

ORDER FOR SUPPLIES OR SERVICES

PAGE OF PAGES

1 2

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

BPA NO.

1. DATE OF ORDER AUG 11 2008		2. CONTRACT NO. (if any) NRC-42-07-036		6. SHIP TO:	
3. ORDER NO. 0049		MODIFICATION NO.		a. NAME OF CONSIGNEE U.S. Nuclear Regulatory Commission	
5. ISSUING OFFICE (Address correspondence to) U.S. Nuclear Regulatory Commission Div. of Contracts Attn: Kala Shankar 301-415-6310 Mail Stop T-7-I-2 Washington, DC 20555		4. REQUISITION/REFERENCE NO. NRC-42-07-036(49) FFS: NRO 08 219		b. STREET ADDRESS Attn: Richard Daniel 415-6319 Mail Stop: T6-C34	
7. TO:		c. CITY Washington		d. STATE DC	e. ZIP CODE 20555
a. NAME OF CONTRACTOR INFORMATION SYSTEMS LABORATORIES, INC ISL		f. SHIP VIA		8. TYPE OF ORDER	
b. COMPANY NAME ATTN: DR. JAMES F. MEYER		<input type="checkbox"/> a. PURCHASE		<input checked="" type="checkbox"/> b. DELIVERY	
c. STREET ADDRESS 11140 ROCKVILLE PIKE, SUITE 500		REFERENCE YOUR Please furnish the following on the terms and conditions specified on both sides of this order and on the attached sheet, if any, including delivery as indicated.		Except for billing instructions on the reverse, this delivery order is subject to instructions contained on this side only of this form and is issued subject to the terms and conditions of the above-numbered contract.	
d. CITY ROCKVILLE	e. STATE MD	f. ZIP CODE 20852		10. REQUISITIONING OFFICE NRO	
9. ACCOUNTING AND APPROPRIATION DATA B&R:825-15-171-111; JC:Q4014; BOC 252A; 31X0200 Obligate: \$85,000 Contractor DUNS: 107928806		11. BUSINESS CLASSIFICATION (Check appropriate box(es))		12. F.O.B. POINT Destination	
<input type="checkbox"/> a. SMALL		<input checked="" type="checkbox"/> b. OTHER THAN SMALL		<input type="checkbox"/> c. DISADVANTAGED	
<input type="checkbox"/> d. WOMEN-OWNED		<input type="checkbox"/> e. HUBZone		<input type="checkbox"/> f. EMERGING SMALL BUSINESS	
<input type="checkbox"/> g. SERVICE-DISABLED VETERAN-OWNED		13. PLACE OF		14. GOVERNMENT B/L NO.	
a. INSPECTION		b. ACCEPTANCE		15. DELIVER TO F.O.B. POINT ON OR BEFORE (Date)	
16. DISCOUNT TERMS		17. SCHEDULE (See reverse for Rejections)			

ITEM NO. (a)	SUPPLIES OR SERVICES (b)	QUANTITY ORDERED (c)	UNIT (d)	UNIT PRICE (e)	AMOUNT (f)	QUANTITY ACCEPTED (g)
	Issuance of Task Order No.49 under Contract No. NRC-42-07-036 Title:"Review SRP Chapter 12.1-12.5 and 14.3.8 for the Levy County (AP1000) SCOLA" Period of Performance: 08/11/2008 - 02/10//2011 Estimated Reimbursable Cost: \$160,995 Fixed Fee:\$7,674 Total Cost Plus Fixed Fee:\$168,669 Funding in the amount of \$85,000 is provided See Continuation Pages					

18. SHIPPING POINT		19. GROSS SHIPPING WEIGHT		20. INVOICE NO.	
21. MAIL INVOICE TO:					
a. NAME U.S. Nuclear Regulatory Commission Payment Team, Mail Stop T-7-I-2					
b. STREET ADDRESS (or P.O. Box) Attn: (NRC-42-07-036 Task Order No. 49)					
c. CITY Washington		d. STATE DC	e. ZIP CODE 20555		
SEE BILLING INSTRUCTIONS ON REVERSE				\$168,669	
				17(h) TOTAL (Cont. pages)	
22. UNITED STATES OF AMERICA BY (Signature) <i>Kala Shankar</i>				17(i). GRAND TOTAL	
				\$168,669	

22. UNITED STATES OF AMERICA BY (Signature) <i>Kala Shankar</i>		23. NAME (Typed) Kala Shankar Contracting Officer TITLE: CONTRACTING/ORDERING OFFICER	
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In accordance with Section G.4, Task Order Procedures, of Contract No. NRC-42-07-036, this definitizes Task Order No. 49. The effort shall be performed in accordance with the attached Statement of Work.

Task Order No. 49 shall be in effect from date of award through thirty months, with a cost ceiling of \$168,669. The amount of \$160,995 represents the estimated reimbursable costs, and the amount of \$7,674 represents the fixed fee.

The amount obligated by the Government with respect to this task order is \$85,000, of which \$80,952 represents the estimated reimbursable costs, and the amount of \$4,048 represents the fixed fee.

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

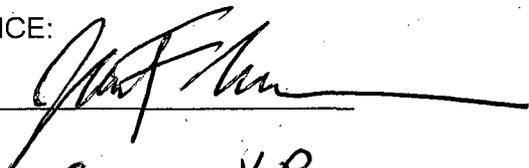
Your contacts during the course of this task order are:

Technical Matter: Richard Daniel
Project Officer
301-415-6319

Contractual Matters: Kala Shankar
Contract Specialist
301-492-3638

Acceptance of Task Order No. 49 should be made by having an official, authorized to bind your organization, execute three copies of this document in the space provided and return two copies to the Contract Specialist at the address identified in Block No. 5 of the OF 347. You should retain the third copy for your records.

ACCEPTANCE:

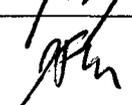


NAME

Senior V.P.

TITLE

8/13/08

DATE


TASK ORDER STATEMENT OF WORK

JCN/Contract No. Q4014	Laboratory/Contractor ISL, Inc.	Task Order No. 49
Applicant Progress	Design/Site AP1000/Levy County	Docket No. Project No. 756
Title/Description Review SRP Chapter 12.1 – 12.5 and 14.3.8 for the Levy County (AP1000) SCOL Application		
TAC No. RX0436	B&R Number 825-15-171-111	SRP Section(s) or ESRP 12.1-12.5 & 14.3.8
NRC Task Order Project Officer (PO) Richard Daniel (301) 415-6319 Richard.Daniel@nrc.gov		
NRC Technical Monitor (TM) Edward H. Roach (301) 415-1973 Edward.Roach@nrc.gov		

REQUEST FOR PROPOSAL

A proposal is requested to perform the work described in this Statement of Work. The due date for your proposal is 4 p.m. (Washington, DC, local time), August 11, 2008 or earlier, and shall consist of two parts: a technical approach and a cost estimate.

As a minimum, the technical approach shall substantiate your understanding of the requirements of the work, note any anticipated problem areas or deviations from the Statement of Work, identify key personnel who will perform the work, include resumes of those personnel not already in the contract, and address any potential conflict of interest issues. The following certification must also be submitted with your proposal: "I represent to the best of my knowledge and belief that the award of Task Order No. 49 under Contract No. NRC-42-07-036 to ISL does // or does not // involve situations or relationships of the type set forth in NRCAR 2009.570."

The contractor shall provide a staffing plan that specifically reflects services to be provided. Examples of the staffing plan are provided in Section J, Attachment 2 of the basic contract award document.

You are also required to identify any current/former NRC employees who have or will be involved, directly or indirectly, in developing the proposal, or in negotiating on behalf of your firm or in managing, administering or performing any purchase orders, contracts, consultant agreement or subcontract resulting from this proposal (list name, title and date individual left NRC and provide brief description of individual's role under this proposal.) If there are no current/former NRC employees involved, a negative statement is required.

The second part of your proposal shall be your cost estimate. Submit your cost estimate in accordance with the Federal Acquisition Regulation (FAR). Your proposal format along with supporting information in your own format (information such as proposed labor hours and labor rates, cost of equipment and materials, etc.) which supports your estimated costs must be submitted.

The contractor shall clearly list any personnel proposed for this task order (including employees, subcontractors and consultants) who were not part of the original proposal submitted for the basic contract award. The contractor shall identify proposed personnel status as an employee,

consultant or subcontractor staff. The contractor shall include supporting documentation for newly proposed personnel. If supporting documentation has been provided under a different task order under this contract for new personnel, the contractor shall provide a statement stating so and provide the task order number and title under which supporting documentation can be found.

CAUTION - It should be noted that this request for proposal does not commit the Government to pay any costs incurred in the submission of proposals or make necessary studies or designs for the preparation thereof, nor to procure or contract for the services in the enclosed Statement of Work. It is also brought to your attention that the Contracting Officer is the only individual who can legally commit the Government to the expenditure of public funds in connection with this proposed task order.

Your response to the subject RFP should be sent electronically to the NRC Contracting Officer, Kala.Shankar@nrc.gov with a copy to the NRC Technical Assistance Project Manger (TAPM), Richard.Daniel@nrc.gov and the NRC Technical Monitor (TM), Edward.Roach@nrc.gov.

The proposal shall be signed by an official authorized to bind the company, and it shall contain a statement indicating a proposal acceptance period of not less than 30 days.

1.0 BACKGROUND

On or about July 14, 2008, Progress Energy Nuclear plans to submit an application for a combined license (COL) for AP1000/Levy County Unit 1 & 2. The purpose of this Task Order is to obtain the necessary technical assistance to support the NRC staff in determining whether or not the subject COL application meets appropriate regulatory requirements.

Combined licenses (COL) applications are submitted pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR), Part 52, "Early Site Permits; Standard Design Certifications; and Combined Licenses for Nuclear Power Plants." The U.S. Nuclear Regulatory Commission (NRC) reviews these requests based on information furnished by ESP, DC and COL applicants pursuant to 10 CFR 52.79, "Contents of Applications Technical Information."

The NRC staff has prepared NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants," to provide guidance to the staff in performing safety reviews of COL applications and standard designs and sites for nuclear power plants. The principal purpose of the SRP is to assure the quality and uniformity of staff safety reviews.

The NRC staff has also prepared NUREG-1555, "Standard Review Plans for Environmental Reviews for Nuclear Power Plants," to provide guidance to the staff performing environmental reviews of applications relating to nuclear power plants. The ESRPs are companions to regulatory guides that address siting and environmental issues. As with NUREG-0800, the purpose of the ESRP is to assure the quality and uniformity of environmental reviews.

The staff publishes the results of these reviews in a Safety Evaluation Report (SER) or an Environmental Safety Evaluation Report (ESER).

