Proprietary). The original affidavit supporting the request for information on the Table and Figure to be treated as proprietary remains applicable to the revised information (Attachment 9 of Reference 1).

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NRR

There are no technical changes proposed that impact the original no significant hazards consideration included in Reference 1. There are no new commitments contained in this letter.

If you have any questions or require additional information, please contact Dana Millar at 601-368-5445.

I declare under penalty of perjury that the foregoing is true and correct. Executed on June 13, 2007.

Sincerely,

Dale E. James

DEJ/DM

Attachments:
1. Response to Request for Additional Information
2. Holtec International Drawing 4906 – Proprietary
3. Revised Pages to Licensing Report for ANO Unit 2 Partial Rerack – Non-proprietary
4. Revised Pages to Licensing Report for ANO Unit 2 Partial Rerack – Proprietary
5. Affidavit for Withholding Information for Holtec International Drawing 4906

cc: Dr. Bruce S. Mallett
Regional Administrator
U. S. Nuclear Regulatory Commission
Region IV
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NRC Senior Resident Inspector
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U. S. Nuclear Regulatory Commission
Attn: Mr. Alan B. Wang
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Mr. Bernard R. Bevill
Director Division of Radiation
Control and Emergency Management
Arkansas Department of Health & Human Services
P.O. Box 1437
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Attachment 1

To

2CAN060702

Response to Request for Additional Information

Response to Request for Additional Information Related to License Amendment Request to Support a Partial Re-rack and Revised Loading Pattern in the Spent Fuel Pool
Structural Questions

Question 1:

Provide Reference 9 (Holtec International Drawing 4906, Rev. 5, "Spent Fuel Pool Racks", dated February 22, 2007.)

Response 1:

The Holtec International proprietary drawing is included in Attachment 2. The referenced drawing in the March 30, 2007 submittal was Revision 5. The drawing has since been revised to reflect a change in the dimension of the Metamic™ pocket thickness. The Metamic™ pocket thickness is descriptive of the rack design. Revision 8 of the drawing, which reflects the revised dimension, is therefore provided. No other technical changes were made to the drawings. The dimension for the Metamic™ pocket thickness is descriptive of the rack design and was used as an input in the structural analysis; however the change from 0.118 inches to 0.112 inches will have an inconsequential effect on the analysis result. The Metamic™ pocket thickness does not impact the criticality analysis.

Question 2:

Provide a detailed drawing showing the dimensions and weight of the Metamic panels, and the method of attaching these panels to the cell walls. Clarify how the weight of these panels is included in the rack weight.

Response 2:

Dimensional data for the Metamic™ panels, including the minimum B_4C loading, is provided in Holtec International Drawing 4906, sheet 6 in the Bill of Materials (BOM) and pictorially with tolerances as Item 6 on sheet 4.

The rack weights, which are found on sheet 2 of Holtec International Drawing 4906, are approximated, and include the weight of Metamic™ panels, weld material, and approximately 5% overage to account for the effects of material thickness and manufacturing tolerances. The individual weights for the Metamic™ panels are not separated from the total rack weight in the drawing. The weights are calculated by Holtec considering the part dimensions, material density, and quantities of the individual components. The weight of a Metamic™ panel is approximately 11.52 lbs. The total weight of Metamic™ in a 9 X 9 rack is approximately 3628 lbs and 3225 lbs. for a 8 X 9 rack.

As shown on Holtec Drawing 4906, the Metamic™ panels for the new Holtec racks are effectively encased between the cell walls (referred to as the "box") and added plates referred to as the "Inner" and "Boundary" Sheathing. The Metamic™ panels are 7.2" x 154" x 0.106". The Boundary sheathing is approximately 7½" x 155" x 0.075" and the inner sheathing is about 8" x 155" x 0.035". The Metamic™ panels are contained between the cell walls and the

sheathing. The boundary sheathing is welded to the cell wall plates the entire width along their top and bottom edges. The inner sheathing is welded along these edges using two ¼" long fillet welds plus four spot welds on the top, and two 1" long fillet welds and four spot welds on the bottom. The inner sheathing is then welded intermittently with spot welds spaced about 8", on both sides along the vertical length. The boundary sheathing is welded to the cell plates as a minimum with intermittent 3" bevel welds at about 36" on each vertical side. Note, all four edges of the sheathing plates are bent to form an enclosed pocket for the Metamic™ panels. Nominal clearance for the Metamic™ panels out-of-plane is a minimum of 0.118" – 0.106" = 0.012" (or less than 1/64"), hence any "rattling" of the Metamic™ panels is minimal. Because the modulus of elasticity for the Metamic™ panels is about 2/5 that for the cell wall and sheathing, the relative stiffness out-of-plane of the Metamic™ panels is about 20% of the stiffness for the cell wall and sheathing. Hence structural displacements of the cell wall/ Metamic™ panel/ sheathing assemblies are controlled by the cell wall and sheathing. Since the cell walls and sheathing met acceptance criteria and do not yield, the Metamic™ panels are therefore protected from damage. For modeling, the Metamic™ panels were considered non-structural and not modeled, with the mass of the Metamic™ panels distributed along the length of the cell walls as appropriate.

