

**ORDER FOR SUPPLIES OR SERVICES**

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

BPA NO.

1. DATE OF ORDER <b>AUG 11 2008</b>		2. CONTRACT NO. (if any) NRC-42-07-036		6. SHIP TO:	
3. ORDER NO. 0050		4. REQUISITION/REFERENCE NO. NRC-42-07-036(50) FFS: NRO 08 220		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		c. CITY Washington		d. STATE DC	e. ZIP CODE 20555
7. TO:		f. SHIP VIA			
a. NAME OF CONTRACTOR INFORMATION SYSTEMS LABORATORIES, INC ISL		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.			
d. CITY ROCKVILLE		e. STATE MD	f. ZIP CODE 20852		
9. ACCOUNTING AND APPROPRIATION DATA B&R:825-15-171-111; JC:Q4014; BOC 252A; 31X0200 Obligate: \$100,000 Contractor DUNS: 107928806		10. REQUISITIONING OFFICE NRO			
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 SMALIBUSINESS	
<input type="checkbox"/> g. SERVICE-DISABLED VETERAN-OWNED					
13. PLACE OF		14. GOVERNMENT B/L NO.		15. DELIVER TO F.O.B. POINT ON OR BEFORE (Date)	
a. INSPECTION		b. ACCEPTANCE		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.50 under Contract No. NRC-42-07-036  Title: "Review SRP Chapters 2.4.13, 11.1 - 11.5, and 14.3.7 for the Levy county SCOLA"  Period of Performance: 08/11/2008 - 02/10//2011 Estimated Reimbursable Cost: \$172,543 Fixed Fee:\$8,395 Total Cost Plus Fixed Fee:\$180,938  Funding in the amount of \$100,000 is provided  See Continuation Pages					

SEE BILLING INSTRUCTIONS ON REVERSE	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. 50)		c. CITY Washington		d. STATE DC	e. ZIP CODE 20555	17(h) TOTAL (Cont. pages)  17(i) GRAND TOTAL \$180,938
	22. UNITED STATES OF AMERICA BY (Signature)  <i>Kala Shankar</i>		23. NAME (Typed) Kala Shankar Contracting Officer TITLE: CONTRACTING/ORDERING OFFICER						

In accordance with Section G.4, Task Order Procedures, of Contract No. NRC-42-07-036, this definitizes Task Order No. 50. The effort shall be performed in accordance with the attached Statement of Work.

Task Order No. 50 shall be in effect from date of award through thirty months, with a cost ceiling of \$180,938. The amount of \$172,543 represents the estimated reimbursable costs, and the amount of \$8,395 represents the fixed fee.

The amount obligated by the Government with respect to this task order is \$100,000, of which \$95,238 represents the estimated reimbursable costs, and the amount of \$4,762 represents the fixed fee.

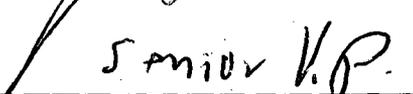
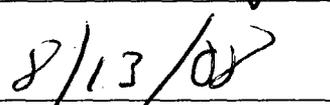
The issuance of this task order does not amend any terms or conditions of the subject contract.

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. 50 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  
  
\_\_\_\_\_  
TITLE  
  
\_\_\_\_\_  
DATE

## TASK ORDER STATEMENT OF WORK

JCN/Contract No. Q4014	Contractor ISL, Inc.	Task Order No. 50
Applicant Progress	Design/Site AP1000/Levy County	Docket No. Project No. 756
Title/Description Review SRP Chapters 2.4.13, 11.1 – 11.5, and 14.3.7 for the Levy County (AP1000) SCOL Application		
TAC No. RX0437	B&R Number 825-15-171-111	SRP Section(s) 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) Steven Schaffer, DCIP/CHPB (301) 415-1093 Steven.Schaffer@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. 50 under Contract No. NRC-42-07-036 to Information Systems Laboratories (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 Kala.Shankar@nrc.gov with a copy to the Technical Assistant Project Manager (TAPM), Richard.Daniel@nrc.gov and Technical Monitor (TM), Steven.Schaffer@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 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.

Early site permits (ESP), standard design certifications (DC) and combined operating license (COL) applications are submitted pursuant to Section 52 of Title 10 of the *Code of Federal Regulations* (10 CFR 52), "Early Site Permits; Standard Design Certifications; and Combined Licenses for Nuclear Power Plants." 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."

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 of 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," (ESRP) to provide guidance to the staff in performing environmental reviews of applications related 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 liquid, gaseous, and solid waste management systems described in the application. These systems deal with the treatment, storage, handling and disposal of radioactive waste solids, liquids and gases. The review of each waste management system includes the design, design objectives, design criteria, methods of treatment, expected releases, and methods and principal parameters used in calculating effluent source terms and releases of radioactive materials. The review includes system piping and instrumentation diagrams (P&IDs) and process flow diagrams showing methods of operation and factors that influence waste treatment (e.g., system interfaces and potential bypass routes to nonradioactive systems). In addition, the review entails estimating gaseous and liquid effluent releases and calculating offsite doses to the maximally exposed individual and surrounding populations in order to comply with 10 CFR 20.1301 and 1302, and Appendix I to 10 CFR 50. Finally, the process and effluent radiological monitoring and sampling systems (RMS) used to monitor liquid and gaseous process streams and effluents from the liquid waste management system (LWMS), gaseous waste management system (GWMS), and solid waste management system (SWMS), will be reviewed.

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 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:

### **2.4.13 Accidental Release of Radioactive Liquid Effluents**

Note: CHPB has secondary review responsibilities to hydro-geologic engineering Branch.

- 11.1 Radioactive Waste Source Terms – Design Basis and Normal Operation and AOOs  
Note: CHPB has secondary review responsibilities for normal operations and AOOs
- 11.2 Radioactive Liquid Waste Management Systems
- 11.3 Radioactive Gaseous Waste Management Systems
- 11.4 Radioactive Solid Waste Management Systems
- 11.5 Radioactive Waste Monitoring and Sampling
- 14.3.7 Plant Systems – Inspections, Tests, Analyses, and Acceptance Criteria (ITAAC)  
Note: CHPB has secondary review responsibilities to balance of plant Branch.

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: 11.2 – 11.5 and associated references. CHPB secondary review responsibilities: 1.8, 1.9, 2.3.5, 2.4.12, 2.4.13, 7.5, 9.2, 9.3, 9.4, 10.3, 10.4, 11.1, 13.1, 13.3, 13.4, 12.3-12.4, 14.2, 14.3.7, 16, 17, and associated references.</p> <p>STANDARD: Written confirmation that familiarization is complete. 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 and the scope of review of technical areas where CHPB has secondary review responsibilities.</p> <p>STANDARD: Attendance by individuals designated by NRC.</p>	<p>* 10 days after authorization of work</p>	<p>N/A</p>

Tasks/Standards	Scheduled Completion	Deliverables
<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>
<p>4. REQUIREMENT: Review the COL application sections 11.2 – 11.5 and, as needed, supporting COLA Sections 1.8, 1.9, 2.3.5, 2.4.12, 2.4.13, 7.5, 9.2, 9.3, 9.4, 10.3, 10.4, 11.1, 13.1, 13.3, 13.4, 12.3-12.4, 14.2, 14.3.7, 16, and 17.</p> <p>Review the COL application Sections 2.4.13, 11.1 through 11.5, and 14.3.7 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>

Tasks/Standards	Scheduled Completion	Deliverables
<p>6. <b>REQUIREMENT:</b> 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><b>STANDARD:</b> 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. <b>REQUIREMENT:</b> Prepare final supplement with no open items.</p> <p><b>STANDARD:</b> Supplement reviewed and approved by NRC staff.</p>	<p>10 days following ACRS review of supplement</p>	<p>Final supplement.</p>
<p>8a. <b>REQUIREMENT:</b> <i>(If applicable)</i> Prepare for and travel to the applicant's office and participate in an NRC review team to:</p> <p>a) Audit the application as described in the CQL for Levy County 3.</p> <p>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.</p> <p>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> <p><b>STANDARD:</b> Complete evaluation as defined in Task. Submit Trip Report within 2 weeks of site review.</p>	<p>*2 weeks after the trip</p>	<p>Trip Report</p>
<p>8b. <b>REQUIREMENT:</b> <i>(If applicable)</i> Prepare for and travel to the applicant's site and participate in the environmental site audit to:</p> <p>a) Identify and resolve any inconsistencies between the applicant's ER and FSAR with regard to the offsite dose resulting from effluents (ER section 4.5, 5.4, and FSAR Section 11)</p> <p><b>STANDARD:</b> Submit a Trip Report within 2 weeks of site audit.</p>	<p>*2 weeks after the trip</p>	

Tasks/Standards	Scheduled Completion	Deliverables
<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:

- Formal education, training, and experience in nuclear engineering, applied health physics, nuclear licensing, radiochemistry, or radiological engineering, and at least seven years direct nuclear power plant related experience.
- Knowledge of the design and performance characteristics which constitute an effective liquid and gaseous radioactive waste management system for radioactive materials produced during normal operation and anticipated operational occurrences. Including knowledge of those design features that are necessary for collecting, handling, and treatment of system process streams, and releasing and disposing of liquid and gaseous effluents, including but not limited to piping, pumps, valves, filters, demineralizers, mobile equipment connected to permanently installed systems, and any additional equipment that may be necessary to process and treat liquid wastes and route them to the point of discharge. Ability to assess types and characteristics of filtration, ion-exchange resins, and adsorbent media to treat process and effluent streams, including expected removal efficiencies, decontamination factors, and holdup or decay times.
- Ability to use, as applicable, PWR-GALE and BWR-GALE code to calculate effluent source terms and releases of radioactive materials in liquid and gaseous effluents, with given parameters and calculation techniques provided in NUREG-0016 or NUREG-0017 and Regulatory Guide 1.112, and ANSI/ANS 18.1-1999, including setting up analyses and data input, running the code, and providing associated reports describing results and interpretation of results. Ability to review alternate methods, other than the GALE

code or ANSI/ANS 18.1-1999, proposed by ESP/DCD/COL applicants in developing liquid and gaseous radioactive effluent source terms and assess whether the methods and results are acceptable and consistent with NRC guidance.

