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December 22, 2006

Dr. Edward O'Donnell
Division of Fuel, Engineering & Radiological Research
Office of Nuclear Regulatory Research
U.S. Nuclear Regulatory Commission
TWFN, Mail Stop 9-F39
Washington, DC 20555

Subject: Lessons-Learned Report - Final Deliverable for the First Three Project Milestones of Task Order 4 under Contract No. NRC-04-04-062, "Identification and Prioritization of Changes to Regulatory Guidance to Support Implementation of 10 CFR 20.1406"

Dear Dr. O'Donnell:

In accordance with the subject task order of the stated contract, this letter report serves as the deliverable for the first three project milestones as indicated in the statement of work and agreed upon by NRC staff during meetings held between the staff and ISL.

Attachment 1 to this letter report addresses the first milestone which is to summarize the results of the review of 10 CFR 20.1406 and lessons learned from experience. Attachment 1 provides this information in the form of technical input for a proposed new regulatory guide for implementation of 10 CFR 20.1406. The information in this attachment has been structured in accordance with the four major criteria identified in 10 CFR 20.1406. This document also provides background information (captured in terms of higher-level design or operation philosophy) which is relevant to each of the four criteria. The starting point for developing the technical input document (Attachment 1) was the results obtained from the review of the existing regulatory guides and other relevant documents as described in Attachment 2. The basis information for the technical input is provided in Attachment 3.

Attachment 2 provides the results of the Project Team's (ISL, Inc. and Chesapeake Nuclear Services (CNS)) systematic review of the existing regulatory guides, various NUREG reports and other appropriate lessons-learned documents as well as selected industry codes and standards. This attachment satisfies the requirements of Milestone 2 of the statement of work. It summarizes the regulatory guides that need to be modified or created and provides a resource estimate for the level of effort required. In addition, Attachment 2 addresses Milestone 3 of the statement of work by providing the rationale for identifying and scheduling the proposed regulatory guide revisions. During the systematic review of the existing regulatory guide structure, the Project Team identified those regulatory guides (RGs) which could require revision to recognize 10 CFR 20.1406 requirements; those RGs that may be in conflict with the requirements of 10 CFR 20.1406; and, those RGs which contain information that should be included in the new proposed RG for implementation of 10 CFR 20.1406.

Finally, Attachment 3 provides an electronic copy of the database was used to capture all of the information obtained during the development of the deliverables for the first three milestones. This database contains the baseline information captured during the Project Team document reviews and provides a historical record of the reviews as well as the linkage to the source material. Pertinent information was extracted from this database and summarized in the technical input contained in Attachment 1. Information was also extracted from this database to develop the deliverable for Milestone 2. The database includes the lessons-learned from the decommissioning activities and other documents as well as key guidance information from the existing regulatory guides. Although not a specific project deliverable, this database is provided as a project record to support the subsequent development of the new regulatory guide for the implementation of 10 CFR 20.1406.

If you have any questions or require additional information, please contact me on 301-255-2267, or Scott Newberry on 301-255-2271.

Sincerely,

Michael Kennedy

Michael Kennedy
Task Manager

Attachments:

(1) Summary of Lessons-Learned Information and Relevant Regulatory Guidance
(2) Results of Regulatory Guide and Document Reviews
(3) Electronic Copy of Database Containing Detailed Information from the Document Reviews

cc: Jeffrey Mitchell, NRC
William Ott, NRC
Scott Newberry, ISL
Steve Pope, ISL
Stewart Bland, CNS
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File: 4517-004

Attachment 1

Summary of Lessons-Learned Information and Relevant Regulatory Guidance

Information relevant to lessons-learned from decommissioning of nuclear facilities was derived from the Project Team's review of pertinent documents such as NUREGs, NUREG/CRs, decommissioning lessons-learned reports (NRC and EPRI), and selected industry standards. Details of the review are found in an electronic database which is provided as Attachment 3. The information judged to be relevant to the new proposed regulatory guide for implementation of 10 CFR 20.1406 was extracted from the electronic database and organized into the document below entitled "Preliminary Draft of Technical Input to Regulatory Guide 20.1406." The Project Team also incorporated relevant professional experience into the technical input as part of the peer review process. So this technical input has been augmented by the industry experience of the team members. The draft technical input document was organized according to four criteria taken from 10 CFR 20.1406. Both design and operation were considered for each of these criteria. The criteria are as follows:

* Contamination of the Facility
* Contamination of the Environment
* Facilitate Decommissioning
* Generation of Waste

Under each section, background information (termed philosophy) has been included to provide the overarching design or operational principles which are highlighted by the specific statements captured from the basis documents.

Preliminary Draft of Technical Input to Regulatory Guide 20.1406

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RULE

"Applicants for licenses, other than renewals, after August 20, 1997, shall describe in the application how facility design and procedures for operation will minimize, to the extent practicable, contamination of the facility and the environment, facilitate eventual decommissioning, and minimize, to the extent practicable, the generation of radioactive waste."

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1. CONTAMINATION OF FACILITY

[*philosophy*]

- The total life cycle of the facility, including removal and disposal, should be considered when designing modifications and operating processes.
- Licensees should endeavor to operate a clean plant - prevent leaks and spills, and clean them up quickly when they do occur; aggressively control contamination and eliminate hot spots; minimize areas, to the extent practical, where licensed materials are used and stored; and minimize the amount of radiation work performed outside the restricted area.

- A maintenance and inspection program should be applied to all components that have a potential for leakage. An aggressive leak identification and repair program for components containing radioactive materials will prevent unnecessary contamination and will minimize radioactive waste.
- Despite any design considerations to either avoid or collect liquid waste, it is important during operations to be able to detect when such possible waste contamination starts so that its spread can be quickly stopped or mitigated. Thus continuous monitoring for the detection of any potential contamination should be considered. This should include consideration of designing placement of instruments at readily inspectible locations, and writing associated procedures that will enable early detection of contamination. Because leakage detection is only the necessary first step, mitigation plans should also be developed for quickly acting to stop any spread of contamination, should it be detected.
- Areas in which liquid radioactive waste is treated should be isolated from production, loading, storage and support systems and facilities by compartmentalization and access controls to reduce the potential for cross contamination.
- System decontamination facilities/provisions should be provided in the initial design to preclude major problems that may arise in operation, e.g., the rupture of temporary hose connections, exposure to partially shielded ion exchange columns, and lack of operating and maintenance space. These shortcomings can result in high doses to station staff, possible high liquid effluent releases and significant levels of surface contamination.

[*structures, systems and components*]

- The potential for contamination of non-radioactive "clean services" systems (such as station service air, nitrogen, or water supply) and components from leakage from adjacent radioactive systems containing contaminants can be reduced by separating piping for these services from piping that contains radioactive sources.
- Piping that carries radioactive sources can be designed for the lifetime of the station, thus avoiding the necessity for replacement and lessening the potential for contamination of non-radioactive systems if it is impracticable to provide isolation through separate chases.
- Tank and piping systems used for liquid waste handling and treatment should be designed to take advantage of gravity flow to reduce the potential for contamination associated with pumping and pressurization. Use appropriate plumbing materials with minimal pipe lengths and traps. Design considerations should strive to protect and/or isolate any liquid contamination through such redundancy concepts as multiple piping enclosures with pans to channel contamination runoffs for collection and processing.
- Make use of reusable, life of plant components. A program should be established for selecting materials, compatible with processing/disposal options.
- The necessity for decontamination can be reduced by limiting, to the extent practicable, the deposition of radioactive material within the processing equipment – particularly in the “dead spaces” or “traps” in components where substantial accumulations can occur. The deposition of radioactive material in piping can be reduced and decontamination efforts enhanced by avoiding stagnant legs, by locating connections above the pipe centerline, by using sloping rather than horizontal runs, and by providing drains at low points in the system.