Question 3:

Provide analytical or experimental benchmark verification for the non-linear analysis method using gap elements in the computer program SOLVIA, or provide a reference where the staff reviewed and approved this program.

Response 3:

SOLVIA was used on Arkansas Nuclear One, Unit 1 (ANO-1) Spent Fuel Pool (SFP) structural analysis. Reference: "Safety Evaluation by the Office of Nuclear Reactor Regulation Related to Amendment No. 228 to Renewed Facility Operating License No. DPR-51, Entergy Operations, Inc., Arkansas Nuclear One, Unit No. 1, Docket No. 50-313," issued January 26, 2007.

Question 4:

Provide a detailed description of the method used for calculating the mass and stiffness of the gap elements.

Response 4:

The purpose of the gap elements is to account for gaps and clearances between the fuel assemblies and in the inside walls of the cells, clearances between the racks, and clearances between the racks and pool wall. When the gaps close, the element stiffness becomes effective, and resists displacement and impact effects. The stiffness for the gap elements was in general obtained by modeling the local parts of affected components and structures. Stiffness coefficients were obtained from these local models by loading with unit forces or displacements statically at the potential point of impact. For seismic loading, the velocities

are very low, and strain rates from impact are very low, and hence, the stiffnesses from this methodology are considered appropriate. No mass was applied to the gap elements themselves. Mass was either lumped at appropriate points of the structural members or included by use of mass matrix elements.

Question 5:

In Section 7.3.2, "Compression Allowable Stress - DBE," states that the allowable axial compression loads applicable to the overall rack structure is limited to 2/3 of the critical buckling load, where this buckling load is defined as the Euler buckling load. The Euler equation is applicable to long columns and is valid as long as the calculated critical buckling stress is less than or equal to 0.5Sy.

A. Provide the critical buckling stress for each rack module.

B. Clarify whether the racks were checked for overall buckling, or provide justification for not doing so.

Response 5:

Response to Subpart A

The specified acceptance criteria basis (ASME III, Subsection NF--for linear supports) does not address plate/shell type structures. The racks are mainly plate and shell structures. For this reason, buckling criteria for plate and shell elements from Chajes was included for consideration of local panel buckling of the cell walls. The same criterion was considered for both OBE and SSE loadings without modification.

The pedestals could be considered as structural columns (to which Euler buckling would apply if they were long enough) however, because they are so short relative to slenderness, they are not a buckling concern. It is agreed that the buckling criteria referenced applies to "long" columns subject to elastic buckling. It was included from the reference criteria basis but not actually used for the rack analysis.

Response to Subpart B

The racks as constructed and as loaded do not exhibit an overall buckling mode. As noted above, they consist mostly of plate and shell type elements. Local buckling of the cell wall panels could be possible, however, from the magnitude of the stress results localized buckling was also not indicated, and hence was not explicitly checked.

**Response to Request for Additional Information Related to
License Amendment Request to Support a Partial Re-rack and Revised Loading Pattern
in the Spent Fuel Pool
BOP Questions**

Question 1

Section 6.0 of the Analysis of Proposed Technical Specification Change states, "The designated special lifting device (rigging) is designed to meet the criteria of ANSI N14.6-1993 and NUREG-0612-1980 in order to be operated without redundant links between the L3 crane and the lifted rack."

Please provide clarification as to the type/design of rigging and how it meets the criteria of ANSI N14.6 and NUREG-0612 for use with a single-failure-proof handling system.

Response 1

The lifting devices employed to remove and install spent fuel racks at Arkansas Nuclear One, Unit 2 are designed as load-bearing members with increased stress design factors for handling critical loads. The lifting devices consist of a tubular, rectangular frame with four lift poles extending below. The crane lifts the frame using attached angle plates and the poles engage and lift the rack. When normally attached, the lifting devices and connection points are distributed about the center of the rack to maintain a balanced vertical load when lifted.