This task order involves the review of the radiation protection program described in the application. The operation radiation protection program includes the organization; the equipment, instrumentation and facilities; the procedures and the program description used in implementing all aspects of radiation protection at the plant.

The purpose of the program is to maintain occupational radiation exposures (ORE) as low as is reasonable achievable (ALARA), protect personnel from surface and airborne contamination, and maintain control over radioactive materials and radwaste. Review and assess that sampling and analysis capabilities, radiochemistry laboratory, instruments for measuring radiation or radioactivity, personnel monitoring instruments, personnel protection equipment, radiation protection support facilities or areas, and special shields and equipment are in compliance with SRP acceptance criteria and 10 CFR 20.1101, as it relates to the radiation protection program and ALARA.

The review includes system piping and instrumentation diagrams (P&IDs), plant drawings and figures and process flow diagrams showing methods of operation, and Radiation protection training and retraining programs. In addition, implementation of Regulatory Guides 1.8, 1.39, 8.2, 8.7, 8.8, 8.9, 8.10, 8.13, 8.15, 8.20, 8.25, 8.26, 8.27, 8.29, 8.32, 8.34, 8.35, 8.36, and 8.38, or proposed alternatives.

Additional background information may be found in Section C.1. of the basic contract award document.

2.0 OBJECTIVE

The objective of this task order is to obtain technical expertise from the contractor to assist the staff in determining whether the application meets appropriate regulatory requirements.

The primary deliverable, or output, of this regulatory review shall be the Technical Evaluation Report (TER). The TER will serve as input to the NRC staff's SER which will document the NRC's technical, safety, and legal basis for approving the application. The TER must provide sufficient information to adequately explain the NRC staff's rationale for why there is *reasonable assurance* that public health and safety is protected. The TER, and ultimately the SER, should be written in a manner whereby a person with a technical (non-nuclear) background and unfamiliar with the applicant's request could understand the basis for the staff's conclusions. The TER shall be prepared using the NRC-provided format. The TER format is provided in Attachment 1 to this Task Order Statement of Work (SOW).

The initial task, which is optional, will be to perform an Acceptance Review of the Combined License Application (COLA) to determine the completeness and technical sufficiency of the combined license application. This includes evaluating the technical sufficiency of the application to identify major deficiencies that might impact the review process or affect the planned resources and schedule. This review will be conducted consistent with Office Instruction NRO-REG-100, "Acceptance Review Process for Design Certification and Combined License Applications", [ML071980027], sections 3.2.1, 3.2.3, and Attachment C. This acceptance review will be documented in the table, columns 1-6, 10 and 11, provided in attachment 2 to this Task Order Statement of Work (SOW). The technical monitor will provide direction through the Project Officer if this task is to be performed.

Following the acceptance review, the contractor will review the application on behalf of and under the purview of the Construction Health Physics Branch (CHPB). The contractor has primary review responsibilities for the following SRP sections:

- 12.1 Assuring that Occupational Radiation Exposures are as Low as is Reasonably Achievable
- 12.2 Radiation Sources
- 12.3 Radiation Protection Design Features

- 12.4 Dose Assessment
- 12.5 Operational Radiation Protection Plan
- 14.3.8 Radiation Protection ITAAC

In addition, the contractor will review applicable CHPB generic issues including NRC Bulletins and Generic Letters, TMI action Items, Task Action Plan, and New Generic Issues. For passive plants, the contractor will review the applicable Regulatory Treatment of Non-Safety systems (RTNSS).

3.0 WORK REQUIREMENTS, SCHEDULE AND DELIVERABLES

Tasks/Standards	Scheduled Completion	Deliverables
<p>1. REQUIREMENT: CHPB primary review responsibilities:</p> <p>Sections 12.1 – 12.5, and associated references of the SRP, AP1000 DCD and Bellefonte RCOLA. Also, Section 14.3.8 of the SRP.</p> <p>CHPB secondary review responsibilities:</p> <p>Sections 1.0, 2.3, 9.4, 11.2, 13.3, 13.4, 14, 16, 17, 13, 9.3.2, and associated references of the SRP, AP1000 DCD, and Bellefonte RCOLA.</p> <p>STANDARD: Written confirmation that familiarization is complete.</p> <p>The level of effort for Task 1 is based on the volume of materials to be reviewed; this task is for familiarity and not for evaluation.</p>	<p>* 30 days after authorization of work</p>	<p>Documentation that assigned personnel have reviewed references.</p>
<p>2. REQUIREMENT: Participate in an orientation/kick-off meeting with the NRC staff to discuss the scope of the work, expectations and task order management.</p> <p>STANDARD: Attendance by individuals designated by NRC.</p>	<p>* 10 days after authorization of work</p>	<p>N/A</p>
<p>3. REQUIREMENT (Optional): Review the application to support staff's acceptance review to determine the completeness and technical sufficiency of a combined license application. This includes identifying major deficiencies in the application that might impact the review process or affect the planned resources and schedule.</p> <p>STANDARD: Written documentation that review is complete.</p>	<p>* 15 days after receipt of application</p>	<p>Acceptance review results documented in Attachment 2</p>

Tasks/Standards	Scheduled Completion	Deliverables
<p>4. REQUIREMENT: Review the COL application Sections 9.3.2, 12.1 through 12.5, and 14.3.8 to determine the adequacy of the application described in those sections. Determine if the methods and approach proposed by the applicant meet the appropriate review guidance. Identify issues and those aspects of the application that need additional or clarifying information, RAIs. Prepare a Technical Evaluation Report (TER). The contractor will periodically meet with the TM to discuss DCD and RCOL issues and progress to facilitate this SCOL review. The TM will communicate RAIs and RCOL Open Items related to this review.</p> <p>NOTE: The contractor's review will likely focus on site-specific information provided by applicant when the SCOL is standardized with the RCOL for this reactor design.</p> <p>STANDARD: Completed TER that follows the NRC provided template without deviation. No deviation from the guidance defined in Section III, RAI Guidance of Attachment 1 to the basic contract SOW. Typically, no more than two (2) rounds of comment incorporation are acceptable.</p>	<p>* 90 days after docketing of application</p>	<p>TER, and RAIs if applicable</p>
<p>5. REQUIREMENT: Review responses to the RAI questions to determine if they adequately resolve the outstanding issues. Identify any other open items. Prepare a TER providing the input to the SER with open items (SER/OI).</p> <p>STANDARD: Complete TER with open items</p>	<p>* 30 days after receipt of the responses.</p>	<p>Revised TER with open items</p>
<p>6. REQUIREMENT: Review the applicant's response to the open items identified in the SER/OI. Identify any unresolved issues. Prepare a TER providing the input to the final SER describing the resolution to the open items.</p> <p>STANDARD: Complete TER that follows the NRC provided template without deviation.</p>	<p>*45 days after receipt of responses to OIs</p>	<p>SER input with open items resolved</p>
<p>7. REQUIREMENT: Prepare final supplement with no open items.</p> <p>STANDARD: Supplement reviewed and approved by NRC staff.</p>	<p>10 days following ACRS review of supplement</p>	<p>Final supplement.</p>

Tasks/Standards	Scheduled Completion	Deliverables
<p>8a. REQUIREMENT: <i>(If applicable)</i> Prepare for and travel to the applicant's office and participate in an NRC review team to:</p> <ul style="list-style-type: none"> a) Audit the application as described in the COL for Levy County. b) Evaluate and discuss the applicant's responses to the unresolved issues identified in Task 4 to determine if the outstanding issues are adequately resolved. c) Prepare a trip report (as an input to NRC Audit Report) to summarize the information reviewed, results of the audit, and meeting discussions. <p>STANDARD: Complete evaluation as defined in Task. Submit Trip Report within 2 weeks of site review.</p>	*2 weeks after the trip	Trip Report
<p>8b. REQUIREMENT: <i>(If applicable)</i> Prepare for and travel to the applicant's site and participate in the environmental site audit to:</p> <ul style="list-style-type: none"> a) Identify and resolve any inconsistencies between the applicant's ER and FSAR with regard to Dose to Construction Workers (ER section 4.5 and FSAR Section 12.3.5.1) <p>STANDARD: Submit a Trip Report within 2 weeks of site audit.</p>	*2 weeks after the trip	
<p>8c. REQUIREMENT: As needed and requested by the staff, provide technical support to the staff during related ACRS meetings and hearing proceedings.</p> <p>STANDARD: Ensure presentation materials are reviewed and approved by NRC staff.</p>	TBD	Prepare presentation materials. Attend meetings, if requested.

* These Work Schedules are subject to change by the NRC Contracting Officer (CO) to support the needs of the NRC Licensing Program Plan.

The Technical Monitor may issue technical instruction from time to time throughout the duration of this task order. Technical instructions must be within the general statement of work delineated in the task order and shall not constitute new assignments of work or changes of such a nature as to justify an adjustment in cost or period of performance. The contractor shall refer to Section G.1 of the base contract for further information and guidance on any technical directions issued under this task order.

Any modifications to the scope of work, cost or period of performance of this task order must be

issued by the CO and will be coordinated with the NRO Project Officer.

4.0 TECHNICAL AND OTHER SPECIAL QUALIFICATIONS REQUIRED

As specified in the basic task ordering agreement, the contractor shall provide individuals who have the required educational background and work experience to meet the objectives of the work specified in this task order. Specific qualifications for this effort include:

1. Formal education and training in nuclear engineering, applied health physics, or radiological engineering and at least seven years direct nuclear power plant related experience.
2. Ability to verify that management policies, operations, organizational structure and practices, and equipment and facility design features are used to maintain occupational radiation exposures as low as reasonably achievable (ALARA) as defined in 10 CFR 20.1003 and to ensure that all personnel doses do not exceed requirements of 10 CFR Part 20.
3. Knowledge of implementation of Regulatory Guide 8.8 on facility equipment design and layout.
4. Ability to assess the validity of source term descriptions and radiation zone designations.
5. Knowledge of methods used to minimize contamination of the facility and environment as well as minimize waste generation for the purpose of facilitating eventual decommissioning as described in 10 CFR 20.1406.
6. Knowledge of the personnel radiation protection features incorporated in ventilation system designs.
7. Ability to assess the various radiological impacts and dose contributions (from direct radiation and from liquid and gaseous effluents from adjacent plants) to the project construction work force.
8. Knowledge of fixed area radiation and airborne radioactivity monitoring instrumentation including in-containment high-range radiation monitors, special nuclear material radiation monitors and continuous airborne monitors used for normal operation, anticipated operational occurrences and accident conditions.
9. Expertise in the criteria and methods used for obtaining representative in-plant airborne radioactive concentrations in work areas.
10. Ability to use shielding calculation codes available in the code description file of the Radiation Safety Information Computational Center at Oak Ridge National laboratory to verify COL applicant's methods of calculating dose rates for given shield designs and source strengths.
11. Ability to evaluate dose assessments performed in accordance with Regulatory Guide 8.19.
12. Skills must include setting up analyses and data input, running the code, and providing associated reports describing results and interpretation of results.

