

ORDER FOR SUPPLIES OR SERVICES

PAGE OF PAGES
1 3

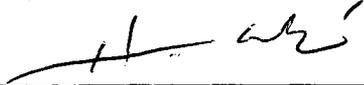
IMPORTANT: Mark all packages and papers with contract and/or order numbers.

BPA NO.

1. DATE OF ORDER 12-22-2008		2. CONTRACT NO. (if any) NRC-04-06-068		6. SHIP TO:	
3. ORDER NO. NRC TASK ORDER 006		4. REQUISITION/REFERENCE NO. 04-06-068T006 RES-C09-626 (FFS #)		a. NAME OF CONSIGNEE U.S. Nuclear Regulatory Commission	
5. ISSUING OFFICE (Address correspondence to) U.S. Nuclear Regulatory Commission Div. of Contracts Attn: H. (Eddie) Colon, Jr., 301-492-3620 Mail Stop TWB-01-10M Washington, DC 20555		7. TO:		b. STREET ADDRESS Attn: Shawn Marshall, 301-251-723 Mail Stop: C3-A07M 11545 Rockville Pike	
a. NAME OF CONTRACTOR INFORMATION SYSTEMS LABORATORIES ISL		b. COMPANY NAME ATTN: DR. JAMES F. MEYER		c. CITY Rockville	
c. STREET ADDRESS 11140 ROCKVILLE PIKE STE 500		d. CITY ROCKVILLE		e. STATE MD	
8. ACCOUNTING AND APPROPRIATION DATA 960-15-111-205 N6254 252A 31X0200.960 OBLIGATE: \$300,000.00 RES-C09-626 (FFS Commitment #) Contractors DUNS: 150135445		e. STATE MD		f. ZIP CODE 208523106	
11. BUSINESS CLASSIFICATION (Check appropriate box(es)) <input type="checkbox"/> a. SMALL <input checked="" type="checkbox"/> b. OTHER THAN SMALL <input type="checkbox"/> c. DISADVANTAGED <input type="checkbox"/> g. SERVICE-DISABLED VETERAN-OWNED <input type="checkbox"/> d. WOMEN-OWNED <input type="checkbox"/> e. HUBZone <input type="checkbox"/> f. EMERGING SMALLBUSINESS		10. REQUISITIONING OFFICE RES		12. F.O.B. POINT Destination	
13. PLACE OF a. INSPECTION b. ACCEPTANCE		14. GOVERNMENT B/L NO.		15. DELIVER TO F.O.B. POINT ON OR BEFORE (Date) N/A	
16. DISCOUNT TERMS Net 30		17. SCHEDULE (See reverse for Rejections) See CONTINUATION Page			

ITEM NO. (a)	SUPPLIES OR SERVICES (b)	QUANTITY ORDERED (c)	UNIT (d)	UNIT PRICE (e)	AMOUNT (f)	QUANTITY ACCEPTED (g)
	<p>TASK ORDER NO. 006 ENTITLED "DEVELOPMENT OF PLANT INPUT MODELS FOR TRACE CODE"</p> <p>Reference is made to your technical and cost proposals dated January 14 & 15, 2009 in response to this effort. This confirms the email authorization provided to ISL on 12/19/2008 to begin work on the subject task order, effective 12/22/2008, with an initial temporary ceiling of \$100,000.00.</p> <p>In accordance with Section G.4 entitled "Task Order Procedures" of the subject contract, this order definitizes Task Order No. 006, which shall be performed in accordance with the enclosed Statement of Work.</p> <p>Task Order No. 006 shall be effective December 22, 2008 <u>August 23, 2009</u> with a total cost ceiling of \$649,739.00. The amount of \$603,376.00 represents the reimbursable costs, and the amount of \$43,363.00 represents the fixed fee.</p>					

18. SHIPPING POINT		19. GROSS SHIPPING WEIGHT		20. INVOICE NO.	
21. MAIL INVOICE TO:					
a. NAME Department of Interior National Business Center		17(h) TOTAL (Cont. pages)			
b. STREET ADDRESS (or P.O. Box) Attn: Fiscal Services Branch - D2270 7301 W. Mansfield Avenue					
c. CITY Denver	d. STATE CO				

22. UNITED STATES OF AMERICA BY (Signature) 		23. NAME (Typed) Heriberto Colon, Jr. Contracting Officer TITLE: CONTRACTING/ORDERING OFFICER	
---	--	--	--

AUTHORIZED FOR LOCAL REPRODUCTION
PREVIOUS EDITION NOT USABLE

OPTIONAL FORM 347 (REV. 4/2006)
PRESCRIBED BY GSA/FAR 48 CFR 53.213(f)

TEMPLATE - ADM001

SUNSI REVIEW COMPLETE

MAR 05 2009

ADM002

**ORDER FOR SUPPLIES OR SERVICES
SCHEDULE - CONTINUATION**

PAGE NO.
2

IMPORTANT: Mark all packages and papers with contract end/or order numbers.