The lifting devices are designed to be operated without redundant links between the crane above and the lifted rack below. For all components in the load path, the primary tensile or shear stress at a given section was calculated to be less than the minimum of either one fifth (1/5) the material ultimate strength or one third (1/3) the material yield strength when the applied load is equal to the lifted load including any dynamic amplification. Additionally, in accordance with ANSI N14.6, an added reduction in allowable strength was applied to the lifting devices since they do not have redundant load paths. The dynamic load factor is conservatively assumed to be 15% of dead weight to account for inertia effects, which is appropriate for the low speed lifts. A factor of two (2) was used for the reduction in allowable strengths. All stress safety factors for the lift rig components in the load path, defined as the ratio of allowable stress to the actual stress, must be larger than one. The summarized structural analysis results for the lifting devices demonstrate the stress safety factors for all members in the load path are greater than one (1.0).

Prior to load testing, all welds will be 100% Quality Control (QC) inspected. Load testing is 300% of rated load which is held for 10 minutes. Post testing consists of QC visually inspecting the lifting devices for signs of permanent deformation and PT of all applicable load bearing welds.

**Response to Request for Additional Information Related to
License Amendment Request to Support a Partial Re-rack and Revised Loading Pattern
in the Spent Fuel Pool
Reactor Systems Branch Questions**

Question 1

Define NGF explicitly. Is NGF limited solely to Westinghouse Next Generation Fuel as described in Westinghouse topical report #WCAP-16500, or does NGF include any generic fuel developed for next generation reactors?

Response 1

Westinghouse NGF as described in WCAP-16500 will be used. Subtle changes to the fuel design from those defined in the WCAP may be made as needed.