- Knowledge of the design and performance characteristics which constitute an effective gaseous radioactive waste management system for processing radioactive gases collected in off-gas systems (with charcoal delay beds) or waste gas storage and decay tanks. In addition, knowledge of how gaseous radioactive waste from the following sources is managed: condenser air removal system, steam generator blowdown flash tank (if applicable), and containment purge exhausts for PWRs; hydrogen and oxygen recombiners and instrumentation to control hydrogen and oxygen levels; gland seal exhaust and mechanical vacuum pump operation exhaust for BWRs; and building ventilation exhausts for both PWRs and BWRs. Ability to assess types and characteristics of filtration and adsorbent media to treat gaseous process and effluent streams, including expected removal efficiencies, decontamination factors, and holdup or decay times.
- Knowledge of how mobile equipment connected to permanently installed systems is used to reduce releases of radioactive materials in effluents from the sources described above. In particular, ability to read P&IDs and process flow diagrams showing methods of operation and factors that influence waste treatment (e.g. system interfaces and potential bypass routes for non radioactive systems) and engineering methods applied to avoid uncontrolled and unmonitored releases to the environment.
- Ability to perform dose calculations associated with liquid and gaseous effluents using NUREG/CR-4653 (GASPAR II code) and NUREG/CR-4013 (LADTAP II), including setting up analyses and data input, running code, and providing associated reports describing results, interpretation of results, and assessment of compliance with NRC regulations and guidance, including Regulatory Guides 1.109, 1.111, and 1.113. Ability to review alternate methods proposed by ESP/DCD/COL applicants in assessing doses from liquid and gaseous radioactive effluents and assess whether the methods and dose results are acceptable and consistent with NRC guidance.
- Knowledge of the design and performance characteristics of solid waste management systems (SWMS) designed for managing and processing liquid, wet, and dry solid radioactive wastes. Knowledge of those design features that are necessary for collecting, handling, processing, and storing wastes, such as piping, pumps, valves, mobile equipment connected to permanently installed systems, piping and instrumentation diagrams, process and effluent radiation monitoring and control instrumentation, process flow diagrams and any additional equipment that may be necessary to process and treat liquid, dry, and wet wastes and route them to the point of discharge from the SWMS or to prepare them for shipment to authorized offsite disposal sites or licensed radioactive waste processors.
- Ability to assess whether DCD/COL applicants have fulfilled the requirements of Section II.D of Appendix I to 10 CFR Part 50 with respect to meeting the ALARA criterion. The assessment considers the potential effectiveness of augmenting the proposed LWMS, GWMS, and SWMS using items of reasonably demonstrated technology and has determined that further waste treatment will not effect reductions in cumulative population doses reasonably expected within a 50-mile radius. Ability to review alternate methods, other than Regulatory Guide 1.110, proposed by DCD/COL applicants in

assessing whether the methods and cost-benefit analysis results are acceptable and consistent with NRC guidance.

- Knowledge of the process and effluent radiological monitoring and sampling systems (RMS) used to monitor liquid and gaseous process streams and effluents from the liquid waste management system (LWMS), gaseous waste management system (GWMS), and solid waste management system (SWMS). The RMS includes subsystems used to collect process and effluent samples during normal operation and anticipated operational occurrences and under post-accident conditions. Capability to assess the design objectives and criteria for the RMS, including the interface with skid-mounted radiation monitoring equipment connected to permanently installed systems. The assessment addresses (1) process and effluent streams to be monitored by radiation detection instrumentation or sampled for separate analyses, (2) purpose of each monitoring or sampling function, and (3) parameters to characterize, through monitoring instrumentation or sampling and analysis, radionuclide distributions and concentrations in sampled process and effluent streams (e.g., total gross beta-gamma or alpha activity, radionuclide-specific concentrations, isotopic, total radioactivity level, or groupings of radionuclides). Assess compliance with NRC regulations under 10 CFR Parts 20, 50.34a, and 50.36a; General Design Criteria 60, 63, and 64 of Appendix A to Part 50; related requirements of Part 50.34(f); requirements of Appendix I to Part 50; and 10 CFR Part 20 as it relates to allowable dose limits and effluent concentrations in unrestricted areas. Assess compliance with NRC guidance given in NUREG-1301, NUREG-1302, NUREG-0133, NUREG-0543, SRP Chapters 7.5, 11.5 and 16 of NUREG-0800, and Regulatory Guides 1.21, 1.33, 1.97, and 4.15; and ANSI/HPS N13.1-1999 and ANSI N42.18-2004. Ability to review alternate instrumentation equipment and monitoring methods proposed by DCD/COL applicants and assess whether equipment and methods are acceptable and consistent with NRC guidance.
- Demonstrate a working knowledge of NRC regulations and guidance, as they relate to characterizing, monitoring, controlling, and reporting of radioactive materials present in liquid and gaseous produced 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 Parts 50.34a and 50.36a; General Design Criteria of Appendix A to Part 50; related requirements of Part 50.34(f); requirements of Appendix I to Part 50; 10 CFR Part 20 as it relates to allowable dose limits and effluent concentrations in unrestricted areas; and 10 CFR Parts 20 and 61 as they relate to the characterization and shipment of low-level radioactive wastes for disposal or processing by waste brokers. Demonstrate a working knowledge or understanding of NRC regulations and guidance described in SRP Sections 11.1 to 11.5 (as primary responsibilities, NUREG-0800, March 2007), and Regulatory Guide 1.206.
- Ability to assess the scope, technical elements, and regulatory compliance of operational programs, including the ODCM, RETS/SREC, REMP, and PCP 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. . Assess whether these operational programs are consistent with surveillance requirements of plant's TS, administrative procedures, operational procedures, quality assurance and quality control program, radiological controls and monitoring program, and annual reporting requirements to the NRC. Assess compliance with NRC guidance given in NUREG-1301; NUREG-1302; NUREG-0133; NUREG-0543; SRP Chapters 11.4, 11.5, and 16 of NUREG-0800; and Regulatory Guides 1.21, 1.33, 1.97, and 4.15.

The contractor shall provide a 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 specialization to work in the proposed area. The use of particular personnel on this task order is subject to the NRC TM's approval and the resume for each shall be provided. 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, TAPM and CO.

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 Microsoft Word (2003) or other word compatible 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.:     ; the applicant: Progress Energy; and, the site: Levy County.

- A. 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.

- B. 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.
- C. 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.
- D. 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.
- E. 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, 2-day working meeting to kickoff project and contractor orientation (Task 2)
- 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 three will be face to face meetings)
- *(If required)* one, 2-person, 3-day trip to the applicant's facility (Task 8a)
- One, 2-person, 2-day working meeting at NRC headquarters to review deliverables.
- One, 1-person, 2-day meetings to participate in the Environmental Site Audit (task 8b)
- Two, 2-person, 2-day meetings, if needed, for hearing or ACRS meeting. (Task 8b)

At the discretion of the NRC TM, quarterly progress meetings may be conducted at the contractor's office 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 FY 2008 (hrs)	Level of Effort FY 2009 (hrs)	Level of Effort FY 2010 (hrs)
1	Health Physicist/ engineers / analysts	120	0	0
2	Health Physicist/ engineers / analysts	40	0	0
3	Health Physicist/ engineers / analysts	60	0	0
4	Health Physicist/ engineers / analysts	40	200	0
5	Health Physicist/ engineers / analysts	0	260	0
6	Health Physicist/ engineers / analysts	0	100	0
7	Health Physicist/ engineers / analysts	0	0	44
8	Health Physicist/ engineers / analysts	0	140	76
9	Project Manager	20	60	10
<b>Total</b>		<b>280</b>	<b>760</b>	<b>130</b>

## 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.
- The level of effort for Tasks 3 and 4 is based on the assumption that the contractor is familiar with the review procedures of the SRP Sections.
- The level of effort for Task 5 is based on the assumption that there will be 50 RAIs and it will take, on the average, 2.5 hours to review and address each response (about 125 hours).
- The level of effort for Task 6 is based on the need to resolve 20 open items and it will take, on the average, 4 hours to review and resolve each open item, and prepare an SER (about 80 hours).
- The level of effort for the visit to the applicant's site, if necessary, is based on one, two-person, three-day trip (including travel time) plus four days to prepare for the trip and to write the trip reports.
- The level of effort in Task 8b is based on requiring three, two-day trips to NRC headquarters.
- 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.

### **Attachments:**

1. Outline, format, and sample content for the TER (draft SER) Input. Sample Generic Safety Evaluation Report for AP1000 COL, chapter 11
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 11.1 – 11.5, for use with COLA sections which are not incorporated by reference from the RCOLA.

**SAMPLE GENERIC SAFETY EVALUATION REPORT  
FOR AP1000 COL  
CHAPTER 11**

**RADIOACTIVE WASTE MANAGEMENT**

This chapter of the application describes the capabilities of the plant to control, collect, handle, process, store, and dispose of liquid, gaseous, and solid wastes that may contain radioactive materials, and the instrumentation used to monitor and control the release of radioactive effluents and wastes. The information covers normal operation, including anticipated operational occurrences (AOO), e.g., refueling, purging, equipment downtime, maintenance. The proposed radioactive waste (radwaste) treatment systems should have the capability to meet the requirements of 10 CFR Part 20, 10 CFR Part 50, and the recommendations of appropriate regulatory guides concerning system design, control, and monitoring of releases, and to maintain releases of radioactive materials at the ALARA level in accordance with Appendix I, "Numerical Guides for Design Objectives and Limiting Conditions for Operation to Meet the Criterion 'As Low as is Reasonably Achievable' for Radioactive Material in Light-Water-Cooled Nuclear Power Reactor Effluents," to 10 CFR Part 50.

**11.1 Source Terms (Related to RG 1.206 Section 11.1, "SOURCE TERMS")**

**11.1.1 Introduction/Overview/General**

This section of the application addresses the radioactive source terms including consideration of parameters used to determine the concentration of each isotope in the reactor coolant, fraction of fission product activity released to the reactor coolant, and concentrations of all non-fission product radioactive isotopes in the reactor coolant. Gaseous and liquid waste sources are considered in the evaluation of effluent releases.

**11.1.2 Summary of Application**

The applicant incorporated by reference Section 11.1, "Source Terms," of the certified AP1000 DCD referenced in to 10 CFR Part 52, App D. No departures from the certified design were identified. The applicant provided information to address COL information in item 11.1.6 of the generic DCD.

- COL information item 11.1.x addresses plant specific source term information.

**11.1.3 Regulatory Basis**

N/A

**11.1.4 Technical Evaluation**

As documented in NUREG-1793, "Final Safety Evaluation Report Related to the Certification of the AP1000 Standard Design," the NRC staff reviewed and approved Section 11.1 of the generic DCD for the AP1000 design. The applicant took no exceptions to Section 11.1 of the generic DCD for the AP1000 design and there is no outstanding information item related to this section. . . .

**11.1.5 Post Combined License Activities**

TBD – NRC staff to provide further guidance

**11.1.6 Conclusion**

The staff finds that this area is addressed within the generic DCD and the related NRC FSER provided in NUREG-1793. The applicant has provided sufficient information to support issuance of a (license/permit).