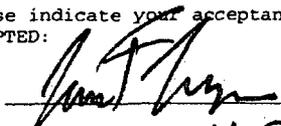
DATE OF ORDER 12-22-2008	CONTRACT NO. NRC-04-06-068	ORDER NO. NRC TASK ORDER 006
-----------------------------	-------------------------------	---------------------------------

ITEM NO. (A)	SUPPLIES OR SERVICES (B)	QUANTITY ORDERED (C)	UNIT (D)	UNIT PRICE (E)	AMOUNT (F)	QUANTITY ACCEPTED (G)

The issuance of this task order does not amend any other terms or conditions of the subject contract.

Please indicate your acceptance of this Task Order.

ACCEPTED:

Name 
 Title Senior V.P.
 Date 3/3/09

TOTAL CARRIED FORWARD TO 1ST PAGE (ITEM 17(H))

NRC TASK ORDER 006

**A.1 CONSIDERATION AND OBLIGATION--COST PLUS FIXED FEE (JUN 1988) ALTERNATE I
(JUN 1991)**

(a) The total estimated cost to the Government for full performance of this TASK ORDER is \$649,739.00, of which the sum of \$603,376.00 represents the estimated reimbursable costs, and of which \$46,363.00 represents the fixed fee.

(b) There shall be no adjustment in the amount of the Contractor's fixed fee by reason of differences between any estimate of cost for performance of the work under this contract and the actual cost for performance of that work.

(c) The amount currently obligated by the Government with respect to this TASK ORDER is \$300,000.00, of which the sum of \$278,593.10 represents the estimated reimbursable costs, and of which \$21,406.90 represents the fixed fee.

(d) It is estimated that the amount currently allotted will cover performance through April 21, 2009.

OPTIONAL TASKS 3A, 4A, 7A, AND 8A*

(e) The total estimated cost to the Government for full performance the OPTIONAL TASK under this TASK ORDER is \$65,079.00, of which the sum of \$60,259.00 represents the estimated reimbursable costs, and of which \$4,821.00 represents the fixed fee.

**The Contracting Officer may unilaterally exercise the OPTIONAL TASKS via written modification to this TASK ORDER.*

**STATEMENT OF WORK FOR
TASK ORDER NO. 006 UNDER CONTRACT NO. NRC-04-06-068**

TITLE: DEVELOPMENT OF PLANT INPUT MODELS FOR TRACE CODE

BACKGROUND

The TRACE code is being developed by the NRC to perform large and small break loss of coolant accident (LOCA) and system transient analyses for a wide range of nuclear plants. This code will be used as an audit tool for analyses submitted by NRC licensees. Plant safety analyses in support of licensing require a broad range of accident and transient scenarios to be analyzed to help understand the limiting conditions for safe operation of the plant.

RES continues the development of high priority plant input models in support of extended power uprates (EPU). Task Order 6 (this task order) resumes and continues the development of plant decks started with Task Orders 4 and 5 and starts the development of new EPU models for five plants with EPU submittals expected during fiscal years 2009 and 2010.

OBJECTIVE

This task order resumes the development of EPU plant TRACE models started with Task Order 4 for Monticello and continues the development of EPU plant models started with Task Order 5 for Point Beach 1&2, St. Lucie 1&2 and Crystal River 3. Furthermore, this task order initiates development of new EPU plant models for five additional PWRs: Turkey Point 3&4, Prairie Island 1&2, Calvert Cliffs 1&2, Callaway and Fort Calhoun.

SCOPE OF WORK

Due to CR limits on new spending, Project Manager written approval shall be required to proceed with Tasks 9 and 10 below.