Attachment 3

To

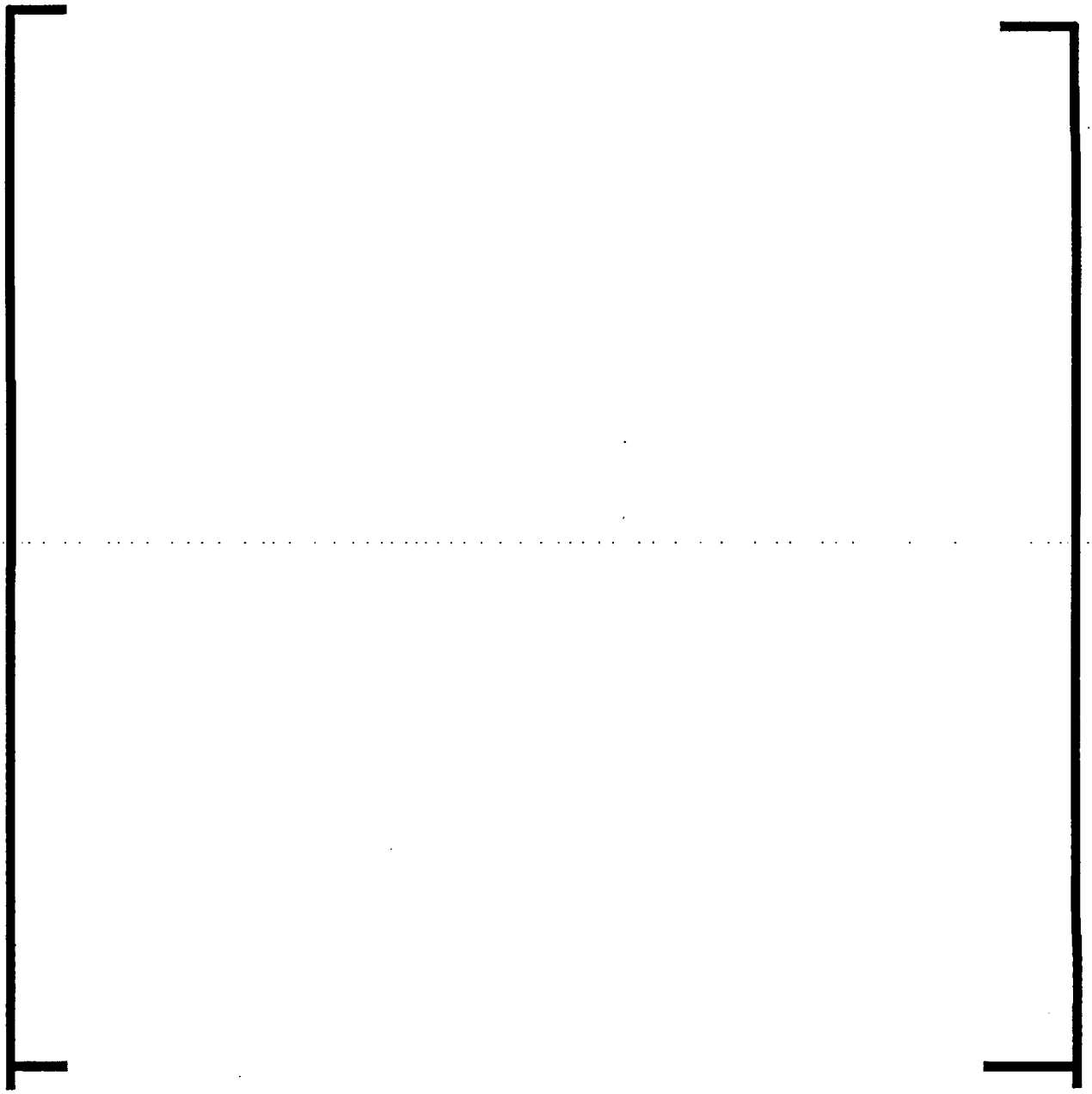
2CAN060702

Revised Pages to Licensing Report for ANO Unit 2 Partial Rerack
Non-proprietary

Table 4.5.5: Fuel Rack Specifications – Region 1 Racks

Parameter	Value
Cell ID, Inches	8.58 [ ]^{a,b}
Box Wall Thickness, Inches	0.075 [ ]^{a,b}
Inner Sheathing Thickness[8], Inches	0.035 [ ]^{a,b}
Cell Pitch, Inches	9.8 [ ]^{a,b}
Water Gap[9], Inches	0.76 [ ]^{a,b}
Metamic Pocket Thickness[9a], Inches	0.112 (min)
Metamic Width[10], Inches	7.2 [ ]^{a,b}
Metamic Thickness, Inches	0.106 [ ]^{a,b}
Metamic B_4C Weight Percent	30.5 [ ]^{a,b}

[8] The sheathing thickness on the outside surfaces of the rack is 0.075 [ ]^{a,b} inches. The sheathing for the Region 1 racks are conservatively modeled as the thinner inner sheathing thickness of [ ]^{a,b}.
[9] The Water gap tolerance is based on the tolerances of the cell pitch and cell ID.
[9a] The pocket is modeled as 0.118 inches instead of 0.112 inches. This has a negligible effect on the results.
[10] The Metamic width tolerance was conservatively modeled as [ ]^{a,b} inches as shown in Section 4.7.1.3.



a, b

FIGURE 4.5.6: SKETCH OF REGION 1 RACKS, DETAILING IMPORTANT DIMENSIONS AND TOLERANCES
(NOT TO SCALE, all dimensions in inches)

[14a] The pocket is modeled as 0.118 inches instead of 0.112 inches. This has a negligible effect on the results.

Attachment 5

To

2CAN060702

Affidavit for Withholding Information
for
Holtec International Drawing 4906

HOLTEC INTERNATIONAL

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U.S. Nuclear Regulatory Commission
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AFFIDAVIT PURSUANT TO 10 CFR 2.390

I, Debabrata Mitra-Majumdar, being duly sworn, depose and state as follows:

(1) I am the Holtec International Project Manager for the Arkansas Nuclear One Unit 2 Partial Rerack Project and have reviewed the information described in paragraph (2) which is sought to be withheld, and am authorized to apply for its withholding.

(2) The information sought to be withheld is Holtec Drawing 4906 containing Holtec Proprietary information.

(3) In making this application for withholding of proprietary information of which it is the owner, Holtec International relies upon the exemption from disclosure set forth in the Freedom of Information Act ("FOIA"), 5 USC Sec. 552(b)(4) and the Trade Secrets Act, 18 USC Sec. 1905, and NRC regulations 10CFR Part 9.17(a)(4), 2.390(a)(4), and 2.390(b)(1) for "trade secrets and commercial or financial information obtained from a person and privileged or confidential" (Exemption 4). The material for which exemption from disclosure is here sought is all "confidential commercial information", and some portions also qualify under the narrower definition of "trade secret", within the meanings assigned to those terms for purposes of FOIA Exemption 4 in, respectively, Critical Mass Energy Project v. Nuclear Regulatory Commission, 975F2d871 (DC Cir. 1992), and Public Citizen Health Research Group v. FDA, 704F2d1280 (DC Cir. 1983).