**11.2 Liquid Waste Management Systems (RELATED TO RG 1.206 SECTION 11.2, "LIQUID WASTE MANAGEMENT SYSTEMS")****11.2.1 Introduction/Overview/General**

This section of the application addresses the design of liquid waste management system (LWMS) to ensure that liquids and liquid wastes produced during normal operation, including anticipated operational occurrences (AOO), are handled, processed, stored, and released or routed to their final destination in accordance with the relevant regulations.

**11.2.2 Summary of Application**

The applicant incorporated by reference Section 11.2, "Liquid Waste Management Systems," of the certified AP1000 DCD referenced in 10 CFR Part 52, App D. No departures from the certified design were identified. The applicant provided information to address COL information in items 11.2.3.3, 11.2.3.5, and 11.2.5.1 through 11.2.5.4 of the generic DCD.

- COL information items 11.2.3.3 addresses dilution flow.
- COL information items 11.2.3.5 addresses estimated doses.
- COL information items 11.2.5.1 addresses how any mobile or temporary equipment used for storing or processing liquid radwaste conforms to RG 1.143.
- COL information items 11.2.5.2 addresses cost benefit analyses of population doses per 10 CFR 50 Appendix I.
- COL information item 11.2.5.3 identifies the types of liquid waste ion exchange and adsorption media.
- COL information items 11.2.5.3 addresses dilution and control of boric acid discharges.

**11.2.3 Regulatory Basis**

The acceptance criteria from NUREG-0800, Section 11.2 are incorporated by reference to the generic DCD for the AP1000 design and NUREG-1793. COL information item 11.2.X is satisfied based on meeting the requirements and guidelines of 10 CFR 50, Appendix I, ANSI Std. N13.1, "Guide to Sampling Airborne Radioactive Materials in Nuclear Facilities," RG 1.21 "Measuring and Reporting Radioactivity in Solid Wastes and Releases of Radioactive Materials in Liquid and Gaseous Effluents from Light-Water-Cooled Nuclear Power Plants", and RG 4.15, "Quality Assurance for Radiological Monitoring Programs (Normal Operation)—Effluent Streams and the Environment."

**11.2.4 Technical Evaluation**

As documented in NUREG-1793, the NRC staff reviewed and approved Section 11.2 of the generic DCD for the AP1000 design. The applicant took no exceptions to Section 11.2 of the generic DCD for

the AP1000. The NRC staff's review of this application is limited to the COL information items 11.2.3.3, 11.2.3.5, and 11.2.5.1 to 11.2.5.4, regarding plant-specific liquid radwaste information. Specific information provided by the applicant to address the COL information item includes:

- (1) Compliance with 10 CFR 50 Appendix I and the guidelines given in ANSI Std. N13.1, RG 1.21, and RG 4.15
- (2) Mobile or temporary equipment used for storing or processing liquid radwaste conformance to RG 1.143.
- (3) Cost benefit analysis of population doses due to liquid effluents (compliance with 10CFR50, Appendix I).
- (4) Identification of Ion Exchange and Adsorbent Media
- (5) Dilution and Control of Boric Acid Discharge - Planned discharge flow rate and controls for limiting the boric acid concentration in the circulating water system blow-down.
- (6) Additional Liquid Radwaste Monitor Tanks and Radwaste Building Extension.

The NRC staff reviewed the applicant's proposal using the review procedures described in Section 11.2 of NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants."

#### Departures

The following departures were identified by the applicant and addressed in the application.

- STD DEP 11.2-1, "Mobile Systems"

The NRC staff reviewed the applicant's departures from the certified AP1000 design using the review procedures described in Section 11.2 of NUREG-0800.

#### **11.2.5 Post Combined License Activities**

TBD – NRC staff to provide further guidance

#### **11.2.6 Conclusion**

The staff finds that this area is addressed within the generic DCD and the related NRC FSER provided in NUREG-1793. The staff has compared the application to the relevant NRC regulations; acceptance criteria defined in NUREG-0800, Section 11.2, and other NRC regulatory guides and concludes that the applicant is in compliance with the NRC regulations. COL information items in sections 11.2.3 and 11.2.5 are adequately addressed by the applicant and can be considered closed. The applicant has provided sufficient information to support issuance of a (license/permit).

### **11.3 Gaseous Waste Management Systems (RELATED TO RG 1.206 SECTION 11.3, "GASEOUS WASTE MANAGEMENT SYSTEMS")**

#### **11.3.1 Introduction/Overview/General**

This section of the application addresses the gaseous waste management system (GWMS) including the gaseous radwaste system (GRS), which deals with the management of radioactive gases

collected in the off-gas system (this system contains charcoal delay beds) or the waste gas storage and decay tanks. In addition, it involves the management of control hydrogen and oxygen levels; gland seal exhaust and mechanical vacuum pump operation exhaust; and building ventilation system exhausts. The management for gaseous effluents to the environment from the above sources may, in turn, involve the use of mobile equipment connected to permanently installed systems to reduce releases of radioactive materials in effluents from the above sources.

### 11.3.2 Summary of Application

The applicant incorporated by reference Section 11.3, "Gaseous Waste Management Systems," of the certified AP1000 DCD referenced in 10 CFR Part 52, App D. No departures from the certified design were identified. The applicant provided information to address COL information item 11.3.5 of the generic DCD.

- COL information item 11.3.5.1 addresses cost benefit analysis issues of 10 CFR 50, Appendix I.
- COL information item 11.3.5.2 identifies the types of adsorbent media to be used in the gaseous radwaste system.

### 11.3.3 Regulatory Basis

The acceptance criteria from NUREG-0800, Section 11.3 are incorporated by reference to the generic DCD for the AP1000 design and NUREG-1793. COL information item 11.3.5 is satisfied based on meeting the requirements of 10 CFR 50, Appendix I.

### 11.3.4 Technical Evaluation

As documented in NUREG-1793, the NRC staff reviewed and approved Section 11.3 of the generic DCD for the AP1000 design. The applicant took no exceptions to Section 11.3 of the generic DCD for the AP1000. The NRC staff's review of this application is limited to the COL information item 11.3 regarding compliance with 10 CFR 50, Appendix I. Specific information provided by the applicant to address the COL information item includes:

(1) Cost benefit analysis of population doses due to gaseous effluents (compliance with 10CFR50, Appendix I).

(2) Identification of adsorbent media.

The NRC staff reviewed the applicant's proposal using the review procedures described in Section 11.3 of NUREG-0800. . . .

#### Departures

The following departures were identified by the applicant and addressed in the application.

- STD DEP 11.3-1, "Mobile Systems"

The NRC staff reviewed the applicant's departures from the certified AP1000 design using the review procedures described in Section 11.3 of NUREG-0800. . . .

### 11.3.5 Post Combined License Activities

TBD – NRC staff to provide further guidance

### 11.3.6 Conclusion

The staff finds that this area is addressed within the generic DCD and the related NRC FSER provided in NUREG-1793. The staff has compared the application to the relevant NRC regulations; acceptance criteria defined in NUREG-0800, Section 11.3, and other NRC regulatory guides and concludes that the applicant is in compliance with the NRC regulations. COL information item 11.3 is adequately addressed by the applicant and can be considered closed. The applicant has provided sufficient information to support issuance of a (license/permit).

## 11.4 Solid Waste Management Systems (RELATED TO RG 1.206 SECTION 6.2.2, "SOLID WASTE MANAGEMENT SYSTEMS")

### 11.4.1 Introduction/Overview/General

This section of the application addresses how the solid waste management system (SWMS) manages radioactive wastes, as liquid, wet, and dry solid wastes, produced during normal operation and AOO. The review includes an evaluation of any additional equipment that may be necessary to process liquid, dry, and wet wastes and route them to the point of discharge from the SWMS or to prepare them for shipment to authorized offsite disposal sites or licensed radioactive waste processors.

### 11.4.2 Summary of Application

The applicant incorporated by reference Section 11.4, "Solid Waste Management Systems" of the certified AP1000 DCD referenced in 10 CFR Part 52, App D. No departures from the certified design were identified. The applicant provided information to address COL information item 11.3 from the generic DCD.

- COL information item 11.4.6 addresses plant-specific solid radwaste process control program.

### 11.4.3 Regulatory Basis

The acceptance criteria from NUREG-0800, Section 11.4 are incorporated by reference to the generic DCD for the AP1000 design and NUREG-1793. COL information item 11.4 is satisfied based on meeting the requirements and guidelines of \_\_\_\_\_.

### 11.4.4 Technical Evaluation

As documented in NUREG-1793, the NRC staff reviewed and approved Section 11.4 of the generic DCD for the AP1000 design. The applicant took no exceptions to Section 11.4 of the generic DCD for the AP1000. The NRC staff's review of this application is limited to the COL information item 11.4.6 regarding plant specific solid radwaste information. Specific information provided by the applicant to address the COL information item includes:

- (1) A description of the solid waste management system process control program for both wet and dry solid wastes.
- (2) Interim acceptance criteria for solidification agents for radioactive solid wastes.

The NRC staff reviewed the applicant's proposal using the review procedures described in Section 11.4 of NUREG-0800.

#### 11.4.5 Post Combined License Activities

TBD – NRC staff to provide further guidance

#### 11.4.6 Conclusion

The staff finds that this area is addressed within the generic DCD and the related NRC FSER provided in NUREG-1793. The staff has compared the application to the relevant NRC regulations; acceptance criteria defined in NUREG-0800, Section 11.4, and other NRC regulatory guides and concludes that the applicant is in compliance with the NRC regulations. COL information item 11.4.6 is adequately addressed by the applicant and can be considered closed. The applicant has provided sufficient information to support issuance of a (license/permit).

### 11.5 Process and Effluent Radiological Monitoring and Sampling Systems (RELATED TO RG 1.206 SECTION 11.5, "PROCESS AND EFFLUENT RADIOLOGICAL MONITORING AND SAMPLING SYSTEMS")

#### 11.5.1 Introduction/Overview/General

This section of the application addresses how the process and effluent radiological monitoring and sampling systems (RMS) are used to monitor liquid and gaseous process streams and effluents from the liquid waste management system (LWMS), gaseous waste management system (GWMS), and solid waste management system (SWMS). The RMS includes subsystems used to collect process and effluent samples during normal operation and AOO and under post-accident conditions.

#### 11.5.2 Summary of Application

- The applicant incorporated by reference Section 11.5, "Process and Effluent Radiological Monitoring and Sampling Systems," of the certified AP1000 DCD referenced in 10 CFR Part 52, App D. No departures from the certified design were identified. The applicant provided information to address COL information item 11.5.7 from the generic DCD.
- COL information item 11.5.7 addresses calculation of offsite doses consistent with the Offsite Dose Calculation Manual (ODCM), 10 CFR 50 Appendix I, Regulatory Guides 1.21 and 4.15, and ANSI N13.1, and the process control program.