Task 1: **Characterization of Input Data Requirements and Differences for New Plant Models**

As specified above the five additional PWRs are Turkey Point 3&4 (Westinghouse, 3-loop, 15x15), Prairie Island 1&2 (Westinghouse, 2-loop, 14x14), Calvert Cliffs 1&2 (C-E, 2-loop, 14x14), Callaway (Westinghouse, 4-loop, 17x17) and Fort Calhoun (C-E, 2-loop, 14x14). Although with the exception of Calvert Cliffs the staff does not currently have plant specific decks for these units, with the exception of Fort Calhoun, up-to-date TRACE LOCA decks are available for sister plants H.B. Robinson, Point Beach and Seabrook. One of the objectives of Task 1 is to confirm that these sister plans are sufficiently close in design to Turkey Point, Prairie Island and Callaway to be used as look-alikes operating at currently licensed thermal power. The staff is aware that the licensee of Fort Calhoun has developed RELAP5 input decks for this unique plant. The staff will provide these inputs to the contractor upon receipt from the licensee.

A review of current plant modeling and documentation is required for Prairie Island 1&2, Callaway and Fort Calhoun. The contractor shall review available plant specific documents, e.g., plant dockets, updated final safety analysis reports (UFSARs), NUREG CR-5640 [7], etc. to accomplish this task. The review shall focus on systems and components that are most important for the modeling of large break LOCA (LBLOCA) and small break LOCA (SBLOCA). For the subject PWR units the review shall focus on reactor power, fuel design, primary loop flowrates, temperatures and pressures, primary loop piping, accumulator, pressurizer, reactor coolant pump, emergency core cooling system (ECCS), residual heat removal (RHR), power operated relief valve / safety relief valves (PORV / SRV), main steam isolation valves (MSIVs), containment model, setpoints and operator action guidelines. The review shall also address key parameters of PWR models for LOCA simulation as described in reference [1] entitled "PWR Steady-State Parameter Checklist". The contractor shall summarize the review findings in a letter report.

The contractor shall characterize and rank the differences between Prairie Island and Callaway and their sister units (Point Beach and Seabrook) in a letter report in terms of impact on LOCA analyses. For Fort Calhoun the contractor shall determine adequacy of the licensee's RELAP5 models for LBLOCA and SBLOCA analyses and any additional plant specific data to support the conversion of the RELAP5 decks to TRACE.

The contractor shall identify additional data requirements necessary to prepare TRACE input models for future staff analyses of LBLOCA (excluding Prairie Island 1&2) and SBLOCA. If the contractor anticipates the need for additional information, this information shall be identified and requested during this initial review. The Project Manager will specify an approach for handling the missing information for subsequent input deck preparation.

Task 2: Resume the Development of LOCA Models for Monticello

Task 2.1: Prepare Input Models

The contractor shall continue the development of the Monticello EPU LBLOCA and SBLOCA decks started with Task Order 4. The contractor shall implement the missing plant data identified with Task Order 4 into the model and replace the TRACE PIPE components used for modeling the containment with the TRACE CONTAN component and run the updated steady-state model. Model updates that document the CONTAN component shall be added to the existing calculation notebook as well as model enhancement implemented by the NRC. Project Manager written approval shall be required for plant specific modifications.

Estimated completion date: 3 weeks after task order award

Task 2.2: Run Demonstration Calculations, Prepare Plant Reports and Resolve Open Items

The contractor shall run representative LOCA EPU analyses of the plant decks developed above. The work shall closely follow the development of the plant decks. The demonstration calculations for each plant model shall commence as soon as the model of the plant is completed.

. If in the course of developing plant models the contractor identifies deficiencies in TRACE user guidance, the contractor shall document these and recommend changes. Input model development shall also adhere to the guidance provided in the User's Manual for the TRACE 5.0 code.

The cases associated with these TRACE code runs shall use AVScript input files and code input files prepared for each plant. Where applicable, results for each plant shall be compared to previous analyses (results of LOCA analyses published in UFSARs, LOCA LTRs, etc.). All calculations shall be documented in a TRACE Model User Description and Analysis Report written in Framemaker which shall follow the TRACE User Description and Analysis Report Outline document [4]. All figures present in the Framemaker assessment report documents shall exist as separate files on disk and linked to the files using the Aimport by reference feature[®] of Framemaker. All plant reports shall also be made available in Adobe PDF and Rich Text Format (RTF). Exceptions to this requirement shall be approved by the Project Manager.