13. Demonstrate a working knowledge of NRC regulations and guidance, as they relate to occupational radiation protection during normal plant operations and anticipated operational occurrences. Demonstrate a working knowledge of NRC regulations under 10 CFR Parts 52 (Subparts A, B, and C); 10 CFR 50.36a; General Design Criteria of Appendix A to Part 50; pertinent requirements of Part 50.34(f); requirements of Appendix I to Part 50; Subpart H of 10 CFR Part 71 as it relates to quality assurance programs; 10 CFR Parts 19 and 20 as they relate to occupational radiation protection; 10 CFR Part 20 and 10 CFR 71.5 and Subpart G as they relate to securing, transferring and controlling licensed material. Demonstrate a working knowledge or understanding of NRC regulations and guidance (as described in the referenced Regulatory Guides) described in SRP Sections 12.1 to 12.5 as pertinent parts of Section 14.3.8 (NUREG-0800, March 2007), ESRP Section 4.5 (NUREG-1555, October 1999), and pertinent sections of Regulatory Guide 1.206.

The contractor shall provide a contractor project manager (PM) or environmental project team leader (PTL) to oversee the effort and ensure the timely submittal of quality deliverables so that all information is accurate and complete as defined in the base contract.

The NRC will rely on representations made by the contractor concerning the qualifications of the personnel assigned to this task order, including assurance that all information contained in the technical and cost proposals, including resumes, is accurate and truthful. The resume for each professional proposed to work under this task order (principal investigators, technical staff, employees, consultants, specialists or subcontractors) shall describe the individual's experience in applying his or her area of engineering specialization to work in the proposed area. The use of particular personnel on this task order is subject to the NRC technical monitor's (TM's) approval. This includes any proposed changes to key personnel during the life of the task order.

5.0 REPORTING REQUIREMENTS

Task Order Progress Report

The contractor shall provide a bi-weekly progress report summarizing accomplishments, expenditures, contractor staff hours expended, percent completed for each task under this task order, and any problems encountered by the contractor. The report shall be sent via e-mail to the NRC TM, CO and TAPM.

Please refer to Section F of the basic contract award document for contract reporting requirements.

Technical reporting requirements

Unless otherwise specified above, the contractor shall provide all deliverables as draft products. The NRC TM will review all draft deliverables (and coordinate any internal NRC staff review, if needed) and provide comments back to the contractor. The contractor shall revise the draft deliverable based on the comments provided by the TM, and then deliver the final version of the deliverable. When mutually agreed upon between the contractor and the TM, the contractor may submit preliminary or partial drafts to help gauge the contractors' understanding of the particular work requirement.

The contractor shall provide the following deliverables in hard copy and electronic formats. The electronic copy shall be provided in Word format or other word processing software approved by

the TM. For each deliverable, the contractor shall provide an electronic copy to the TM and TAPM, and one hard copy to the TM. The schedule for deliverables shall be contained in the approved project plan for the task order effort.

In all correspondence, include identifying information: JCN No.: Q4014; Task Order No.:49; the applicant: Progress Energy; and, the site: Levy County Station.

1. At completion of Task 3, submit a TER that contains, for each Sub-section of the SER (see Attachment 1 for the outline, format and content of the report): a description of the information proposed by the applicant including the assumptions for the analysis, design, and references to consensus standards: review findings (including the basis for the findings), as a result of comparison with the review guidelines: and a list of deficiencies from completion of Table 1 of Attachment 2 to this Task Order.
2. At the completion of Task 4, submit a TER that contains, for each Sub-section of the SER, a description of the information proposed by the applicant including the assumptions for the analysis, design, and references to consensus standards: review findings (including the basis for the findings), as a result of comparison with the review guidelines: and a list of "Requests for Additional Information (RAIs). See Attachment 1 in the base contract SOW for the guidelines for developing RAIs.
3. At the completion of Task 5, submit a TER (see Attachment 1) that contains a summary of the review results and the updated report completed under Task 4 incorporating the findings from the resolution of the RAIs. Include a separate list of the remaining open items and the basis for such determination.
4. At the completion of Task 8a, submit a trip report, as an input to NRC audit report, containing a summary of documents audited, the audit results of the design reports and design calculations, a summary of meeting discussions conducted with, the applicant list of outstanding issues, significance of these issues, and the basis for the conclusion. Incorporate the findings in the report developed under Task 4.
5. At the completion of Task 6, submit a TER (see Attachment 1) that contains a safety evaluation report with open items resolved and update of the TER developed under Task 5.

6.0 MEETINGS AND TRAVEL

The following travel assumptions should be considered in planning the work effort. It is likely that a smaller group than the entire review team will be necessary to accomplish some activities; the actual travel contingent will be determined by the NRC TM after discussion with the contractor PM. Travel in excess of the total number of person-trips must be approved by the NRC Contracting Officer (CO); travel within the work scope limits will be approved by the NRC TAPM.

- One, 3-person, 1-day working meeting to kickoff project and contractor orientation*
- Up to 10, 2-person, half-day working meetings to review and update contractor on RCOL and DCD progress, status, RAIs and open items. (at least 3 to be held face to face)
- One, 1-person, 2-day meetings to participate in the Environmental Site Audit

- One, 2-person, 2-day working meetings at NRC headquarters to review deliverables*
- One, 2-person, 2-day meetings, if needed, for hearing or ACRS meeting.

* At the discretion of the NRC TM, quarterly progress meetings may be conducted at the contractor site or via telephone or video conference.

7.0 NRC FURNISHED MATERIAL

The following NRC furnished materials will be provided to the contractor together with SOW:

- a) CD-ROM containing SCOL Sections and the relevant Appendices from the SCOL application.
- b) CD-ROM containing the Final Safety Evaluation Report of the DCD.
- c) CD-ROM containing RCOL Sections and the relevant Appendices from the RCOL application.

8.0 LEVEL OF EFFORT

The estimated level of effort in professional staff hours apportioned among the subtasks and by labor category for the SCOL is as follows:

Task(s)	Labor Category	Level of Effort FY2008 (hours)	Level of Effort FY 2009 (hours)	Level of Effort FY 2010 (hours)
1	Health Physics Technical Reviewer	120	40	40
2	Health Physics Technical Reviewer	16	0	0
3	Health Physics Technical Reviewer	66	0	0
4.1	Health Physics Technical Reviewer (12.1)	0	16	0
4.II	Health Physics Technical Reviewer(12.2)	0	16	0
4.III	Health Physics Technical Reviewer(12.3-4)	0	40	0
4.IV	Health Physics Technical Reviewer(12.5)	0	40	0
5	Health Physics Technical Reviewer	0	80	0
6	Health Physics Technical Reviewer	0	0	180
7	Health Physics Technical Reviewer	0	0	48

Task(s)	Labor Category	Level of Effort FY2008 (hours)	Level of Effort FY 2009 (hours)	Level of Effort FY 2010 (hours)
8	Health Physics Technical Reviewer	0	120	100
All	Project Manager	20	40	40
Total		222	392	408

9.0 PERIOD OF PERFORMANCE

The projected period of performance is 30 months from authorization of work.

10.0 OTHER APPLICABLE INFORMATION

License Fee Recovery

- All work under this task order is fee-recoverable under 10 CFR Part 170 and shall be charged to the appropriate TAC number(s).

Assumptions and Understandings:

- The level of effort for Task 1 is based on the volume of materials to be reviewed; this task is for familiarity and not for evaluation.
- It is assumed that the contractor has access to the NRC furnished material available on the Internet.
- It is understood that the scope of the review consists of conference calls with the NRC staff, and with the NRC staff and the applicant, to discuss open items in an attempt to obtain additional information or reach resolution.
- During the course of the review, the Technical Monitor, and possibly other NRC personnel, may travel to the contractor site to discuss the status of the review and participate in the resolution of open items. It is assumed that the level of effort covers such a meeting.

Attachments:

1. Outline, format, and sample content for the TER (draft SER) Input. Sample Generic Safety Evaluation Report for PWR/BWR COL, chapter 12
2. Acceptance Criteria Checklist. From NRO Office Instruction, NRO-REG-100, "Acceptance Review Process for Design Certification and Combined License Applications", [ML071980027], Attachment C, Table 1
3. Detailed Review Criteria and Regulatory Guidance for SRP Sections 12.1 – 12.5, for use with COLA sections which are not incorporated by reference from the RCOLA.

Attachment 1
GENERIC COL SAFETY EVALUATION REPORT
Chapter 12

12. Radiation Protection

The radiation protection chapter provides information on radiation protection methods, features, and estimated occupational exposure associated with the reactor (AP1000) design. The radiation protection measures for the AP1000 are intended to ensure that internal and external occupational radiation exposures to plant personnel, contractors, and the general population, as a result of plant operations, including shutdown periods and anticipated operational occurrences (AOOs), will be within applicable limits of regulatory criteria and will be as low as is reasonably achievable (ALARA). Specifically, this chapter provides information on facility and equipment design, planning and procedures programs, and techniques and practices employed by the applicant to meet the radiation protection standards.

12.1 Ensuring that Occupational Radiation Exposures are ALARA (Related to FSAR Section 12.1, "Ensuring that Occupational Radiation Exposures are ALARA")

12.1.1 Introduction/Overview/General

This section addresses the administrative programs and procedures, in conjunction with facility design to ensure that the occupational radiation exposure to personnel will be kept as low as reasonably achievable (ALARA).

12.1.2 Summary of Application

The applicant incorporated by reference Section 12.1 of the certified PWR/BWR DCD document referenced in 10 CFR 20. The applicant provided information to address COL information items 12.1, 12.2, 12.3, and 12.4 from the DCD Tier 2, Table 1.9-1 for the summary of the PWR/BWR COL license information.

- COL information item 12.1 addresses the compliance with Regulatory Guide 8.10.
- COL information item 12.2 addresses the compliance with Regulatory Guide 1.8.
- COL information item 12.3 addresses the occupational radiation exposures to comply with Regulatory Guide 1.70.
- COL information item 12.4 addresses the compliance with Regulatory Guide 8.8.

The policy considerations regarding plant operations are contained in RG 8.10 (Rev. 1), "Operating Philosophy for Maintaining Occupational Radiation Exposures ALARA," RG 1.8 (Rev. 2) "Qualification and Training of Personnel for Nuclear Power Plants," RG 1.70 (Rev. 3), "Standard Format and Content of Safety Analysis Reports for Nuclear Power Plants, LWR Edition," and RG 8.8 (Rev. 3), "Information Relevant to Ensuring that Occupational Radiation Exposures at Nuclear Power Stations Will Be As Low As Is Reasonably Achievable."