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(4) Some examples of categories of information which fit into the definition of proprietary information are:

a. Information that discloses a process, method, or apparatus, including supporting data and analyses, where prevention of its use by Holtec's competitors without license from Holtec International constitutes a competitive economic advantage over other companies;

b. Information which, if used by a competitor, would reduce his expenditure of resources or improve his competitive position in the design, manufacture, shipment, installation, assurance of quality, or licensing of a similar product.

c. Information which reveals cost or price information, production, capacities, budget levels, or commercial strategies of Holtec International, its customers, or its suppliers;

d. Information which reveals aspects of past, present, or future Holtec International customer-funded development plans and programs of potential commercial value to Holtec International;

e. Information which discloses patentable subject matter for which it may be desirable to obtain patent protection.

The information sought to be withheld is considered to be proprietary for the reasons set forth in paragraphs 4.a and 4.b, above.

(5) The information sought to be withheld is being submitted to the NRC in confidence. The information (including that compiled from many sources) is of

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a sort customarily held in confidence by Holtec International, and is in fact so held. The information sought to be withheld has, to the best of my knowledge and belief, consistently been held in confidence by Holtec International. No public disclosure has been made, and it is not available in public sources. All disclosures to third parties, including any required transmittals to the NRC, have been made, or must be made, pursuant to regulatory provisions or proprietary agreements which provide for maintenance of the information in confidence. Its initial designation as proprietary information, and the subsequent steps taken to prevent its unauthorized disclosure, are as set forth in paragraphs (6) and (7) following.

(6) Initial approval of proprietary treatment of a document is made by the manager of the originating component, the person most likely to be acquainted with the value and sensitivity of the information in relation to industry knowledge. Access to such documents within Holtec International is limited on a "need to know" basis.

(7) The procedure for approval of external release of such a document typically requires review by the staff manager, project manager, principal scientist or other equivalent authority, by the manager of the cognizant marketing function (or his designee), and by the Legal Operation, for technical content, competitive effect, and determination of the accuracy of the proprietary designation. Disclosures outside Holtec International are limited to regulatory bodies, customers, and potential customers, and their agents, suppliers, and licensees, and others with a legitimate need for the information, and then only in accordance with appropriate regulatory provisions or proprietary agreements.

(8) The information classified as proprietary was developed and compiled by Holtec International at a significant cost to Holtec International. This information is classified as proprietary because it contains detailed descriptions of analytical

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approaches and methodologies not available elsewhere. This information would provide other parties, including competitors, with information from Holtec International's technical database and the results of evaluations performed by Holtec International. A substantial effort has been expended by Holtec International to develop this information. Release of this information would improve a competitor's position because it would enable Holtec's competitor to copy our technology and offer it for sale in competition with our company, causing us financial injury.

(9) Public disclosure of the information sought to be withheld is likely to cause substantial harm to Holtec International's competitive position and foreclose or reduce the availability of profit-making opportunities. The information is part of Holtec International's comprehensive spent fuel storage technology base, and its commercial value extends beyond the original development cost. The value of the technology base goes beyond the extensive physical database and analytical methodology, and includes development of the expertise to determine and apply the appropriate evaluation process.

The research, development, engineering, and analytical costs comprise a substantial investment of time and money by Holtec International.

The precise value of the expertise to devise an evaluation process and apply the correct analytical methodology is difficult to quantify, but it clearly is substantial.

Holtec International's competitive advantage will be lost if its competitors are able to use the results of the Holtec International experience to normalize or verify their own process or if they are able to claim an equivalent understanding by demonstrating that they can arrive at the same or similar conclusions.

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The value of this information to Holtec International would be lost if the information were disclosed to the public. Making such information available to competitors without their having been required to undertake a similar expenditure of resources would unfairly provide competitors with a windfall, and deprive Holtec International of the opportunity to exercise its competitive advantage to seek an adequate return on its large investment in developing these very valuable analytical tools.

STATE OF NEW JERSEY)
) ss:
COUNTY OF BURLINGTON)

Dr. Debabrata Mitra-Majumdar, being duly sworn, deposes and says:

That he has read the foregoing affidavit and the matters stated therein are true and correct to the best of his knowledge, information, and belief.

Executed at Marlton, New Jersey, this 15th day of May, 2007.

Debabrata Mitra-Majumdar
Holtec International

Subscribed and sworn before me this 15th day of May, 2007.

Maria C. Massi

MARIA C. MASSI
NOTARY PUBLIC OF NEW JERSEY
My Commission Expires April 25, 2010