All models shall run on Microsoft Windows platforms, with SNAP and TRACE executables provided by the staff, within acceptable CPU times and without user intervention. The contractor shall attempt to complete all runs within acceptable CPU times and without user intervention. Run time goals are as follows:

- For the steady state, real-time execution is preferred (CPU time = modeling time). No steady state run shall take longer than three times the modeling time to converge.
- For LBLOCAs the CPU time shall not exceed ten times the modeling time for BWRs and fifty times the modeling time for PWRs. In addition, the code should be able to sustain a timestep range of 0.005 - 0.02 sec during blowdown, 0.0025 - 0.005 sec during refill and early reflood and 0.01 - 0.02 sec during middle and late reflood (after accumulators empty for PWRs).
- For SBLOCAs the CPU time shall not exceed five times the modeling time for BWRs and ten times the modeling time for PWRs. In addition, the code should be able to sustain a timestep range of 0.025 - 0.1 seconds through the entire event.

The above criteria assume that all TRACE modeling guidelines are followed. Exceptions to this requirement shall be approved by the NRC Project Manager.

This task shall include time set aside to respond to the staff's questions and to resolve issues raised during preliminary and final acceptance reviews.

The contractor shall deliver the TRACE code version with CONTAN fixes that is used for the preliminary analysis and also provide the code version used for the final analyses.

Estimated completion date: 2 months after task order award

Task 3: Continue the Development of the SBLOCA Model for Point Beach

Task 3.1: Prepare Input Models

The contractor shall continue the development of the TRACE SBLOCA models for Point Beach 1&2 started with Task Order 5. The model shall be specific to the limiting plant (unit 1 or unit 2). ISL shall provide justification for selection of the limiting unit and shall proceed only after receiving the approval of the NRC Project Officer. The contractor shall fine-tune the EPU power level of the Point Beach SBLOCA model using plant specific EPU power levels specified by the Project Manager. The contractor shall then develop plant specific EPU LOCA models by incorporating the plant specific data identified with Tasks 1 and 3 of Task Order 5 into the EPU "look-alike" models. Project Manager written approval shall be required for plant specific modifications.

The contractor shall prepare well-structured and formatted steady state and LOCA input files for SNAP and TRACE and shall develop preliminary as well as final input decks for each plant to facilitate timely review and testing by the NRC staff. All decks shall be robust and run to completion without user intervention.

In order to maintain control over the development of steady state plant models, the TRACE LOCA input files shall be restarts from steady state. The SNAP LOCA files shall be created by importing the TRACE LOCA restart decks into the steady state SNAP model. All SNAP and TRACE input files, AVScript files and other extraneous scripts or files necessary to reproduce the work shall be archived in the NRC data bank.

Task 3.3: Run Demonstration Calculations, Prepare Plant Reports and Resolve Open Items

The contractor shall run demonstration calculations, prepare plant reports and resolve open items as specified in Task 2.2.

Estimated completion date: 3 months after task order award

OPTION 3A: Add Conservative Model Features

The existing Point Beach SBLOCA model does not predict a heatup. Based on the experience gained during earlier work on the Point Beach TRACE model, merely initializing the model at conservative EPU conditions does not incorporate the level of conservatism that is in the licensing calculation. To mimic the licensee calculations conservative features will need to be added to the model, including a thermal-hydraulic hot channel and a means of delaying loop seal clearing, e.g. valves that close and open at specified times. In this optional task, sufficient conservative features will be added to predict a fuel clad heatup similar to the licensing calculation. The model features will be incorporated using SNAP numerics in such a way that they can be readily turned on or off individually. A new steady-state run may be required depending on the conservative feature characteristics. The level of effort stated below is in addition to that of Task 3 above.

Estimated completion date: 2 months after task order award, if exercised

Task 4: Continue the Development of LOCA Models for Crystal River 3

Task 4.1: Prepare Input Models

The contractor shall continue the development of the TRACE LOCA models for Crystal River 3 started with Task Order 5. The contractor shall update the power level of the "look-alike" TRACE LOCA models for Crystal River 3 using plant specific EPU power levels specified by the Project Manager. The contractor shall then develop plant specific EPU LOCA models by incorporating the plant specific data identified with Tasks 1 and 3 of Task Order 5 into the EPU "look-alike" models. Project Manager written approval shall be required for plant specific modifications.

The contractor shall prepare well-structured and formatted steady state and LOCA input files for SNAP and TRACE and shall develop preliminary as well as final input decks for each plant to facilitate timely review and testing by the NRC staff. All decks shall be robust and run to completion without user intervention.