12.1.3 Regulatory Basis

The acceptance criteria from NUREG-0800, Section 12.1 are incorporated by reference to the generic DCD for the PWR/BWR design and NUREG-XXXX, "Final Safety Evaluation Report Related to the Certification of the [PWR/BWR Type]". Col information items 12.1 through 12.5 are satisfied based on meeting the Regulatory Guidance 8.10, 1.8, 1.7, and 8.8, in this order.

12.1.4 Technical Evaluation

As documented in NUREG-XXXX, the NRC staff reviewed and approved Section 12.1 of the generic

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DCD for the PWR/BWR design. The applicant took no exceptions to Section 12.1 of the generic DCD for the PWR/BWR. The NRC staff's review of this application is limited to the COL information items 12.1, 12.2, 12.3, 12.4 and 12.5.

The applicant committed to address the operational policy considerations for COL 12.1 and 12.2 in RG 8.1 (Rev.1) and RG 1.8 (Rev.2) to ensure that radiation doses are ALARA. In an amendment to the SSAR, the applicant revised section 12.1.4 to properly characterize these issues. The staff finds it to be acceptable.

Also COL 12.3, the applicant will address the operational considerations to the level of details provided in RG 1.70 (Rev. 3). In an amendment to the SSAR, the applicant revised Section 12.1.1 to clarify the policy considerations that will be addressed by the COL applicant. The staff finds this to be acceptable.

The applicant is also committed to ensure that the PWR/BWR will be designed and constructed in a manner consistent with RG 8.8 (COL 12.4). The ALARA policy was applied through detailed engineering reviews and design modifications to ensure that the resulting plant design can maintain exposure ALARA.

The NRC staff reviewed the applicant's proposal using the review procedures described in Section 12.1 of NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants."...

12.1.5 Post Combined Operating License Activities

TBD – NRC staff to provide further guidance.

12.1.6 Findings/Conclusions

The staff finds that this area is addressed within the generic DCD and the related NRC FSER provided in NUREG-XXXX. Specifically, the staff finds that the radiation protection measures incorporated in the AP1000 design would provide reasonable assurance that occupational doses can be maintained ALARA and below the limits of 10 CFR Part 20 during all plant operations. The staff has compared the application, as supplemented, to the relevant NRC regulations, acceptance criteria defined in NUREG-0800, Section 12.1, and other NRC regulatory guides and concludes that the applicant is in compliance with the NRC regulations. The applicant has provided sufficient information to support issuance of a (license/permit).

12.2 Radiation Sources (Related to FSAR Section 12.2, "Radiation Sources")

12.2.1 Introduction/Overview/General

This section addresses the issues related to contained radiation sources and airborne radioactive material sources during normal operations, anticipated operational occurrences, and accident conditions affecting in plant radiation protection.

12.2.2 Summary of Application

The applicant incorporated items referred to in section 12.2 of the certified PWR/BWR DCD document. The applicant provided information to address COL information items 12.5 from the DCD Tier 2, Table 1.9-1 for the summary of the PWR/BWR COL license information.

COL information item 12.5 addresses the compliance with 10CFR 20 and 10CFR 50 Appendix I

12.2.3 Regulatory Basis

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The acceptance criteria from NUREG-0800, Section 12.2 are incorporated by reference to the generic DCD for the PWR/BWR design and NUREG-XXXX. The contained source terms and airborne radioactive material source terms are audited for completeness against the guidelines in RG 1.7 (Rev. 3) and against the other criteria set forth in NUREG-0800, Section 12.2.

12.2.4 Technical Evaluation

As documented in NUREG-XXXX," the staff reviewed and audited the contained source terms and airborne radioactive material source terms for completeness against the guidelines in RG 1.7 (Rev. 3) and against the criteria set forth in NUREG-0800, Section 12.2. Furthermore the staff selectively compared source terms for specific systems against those used for plants of similar design.

The staff found that the source term parameters needed to calculate radiation shielding cannot be provided as specified in the SRP. Similarly the leakage characteristics and the concentration of airborne radioactive material cannot be provided in certain areas. As an alternative, a DAC was provided that require the applicant to determine source term parameters that will be verified during plant construction. The DAC describing the bases for the source term are consistent with the SRP acceptance criteria. Compliance with these DAC, supplemented by the information in SSAR Sections 12.2 and 12.3, is acceptable to adequately address the requirement to identify the kinds and quantities of radioactive materials expected to be produced by plant operation in 10 CFR 50.34(b)(3) and will ensure that the appropriate source terms are used to demonstrate that the PWR/BWR design meets the relevant requirements in 10 CFR Part 20 concerning the limitation of radiation dose to personnel; and 10 CFR 50.34(f) with respect to operator access to plant areas during and following a reactor accident.

In an SSAR markup of Chapter 12, the applicant revised Section 12.2.3 to identify the issues regarding compliance with 10 CFR Parts 20 and 50 as COL license information. The staff finds the changes to be acceptable. Therefore, this confirmatory item is resolved.

The NRC staff reviewed the applicant's proposal using the review procedures described in Section 12.1 of NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants."

12.2.5 Post Combined Operating License Activities

TBD – NRC staff to provide further guidance.

12.2.6.1 Findings/Conclusions

The staff finds that this area is addressed within the generic DCD and the related NRC FSER provided in NUREG-XXXX. As discussed in the technical reevaluation section above, the applicant revised Section 12.2.3 of the SSAR to identify the issues regarding compliance with 10 CFR Parts 20 and 50 as COL license information. The applicant included this information in the SSAR. The NRC staff has compared the application, as supplemented, to the relevant NRC regulations, acceptance criteria defined in SRP 12.2, and other NRC regulatory guides and concludes that the applicant is in compliance with the NRC regulations. The applicant has provided sufficient information to support issuance of a (license/permit).

12.3-12.4 Radiation Protection Design Features (Related to FSAR Sections 12.3-12.4, "Radiation Protection Design Features" and "Dose Assessment")

[Note: Section 12.3 is called "Radiation Protection Design" in the FSER, NUREG-XXXX. Section 12.4, "Dose Assessment", is identified as a separate section in RG 1.206, DCD Tier 2, SSAR, and NUREG-

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XXXX. However, as indicated in RG 1.206, this section, "Dose Assessment", is discussed as a subsection at the end of Section 12.3. Therefore Section 12.4 in RG 1.206 has only the title with no text, just referring to section 12.3. Accordingly, these two sections are usually lumped together for the COL items and in the PWR/BWR Matrix.]

12.3.1 Introduction/Overview/General

This section addresses the issues related to radiation protection equipment and design features used to ensure that occupational radiation exposures are ALARA. It takes into account design dose rates, anticipated operational occurrences, and accident conditions. These issues include the facility design features, shielding, ventilation, area radiation and airborne radioactivity monitoring instrumentation, dose assessment, and Inspections, Tests, Analyses, and Acceptance Criteria (ITAAC),

12.3.2 Summary of Application

The applicant incorporated items referred to in sections 12.3-12.4 of the certified PWR/BWR DCD document. The applicant provided information to address COL information items 12.6, 12.7, and 12.8 from the DCD Tier 2, Table 1.9-1 for the summary of the PWR/BWR COL license information.

- COL information item 12.6 addresses the airborne radionuclide concentration calculation.
- COL information item 12.7 addresses the operational considerations and procedures for area radiation and airborne radiation monitoring and for the calibration of the monitors.
- COL information item 12.8 addresses the requirements of 10 CFR Part 70.24.

12.3.3 Regulatory Basis

The acceptance criteria from NUREG-0800, Sections 12.3-12.4 are incorporated by reference to the generic DCD for the PWR/BWR design and NUREG-XXXX, "Final Safety Evaluation Report Related to the Certification of the Advanced Boiling Water Reactor." The radiation design protection features are audited for completeness against the relevant requirements of 10 CFR Parts 20 and 50, the GDC 19 and 61, the guidelines in RG 1.7 (Rev. 3), and against the other criteria set forth in Sections 12.3-12.4 of the SRP.

12.3.4 Technical Evaluation

As documented in NUREG-XXXX, "Final Safety Evaluation Report Related to the Certification of the Advanced Boiling Water Reactor," the NRC staff reviewed and audited the facility design features in the SSAR, including the shielding, the ventilation, and the radiation and airborne radioactivity monitoring instrumentation for completeness against the guidelines in RG 1.7 (Rev. 3) and against the criteria set forth in Sections 12.3-12.4 of the SRP.

The NRC staff found that the design features (that protect personnel and equipment from extreme environmental conditions) are in accordance with the guidelines of RG 8.8 (Rev. 3) are acceptable. However, the expected leakage of radioactive fluids from plant systems could not be determined at this stage of the PWR/BWR design. The staff could not verify that the plant ventilation system design meets the criteria in the SRP. The applicant provided design acceptance criteria (DAC) that require the COL applicant to calculate the expected concentrations of airborne radionuclides (COL 12.6) as specified in the SRP, to verify that adequate ventilation is provided. An amendment was added that describes the calculation methods and assumptions. These calculation methods and assumptions are consistent with provisions of the SRP. The COL applicant is required to perform shielding analysis and airborne radionuclide concentration calculations that would be verified by the ITAAC during plant construction. The calculations should be carried out using the methods described in the FSER

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document and the results of the calculations need to be compared with NRC standards. The NRC staff found this to be acceptable.

As for the questioning of the description of the PWR/BWR area radiation monitoring system (COL 12.7), the applicant indicated that the monitored radiation levels will be recorded and indication will be provided in the control room. The staff concluded that the area radiation monitoring system meets the applicable criteria in RG 8.8 (Rev. 3), RG 1.97 (Rev. 3), and the provisions in Item II.F.1.3 of NUREG-0737 that are required by 10 CFR 50.34(f)(2)(xvii)(D) and is acceptable.

As for meeting the requirements of 10CFR70.24 (COL 12.8) regarding the criticality accident monitoring system, the NRC staff requested the applicant to amend the SSAR to either provide information showing that their plant meets the requirements of the 10CFR70.24 or request an exemption stating that these monitors are unnecessary because the PWR/BWR is designed to ensure sub critical conditions during fuel handling and storage. A DAC was provided that would require the COL applicant to verify that airborne monitors provided in the final PWR/BWR design meet the criteria of the SRP. The applicant concurred and included this action item in the SSAR. The staff found this to be acceptable.

The NRC staff reviewed the applicant's proposal using the review procedures described in Section 12.1 of NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants."...

12.3.5 Post Combined Operating License Activities

TBD – NRC staff to provide further guidance.