#### 11.5.3 Regulatory Basis

The acceptance criteria from NUREG-0800, Section 11.5 are incorporated by reference to the generic DCD for the AP1000 design and NUREG-1793. COL information item 11.5.7 is satisfied based on meeting the guidelines of \_\_\_\_\_.

#### 11.5.4 Technical Evaluation

As documented in NUREG-1793, the NRC staff reviewed and approved Section 11.5 of the generic DCD for the AP1000 design. The applicant took no exceptions to Section 11.5 of the generic DCD for the AP1000. The NRC staff's review of this application is limited to COL information item 11.5.7 from the

generic DCD. Specific information provided by the applicant to address the COL information items includes:

(1) A description of the Plant Offsite Dose Calculation Manual (ODCM)

The COL applicant described the ODCM, including; an overview of the methodology and parameters used for calculation of offsite doses resulting from gaseous and liquid effluents, planned discharge flow rates, and operational setpoints / performance criteria for the radiation monitors and programs for monitoring and controlling the release of radioactive material to the environment, to eliminate the potential for unmonitored and uncontrolled release.

(2) A description of the Process Control Program

The COL applicant provided for review the site-specific and program aspects of the process and effluent monitoring and sampling per ANSI N13.1 and Regulatory Guides 1.21 and 4.15, including: Process Control Program (PCP), Radiological Effluent Technical Specifications/ Standard Radiological Effluent Controls (RETS/SREC), Offsite Dose Calculation manual (ODCM) and Radiological Environmental Monitoring Program (REMP).

(3) 10 CFR 50 Appendix I issues with regard to maximally exposed offsite individual doses and population doses attributable to liquid and gaseous effluents.

The COL applicant provided for review their determinations relative to 10 CFR 50, Appendix I guidelines for maximally exposed offsite individual doses and population doses via liquid and gaseous effluents.

The NRC staff reviewed the applicant's proposal using the review procedures described in Section 11.5 of NUREG-0800 . . .

#### **11.5.5 Post Combined License Activities**

TBD – NRC staff to provide further guidance

#### **11.5.6 Conclusion**

The staff finds that this area is addressed within the generic DCD and the related NRC FSER provided in NUREG-1793. The staff has compared the application to the relevant NRC regulations; acceptance criteria defined in NUREG-0800, Section 11.5, and other NRC regulatory guides and concludes that the applicant is in compliance with the NRC regulations. COL information item 11.5.7 is adequately addressed by the applicant and can be considered closed. The applicant has provided sufficient information to support issuance of a (license/permit).

**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 the section address the intent/requirement of 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.

## Attachment 2

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

## **Chapter 11.1 Source Terms**

To be determined – limited to support of sections 11.2 through 11.5.

## **Chapter 11.2 Liquid Waste Systems Background**

The liquid waste management system (LWMS) is designed to ensure that liquids and liquid wastes produced during normal operation, including anticipated operational occurrences are handled, processed, stored, and released to their final destination in accordance with the relevant regulations of the U.S. Nuclear Regulatory Commission (NRC). Review of the LWMS includes the design features that are necessary for collecting, handling, processing, releasing, and disposing of liquid effluents. This review encompasses, but is not limited to, piping, pumps, valves, filters, demineralizers, mobile equipment connected to permanently installed systems, in combination with any mobile liquid waste processing equipment, that may be necessary to process and treat liquid wastes and route them to the point of discharge or storage.

The review of the LWMS includes the design, design objectives, design criteria, methods of treatment, expected releases, and calculation methods and principal parameters used in calculated effluent source terms and releases of radioactive materials in liquid effluents, including system piping and instrument diagrams (P&IDs) and process flow diagrams showing methods of operation and factors that influence waste treatment, e.g., system interfaces and potential bypass routes to non-radioactive systems and potential unmonitored and uncontrolled releases.

The contractor shall review the applicant's final safety analysis report (SAR) for an operating license (OL), design certification (DC), or combined license (COL) as described in Standard Review Plan 11.2, "Liquid Waste Management System (LWMS)." The review shall be conducted using the process described in SRP Section 11.2, including: areas of reviews, review interfaces, acceptance criteria, technical rationale, review procedures, and evaluation findings. For the evaluation of the LWMS system design, the reviewer shall consider regulatory requirements and guidance listed in SRP Section 11.2, supporting technical requirements identified under Review Interfaces of SRP Section 11.2, documents listed as references in SRP Section 11.2, 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 11.2 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 11.2 of the SRP.

### **Subtask 1: System Design**

Review and assess the overall ability of the LWMS design to meet anticipated demands imposed by major processing equipment downtime and waste volume surges resulting from normal plant operation and anticipated operational occurrences. Review and assess LWMS design provisions, including equipment and facility design provisions for facilitating operation and maintenance, and provisions for reducing leakage of liquid waste or unintentional discharges of radioactive materials into liquid effluents for the purpose of avoiding uncontrolled and unmonitored releases to the environment. Review system design capacity relative to the design and expected input flows and the period of the time system is required to be in service to process normal waste flows. Review and assess the acceptability of the types and performance characteristics of filtration, ion-exchange resins, and adsorbent media, etc., to treat liquid process and effluent streams by types of processing or treatment methods, including expected removal efficiencies, decontamination factors, and holdup or decay times in maintaining process and effluent streams ALARA, and in controlling effluent releases to allowable concentration limits in unrestricted areas and dose limits to members of the public. Assess design features that would minimize, to the extent practicable, contamination of the facility and environment; facility eventual decommissioning; and minimize to the extent practicable the generation of radioactive waste. Review any system design features and operational procedures used to ensure that interconnections between plant systems and mobile processing equipment will avoid contamination of non-radioactive systems and uncontrolled

## Attachment 3

releases of radioactivity into the environment. Review provisions to prevent, control, and collect radioactive materials in liquids from tank overflows from all plant systems and the potential for the tanks located outside the reactor containment to result in uncontrolled, and unmonitored releases, and design features applied to mitigate the effects of a postulated tank failure. Review design and expected temperatures and pressures and materials of construction of the components of the LWMS. Review design provisions to preclude placing the components and structures of the system under adverse vacuum conditions. Quality group classifications of piping and equipment shall be reviewed, along with the bases governing the chosen design criteria, design and expected temperatures and pressures, and materials used to construct the system components. The definition of the boundary of the LWMS shall be reviewed for conformance with regulatory guidance, and for multi-unit stations, descriptions and design features of permanent or mobile equipment and components normally shared between interconnected processing and treatment subsystems should be evaluated.

### **Subtask 2: Source Term**

Review equipment system design capacities, expected flows, source terms and radionuclide concentrations developed for normal operations and anticipated operation occurrences. This evaluation involves a review of the information presented in SRP Section 11.1 and any supplemental information provided by the COL application as supporting bases. Review design features used to reduce the volume of liquid waste to the LWMS and reduce radioactivity levels and discharges of radioactive materials in liquid effluents. Review the types and performance characteristics of the filtration, ion-exchange resins, and adsorbent media used to treat liquid process and effluent streams, including expected removal efficiencies, decontamination factors, and holdup or decay times, against expected chemical and radiological properties of wastes to be treated by the LWMS systems. The above information shall be used to review and verify (by calculation) the source terms calculations conducted under SRP Section 11.1 for normal operation and anticipated operational occurrences. The reviewer shall consider incorporating the guidance and calculation methods provided by Regulatory Guide 1.112, NUREG-0016 (BWR-GALE code) or NUREG-0017 (PWR-GALE code) and the guidance provided in ANSI/ANS 18.1-1999, as well as other Section 11.2 reference documents, as appropriate. The reviewer shall determine whether the source terms forming the basis of normal operation and anticipated operational occurrences are acceptable in characterizing expected process streams and effluent releases. If the SAR includes models or parameters to estimate reactor coolant or steam radionuclide concentrations that differ from NRC guidance, the reviewer shall confirm that the assumptions, parameters, and calculations used by the applicant are substantiated and included in the COL application with sufficient details to conduct an independent evaluation.

### **Subtask 3: Analysis**

#### *Effluent Concentrations*

The reviewer shall verify that the annual average concentrations of radioactive materials released to unrestricted areas are within the limits specified in Table 2, Column 2, of Appendix B to 10 CFR Part 20 during normal operation, and anticipated occurrences. The reviewer shall confirm that all estimated effluent concentrations are based on plant design features (such as process and effluent flow rates and in-plant dilution factors), and site-specific features (such as the type of receiving water body and dilution factor beyond the point of discharge). See specific details under SRP Acceptance Criteria.

#### *Dose to Unrestricted Areas*

The reviewer shall verify that LWMS has the capability to meet the dose limits of 10 CFR Part 20.1301(a) and 20.1301(e), complies with Part 20.1302, and complies with the design objectives of Appendix I to 10 CFR Part 50, Section II.A. The guidance and calculation methods provided by Regulatory Guides 1.109 and 1.113 and computer codes, such as LADTAP II (NUREG/CR-4013) provide acceptable methods for performing this analysis. See details under Acceptance Criteria. If the SAR includes models or parameters to estimate doses that differ from NRC guidance, the reviewer shall confirm that the assumptions, parameters, and calculations used by the applicant are substantiated and included in the

## Attachment 3

COL application with sufficient details to conduct an independent evaluation.

### *Radwaste Cost-Benefit Analysis*

The reviewer shall determine, based on the applicants cost-benefit analysis that includes population cumulative dose calculations and cost-benefit studies, that the LWMS includes all items of reasonably demonstrated technology that can effect reductions in dose to the population. Regulatory Guide 1.110 provides an acceptable method of performing this analysis in determining compliance with the design objectives of Appendix I to 10 CFR Part 50, Sections II.A and II.D. See details under Acceptance Criteria. If the SAR includes models or parameters for a cost-benefit analysis that differ from NRC guidance, the reviewer shall confirm that the assumptions, parameters, and calculations used by the applicant are substantiated and included in the COL application with sufficient details to conduct an independent evaluation.

### *Branch Technical Position (BTP) 11-6*

The reviewer shall verify that LWMS is in conformance with the guidance provided in BTP 11.6, as it relates to potential releases of radioactive materials (liquid effluents) as a result of postulated leakage or failure of a waste liquid storage tank or its components. The reviewer shall rely on methods described in BTP 11-6 and the use of the PWR-GALE or BWR GALE code (NUREG-0016 or NUREG-0017) and Regulatory Guide 1.112 to perform the analysis. If the SAR includes models or parameters in evaluating the impacts of a radwaste tank failure that differ from NRC guidance, the reviewer shall confirm that the assumptions, parameters, and calculations used by the applicant are substantiated and included in the COL application with sufficient details to conduct an independent evaluation.

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

Review and access the applicant's proposed ITAAC associated with the structures, systems, and components (SSCs) related to this SRP section in accordance with SRP Section 14.3, "Inspections, Tests, Analyses, and Acceptance Criteria."