In order to maintain control over the development of steady state plant models, the TRACE LOCA input files shall be restarts from steady state. The SNAP LOCA files shall be created by importing the TRACE LOCA restart decks into the steady state SNAP model. All SNAP and TRACE input files, AVScript files, and other extraneous scripts or files necessary to reproduce the work shall be archived in the NRC data bank.

Task 4.2: Run Demonstration Calculations, Prepare Plant Reports and Resolve Open Items

The contractor shall run demonstration calculations, prepare plant reports and resolve open items as specified in Task 2.2.

Estimated completion date: 4 months after task order award

OPTION 4A: Add Conservative Model Features

The existing Crystal River-3 SBLOCA model does not predict a heatup. Based on the experience gained during earlier work on this model, merely initializing the model at conservative EPU conditions may not incorporate the level of conservatism that is in the licensing calculations. To predict a heatup, it was necessary to specify unrealistically large flow resistance and/or opening pressure for the vent valves. To mimic the licensee calculations conservative features will need to be added to the model, including a thermal-hydraulic hot channel. In this optional task, sufficient conservative features will be added to predict a fuel clad heatup similar to the licensing calculation. The model features will be incorporated using SNAP numerics in such a way that they can be readily turned on or off individually. A new steady-state run may be required depending on the conservative feature characteristics. The level of effort stated below is in addition to that of Task 4 above.

Estimated completion date: 4 months after task order award, if exercised

Task 5: Continue the Development of LOCA Models for St. Lucie 1&2

Task 5.1: Prepare Input Models

The contractor shall continue the development of the TRACE LOCA models for St. Lucie 1&2 started with Task Order 5. The contractor shall update the power level of the "look-alike" TRACE LOCA models for Lucie 1&2, using plant specific EPU power levels specified by the Project Manager. The contractor shall then develop plant specific EPU LOCA models by incorporating the plant specific data identified with Tasks 1 and 3 of Task Order 5 into the EPU "look-alike" models. Project Manager written approval shall be required for plant specific modifications.

The contractor shall prepare well-structured and formatted steady state and LOCA input files for SNAP and TRACE and shall develop preliminary as well as final input decks for each plant to facilitate timely review and testing by the NRC staff. All decks shall be robust and run to completion without user intervention.

In order to maintain control over the development of steady state plant models, the TRACE LOCA input files shall be restarts from steady state. The SNAP LOCA files shall be created by importing the TRACE LOCA restart decks into the steady

state SNAP model. All SNAP and TRACE input files, AVScript files, and other extraneous scripts or files necessary to reproduce the work shall be archived in the NRC data bank.

Task 5.2: Run Demonstration Calculations, Prepare Plant Reports and Resolve Open Items

The contractor shall run demonstration calculations, prepare plant reports and resolve open items as specified in Task 2.2.

Estimated completion date: 5 months after task order award

Task 6: Develop LOCA Models for Turkey Point 3&4

Task 6.1: Prepare Input Models

The contractor shall develop "look-alike" EPU LOCA models for Turkey Point 3&4 based on the TRACE LOCA models developed for sister plant H.B. Robinson. Upon receiving Project Manager written approval, these "look-alike" EPU decks shall be made plant specific by implementing the plant specific changes recommended in Task 1.

The contractor shall prepare well-structured and formatted steady state and LOCA input files for SNAP and TRACE and shall develop preliminary as well as final input decks for each plant to facilitate timely review and testing by the NRC staff. All decks shall be robust and run to completion without user intervention.

In order to maintain control over the development of steady state plant models, the TRACE LOCA input files shall be restarts from steady state. The SNAP LOCA files shall be created by importing the TRACE LOCA restart decks into the steady state SNAP model. All SNAP and TRACE input files, AVScript files, and other extraneous scripts or files necessary to reproduce the work shall be archived in the NRC data bank.

Task 6.2: Run Demonstration Calculations, Prepare Plant Reports and Resolve Open Items

The contractor shall run demonstration calculations, prepare plant reports and resolve open items as specified in Task 2.2.

Estimated completion date: 4 months after task order award

Task 7: Develop SBLOCA Model for Prairie Island 1&2

Task 7.1: Prepare Input Models

The contractor shall develop "look-alike" EPU SBLOCA models for Prairie Island 1&2 based on the TRACE SBLOCA models developed for sister plant Point

Beach (to be completed with this Task Order). Upon receiving Project Manager written approval, these "look-alike" EPU decks shall be made plant specific by implementing the plant specific changes recommended in Task 1.