12.3.6 Findings/Conclusions

The applicant revised Sections 12.3-12.4 of the SSAR to identify the issues regarding the airborne radionuclide concentration calculation, the operational consideration, and the compliance with the requirements of 10CFR 70.24. The NRC staff has compared the application, as supplemented, to the relevant NRC regulations, acceptance criteria defined in SRP 12.3-12.4, and other NRC regulatory guides and concludes that the applicant is in compliance with the NRC regulations. Specifically, the staff concludes that the applicant demonstrated that the PWR/BWR design can meet the relevant requirements of 10 CFR Parts 20 and 50, the GDC 19 and 61 in all areas of the plant. Accordingly, the applicant has provided sufficient information to support issuance of a (license/permit).

12.5 Organization (Related to FSAR Section 12.5, "Organization")

[Note: This section is called "Organization" in RG 1.206 and NUREG-XXXX, is called "Operational Radiation Protection Program" in the SRP, NUREG-0800, and is called "Health Physics Program" in the DCD – Tier2 and the SSAR]

12.5.1 Introduction/Overview/General

This section addresses the issues related to operational aspects of the radiation protection program. The goal is to maintain occupational and public doses both below regulatory limits and ALARA. The radiation protection program includes the following components:

- a documented management commitment to keep exposures ALARA
- a trained and qualified organization with sufficient authority and well-defined responsibilities
- adequate facilities, equipment, and procedures to effectively implement the program

12.5.2 Summary of Application

The applicant incorporated items referred to in section 12.5 of the certified PWR/BWR DCD document. The applicant provided information to address COL information items 12.9 and 12.10 from

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the DCD Tier 2, Table 1.9-1 for the summary of the PWR/BWR COL license information.

- COL information item 12.9 addresses the level of detail required by Regulatory Guide 1.70, the implementation of a radiation protection program for operational considerations.
- COL information item 12.10 addresses the portable instruments in operating reactors that accurately measure radio-iodine concentrations in plant areas under accident conditions and will provide training and procedures on the use of these instruments in compliance with Paragraph 50.34 (f) (xxvii) of 10CFR50 and NUREG-0737 Item III.D.3.3 (Subsection 12.5.2).

12.5.3 Regulatory Basis

The acceptance criteria from NUREG-0800, Section 12.5 are incorporated by reference to the generic DCD for the PWR/BWR design and NUREG-XXXX, "Final Safety Evaluation Report Related to the Certification of the Advanced Boiling Water Reactor." The operational radiation protection program for this section is audited for completeness against, among others, the relevant requirements of 10 CFR Parts 20, 50, and 71, the guidelines in RGs 1.7 (Rev. 3), 1.8, 8.2, 8.8, and 8.10, and against the other criteria set forth in Sections 12.5 of the SRP.

12.5.4 Technical Evaluation

As documented in NUREG-XXXX, the staff reviewed and audited the implementation of an effective operational radiation protection program (COL 12.9) to ensure that radiation exposures are within the limits of 10 CFR Part 20 and are ALARA. The organizational radiation protection plan also requires that the regulation in 10 CFR 50.34(f) (2) (xxvii) are implemented for in plant radiation and airborne radioactivity monitoring (COL 12.10) in accordance with Item III.D.3.3 of the TMI Action Plan. Item III.D.3.3 requires that operating reactors be capable of accurately measuring radio-iodine concentrations in plant areas under accident conditions. The NUREG-0737 clarification of Item III.D.3.3 specifies that this capability use portable instruments and includes requirements for training and procedures for the use of these instruments. This was identified as DFSE COL Action Item 12.5.1-1 Appendix A to the SSAR. Accordingly, the applicant included this information in the markup of the SSAR section 12.5.3.2 and included the action item in the SSAR. The staff finds that to be acceptable.

The NRC staff reviewed the applicant's proposal using the review procedures described in Section 12.1 of NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants."...

12.5.5 Post Combined Operating License Activities

TBD – NRC staff to provide further guidance.

12.5.6 Findings/Conclusions

The applicant revised Section 12.5.3.2 of the SSAR to identify the issues regarding compliance with Regulatory Guide 1.70, the implementation of a radiation protection program for operational considerations, and the compliance with Paragraph 50.34 (f) (xxvii) of 10CFR50 and NUREG-0737 Item III.D.3.3 (Subsection 12.5.2), as referred to the portable instruments in operating reactors that accurately measure radio-iodine concentrations in plant areas under accident conditions. The NRC staff has compared the application, as supplemented, to the relevant NRC regulations, acceptance criteria defined in SRP 12.5, and other NRC regulatory guides and concludes that the applicant is in compliance with the NRC regulations. The applicant has provided sufficient information to support issuance of a (license/permit).

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Table 1: Safety Analysis Report Acceptance Review Results for [Applicant Name] [Design Center Name] [Application Type]

SER Section: _____ Technical Branch: _____ (Primary/Secondary) Technical Reviewer: _____
 Branch Chief: _____ SRP Section: _____ Date: _____

Does the section address the applicable regulations: Yes/No

Are there any technical deficiencies, changes in planning assumptions, or dependencies on concurrent reviews? Yes/No, Identify specific review area/topic in table below.

1. Review Area/Topic*	Completeness and Technical Sufficiency Which Form Basis for Acceptability for Docketing				Changes to Planning Assumptions to be Considered in Development of Baseline Review Schedule		Review Dependencies Among Concurrent Reviews		
	2. Does COL section address the items required by regulation (refer to RG 1.206, Section C.IV.1)? (Yes/No)	3. Is COL section technically sufficient for this review area/ topic? (yes/no)**	4. Can the technical deficiency be resolved through the RAI process? (yes/no)***	5. If no, for either completeness or technical sufficiency, identify deficiency(ies). This information will be needed for technical review.	6. Is the identified technical deficiency related to a risk-significant SSC? (yes/no)****	7. Are the pre-baseline review schedule and estimated staff-hours appropriate? (yes/no)	8. For each no, identify the change (or basis for change).	9. Identify the total review time in staff-hours*****	10. Can the review of the area/topic be completed without the completion of a concurrent review? (yes/no)

*Review Area/Topic: Item identified in RG 1.206 or the regulations for a COLA referencing a DC, including COL information items and departures from the design certification.

**Technical Sufficiency: The application is compared against the SRP acceptance criteria. Note: New safety features, alternate regulatory compliance approaches, and/or deviations from DCs, should not be treated as deficiencies and factored into the basis for rejecting the application, unless staff determines that there is insufficient technical information associated with the respective item. These items are factored into confirmation of planning assumptions.

***Significant deficiencies are those review area/topic which impact the staff's ability to begin the detailed technical review or complete its review within a predictable timeframe.

****DSRA will provide risk significance information at time of review, if available.

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12.1 Assuring that Occupational Radiation Exposures Are as Low as is Reasonably Achievable

Background

It is a long-standing policy and regulatory requirement in the nuclear industry to maintain occupational radiation exposures (ORE) as low as is reasonably achievable (ALARA). ALARA principles should be incorporated into the plant design and operational activities. This begins with the establishment of a management ALARA policy and includes the formation of an organization responsible for implementing radiation protection activities.

The contractor shall review the applicant's safety analysis report (SAR) for an operating license (OL), design certification (DC), or combined license (COL), as described in Standard Review Plan (SRP) 12.1, "Assuring that Occupational Radiation Exposures Are as Low as is Reasonably Achievable." The specific areas of the review are radiation protection policy, design and operational considerations, and inspections, tests, analyses, and acceptance criteria (ITAAC). The review shall be conducted using the process described in SRP Section 12.1, including: areas of reviews, review interfaces, acceptance criteria, technical rationale, review procedures, and evaluation findings. The reviewer shall consider regulatory requirements and guidance listed in SRP Section 12.1, documents listed as references in SRP Section 12.1, and other documents and industry standards cited by the COL applicant. The review and determination of acceptance will be based on the identified SRP Section 12.1 acceptance criteria submitted either as complete operational programs, by reference to NRC-approved templates, or via endorsement of existing operational programs at a site with collocated operating plants. For deviations from these acceptance criteria, the reviewer shall assess the applicant's alternate approach of how the proposed alternatives provide an acceptable method of complying with the relevant NRC requirements and guidance identified in Subsection II of Section 12.1 of the SRP.

Subtask 1: Policy

Review and assess that the management policy considerations comply with SRP Acceptance Criteria 1. Areas of this review include:

- a. ALARA policy
- b. organizational structure with respect to radiation protection responsibilities and experience requirements for key radiation protection personnel
- c. radiation protection activities
- d. implementation of policy, organization, training, and design review guidance with respect to radiation protection
- e. alternative approaches and methods, if any, to those normally used at existing nuclear plants

Subtask 2: System Design

Verify that the design methods, approach, and interactions are in accordance with SRP Acceptance Criteria 2. Areas of review include:

- a. use of experience from past designs and from operating plants to improve radiation protection design
- b. implementation of design guidelines from regulatory guides and other industry-developed design guidance that includes ALARA criteria, including proposed alternatives to normally accepted guidelines or practices
- c. consideration of the use of ALARA criteria during the implementation of certified design or design modifications

Subtask 3: Operations

Verify that the proposed operations comply with SRP Acceptance Criteria 3. Areas of review include:

- a. methods for planning and accomplishing work, including interfaces between radiation protection, operations, maintenance, planning and scheduling
- b. use of plant operating experience in planning for operational considerations for plant design

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- c. planning for and implementation of radiation protection programs and operational guidance from Regulatory Guides 8.8 and 8.10 as well as from industry standards/guidance with respect to radiation protection

Subtask 4: Radiation Protection

Verify that the radiation protection program is in accordance with SRP Acceptance Criteria 4. Areas of the review include ALARA procedures related to:

- a. work scheduling
- b. work planning
- c. radiological controls

Subtask 5: Inspections, Tests, Analyses, and Acceptance Criteria (ITAAC)

Review and assess that the applicant's proposed ITAAC associated with radiation protection are in accordance with SRP Section 14.3, "Inspections, Tests, Analyses, and Acceptance Criteria."

Subtask 6: Acceptance Criteria

Verify that the applicant has provided sufficient information and shall conduct a review and appropriate calculations that support the conclusion that the applicant has met all relevant requirements, including:

- a. 10 CFR 19.12, as it relates to keeping workers who receive ORE informed and properly instructed.
- b. 10 CFR 20.1101 and 10 CFR 20.1003, as they relate to ensuring that radiation exposures are below specified limits and ALARA.
- c. 10CFR 52.47 (b)(1) and 10 CFR 52.80(a) which require that the DC and COL application, respectively, contain the proposed inspections, tests, and analyses (ITAAC) necessary and sufficient to ensure that the facility has been constructed and will operate in conformity with the combined license, the provisions of the Atomic Energy Act, and the NRC's regulations.