### **Subtask 5: Acceptance Criteria**

The reviewer shall verify that the applicant has provided sufficient information and that the review and calculations support the conclusion that the applicant has met the following relevant requirements of the commission's regulations:

General Design Criterion (GDC) 60 and 61 as they relate to the design of the LWMS to control releases of radioactive materials to the environment; and to control of radioactivity in fuel storage and handling areas.

10 CFR Part 50, Appendix I, Sections II.A and II.D, as they relate to the numerical guides for design objectives and limiting conditions for operation to meet the "as low as is reasonably achievable" criterion.

10 CFR Part 20.1302, as it relates to radioactivity in liquid effluents released to unrestricted areas, and Part 20.1406 as it relates to design and operational procedures for minimizing contamination, facilitating eventual decommissioning, and minimizing the generation of radioactive waste.

40 CFR Part 190, EPA's environmental radiation standards applicable to the entire fuel cycle, as it relates to limits on total annual doses from all sources of radioactivity and external radiation from the site (with single or multiple units).

10 CFR 50.34a, which requires that sufficient design information be provided to demonstrate effluents to unrestricted areas are kept as low as reasonably achievable.

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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.

### **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 11.2. Each RAI:

- (1) will be assigned a sequential number that includes the section of the COL application, such as RAI 11.2.3-12, where -12 represents the 12th RAI in a series of RAIs on Chapter 11.2.3,
- (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 RAIs 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.

The TER will summarize the work performed, results, findings and conclusions, and recommendations for RAIs. 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 TER and final TER. In part, the TER will form the bases for the staff to conclude that the applicant has provided sufficient information and details in demonstrating compliance with NRC regulations. The draft TER will be submitted to the NRC PM identified for that chapter of the SAR. The reviewer will address and incorporate NRC comments in the TER and resubmit it as final to the NRC PM. See specific details under SRP Section 11.2, "Evaluation Findings." See Section (later) of this SOW for specific details on the format and contents of TERs, and submission process to NRC staff.

### **Chapter 11.3 Gaseous Waste Systems**

#### **Background**

The gaseous waste management system (GWMS) involves the gaseous radwaste system (GRS), which deals with the management of radioactive gases collected in the off-gas system (this system contains charcoal delay beds) or the waste gas storage and decay tanks. In addition, it involves the management of a condenser air removal system, steam generator blow-down flash tank (if applicable), and containment purge exhausts for PWRs; hydrogen and oxygen recombiners and instrumentation to control hydrogen and oxygen levels and explosive gas mixtures; gland seal exhaust and mechanical vacuum

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pump operation exhaust for BWRs; and building ventilation system exhausts for both PWRs and BWRs. The management for gaseous effluents to the environment from the above sources may, in turn, involve the use of mobile equipment connected to permanently installed systems to reduce releases of radioactive materials in effluents from the above sources. The review of the GWMS includes the design, design objectives, design criteria, methods of treatment, expected releases, and methods and principal parameters used in calculating effluent source terms and releases of radioactive materials (noble gases, radioiodines, tritium, carbon-14, and particulates). SRP Section 12.3-12.4 considers the presence of N-16, as a noble gas, in assessing doses from external radiation from the turbine buildings of BWR plants. The review shall include system piping and instrumentation diagrams (P&IDs) and process flow diagrams showing methods of operation and factors that influence waste treatment (e.g., system interfaces and potential bypass routes to non-radioactive systems) and potential unmonitored and uncontrolled releases.

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 11.3, "Gaseous Waste Management System (GWMS)." The review shall be conducted using the process described in SRP Section 11.3, including: areas of reviews, review interfaces, acceptance criteria, technical rationale, review procedures, and evaluation findings. For the evaluation of the GWMS system design, the reviewer shall consider regulatory requirements and guidance listed in SRP Section 11.3, supporting technical requirements identified under Review Interfaces of SRP Section 11.3, 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 11.3 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 11.3 of the SRP.

### **Subtask 1: System Design**

Review and assess the overall ability of the GWMS design to meet anticipated demands imposed by major processing equipment downtime and anticipated operational occurrences. Review and assess GWMS design provisions, including equipment and facility design provisions for facilitating operation and maintenance, and provisions for reducing leakage of gaseous waste or unintentional discharges of radioactive materials into gaseous effluents in the environment. Review and assess the acceptability of the types and performance characteristics of filtration and adsorbent media to treat gaseous process and effluent streams by types of processing or treatment methods, including expected removal efficiencies, decontamination factors, and holdup or decay times in maintaining process and effluent streams ALARA, and in controlling effluent releases to allowable concentration limits in unrestricted areas and dose limits to members of the public. Confirm that the applicant complies with NRC and industry guidance on the installation, testing, and maintenance of filtration systems. Assess design features that would be used to minimize, to the extent practicable, contamination of the facility and environment; facility eventual decommissioning; and minimize to the extent practicable the generation of radioactive waste. Review any system design features and operational procedures used to ensure that interconnections between plant systems and mobile processing equipment will avoid contamination of non-radioactive systems and uncontrolled releases of radioactivity into the environment. Quality group classifications of piping and equipment shall be reviewed, along with the bases governing the chosen design criteria, design and expected temperatures and pressures, and materials used to construct the system components. Review and assess the adequacy of design features to preclude the possibility of, or control the effects of, an explosion if the potential for hydrogen and oxygen explosive mixtures exist in system components. The definition of the boundary of the GWMS shall be reviewed for conformance with regulatory guidance, and for multi-unit stations, descriptions and design features of permanent or mobile equipment and components normally shared between interconnected processing and treatment subsystems shall be evaluated.

### **Subtask 2: Source Term**

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Review equipment and ventilation system design capacities, expected flows, source terms and radionuclide concentrations developed for normal operations and anticipated operation occurrences. This evaluation involves a review of the information presented in SRP Section 11.1 and any supplemental information provided by the COL application as supporting bases. Review design features used to reduce the volume of gaseous waste to the GWMS and reduce radioactivity levels and discharges of radioactive materials in gaseous effluents. Review the types and performance characteristics of filtration and adsorbent media used to treat gaseous process and effluent streams, including expected removal efficiencies, decontamination factors, and holdup or decay times, against expected chemical and radiological properties of gaseous wastes to be treated by the GWMS systems. The above information shall be used to review and verify (by calculation) the source terms calculations conducted under SRP Section 11.1 for normal operation and anticipated operational occurrences.

The reviewer shall consider incorporating the guidance and calculation methods provided by Regulatory Guide 1.112, NUREG-0016 (BWR-GALE code) or NUREG-0017 (PWR-GALE code), and the guidance provided in ANSI/ANS 18.1-1999, as well as other Section 11.3 reference documents, as appropriate. The reviewer shall determine whether the source terms forming the basis of normal operation and anticipated operational occurrences are acceptable in characterizing expected process streams and effluent releases. If the SAR includes models or parameters to estimate reactor coolant or steam radionuclide concentrations that differ from NRC guidance, the reviewer shall confirm that the assumptions, parameters, and calculations used by the applicant are substantiated and included in the COL application with sufficient details to conduct an independent evaluation.

### **Subtask 3: Analysis**

#### *Effluent Concentrations*

The reviewer shall verify that the annual average concentrations of radioactive materials released to unrestricted areas are within the limits specified in Table 2, Column 1, of Appendix B to 10 CFR Part 20 during normal operation, and anticipated occurrences. The reviewer shall confirm that all estimated effluent radionuclide concentrations are based on plant design features (such as effluent treatment systems, exhaust flow rates, and types and numbers of vents and stacks), and site-specific features (such as distances to the EAB, locations of offsite dose receptors, and atmospheric dispersion and deposition factors for those locations). See specific details under SRP Acceptance Criteria

#### *Dose to Unrestricted Areas*

The reviewer shall verify that GWMS has the capability to meet the dose limits of 10 CFR Part 20.1301(a) and 20.1301(e), complies with Part 20.1302, and complies with the design objectives of Appendix I to 10 CFR Part 50, Sections II.B and II.C. The guidance and calculation methods provided by Regulatory Guides 1.109 and 1.111, and computer codes, such as GASPAR II (NUREG/CR-4653) provide acceptable methods for performing this analysis. See details under Acceptance Criteria. If the SAR includes models or parameters to estimate doses that differ from NRC guidance, the reviewer shall confirm that the assumptions, parameters, and calculations used by the applicant are substantiated and included in the COL application with sufficient details to conduct an independent evaluation.

#### *Radwaste Cost-Benefit Analysis*

The reviewer shall determine, based on the applicants cost-benefit analysis that includes population cumulative dose calculations and cost-benefit studies, that the GWMS includes all items of reasonably demonstrated technology that can effect reductions in dose to the population. Regulatory Guide 1.110 provides an acceptable method of performing this analysis in determining compliance with the design objectives of Appendix I to 10 CFR Part 50, Sections II.B, II.C, and II.D. See details under Acceptance Criteria. If the SAR includes models or parameters for a cost-benefit analysis that differ from NRC guidance, the reviewer shall confirm that the assumptions, parameters, and calculations used by the applicant are substantiated and included in the COL application with sufficient details to conduct an

independent evaluation.

*Branch Technical Position (BTP) 11-5*

The reviewer shall verify that GWMS is in conformance with the guidance provided in BTP 11.5, as it relates to potential releases of radioactive materials (noble gases) as a result of postulated leakage or failure of a waste gas storage tank or off-gas charcoal delay bed. The reviewer shall rely on methods described in BTP 11-5 and the use of the PWR-GALE or BWR GALE code (NUREG-0016 or NUREG-0017) and Regulatory Guide 1.112 to perform the analysis. The reviewer shall confirm that the dose associated with the potential leakage or failure of a waste gas storage tank or charcoal delay beds complies with the dose guideline of BTP 11-5. See details under Acceptance Criteria. If the SAR includes models or parameters for an analysis that differ from NRC guidance, the reviewer shall confirm that the assumptions, parameters, and calculations used by the applicant are substantiated and included in the COL application with sufficient details to conduct an independent evaluation.

*Control of Explosive Oxygen and Hydrogen Gas Mixtures*

The reviewer shall verify that specific provisions have been incorporated in the applicant's design to control mixtures of explosive gases and hydrogen detonations in the GRS, and conclude that the design features proposed by the applicant are adequate to prevent the occurrence of an explosion or to withstand the effects of an explosion, in accordance with GDC 3 and guidelines of SRP Section 11.3. The reviewer shall confirm that the OGS system is either built to withstand the effects of hydrogen explosions, or has been provided with dual gas analyzers with automatic control features to avoid the formation of explosive gas mixtures. The reviewer shall evaluate the type of gas analyzers described by the applicant and assess whether they are also required to withstand the effects of hydrogen explosions. If the SAR refers to a topical report, a system already in use at an operating nuclear power plant, or system features that differ from NRC guidance, the reviewer shall confirm that system descriptions, operating features, design parameters, and calculations used by the applicant are substantiated and included in the COL application with sufficient details to conduct an independent evaluation.