The contractor shall prepare well-structured and formatted steady state and LOCA input files for SNAP and TRACE and shall develop preliminary as well as final input decks for each plant to facilitate timely review and testing by the NRC staff. All decks shall be robust and run to completion without user intervention.

In order to maintain control over the development of steady state plant models, the TRACE LOCA input files shall be restarts from steady state. The SNAP LOCA files shall be created by importing the TRACE LOCA restart decks into the steady state SNAP model. All SNAP and TRACE input files, AVScript files, and other extraneous scripts or files necessary to reproduce the work shall be archived in the NRC data bank.

Task 7.2: Run Demonstration Calculations, Prepare Plant Reports and Resolve Open Items

The contractor shall run demonstration calculations, prepare plant reports and resolve open items as specified in Task 2.2.

Estimated completion date: 5 months after task order award

OPTION 7A: Add Conservative Model Features (assumes Optional Task 3A is completed)

Based on the experience gained during earlier work on the Point Beach TRACE model, merely initializing the Prairie Island model at conservative EPU conditions does not incorporate the level of conservatism that is in the licensing calculation. To mimic the licensee calculations conservative features will need to be added to the model, including a thermal-hydraulic hot channel and a means of delaying loop seal clearing. In this optional task, sufficient conservative features will be added to predict a fuel clad heatup similar to the licensing calculation. The model features will be incorporated using SNAP numerics in such a way that they can be readily turned on or off individually. A new steady-state run may be required depending on the conservative feature characteristics. The level of effort stated below is in addition to that of Task 7 above, and assumes that Optional Task 3A has been completed.

Estimated completion date: 6 months after task order award, if exercised

Task 8: Continue the Development of LOCA Models for Calvert Cliffs 1&2

Task 8.1: Prepare Input Models

The contractor shall continue the development of the TRACE LOCA models for Calvert Cliffs 1&2. The contractor shall develop look-alike EPU LOCA models by increasing the power level of the current, rated power, TRACE LOCA models for Calvert Cliffs 1&2 by using plant specific EPU power levels specified by the Project Manager. The contractor shall then develop plant specific EPU LOCA models by incorporating the EPU specific plant modifications identified by the NRC staff into the EPU "look-alike" models. Project Manager written approval shall be required for the plant specific modifications.

The contractor shall prepare well-structured and formatted steady state and LOCA input files for SNAP and TRACE and shall develop preliminary as well as final input decks for each plant to facilitate timely review and testing by the NRC staff. All decks shall be robust and run to completion without user intervention.

In order to maintain control over the development of steady state plant models, the TRACE LOCA input files shall be restarts from steady state. The SNAP LOCA files shall be created by importing the TRACE LOCA restart decks into the steady state SNAP model. All SNAP and TRACE input files, AVScript files, calculation notebook files and other extraneous scripts or files necessary to reproduce the work shall be archived in the NRC data bank.

Task 8.2: Run Demonstration Calculations, Prepare Plant Reports and Resolve Open Items

The contractor shall run demonstration calculations, prepare plant reports and resolve open items as specified in Task 2.2.

OPTION 8A: Add Conservative Model Features

The existing Calvert Cliff 1&2 SBLOCA model does not predict a heatup. Based on the experience gained during earlier work on the TRACE model, merely initializing the model at conservative EPU conditions may not incorporate the level of conservatism that is in the licensing calculation. To mimic the licensee calculations conservative features will need to be added to the model, including a thermal-hydraulic hot channel and a means of delaying loop seal clearing, e.g. valves that close and open at specified times. In this optional task, sufficient conservative features will be added to predict a fuel clad heatup similar to the licensing calculation. The model features will be incorporated using SNAP numerics in such a way that they can be readily turned on or off individually. A new steady-state run may be required depending on the conservative feature characteristics. The level of effort stated below is in addition to that of Task 8 above.

Estimated completion date: 6 months after task order award, if exercised

Task 9: Develop LOCA Models for Callaway

Due to CR limits on new spending, Project Manager written approval shall be required to proceed with Tasks 9.

Task 9.1: Prepare Input Models

The contractor shall develop "look-alike" EPU LOCA models for Callaway based on the TRACE LOCA models developed for sister plant Seabrook. Upon receiving Project Manager written approval, these "look-alike" EPU decks shall be made plant specific by implementing the plant specific changes recommended in Task 1.