See Part II of SRP Section 12.1, Acceptance Criteria, Requirements, for relevant requirements.

Subtask 7: Request for Additional Information and Draft Technical Evaluation Report

Upon completion of the review, the reviewer will prepare a series of draft questions for the applicant as input to a formal Request for Additional Information (RAI) for all identified issues and aspects of the application that need additional or clarifying information in supporting the necessary conclusions required under SRP Section 12.1. Each RAI:

- (1) will be assigned a sequential number that includes the section of the COL application, such as RAI 12.1.3-12, where -12 represents the 12th RAI in a series of RAIs on Chapter 12.1.3,
- (2) will identify the reviewer by name and organization, and
- (3) will present a concise technical summary that identifies the issue identified by the reviewer and state the type of information or clarification that is being requested of the applicant for incorporation in the SAR.

The RAIs will be compiled and submitted as draft to the NRC PM identified for that chapter of the SAR. The reviewer will address and incorporate any NRC comments on the RIAs and resubmit them as final to the NRC PM. The NRC will transmit all RAIs to the applicant. Depending on the topical issue, the disposition of specific RAIs may require the conduct of site inspections or audits and the NRC may request the presence of the reviewer during such visits. Such arrangements will be made and coordinated by the NRC PM identified for that chapter of the SAR.

The NRC will forward all RAI responses from the COL applicant to the reviewer for evaluation. If the response of the RAI is acceptable in addressing the issue, the RAI will be closed and tracked as a confirmatory item until all proposed changes stated in the RAI are included in the next revision of the SAR.

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If the response of any RAI is not acceptable, a supplemental RAI will be generated and the RAI will be identified as an open item, and will remain open until the issue has been fully resolved.

Once the reviewer verifies that the applicant has responded to all RAIs, incorporated them in the appropriate revision of the SAR chapter, and that the SAR complies with all relevant regulatory requirements, the reviewer shall prepare a draft SER (with open items) and a draft final SER, and document the bases for concluding that the applicant has provided sufficient information and details in demonstrating compliance with NRC regulations. See specific details under SRP Section 12.1, "Evaluation Findings." The draft SER will be submitted to the NRC PM identified for that chapter of the SAR. The reviewer will address and incorporate any NRC comments on the SER and resubmit it as final to the NRC PM.

12.2 Radiation Sources

Background

Nuclear facilities must control both occupational dose limits and dose limits to individual members of the public from radioactivity that may be received from both internal and external sources. Additionally, licensees must maintain security of licensed radioactive material that is stored in controlled or unrestricted areas. Therefore, licensees must have detailed descriptions of all radioactive sources, radiation fields, and source terms found in their facility.

Contractor will review the applicant's final safety analysis report (FSAR) for a combined license (COL) as described in Standard Review Plan 12.2, "Radiation Sources." The review will include radiation sources in normal operations, anticipated operational occurrences, and accident conditions affecting in-plant radiation protection. The review of radiation sources will include both contained and airborne radioactive material sources. For specific details on scope of review, see Section 1, Areas of Review, in SRP 12.2.

The contractor shall review the applicant's safety analysis report (SAR) for an operating license (OL), design certification (DC), or combined license (COL), as described in Standard Review Plan 12.2, "Radiation Sources." The review shall be conducted using the process described in SRP Section 12.2, including: areas of reviews, review interfaces, acceptance criteria, technical rationale, review procedures, and evaluation findings. For the evaluation of radiation sources affecting inplant radiation protection, the reviewer shall consider regulatory requirements and guidance listed in SRP Section 12.2, documents listed as references in SRP Section 12.2, and other documents and industry standards cited by the COL applicant. The review and determination of acceptance will be based on the identified SRP Section 12.2 acceptance criteria. For deviations from these acceptance criteria, the reviewer shall assess the applicant's alternate approach of how the proposed alternatives provide an acceptable method of complying with the relevant NRC requirements and guidance identified in Subsection II of Section 12.2 of the SRP.

Subtask 1: Source Descriptions

Verify that the applicant provides all pertinent information required by SRP 12.2 for all radiation sources that require shielding, special ventilation systems, special storage locations and conditions, traffic or access control, special plans or procedures, or monitoring equipment. Additionally, verify airborne sources that are created by leakage, opening formerly closed containers, storage of leaking fuel elements, and other mechanisms are identified by location and magnitude so that they can be used for designing appropriate ventilation systems and in specifying appropriate monitoring systems. Review and assess that airborne radioactivity concentrations in frequently occupied areas should be a small fraction of the concentrations related to 10 CFR 20.1203, 10 CFR 20.1204, and Appendix B to 10 CFR Part 20. See SRP Acceptance Criteria in SRP 12.2 for more details.

Subtask 2: Radiation Fields

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Verify that neutron and gamma streaming into containment from the annulus, airborne radioactivity concentrations in frequently occupied areas, shielding and ventilation systems design, and coolant and corrosion activation product source terms comply with SRP Acceptance Criteria in SRP 12.2.

Subtask 3: Source Terms

Review and assess that shielding and ventilation design fission product source terms comply with SRP 12.2 SRP Acceptance Criteria bases. Additionally, verify that coolant and corrosion activation products source terms are based on applicable reactor operating experience and that neutron and prompt gamma source terms are based on reactor core physics calculations and applicable reactor operating experience. Additionally, verify source parameters have appropriate quantities and accompanying text as described in SRP 12.2. See SRP Acceptance Criteria in SRP 12.2 for more details.

Subtask 4: Inspections, Tests, Analyses, and Acceptance Criteria (ITAAC)

Review and assess that the applicant's proposed ITAAC associated with radiation sources are in accordance with SRP Section 14.3, "Inspections, Tests, Analyses, and Acceptance Criteria."

Subtask 5: Acceptance Criteria

Verify that the applicant has provided sufficient information and shall conduct a review and appropriate calculations that support the conclusion that the applicant has met all relevant requirements, including:

- a. 10 CFR 20.1201, 10 CFR 20.1202, and 10 CFR 20.1206, as they relate to limiting occupational radiation doses, and 10 CFR 20.1207, as it relates to limiting exposure to minors to one-tenth of limits for adults.
- b. 10 CFR 20.1203 and 10 CFR 20.1204, as they relate to limiting average concentrations of airborne radioactive materials to protect individuals and control the intake (inhalation or absorption) of such materials.
- c. 10 CFR 20.1301, as it relates to limiting dose limits to individual members of the public and General Design Criterion (GDC) 61 as it relates to systems that may contain radioactive materials.
- d. 10 CFR 20.1801, as it relates to securing licensed materials against unauthorized removal.
- e. 10 CFR 50.34(f)(2)(vii) and GDC 19, as they relate to the acceptable radiation conditions in the plant under accident conditions, and the source term release assumptions used to estimate calculate those conditions.
- f. 10CFR 52.47 (b)(1) and 10 CFR 52.80(a) which require that the DC and COL application, respectively, contain the proposed inspections, tests, and analyses (ITAAC) necessary and sufficient to ensure that the facility has been constructed and will operate in conformity with the combined license, the provisions of the Atomic Energy Act, and the NRC's regulations.

See Part II of SRP Section 12.2, Acceptance Criteria, Requirements, for relevant requirements.

Subtask 6: Request for Additional Information and Draft Technical Evaluation Report

Upon completion of the review, the reviewer will prepare a series of draft questions for the applicant as input to a formal Request for Additional Information (RAI) for all identified issues and aspects of the application that need additional or clarifying information in supporting the necessary conclusions required under SRP Section 12.2. Each RAI:

- (1) will be assigned a sequential number that includes the section of the COL application, such as RAI 12.2.3-12, where -12 represents the 12th RAI in a series of RAIs on Chapter 12.2.3,
- (2) will identify the reviewer by name and organization, and

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(3) will present a concise technical summary that identifies the issue identified by the reviewer and state the type of information or clarification that is being requested of the applicant for incorporation in the SAR.

The RAIs will be compiled and submitted as draft to the NRC PM identified for that chapter of the SAR. The reviewer will address and incorporate any NRC comments on the RIAs and resubmit them as final to the NRC PM. The NRC will transmit all RAIs to the applicant. Depending on the topical issue, the disposition of specific RAIs may require the conduct of site inspections or audits and the NRC may request the presence of the reviewer during such visits. Such arrangements will be made and coordinated by the NRC PM identified for that chapter of the SAR.

The NRC will forward all RAI responses from the COL applicant to the reviewer for evaluation. If the response of the RAI is acceptable in addressing the issue, the RAI will be closed and tracked as a confirmatory item until all proposed changes stated in the RAI are included in the next revision of the SAR. If the response of any RAI is not acceptable, a supplemental RAI will be generated and the RAI will be identified as an open item, and will remain open until the issue has been fully resolved.

Once the reviewer verifies that the applicant has responded to all RAIs, incorporated them in the appropriate revision of the SAR chapter, and that the SAR complies with all relevant regulatory requirements, the reviewer shall prepare a draft SER (with open items) and a draft final SER, and document the bases for concluding that the applicant has provided sufficient information and details in demonstrating compliance with NRC regulations. See specific details under SRP Section 12.2, "Evaluation Findings." The draft SER will be submitted to the NRC PM identified for that chapter of the SAR. The reviewer will address and incorporate any NRC comments on the SER and resubmit it as final to the NRC PM.

12.3-12.4 Radiation Protection Design Features

Background

Nuclear facilities are designed to minimize occupational exposure due to normal operation, anticipated operational occurrences and accident conditions. Radiation zones are identified for control of access to radiation areas. Radiation sources are identified and shielding is designed to protect personnel from radiation sources. Radiation monitoring instrumentation is provided to measure radiation hazards and implement appropriate controls.

The contractor shall review the applicant's safety analysis report (SAR) for an operating license (OL), design certification (DC), or combined license (COL), as described in Standard Review Plan (SRP) 12.3-12.4, "Radiation Protection Design Features." The review of radiation protection design features will take into account design dose rates, anticipated operational occurrences, and accident conditions. The areas of this review are facility design features, shielding, ventilation, area radiation and airborne radioactivity monitoring systems, dose assessment, and inspections, tests, analysis, and acceptance criteria (ITAAC). The review shall be conducted using the process described in SRP Section 12.3-12.4, including: areas of reviews, review interfaces, acceptance criteria, technical rationale, review procedures, and evaluation findings. For the evaluation of radiation protection design features, the reviewer shall consider regulatory requirements and guidance listed in SRP Section 12.3-12.4, documents listed as references in SRP Section 11.3, and other documents and industry standards cited by the COL applicant. The review and determination of acceptance will be based on the identified SRP Section 12.3-12.4 acceptance criteria. For deviations from these acceptance criteria, the reviewer shall assess the applicant's alternate approach of how the proposed alternatives provide an acceptable method of complying with the relevant NRC requirements and guidance identified in Subsection II of Section 12.3-12.4 of the SRP.