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

Review and access the applicant's proposed ITAAC associated with the structures, systems, and components (SSCs) related to this SRP section in accordance with SRP Section 14.3, "Inspections, Tests, Analyses, and Acceptance Criteria."

**Subtask 5: Acceptance Criteria**

The reviewer shall verify that the applicant has provided sufficient information and that the review and calculations support the conclusion that the applicant has met the following relevant requirements of the commission's regulations:

General Design Criterion (GDC) 3, 60, and 61 as they relate to the design of the GWMS to minimize the effects of explosive mixtures of hydrogen and oxygen; to control releases of radioactive materials to the environment; and the control of radioactivity in fuel storage and handling areas.

10 CFR Part 50, Appendix I, Sections II.B, II.C, and II.D, as they relate to the numerical guides for design objectives and limiting conditions for operation to meet the "as low as is reasonably achievable" criterion.

10 CFR Part 20.1302, as it relates to radioactivity in gaseous effluents released to unrestricted areas, and 20.1406 as it relates to design and operational procedures for minimizing contamination, facilitating eventual decommissioning, and minimizing the generation of radioactive waste.

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40 CFR Part 190, EPA's environmental radiation standards applicable to the entire fuel cycle, as it relates to limits on total annual doses from all sources of radioactivity and external radiation from the site (with single or multiple units).

10 CFR 50.34a, which requires that sufficient design information be provided to demonstrate effluents to unrestricted areas are kept as low as reasonably achievable.

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.

### **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 11.3. Each RAI:

- (1) will be assigned a sequential number that includes the section of the COL application, such as RAI 11.3.3-12, where -12 represents the 12th RAI in a series of RAIs on Chapter 11.3.3,
- (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 RAIs 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.

The TER will summarize the work performed, results, findings and conclusions, and recommendations for RAIs. 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 TER and final TER. In part, the TER will form the bases for the staff to conclude that the applicant has provided sufficient information and details in demonstrating compliance with NRC regulations. The draft TER will be submitted to the NRC PM identified for that chapter of the SAR. The reviewer will address and incorporate NRC comments in the TER and resubmit it as final to the NRC PM. See specific details under SRP Section 11.3, "Evaluation Findings." See Section (later) of this SOW for specific details on the format and contents of TERs, and submission process to NRC staff.

### **Chapter 11.4 Solid Waste Management Background**

The solid waste management system (SWMS) manages radioactive wastes, as liquid, wet, and dry solid wastes, produced during normal operation and anticipated operational occurrences. Review of the

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SWMS includes design features that are necessary for collecting, handling, processing, and storing wastes. This encompasses the design, design objectives, design criteria, treatment methods, and expected releases, including the description of the SWMS, mobile equipment connected to permanently installed systems, piping and instrumentation diagrams (P&IDs), process and effluent radiation monitoring and control instrumentation, and process flow diagrams showing the operation methods and factors that influence waste treatment. The review includes an evaluation of any additional equipment that may be necessary to process liquid, dry, and wet wastes and route them to the point of discharge from the SWMS or to prepare them for shipment to authorized offsite disposal sites or licensed radioactive waste processors. The design of components and subsystems of mobile waste processing systems that are used by contractors, on behalf of the COL applicant, to process wet and solid wastes and chemical wastes are not within the scope of the review as such facilities are not part of the COL's docket.

The contractor will review the applicant's final safety analysis report (FSAR) for an operating license (OL), design certification (DC), or combined license (COL) as described in Standard Review Plan 11.4, "Solid Waste Management System (SWMS)." The review shall be conducted using the process described in SRP Section 11.4, including: areas of reviews, review interfaces, acceptance criteria, technical rationale, review procedures, and evaluation findings. For the evaluation of the SWMS system design, the reviewer shall consider regulatory requirements and guidance listed in SRP Section 11.4, supporting technical requirements identified under Review Interfaces of SRP Section 11.4, documents listed as references in SRP Section 11.4, 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 11.4 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 11.4 of the SRP.

### **Subtask 1: System Design**

Review and evaluate the effectiveness of methods proposed for volume reduction of dry solid wastes, including sorting methods, technologies (e.g., shredders, crushers, and compactors), system components and their design parameters, and expected waste volume reduction factors. Review the description of the methods used for dewatering or stabilize (e.g., removal of free-standing water, encapsulation, solidification, etc.) wet wastes, types of stabilization media or agents, expected waste volume increase factors, and implementation of a PCP to ensure a solid matrix and proper waste form characteristics and/or complete dewatering of wet wastes. Review the types and performance characteristics of filtration systems, ion-exchange resins, and adsorbent media to treat liquid and wet wastes, including expected removal efficiencies and decontamination factors. Determine the effectiveness of physical and monitoring precautions taken to minimize spills and leaks (e.g., retention basins, curbing, level gauges and alarms, catch containment, and self-sealing quick-disconnects) and measures to prevent interconnections with non-radioactive systems. Review and evaluate the effectiveness of special design features and operational procedures to prevent, control, and collect releases of radioactive materials resulting from overflows from tanks containing liquids, sludge, spent resins, and the like, and measures to prevent the dropping of containers from cranes and forklifts. Assess whether corrosion-resistant properties system piping and valves associated with transfer lines to storage tanks and discharge piping have been considered for components buried in soils and concrete, including features designed for the early detection of leaks and spills (e.g., leak detection sumps and wells).

Review the description of the SWMS, including P&IDs; process and effluent radiation monitoring and control instrumentation; and process flow diagrams showing the methods of operation. Review and assess expected and design volumes of liquid, wet and dry solid wastes and materials to be handled and processed, including expected radionuclide distributions and concentrations, chemicals, and mixed wastes. Review and assess the use of shielding around waste processing equipment, and the use of temporary or permanent shielding mounted on or in the immediate vicinity of mobile equipment. Review provisions for facilitating operation and maintenance. Assess design features used to minimize, to the extent practicable, contamination of the facility and environment; facility eventual decommissioning; and minimize to the extent practicable the generation of radioactive waste. Review any system design provisions and the effectiveness of physical and monitoring precautions taken to minimize spills and

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leaks, as well as provisions for processing radioactive materials associated with the decontamination of leaks and spills and remediation of uncontrolled and unmonitored releases. Review measures to prevent interconnections with non-radioactive systems. Quality group classifications of piping and equipment shall be reviewed, along with the bases governing the chosen design criteria, design and expected temperatures and pressures, and materials used to construct the system components. The definition of the boundary of the SWMS should be reviewed for conformance with regulatory guidance, and for multi-unit stations, descriptions and design features of permanent or mobile equipment and components normally shared between interconnected processing and treatment subsystems shall be evaluated.

Review provisions for onsite waste storage before shipping, including expected design volumes; expected radionuclide concentrations and radioactivity inventories; layout of the packaging, storage, and shipping areas; use of cranes, forklifts, monorails, and similar equipment; storage capacity; fire protection; building ventilation; shielding provisions; expected onsite storage durations; and the design bases for these estimates. Review the description of waste container types and sizes; filling and handling methods; spill and leak prevention features; procedures for monitoring for removable radioactive contamination and external radiation; and provisions for decontamination, packaging, and storage of containers.

Review and assess disposition methods and expected waste volumes and radioactivity inventories for radioactive waste being shipped for disposal, or shipped to waste processors for treatment and disposal, and then returned to the radwaste system for further treatment or reuse. For plants using off-gas treatment systems relying on charcoal beds, review the description of the facilities for storing spent charcoals, and provisions to manage and ship spent charcoals for disposal and estimates of the projected annual or periodic amounts of spent charcoals that will be disposed of as radioactive waste.

Assess whether the applicant has provided information on how large system components will be handled and disposed of as radioactive wastes under operational programs and procedures. Confirm if the applicant is considering or included facilities to temporarily hold large components and other voluminous amounts of wastes in a radwaste building or in other staging areas, or decontaminate and ship to offsite facilities for processing or storage, and disposal, given access to appropriate disposal facilities. Determine whether such arrangements are plausible and acceptable, and consistent with NRC guidance.

#### **Subtask 2: Source Term**

If all liquid and gaseous effluents generated by the SWMS have already been included in the evaluations of SAR Sections 11.2 and 11.3, then no further review is required. If not, the reviewer shall use the above information to verify (by calculation) source term calculations conducted by the applicant under SRP Section 11.1 for normal operation and anticipated operational occurrences. However, only that portion of the source term attributable to the SWMS shall be evaluated in this section. Confirm whether the applicant has included or referenced all required operational programs, including the ODCM, RETS/SREC, and REMP; submitted either as complete operational programs; by reference to the NRC-approved templates; or via endorsement of existing operational programs with collocated operating plants. Review types and performance characteristics of filtration systems, ion-exchange resins, and adsorbent media to treat liquid and wet wastes, including expected removal efficiencies and decontamination factors, against expected chemical and radiological properties of waste streams to be treated by SWMS subsystems. Review design features used to reduce the volume of liquid, wet, and dry wastes handled by the SWMS and reduce radioactivity levels in wastes.

The reviewer shall use the guidance provided in Sections 11.2, 11.3 and 11.4 of the Standard Review Plan, and consider incorporating the guidance and calculation methods provided by Regulatory Guide 1.112, NUREG-0016 (BWR-GALE code) or NUREG-0017 (PWR-GALE code), and the guidance provided in ANSI/ANS 18.1-1999, as well as other Section 11.4 reference documents, as appropriate. The reviewer shall determine whether the source terms forming the basis of normal operation and anticipated operational occurrences are acceptable in characterizing expected waste process streams and associated effluent releases. If the SAR includes models or parameters to estimate reactor coolant or steam radionuclide concentrations that differ from NRC guidance, the reviewer shall confirm that the

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assumptions, parameters, and calculations used by the applicant are substantiated and included in the COL application with sufficient details to conduct an independent evaluation.

### **Subtask 3: Analysis**

#### *Effluent Concentrations*

If the liquid and gaseous effluents generated by the SWMS have not already been incorporated into the review of SAR Sections 11.2 and 11.3, the reviewer shall verify that the annual average concentrations of radioactive materials released in liquid and gaseous effluents from the SWMS to unrestricted areas are within the limits specified in Table 2, Columns 1 and 2, of Appendix B to 10CFR Part 20 during normal operation, anticipated operational occurrences. The reviewer shall confirm that all estimated effluent radionuclide concentrations are based on plant design features of permanently installed and mobile processing system and site-specific characteristics. See specific details under SRP Acceptance Criteria.