For this effort, it is assumed that the steam generator type is the same for Callaway as for Seabrook so that development of a new steam generator model is not necessary. In 2005 the Westinghouse Model F steam generators at Callaway were replaced with Framatome 73/19 T steam generators. The gross parameters for the replacement steam generators (total heat transfer area, number of tubes and tube diameter) are quite different from those of the Model F steam generators. It appears that utilizing the Model F steam generators in the Callaway model will yield conservative results, so it may not be necessary to develop a new steam generator model in order to perform confirmatory calculations. If a new model is to be developed, detailed design drawings for the replacement steam generators will be required. Should it be determined by the NRC that a new steam generator model is required, the contractor shall review the design information and estimate whether any additional level of effort is required to develop and include the steam generator model.

To mimic the licensee calculations for SBLOCA conservative features shall need to be added to the model, including a thermal-hydraulic hot channel and a means of delaying loop seal clearing. Sufficient conservative features shall be added to predict a fuel clad heatup similar to the licensing calculation. The model features shall be incorporated using SNAP numerics in such a way that they can be readily turned on or off individually. A new steady-state run may be required depending on the conservative feature characteristics.

The contractor shall prepare well-structured and formatted steady state and LOCA input files for SNAP and TRACE and shall develop preliminary as well as final input decks for each plant to facilitate timely review and testing by the NRC staff. All decks shall be robust and run to completion without user intervention.

In order to maintain control over the development of steady state plant models, the TRACE LOCA input files shall be restarts from steady state. The SNAP LOCA files shall be created by importing the TRACE LOCA restart decks into the steady state SNAP model. All SNAP and TRACE input files, AVScript files, and other extraneous scripts or files necessary to reproduce the work shall be archived in the NRC data bank.

Task 9.2: Run Demonstration Calculations, Prepare Plant Reports and Resolve Open Items

The contractor shall run demonstration calculations, prepare plant reports and resolve open items as specified in Task 2.2.

Estimated completion date: 5 months after task order award

Task 10: Develop LOCA Models for Fort Calhoun

Due to CR limits on new spending, Project Manager written approval shall be required to proceed with Tasks 10.

Task 10.1: Prepare Input Models

The contractor shall develop LBLOCA and SBLOCA models for Fort Calhoun in two steps. First, rated power LOCA models shall be created by converting the plant specific RELAP5 inputs (to be provided by the licensee) to TRACE. The plant specific data identified in Task 1 shall be used to validate the inputs of the plant specific model. The power level of the model shall then be increased to the target EPU. Although the staff does not currently have input decks for this plant, the staff will provide these inputs to the contractor upon receipt from the licensee.

The contractor shall prepare well-structured and formatted steady state and LOCA input files for SNAP and TRACE and shall develop preliminary as well as final input decks for each plant to facilitate timely review and testing by the NRC staff. All decks shall be robust and run to completion without user intervention.

In order to maintain control over the development of steady state plant models, the TRACE LOCA input files shall be restarts from steady state. The SNAP LOCA files shall be created by importing the TRACE LOCA restart decks into the steady state SNAP model. All SNAP and TRACE input files, AVScript files, calculation notebook files and other extraneous scripts or files necessary to reproduce the work shall be archived in the NRC data bank.

Task 10.2: Run Demonstration Calculations, Prepare Plant Reports and Resolve Open Items

The contractor shall run demonstration calculations, prepare plant reports and resolve open items as specified in Task 2.2.

Estimated completion date: 6 months after task order award

PERIOD OF PERFORMANCE

The estimated period of performance of this task order is December 22, 2008 through August 23, 2009