Subtask 1: Facility Design

Review and assess that the facility design is in compliance with SRP Acceptance Criteria 1. Areas of this review include:

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- a. Design features for assuring that occupational radiation exposures (ORE) are maintained as low as is reasonably achievable (ALARA).
- b. Radiation zone designations as they relate to normal operational (including anticipated abnormal operational occurrences), refueling and accident conditions.
- c. Facility layout, including the location of all radiation sources and pertinent design details, and the specification of shield wall thickness of all shielding provided.
- d. Information describing the implementation of Regulatory Guide (RG) 8.8 or proposed alternatives on facility equipment design and layout.
- e. Information describing design features that will facilitate eventual decommissioning, and minimize, to the extent practical, contamination of the facility and the environment and the generation of radioactive waste, as required by 10 CFR 20.1406.

Subtask 2: Shielding

Review and assess that the shielding design assumptions are in compliance with SRP Acceptance Criteria 2. Areas of this review include:

- a. Design of shielding for each radiation source identified, including the design criteria and shielding material used for penetrations and for attenuation of neutron streaming from the annulus between the reactor pressure vessel and the biological shield.
- b. Methods by which the shield parameters were determined, including codes, assumptions and techniques.
- c. Special protective features that use shielding, geometric arrangement or remote handling to ensure that the ORE will be maintained ALARA.
- d. Implementation of RG 1.69 and 8.8 or proposed alternatives with respect to special protective features.
- e. Descriptions and location of areas (including a description of access to and egress from these areas) that personnel may need to access following an accident.
- f. Physical layout and composition of structures and walls that provide shielding for and barriers that control access to high and very high radiation areas.

Subtask 3: Ventilation

Review and assess that the ventilation systems are in compliance with SRP Acceptance Criteria 3. Areas of this review include:

- a. Personnel radiation protection features (including illustrative examples) incorporated in to the ventilation system called for by RG1.70 or 1.206, as applicable.
- b. Information describing the application of RG 1.52 and 8.8 or any proposed alternatives.

Subtask 4: Area Radiation and Airborne Radioactivity Monitoring Systems

Review and assess that area radiation monitoring systems are in compliance with SRP Acceptance Criteria 4. Areas of this review include:

- a. Fixed area radiation and airborne radioactivity monitoring instrumentation for normal operation, anticipated operational occurrences, and accident conditions, including the criteria for placement.
- b. Criteria and method for obtaining representative in-plant airborne radioactivity concentrations in the work area.
- c. Procedures for locating suspected high-activity areas.
- d. Implementation of radiation measuring equipment criteria listed in RG 8.2, 8.8, 8.25, and 1.97 and American National Standards Institute (ANSI) 13.1-1999 or proposed alternatives.
- e. In-containment high-range radiation monitoring capability following an accident.
- f. Portable instrumentation to determine airborne iodine contamination following an accident.
- g. Locations for fixed radiation monitors.
- h. Radiation monitors where special nuclear material is handled or stored.

Subtask 5: Dose Assessment

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Review and assess information provided on dose assessment is in compliance with SRP Acceptance Criteria 5. Areas of this review include:

- a. Basis for the dose assessment process, providing detailed information as to the expected occupancy of the plant radiation areas, and the annual person-Sievert (person-rem) doses associated with major functions, such as operation, radwaste handling, normal maintenance, special maintenance, refueling and inservice inspection.
- b. Any additional dose-reducing measures taken as a result of the dose assessment process.

Subtask 6: Inspections, Tests, Analyses, and Acceptance Criteria (ITAAC)

Review and assess that the applicant's proposed ITAAC associated with radiation design features, shielding, and radiation monitoring equipment are in accordance with SRP Section 14.3, "Inspections, Tests, Analyses, and Acceptance Criteria."

Subtask 7: Acceptance Criteria

The contractor shall verify that the applicant has provided sufficient information and shall conduct a review and appropriate calculations that support the conclusion that the applicant has met the following relevant requirements of the commission's regulations, including:

- a. 10 CFR 20.1101(b) and the definition of ALARA in 10 CFR 20.1003, as they relate to persons involved in licensed activities making every reasonable effort to maintain radiation exposures ALARA.
- b. 10 CFR 20.1201, as it relates to occupational dose limits for adults.
- c. 10 CFR 20.1201, 10 CFR 20.1202, 10 CFR 20.1203, 10 CFR 20.1204, 10 CFR 20.1701, and 10 CFR 20.1702, as they relate to design features, ventilation, monitoring, and dose assessment for controlling the intake of radioactive materials.
- d. 10 CFR 20.1301 and 10 CFR 20.1302, as they relate to the facility design features that impact the radiation exposure to a member of the public from non-effluent sources associated with normal operations and anticipated operational occurrences.
- e. 10 CFR 20.1406, as it relates to the design features that will facilitate eventual decommissioning and minimize, to the extent practicable, the contamination of the facility and the generation of radioactive waste.
- f. 10 CFR 20.1601, 10 CFR 20.1602, 10 CFR 20.1901, 10 CFR 20.1902, 10 CFR 20.1903, and 10 CFR 20.1904, as they relate to the identification of potential sources of radiation exposure and the controls of access to and work within areas of the facility with a high potential for radiation exposure.
- g. 10 CFR 20.1801, as it relates to securing licensed materials against unauthorized removal from the place of storage.
- h. General Design Criterion (GDC) 19, found in Appendix A to 10 CFR Part 50, as it relates to the provision of adequate radiation protection to permit access to areas necessary for occupancy after an accident, without personnel receiving radiation exposures in excess of 50 millisievert (mSv) (5 rem) to the whole body or the equivalent to any part of the whole body for the duration of the accident in accordance with 10 CFR 50.34(f) (vii).
- i. GDC 61, as it relates to occupational radiation protection aspects of fuel storage, handling, radioactive waste, and other systems that may contain radioactivity, designed to ensure adequate safety during normal and postulated accident conditions, with suitable shielding and appropriate containment and filtering systems.
- j. GDC 63, as it relates to detecting excessive radiation levels in the facility.
- k. 10 CFR 50.68, as it relates to procedures and criteria for radiation monitoring in areas where special nuclear material is stored and handled.
- l. 10 CFR 52.47 (b)(1) and 10 CFR 52.80(a) which require that the DC and COL application, respectively, contain the proposed inspections, tests, and analyses (ITAAC) necessary and sufficient to ensure that the facility has been constructed and will operate in conformity with the combined license, the provisions of the Atomic Energy Act, and the NRC's regulations.

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See Part II of SRP Section 12.3-12.4, Acceptance Criteria, Requirements, for relevant requirements.

Subtask 8: Request for Additional Information and Draft Technical Evaluation Report

Upon completion of the review, the reviewer will prepare a series of draft questions for the applicant as input to a formal Request for Additional Information (RAI) for all identified issues and aspects of the application that need additional or clarifying information in supporting the necessary conclusions required under SRP Section 12.3-4. Each RAI:

- (1) will be assigned a sequential number that includes the section of the COL application, such as RAI 12.3-4.3-12, where -12 represents the 12th RAI in a series of RAIs on Chapter 12.3-4.3,
- (2) will identify the reviewer by name and organization, and
- (3) will present a concise technical summary that identifies the issue identified by the reviewer and state the type of information or clarification that is being requested of the applicant for incorporation in the SAR.

The RAIs will be compiled and submitted as draft to the NRC PM identified for that chapter of the SAR. The reviewer will address and incorporate any NRC comments on the RIAs and resubmit them as final to the NRC PM. The NRC will transmit all RAIs to the applicant. Depending on the topical issue, the disposition of specific RAIs may require the conduct of site inspections or audits and the NRC may request the presence of the reviewer during such visits. Such arrangements will be made and coordinated by the NRC PM identified for that chapter of the SAR.

The NRC will forward all RAI responses from the COL applicant to the reviewer for evaluation. If the response of the RAI is acceptable in addressing the issue, the RAI will be closed and tracked as a confirmatory item until all proposed changes stated in the RAI are included in the next revision of the SAR. If the response of any RAI is not acceptable, a supplemental RAI will be generated and the RAI will be identified as an open item, and will remain open until the issue has been fully resolved.

Once the reviewer verifies that the applicant has responded to all RAIs, incorporated them in the appropriate revision of the SAR chapter, and that the SAR complies with all relevant regulatory requirements, the reviewer shall prepare a draft SER (with open items) and a draft final SER, and document the bases for concluding that the applicant has provided sufficient information and details in demonstrating compliance with NRC regulations. See specific details under SRP Section 12.3-4, "Evaluation Findings." The draft SER will be submitted to the NRC PM identified for that chapter of the SAR. The reviewer will address and incorporate any NRC comments on the SER and resubmit it as final to the NRC PM.

12.5 Operational Radiation Protection Program

Background

The operation radiation protection program includes the organization; the equipment, instrumentation and facilities; the procedures and the program description used in implementing all aspects of radiation protection at the plant.

The purpose of the program is to maintain occupational radiation exposures (ORE) as low as is reasonable achievable (ALARA), protect personnel from surface and airborne contamination, and maintain control over radioactive materials and radwaste.

The contractor shall review the applicant's safety analysis report (SAR) for an operating license (OL), design certification (DC), or combined license (COL), as it relates to operational aspects of radiation protection program as described in SRP 12.5, "Operational Radiation Protection Plan." The review of the operational radiation protection program will include the applicant's proposed radiation protection

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organization, procedures, and operational program description and implementation. Additionally, the review will include equipment, instrumentation, and facilities as they relate to radiation protection. The review shall be conducted using the process described in SRP Section 12.5, including: areas of reviews, review interfaces, acceptance criteria, technical rationale, review procedures, and evaluation findings. For the evaluation of the operational radiation protection program, the reviewer shall consider regulatory requirements and guidance listed in SRP Section 12.5, supporting technical requirements identified under Review Interfaces of SRP Section 12.5, documents listed as references in SRP Section 12.5, and other documents and industry standards cited by the COL applicant. The review and determination of acceptance will be based on the identified SRP Section 12.5 acceptance criteria, or submitted either as complete operational programs, by reference to NRC-approved templates, or via endorsement of existing operational programs at a site with collocated operating plants. For deviations from these acceptance criteria, the reviewer shall assess the applicant's alternate approach of how the proposed alternatives provide an acceptable method of complying with the relevant NRC requirements and guidance identified in Subsection II of Section 12.5 of the SRP.