#### *Dose to Unrestricted Areas*

If the liquid and gaseous effluents generated by the SWMS have not already been incorporated into the evaluations of SAR Sections 11.2 and 11.3, the reviewer shall verify that SWMS has the capability to meet dose design objectives. The reviewer shall verify that SWMS has the capability to meet the dose limits of 10 CFR Part 20.1301(a) and 20.1301(e), complies with Part 20.1302, and complies with the design objectives of Appendix I to 10 CFR Part 50, Sections II.A, II.B, and II.C. The guidance and calculation methods provided by Regulatory Guides 1.109, 1.111, 1.113, and computer codes, such as GASPARD II code (NUREG/CR-4653) and LADTAP II code (NUREG/CR-4013) provide acceptable methods for performing this analysis. See details under Acceptance Criteria. If the SAR includes models or parameters to estimate doses that differ from NRC guidance, the reviewer shall confirm that the assumptions, parameters, and calculations used by the applicant are substantiated and included in the COL application with sufficient details to conduct an independent evaluation.

#### *Radwaste Cost-Benefit Analysis*

If a cost-benefit analysis of the SWMS has not already been incorporated into the evaluations of SAR Sections 11.2 and 11.3, the reviewer shall verify that SWMS has the capability to meet dose design objectives of Section II.D of Appendix to Part 50.

The reviewer shall determine, based on the applicants cost-benefit analysis that includes population cumulative dose calculations and cost-benefit studies, that the SWMS includes all items of reasonably demonstrated technology that can effect reductions in dose to the population. Regulatory Guide 1.110 provides an acceptable method of performing this analysis in determining compliance with the design objectives of Appendix I to 10 CFR Part 50, Sections II.A, II.B, II.C, and II.D. See details under Acceptance Criteria. If the SAR includes models or parameters for a cost-benefit analysis that differ from NRC guidance, the reviewer shall confirm that the assumptions, parameters, and calculations used by the applicant are substantiated and included in the COL application with sufficient details to conduct an independent evaluation.

#### *Provisions for Short and Long-Term Radwaste Storage (BTP 11-3 and Appendix 11.4-A to SRP Section 11.4)*

Based on the applicant's projected waste generation rates, the reviewer shall determine whether there is sufficient onsite storage capacity in the short-term, such as 6 months. If a storage capacity for up to six months of onsite storage is included in the design of the radwaste building, the need and plans for storage space capacity beyond 6 months should be stated by the COL applicant. Buildings and facilities used for radwaste storage should conform with the guidelines of BTP 11-3 and Appendix 11.4-A to SRP Section 11.4. In GL 81-38, "Storage of Low-Level Radioactive Wastes at Power Reactor Sites," the NRC provides guidance to licensees on the addition of onsite storage facilities for low-level radioactive wastes generated onsite. The availability of offsite low-level waste storage space is beyond the control of COL

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applicants and depends, in part, on whether the state or the regional low-level waste compact has provided a facility for long-term storage and disposal. Consequently, the COL applicant should include a commitment to submit to the NRC the details of arrangements about long-term onsite storage or disposal of low-level radioactive waste. The review shall evaluate such proposals for additional plant-specific facility against the guidelines in GL 81-38, which is similar to the guidance in Appendix 11.4-A to SRP Section 11.4.

### **Subtask 4: Process Control Program (PCP)**

Review of the PCP and Technical Specifications (i.e., administrative controls section proposed by the applicant for process and effluent control) should be performed for input to the review of SRP Section 16.0 and this SRP section. Confirm whether the applicant has included or referenced the PCP; submitted either as a complete operational program; by reference to the NRC-approved templates; or via endorsement of existing operational programs with collocated operating plants. The review of the PCP may be conducted as part of the review of SRP Section 11.4 or as part of the review of SRP Section 11.5, depending on where the applicant has located the procedural details and programmatic controls of the PCP, given the provisions of Generic Letter 89-01 and NUREG-1301 or NUREG-1302. The reviewer shall determine whether the description of the operational program and the proposed implementation milestones for the PCP aspect of the Process and Effluent Monitoring and Sampling Program identify all regulatory requirements, follow NRC's guidance, and contain all appropriate operational elements. The reviewer shall consider related guidance such as that found in NUREG-1301 or NUREG-1302, NUREG-0133, NUREG/BR-0204, and Regulatory Guide 1.21. See specific details under Section 11.4 SRP Acceptance Criteria.

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

Review and access the applicant's proposed ITAAC associated with the structures, systems, and components (SSCs) related to this SRP section in accordance with SRP Section 14.3, "Inspections, Tests, Analyses, and Acceptance Criteria."

### **Subtask 6: Acceptance Criteria**

The reviewer will verify that the applicant has provided sufficient information and that he or she's review and calculations support the conclusion that the applicant has met the following relevant requirements of the commission's regulations:

Appendix A to 10 CFR part 50, General Design Criterion (GDC) 60, 61 and 63 as they relate to the design of the SWMS to control releases of radioactive materials to the environment; have sufficient design capacity to handle solid wastes during normal operation and anticipated operational occurrences; ensure adequate safety under normal and postulated accident conditions; and detect conditions that may result in excessive radiation levels and to initiate appropriate safety actions.

10 CFR Part 50, Appendix I, Sections II.A, II.B, II.C, and II.D, as they relate to the numerical guides for design objectives and limiting conditions for operation to meet the "as low as is reasonably achievable" criterion.

10 CFR Part 20.1302 and 10 CFR 20.1301(e), as they relate to radioactivity in gaseous and liquid effluents released to unrestricted areas due to SWMS operation, and 10 CFR 20.1406 as it relates to design and operational procedures for minimizing contamination, facilitating eventual decommissioning, and minimizing the generation of radioactive waste.

40 CFR Part 190, EPA's environmental radiation standards applicable to the entire fuel cycle, as it relates to limits on total annual doses from all sources of radioactivity and external radiation from the site (with single or multiple units).

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10 CFR 50.34a, which requires that sufficient design information be provided to demonstrate effluents to unrestricted areas are kept as low as reasonably achievable.

10 CFR Part 20, including 10 CFR 20.2006 as it relates to characterizations of waste in shipping manifests; 10 CFR 20.2007 as it relates to compliance with applicable Federal, State, and local regulations governing the presence of any other toxic or hazardous materials in waste, and 10 CFR 20.2108, as it relates to maintenance of waste disposal records until termination of the pertinent license requirements by the NRC.

10 CFR Part 71 and 49 CFR Parts 171 – 180, as they relate to the use of approved containers and packaging methods for the shipment of radioactive materials.

10 CFR 61.55 and 10 CFR 61.56 as they relate to classifying, processing, and disposing of dry solid and wet wastes at approved sites.

49 CFR 173.443, as it relates to methods and procedures used to monitor for the presence of removable contamination on shipping containers, and 49 CFR 173.441, as it relates to methods and procedures used to monitor external radiation levels for shipping containers and vehicles.

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.

### **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 11.4. Each RAI:

- (1) will be assigned a sequential number that includes the section of the COL application, such as RAI 11.4.3-12, where -12 represents the 12th RAI in a series of RAIs on Chapter 11.4.3,
- (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.

The TER will summarize the work performed, results, findings and conclusions, and recommendations for RAIs. 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 TER and final TER. In part, the TER will form the bases

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for the staff to conclude that the applicant has provided sufficient information and details in demonstrating compliance with NRC regulations. The draft TER will be submitted to the NRC PM identified for that chapter of the SAR. The reviewer will address and incorporate NRC comments in the TER and resubmit it as final to the NRC PM. See specific details under SRP Section 11.4, "Evaluation Findings." See Section (later) of this SOW for specific details on the format and contents of TERs, and submission process to NRC staff.

### **Chapter 11.5 Process Effluent Radiological Monitoring Instrumentation and Sampling System**

#### **Background**

The process and effluent radiological monitoring instrumentation and sampling systems (PERMISS) are used to monitor liquid and gaseous process streams and effluents from the liquid waste management system (LWMS), gaseous waste management system (GWMS), and solid waste management system (SWMS). The PERMISS includes subsystems used to collect process and effluent samples during normal operation and anticipated operational occurrences and under post-accident conditions. The review includes information provided on continuous process and effluent radiation monitors, including P&IDs, process flow diagrams, and descriptions of proposed sampling points for the liquid, gaseous, and solid waste systems, including locations of monitoring and sampling points relative to effluent release points.

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 11.5, "Process and Effluent Radiological Monitoring Instrumentation and Sampling Systems." The review shall be conducted using the process described in SRP Section 11.5, including: areas of reviews, review interfaces, acceptance criteria, technical rationale, review procedures, and evaluation findings. For the evaluation of the PERMISS design, the reviewer shall consider regulatory requirements and guidance listed in SRP Section 11.5, supporting technical requirements identified under Review Interfaces of SRP Section 11.5, documents listed as references in SRP Section 11.5, 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 11.5 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 11.5 of the SRP.

#### **Subtask 1: System Design**

The reviewer shall compare the listing of process and effluent monitors contained in the SAR with the principal release points identified in SAR Sections 11.2 to 11.4 to ensure that all major process streams and release points are being monitored during normal operation, anticipated operational occurrences, and postulated accidents. The comparison will include radiation monitoring systems that are used for plant safety and protection, monitoring plant operation (including the operation of the LWMS, GWMS, and SWMS), monitoring and controlling liquid and gaseous effluent releases to unrestricted areas, and instrumentation used for monitoring intersystem leakage among plant subsystems. In addition, the review shall address the monitoring of non-radioactive systems that could become contaminated with radioactivity through interfaces with radioactive systems.

The review shall address the types and numbers of instruments, number of instrumentation channels, and location of probes, detectors, sampling points, and process and effluent sampling stations, P&IDs, and process flow diagrams, including the descriptions of proposed monitoring and sampling points for the liquid, gaseous, and solid waste systems relative to effluent release points. The bases for the selection of these sampling or monitoring points will be compared with the general principles and criteria for obtaining valid samples of radioactive materials from liquid and gaseous process and effluent streams. The review shall consider the methods and materials used in locating gaseous and particulate sampling equipment and guidance in

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obtaining representative samples from ducts and stacks as described in Regulatory Guides 1.21, 1.97, 1.143, 4.15, ANSI N42.18-2004, and ANSI/HPS N13.1-1999. The reviewer shall compare the applicant's monitoring instrumentation specifications and performance criteria with those contained in Tables 1 and 2 of SRP Section 11.5, Appendix 11.5-A to SRP Section 11.5), and SRP BTP 7-10 (see SRP Section 7.5) on the application of Regulatory Guide 1.97.