DELIVERABLES/SCHEDULE AND/OR MILESTONES

1. As described in Task 1, the contractor shall prepare and provide a letter report to the staff by 3 weeks after start of this contract. In the letter report the contractor shall summarize the review of current plant modeling and documentation for three plants (Prairie Island 1&2, Callaway and Fort Calhoun), and characterize and rank the differences between two plants (Prairie Island and Callaway) and their sister units (Seabrook and Point Beach) in terms of impact on LOCA analyses and shall identify additional data requirements necessary to prepare complete TRACE LOCA input models to be used for representative analyses.
2. As described in Tasks 2 through 10, TRACE LOCA input models shall be developed for nine plants (Point Beach 1&2, Monticello, St. Lucie 1&2, Crystal River 3, Turkey Point 3&4, Prairie Island 1&2, Calvert Cliffs 1&2, Callaway and Fort Calhoun). Of the multi-unit plants, only St. Lucie-1&2 will have separate models for each unit, necessitated by the different fuel types (14 x 14 and 16 x 16). For two of these plants (Point Beach 1&2 and Prairie Island 1&2) only SBLOCA models shall be developed. For each plant preliminary as well as final input decks shall be delivered to facilitate timely review and testing by the NRC staff. As specified in Tasks 7 and 9, prior written approval by the Project Manager is required to proceed with the deck updates for Prairie Island 1&2 and Callaway. In addition, the approval of the Project Manager is required to make any major changes in the functionality of the plant decks.
3. Nine Ten plant specific TRACE Model User Description and Analysis Reports documenting the results from the demonstration TRACE calculations as described in Task 2.2, as well as all modified AVScripts, TRACE input files, and SNAP input files shall be prepared and provided to the staff:

Plant	Delivery Dates	
	Preliminary Model	Final Model
Point Beach 1&2	1/30/09	2/28/09
Monticello	2/9/09#	3/9/09#
Crystal River 3	3/15/09	4/28/09
Turkey Point 3&4	3/31/09*	5/31/09
St. Lucie 1&2	4/15/09	6/15/09
Prairie Island 1&2	5/15/09*	6/30/09
Calvert Cliffs 1&2	5/15/09	6/30/09
Callaway	6/15/09*	7/31/09
Fort Calhoun	6/15/09	7/31/09

* Look-alike models

assumes NRC updated TRACE model available 1/20/09

TRACE Input Model Calculation Notebooks will be prepared for Monticello, Calvert Cliffs and Ft. Calhoun. Documentation for model changes in all other plants will be documented as SNAP Notes.

PERSONNEL

Only those members of the contractor's staff with a proven record of delivering high-quality TRACE decks to the NRC shall be assigned as key personnel on any of the identified tasks.

ORGANIZATIONAL CONFLICT OF INTEREST DISCLOSURE

List any work in the proposal that is similar to that previously performed or is to be performed by the contractor on behalf of another sponsor that might give rise to an apparent (perceived) or actual organizational conflict of interest, including duplication of effort.

NRC-FURNISHED MATERIAL

A TRACE executable with compatible SNAP counterpart will be provided or specified by the staff. Existing TRACE input decks developed with Task Order 5 (Point Beach 1&2, St. Lucie 1&2 and Crystal River 3) and TRACE LOCA models developed for Calvert Cliffs 1&2 and for two representative sister plants (H.B. Robinson and Seabrook) will also be made available. Upon receipt of the Fort Calhoun rated power RELAP5 decks from the licensee, the NRC will also furnish these decks to the contractor during the performance of this work. In general, existing input decks and documentation will be provided by the NRC staff. Additional information may also be available on the NRC's TRACE Developer Information Exchange website. Additional required data identified by the contractor in Tasks 1 and 3 and requested from the staff is to be furnished by the NRC as it becomes available. If plant-specific information needed for modeling is unavailable, the contractor shall use generic information or models from a similar plant and note this as a limitation of the model.

TECHNICAL DIRECTION

Technical direction will be provided by the Project Manager and Technical Monitor Shawn Marshall and Technical Monitor Istvan Frankl, who can be reached at:

Shawn Marshall
Mail Stop: T10-K8
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001
Phone: (301) 251-7523
FAX: (301) 415-5160
email: Shawn.Marshall@nrc.gov

Istvan Frankl
Mail Stop: T10-K8
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001
Phone: (301) 415-0729

FAX: (301) 415-5160
email: Istvan.Frankl@nrc.gov

REFERENCES AND ATTACHMENTS

The following guidance and outline documents are referenced in this SOW and shall be used for preparation of the deliverable documents:

1. PWR Steady-State Parameter Checklist **
2. TRACE PWR Input Model Calculation Notebook Development*
3. TRACE BWR Input Model Calculation Notebook Development*
4. TRACE Model User Description and Analysis Report Outline*
5. Original Contract (ML060650512)*
6. CE System 80 Calculation Notebook [INEL-94/0247 Vol.1 (ML071770210) and Vol. 2 (ML071770349)].*
7. NUREG CR-5640 - Overview and Comparison of US LWRs **

* Provided with Task Order 4 by NRC's Project Officer, Kirk Tien, to Dan Prelewicz (ISL)

** Provided with Task Order 5 by NRC's Project Officer, Kirk Tien, to Dan Prelewicz (ISL)