Subtask 1: Organization and Programs

Review and assess that the operational description and implementation are in accordance with SRP Acceptance Criteria 4. Additionally, review and assess to ensure that information in the applicant's proposed organization is in compliance with SRP Acceptance Criteria 1. Areas of this review include:

- a. Administrative organization of the radiation protection program, including authority and responsibilities of each position identified.
- b. Experience and qualifications of personnel responsible for conducting various aspects of the radiation protection program, and for handling and monitoring radioactive material.
- c. Implementation of Regulatory Guides (RGs) 1.8, 8.2, 8.8, and 8.10 or proposed alternatives.
- d. Qualifications, experience and organization related to the operational radiation protection program (coordinated with the general review of staffing).
- e. Authority and responsibility of the management and staff responsible for implementation and documentation of radiation protection reviews required by 10 CFR 20.

Subtask 2: Equipment, Instrumentation, and Facilities

Review and assess that sampling and analysis capabilities, radiochemistry laboratory, instruments for measuring radiation or radioactivity, personnel monitoring instruments, personnel protection equipment, radiation protection support facilities or areas, and special shields and equipment are in compliance with SRP Acceptance Criteria 2. Areas of this review include:

- a. Criteria for selecting portable and laboratory instrumentation (including audible-alarming dosimeters) for normal operation, anticipated operational occurrences, and accident conditions:
 - i. performing radiation and contamination surveys
 - ii. in-plant airborne radioactivity monitoring and sampling
 - iii. area radiation monitoring
 - iv. personnel monitoring
- b. Instrument storage, calibration and maintenance facilities.
- c. Description and location of radiation protection facilities, including locker and shower rooms, personnel decontamination area, respiratory protection equipment, "hot" machine shop and repair facilities, use of close-capture filtration devices, and other contamination control equipment and areas; and descriptions of how such facilities and services will allow male and female workers to receive the necessary protection against radioactive contamination.
- d. Location of items in a.i through a.iv above and a description of the types of detectors and monitors, sensitivity, range, calibration frequency, alarms, and record-keeping, and methods of calibration.
- e. Implementation of the facilities and equipment included in RGs 1.97, 8.4, 8.6, 8.8, 8.9, 8.15, 8.20, 8.26, and 8.28, including proposed alternatives.

Subtask 3: Procedures

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The contractor shall verify procedures comply with specific SRP Acceptance Criteria 3. Areas of the review include:

- a. Physical and administrative methods for controlling access to, and work within, radiation areas, high-radiation areas, and very-high-radiation areas.
- b. Accountability and storage of radiation sources not fixed or installed in plant equipment.
- c. Methods of operation to ensure that ORE will be maintained ALARA, especially for refueling; in-service inspections; rad-waste handling; spent fuel handling, loading and shipping; normal operation; routine maintenance; and sampling and calibration related to radiation safety.
- d. Methods, frequencies, and procedures for conducting radiation surveys.
- e. Bases and methods for monitoring and control of surface contamination (including loose discrete radioactive particles) for personnel and equipment, including a surveillance program to ensure that licensed materials will not be inadvertently released from the controlled area.
- f. Engineering controls for limiting airborne radioactivity, as well as methods and procedures for evaluating and controlling potential airborne radioactivity concentrations, special air sampling, and the issue and use of respiratory protection equipment.
- g. Radiation protection training and retraining programs.
- h. Implementation of Regulatory Guides 1.8, 1.39, 8.2, 8.7, 8.8, 8.9, 8.10, 8.13, 8.15, 8.20, 8.25, 8.26, 8.27, 8.29, 8.32, 8.34, 8.35, 8.36, and 8.38, or proposed alternatives.
- i. Implementation of quality assurance program as it relates to the radiation protection program, especially with respect to RG 1.33.
- j. Procedures covering the packaging and transportation of licensed radioactive materials, and the transfer of low-level radioactive waste.

Subtask 4: Inspections, Tests, Analyses, and Acceptance Criteria (ITAAC)

Review and assess that the applicant's proposed ITAAC associated with radiation protection facilities and equipment are in accordance with SRP Section 14.3, "Inspections, Tests, Analyses, and Acceptance Criteria."

Subtask 5: Acceptance Criteria Requirements

Verify that the applicant has provided sufficient information and shall conduct a review and appropriate calculations that support the conclusion that the applicant has met all relevant requirements, including:

- d. 10 CFR 19.12, as it relates to keeping workers who receive ORE informed and properly instructed.
- e. 10 CFR 20.1101, as it relates to the radiation protection program and ALARA.
- f. 10 CFR 20.1201, 10 CFR 20.1202, 10 CFR 20.1203, and 10 CFR 20.1204, as they relate to dose limits.
- g. 10 CFR 20.1206 and 10 CFR 20.2105, as they relate to the authorization, control, and documentation of planned special exposures to adult workers.
- h. 10 CFR 20.1207, as it relates to control of occupational radiation doses received by minors.
- i. 10 CFR 20.1208, as it relates to control of radiation doses received by the embryo/fetus of a declared pregnant worker.
- j. 10 CFR 20.1301 and 10 CFR 20.1302, as they relate to controlling radiation doses to individual members of the public and the maximum dose rate in unrestricted areas.
- k. 10 CFR 20.1406, as it relates to the facility design and procedures for operation of the plant for minimizing contamination of the facility site.
- l. 10 CFR 20.1501, as it relates to performance of surveys to comply with the regulations in 10 CFR Part 20.
- m. 10 CFR 20.1501(c) and 10 CFR 20.1502, as they relate to requirements for providing appropriate personnel monitoring equipment.
- n. 10 CFR 20.1601, 10 CFR 20.1602, 10 CFR 20.1901, 10 CFR 20.1902, 10 CFR 20.1903, 10 CFR 20.1904, and 10 CFR 20.1905, as they relate to posting of, and control of access to, radiation areas, high radiation areas, very high radiation areas, and airborne radioactivity areas.

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- o. 10 CFR 20.1701 and 10 CFR 20.1702, as they relate to controlling the concentrations and limiting the intake of radioactive materials in the air.
- p. 10 CFR 20.1703, as it relates to the use of respiratory protective equipment to limit the intake of radioactive material.
- q. 10 CFR 20.1906, as it relates to appropriate handling of packages containing certain quantities of radioactive materials.
- r. 10 CFR 20.1801, as it relates to securing licensed materials against unauthorized removal from the place of storage.
- s. 10 CFR 20.1802, as it relates to controlling licensed material that is not in storage. 10 CFR 20.2001 and 10 CFR 20.2006; as they relate to the transfer of radioactive materials and the disposal of low-level radioactive waste.
- t. 10 CFR 20.2101, 10 CFR 20.2102, 10 CFR 20.2103, 10 CFR 20.2104, 10 CFR 20.2105, 10 CFR 20.2106, 10 CFR 20.2107, and 10 CFR 20.2110, as they relate to maintaining records of individuals who are provided with personnel monitoring equipment and who are exposed to radiation, and records of the radiation protection program, including surveys.
- u. 10 CFR 20.2201, as it relates to reports to the NRC required from licensees immediately after they become aware of any loss or theft of certain quantities of licensed material.
- v. 10 CFR 20.2202, 10 CFR 20.2203, 10 CFR 20.2204, and 10 CFR 20.2205, as they relate to requirements for reports to the NRC concerning individual exposures that exceed regulatory limits, incidents requiring notification, levels of radiation or concentrations of radioactive materials in excess of certain values, and planned special exposures.
- w. 10 CFR 20.2206 and 10 CFR 19.13, as they relate to requirements for informing workers of the results of their individual monitoring.
- x. 10 CFR 50.34(f) (2) (viii) and 10 CFR 50.34(f) (2) (xxvii) 1, as they relate to monitoring of inplant radiation and airborne radioactivity for routine and accident conditions. Refer also to NUREG-0737, items II.B.3 and III.D.3.3, for additional detail and clarification of requirements.
- y. 10 CFR 50.120, as it relates to the provisions and requirements for training radiation protection technicians.
- z. General Design Criterion (GDC) 64 found in Appendix A to 10 CFR Part 50, as it relates to the provision of appropriate monitoring for the reactor containment atmosphere and spaces containing components for the recirculation of loss-of-coolant-accident fluids.
- aa. Appendix B to 10 CFR Part 50 and Subpart H of 10 CFR Part 71, as they relate to quality assurance programs.
- bb. 10 CFR 71.5 and Subpart G of 10 CFR Part 71, as they relate to the control of licensed radioactive material during packaging and transportation, as well as Subpart K of 10 CFR Part 20, as it relates to the transfer of low-level radioactive materials and waste.

See Part II of SRP Section 12.5, Acceptance Criteria, Requirements, for relevant requirements.

Subtask 6: Request for Additional Information and Draft Technical Evaluation Report

Upon completion of the review, the reviewer will prepare a series of draft questions for the applicant as input to a formal Request for Additional Information (RAI) for all identified issues and aspects of the application that need additional or clarifying information in supporting the necessary conclusions required under SRP Section 12.5. Each RAI:

- (1) will be assigned a sequential number that includes the section of the COL application, such as RAI 12.5.3-12, where -12 represents the 12th RAI in a series of RAIs on Chapter 12.5.3,
- (2) will identify the reviewer by name and organization, and
- (3) will present a concise technical summary that identifies the issue identified by the reviewer and state the type of information or clarification that is being requested of the applicant for incorporation in the SAR.

The RAIs will be compiled and submitted as draft to the NRC PM identified for that chapter of the SAR. The reviewer will address and incorporate any NRC comments on the RIAs and resubmit them as final to

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the NRC PM. The NRC will transmit all RAIs to the applicant. Depending on the topical issue, the disposition of specific RAIs may require the conduct of site inspections or audits and the NRC may request the presence of the reviewer during such visits. Such arrangements will be made and coordinated by the NRC PM identified for that chapter of the SAR.

The NRC will forward all RAI responses from the COL applicant to the reviewer for evaluation. If the response of the RAI is acceptable in addressing the issue, the RAI will be closed and tracked as a confirmatory item until all proposed changes stated in the RAI are included in the next revision of the SAR. If the response of any RAI is not acceptable, a supplemental RAI will be generated and the RAI will be identified as an open item, and will remain open until the issue has been fully resolved.

Once the reviewer verifies that the applicant has responded to all RAIs, incorporated them in the appropriate revision of the SAR chapter, and that the SAR complies with all relevant regulatory requirements, the reviewer shall prepare a draft SER (with open items) and a draft final SER, and document the bases for concluding that the applicant has provided sufficient information and details in demonstrating compliance with NRC regulations. See specific details under SRP Section 12.5, "Evaluation Findings." The draft SER will be submitted to the NRC PM identified for that chapter of the SAR. The reviewer will address and incorporate any NRC comments on the SER and resubmit it as final to the NRC PM.