The review shall include design objectives and design criteria for the PERMISS (including the interface with skid-mounted radiation monitoring equipment connected to permanently installed systems) for normal operations (including anticipated operational occurrences), and the design objectives for monitoring postulated accidents. Included in the review are the process and effluent streams to be monitored by radiation detection instrumentation or sampled for separate analysis during normal operations (including anticipated operational occurrences) and postulated accidents. Review the purpose of each instrumented monitoring or sampling function provided, and the parameters to be determined through monitoring instrumentation or sampling and analysis (e.g., gross beta-gamma concentrations, radionuclide distribution, and quantities of specific radionuclides). Verify conformance with Regulatory Guides 1.21, 1.33, and 4.15

Review the PERMISS system description, including descriptions of radiation measurement instrumentation and related sampling equipment; locations of radiation instrumentation, monitors, and direct readouts; location and bases of selected sampling points and sampling stations; methods used to convert raw instrumentation readings into meaningful results; measurements, analyses, or determinations made; types and location of annunciators and associated alarms and actions initiated by each; provisions for purging sample lines; proposed calibration methods; and other system information. Review design provisions made for monitoring instrumentation, sampling, and sample analyses for all identified gaseous and liquid effluent release paths in the event of a postulated accident. The design of such systems should meet the provisions of NUREG-0718 and NUREG-0737 (item II.F.1 and Attachments 1 and 2), Appendix 11.5-A, Regulatory Guide 1.97 and SRP BTP 7-10. During the review of the PERMISS system description the reviewer shall consider the guidance provided in Regulatory Guides 1.21, 1.33, 4.1, 4.8, 4.15, 1.97, SRP BTP 7-10, and Appendix 11.5-A. For specific details see SRP Section 11.5, Acceptance Criteria.

The reviewer shall verify that adequate documentation exists to confirm the verification and validation of digital computer software used in radiation monitoring and sampling equipment, including software used to terminate or divert process and effluent streams. This evaluation includes software developed by the applicant, purchased through a vendor, or included with the instrumentation.

The reviewer shall evaluate the use of special system design features or reliance on applicable topical reports, as well as data referenced in the SAR that are applied as technical bases beyond the NRC guidance. If the SAR includes such instances, the reviewer shall confirm that the assumptions, design parameters, and calculations used by the applicant are substantiated and included in the COL application with sufficient details to conduct an independent evaluation.

Review design features and operational procedures used to minimize, to the extent practicable, contamination of the facility and environment; facility eventual decommissioning; and minimize to the extent practicable the generation of radioactive waste. Review any system design provisions used to control the release of radioactive materials in wastes, prevent uncontrolled and unmonitored releases of radioactive materials into the environment, avoid contamination of non-radioactive systems, and avoid interconnections with potable and sanitary water systems. The reviewer shall consider the guidance of Regulatory Guide 1.143. For specific details, see Section 11.5 SRP Acceptance Criteria.

Quality assurance provisions for the PERMISS shall be reviewed, including the quality group classifications used for system components and seismic design applied to structures housing these systems. The reviewer shall consider guidance provided in Regulatory Guides 1.143, 1.21, 1.33, 4.1, 4.8, and 4.15; Generic Letter 89-01; Radiological Assessment BTP (revision 1, November 1979); NUREG-0133, and NUREG-1301 or NUREG-1302. For specific details, see Section 11.5 SRP Acceptance Criteria.

## **Subtask 2: Operational Programs**

Evaluate the programs and procedures described in the applicant's proposed TS/SREC, ODCM, REMP, and PCP for the PERMISS. The format and content of the TS/SREC, ODCM, REMP, and PCP should be consistent with the requirements of Generic Letter 89-01 and the guidance of NUREG-1301 or NUREG-1302 and NUREG-0133 for either type of plant, Radiological Assessment BTP (Revision 1, November 1979), and Regulatory Guides 1.21, 1.33, 4.1, 4.8, and 4.15.

Verify that the RETS/SREC, ODCM and REMP aspects of the Process and Effluent Monitoring and Sampling Program are fully described and that implementation milestones have been identified. The implementation of the PCP is included in the license condition on operational programs and implementation. See SRP Section 11.5, Acceptance Criteria.

### *Technical Specifications (TS)/Standard Radiological Effluent Controls (SREC)*

Review the applicant's process and effluent control TS (i.e., administrative controls section) for input into the review of SRP Section 16.0 and for the SREC. The reviewer shall determine that the elements and scope of the programs identified in the administrative controls section of the TS agree with the requirements identified as a result of the staff's review. The applicant's standard radiological effluent controls (SREC) should describe how liquid and effluent release rates will be derived and parameters used in setting instrumentation alarm set-points to control or terminate effluent releases above 10 CFR Part 20, Appendix B, effluent concentrations (Table 2) in unrestricted areas. Review how the guidance of NUREG-1301 or NUREG-1302 and NUREG-0133 was used in developing the bases of alarm setpoints. The programs identified in the administrative controls section of the TS and elements of the SREC shall be reviewed using the provisions of Generic Letter 89-01 and NUREG-1301 or NUREG-1302. For specific details, see SRP Section 11.5, Acceptance Criteria.

### *Offsite Dose Calculation Manual (ODCM)*

Review the methodology and parameters provided in the ODCM for calculating doses resulting from gaseous and liquid effluents and planned discharge flow rates. Determine whether the guidance provided by Regulatory Guides 1.109, 1.111 or 1.113 was followed, and appropriate computer codes were used (e.g. LADTAP II (NUREG/CR-4013) and GASPAR II (NUREG/CR-4653)). Evaluate whether the procedural details and programmatic elements of the ODCM conform to the guidance provided in NUREG-1301 or NUREG-1302 and NUREG-0133. For specific details, see SRP section 11.5, Acceptance Criteria.

### *Radiological Environmental Monitoring Program (REMP)*

Review the scope of the REMP to determine if the program provides the means to monitor and quantify radiation and radioactivity levels in the environs of the plant associated with gaseous and liquid effluent releases and the direct external radiation from contained sources of radioactive materials in tanks and equipment and in buildings. For specific details, see SRP Section 11.5, Acceptance Criteria

### *Process Control Program (PCP)*

The reviewer shall determine whether the description of the operational program and the proposed implementation milestones for the PCP aspect of the Process and Effluent Monitoring and Sampling Program identify all regulatory requirements, follow NRC's guidance, and contain all appropriate operational elements. The review of the PCP may be conducted as part of the review of SRP Section 11.4, or as part of the review of SRP Section 11.5, depending on where the applicant has located the procedural details and programmatic controls of the PCP, given the provisions of Generic Letter 89-01 and NUREG-1301 or NUREG-1302. Section 11.4 addresses the review and evaluation of the PCP and identifies the regulatory requirements associated with the handling, processing (e.g., dewatering, solidification, and compaction), characterization, packaging, and shipment of radioactive wastes to

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authorized low-level waste disposal sites or licensed waste processors. For specific details, see SRP Section 11.5, Acceptance Criteria.

#### **Subtask 3: Provisions for Monitoring Gaseous Effluents During Accident Conditions**

The review shall address the requirements specified in 10 CFR 50.34(f)(2)(xvii) and 10 CFR 50.34(f)(2)(xxvii) for monitoring gaseous effluents from all potential accident release points, consistent with the requirements of GDC 63 and 64. The evaluation shall consider the applicant's system for sampling process streams and effluents under accident conditions, the reviewer considers Regulatory Guides 1.97 and 1.101; NUREG-0737, items II.B.2 and II.B.3, and other guidance stated in SRP Section 11.4, Technical Rationale. Additional provisions should be included in the application, including purging sample lines, minimizing sample loss or distortion in sample chemical and physical composition, preventing blockage of sample lines, appropriate disposal of samples, and flow restrictions or remotely operated isolation valves to limit reactor coolant loss from rupture of sample lines. Other SRP provisions require that samples shall be representative of reactor primary coolant, reactor steam, secondary coolant, and secondary steam in the core area or system sample streams; that sample lines be as short as possible to minimize the volume of fluid taken from containment process or effluent streams; and if inline monitoring is used, the licensee must provide backup provisions for grab sampling. If the provisions do not address post-accident sampling, the reviewer shall consider whether alternate provisions of SRP Section 11.5 apply, and how the applicant has addressed them.

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

Review and access the applicant's proposed ITAAC associated with the structures, systems, and components (SSCs) related to this SRP section in accordance with SRP Section 14.3, "Inspections, Tests, Analyses, and Acceptance Criteria."

#### **Subtask 5: Acceptance Criteria**

The reviewer will verify that the applicant has provided sufficient information and that the review and calculations support the conclusion that the applicant has met the following relevant requirements of the commission's regulations:

Appendix A to 10 CFR part 50, General Design Criterion (GDC) 60, 63 and 64 as they relate to the design of the LWMS, GWMS, and SWMS to control releases of radioactive materials to the environment; have sufficient design capacity to handle radioactive materials produced during normal operation and anticipated operational occurrences; be designed to monitor radiation levels and radioactivity in effluents, as well as radioactive leakages and spills, during normal operation and anticipated operational occurrences.

10 CFR Part 50, Appendix I, Sections II.A, II.B, and II.C, as they relate to the numerical guides for design objectives and limiting conditions for operation to meet the "as low as is reasonably achievable" criterion.

10 CFR Part 20.1302 and 10 CFR 20.1301(e), as they relate to monitoring radioactivity in plant effluents released to unrestricted areas, and 10 CFR 20.1406 as it relates to design and operational procedures for minimizing contamination, facilitating eventual decommissioning, and minimizing the generation of radioactive waste.

10 CFR 50.34a, as it relates to equipment design and procedures used to ensure that effluent releases to unrestricted areas are kept within the numerical guidance provided in Appendix I to 10 CFR Part 50, and 10 CFR 50.36a, as it relates to operating procedures and equipment installed in the radwaste system to ensure that releases to unrestricted areas are kept ALARA.

10 CFR 50.34(f)(2)(xvii) and 10 CFR 50.34(f)(2)(xxvii), as they relate to the monitoring gaseous effluents from all potential accident release points, consistent with the requirements of GDC 63

and 64.

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.

**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 11.5. Each RAI:

- (1) will be assigned a sequential number that includes the section of the COL application, such as RAI 11.5.3-12, where -12 represents the 12th RAI in a series of RAIs on Chapter 11.5.3,
- (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 RAIs 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.

The TER will summarize the work performed, results, findings and conclusions, and recommendations for RAIs. 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 TER and final TER. In part, the TER will form the bases for the staff to conclude that the applicant has provided sufficient information and details in demonstrating compliance with NRC regulations. The draft TER will be submitted to the NRC PM identified for that chapter of the SAR. The reviewer will address and incorporate NRC comments in the TER and resubmit it as final to the NRC PM. See specific details under SRP Section 11.5, "Evaluation Findings." See Section (later) of this SOW for specific details on the format and contents of TERs, and submission process to NRC staff.