- Interfaces to mobile processing systems should be considered in the design of radwaste processing systems. Potentially radioactive lines should consider connections using self-sealing quick disconnects. Operational interlocks should be incorporated to minimize the possibility of leakage and contamination. Ensure that spills and leaks from skid mounted systems will be contained and routed to radioactive waste drains.
- Any buried piping that is part of the radwaste processing system should either have its integrity verified periodically, or should be part of a monitoring program as a potential source of contamination.
- The need to decontaminate equipment and station areas can be reduced by taking measures that will reduce the probability of release, reduce the amount released, and reduce the spread of the contaminant from the source (e.g., from systems or components that must be opened for service or replacement). Such measures can include auxiliary ventilation systems, treatment of the exhaust from vents and overflows, drainage control such as curbing and floors sloping to local drains, or sumps to limit the spread of contamination from leakage of liquid systems.
- The selection of radiation-damage-resistant materials for use in high radiation areas can reduce the need for frequent replacement and can reduce the probability of contamination from leakage.
- Surfaces can be decontaminated more expeditiously if they are smooth, nonporous, and free of cracks, crevices, and sharp corners. These desirable features can be realized by specifying appropriate design instructions, by giving attention to finishing work during construction or manufacture, and by using sealers (such as special paints) on surfaces where contamination can be anticipated. (ANSI N101.2 provides helpful guidance on this matter.)
- Surfaces can be decontaminated more expeditiously if they are smooth. Provisions for epoxy-type wall and floor coverings which provide smooth surfaces to ease decontamination. Equipment and floor drain sumps are stainless steel lined to reduce crud buildup and to provide surfaces easily decontaminated.
- Concrete floors in areas subject to potential contamination should, as a minimum, be sealed – or alternatively, use stainless steel floor liners with catch basins. Appropriately sloped floor drains should be provided in areas where the potential for a spill exists to limit the extent of contamination. Drain systems for storm water and sanitary sewage should be separate from contaminated waste drain systems.
- Licensees should ensure that concrete block walls, constructed to allow removal for future maintenance, or replacement of large components, are completely sealed to prevent intrusion of radioactive materials into the block interiors. Block walls that are not connected to the ceiling are not always sealed on top, allowing contamination to enter the walls. In addition, hollow and solid block walls that are sealed by concrete, paint, or other coatings, have been found with contamination inside the walls. Contamination has been found within walls that are connected to ceilings and free-standing walls but are not physically connected to the ceilings or roofs. On properly sealed walls, the ceilings are sealed or closed so that no contamination can enter.
- Licensees should develop a floor/wall expansion joint inspection procedure so that floor and wall joints are installed and maintained properly to ensure that spills and leaks on the floors do not enter unmonitored areas beneath the floors and foundations.
- Administrative controls such as standard operating procedures can be effective in preventing the spread of contamination when radioactive material or contaminated equipment must be transported from one station location to another and when the route of transport through lower radiation zones or "clean" areas cannot be avoided.

- Ventilation systems should confine the radioactive materials within the process areas as close to the point of origin as practicable. Materials of construction for the ventilation systems should be carefully selected - with smooth surface finishes to aid in decontamination. Employ ventilation stacks and ductwork with minimal lengths and minimal abrupt changes in direction. Design should permit convenient inspection, maintenance, decontamination, and/or replacement of critical components such as filters, fans, and dampers.
- Spread of airborne contamination within the station can be limited by maintaining air pressure gradients and airflows from areas of low potential airborne contamination to areas of higher potential contamination. Periodic checks would ensure that the design pressure differentials are being maintained.
- Portable or temporary ventilation systems or contamination enclosures and expendable floor coverings can control the spread of contamination.
- Performing work on some components inside disposable tents or, for less complicated jobs, inside commercially available disposable clear plastic glove bags can limit the spread of contamination.
- Enclosures and glove boxes should be constructed using the highest quality materials and workmanship to assure total containment and minimize leakage. Their design should permit filter replacement with minimum exposure to personnel performing this task and with minimum release of contaminants to the environment outside of the glove box or enclosure.

2. CONTAMINATION OF ENVIRONMENT

[*philosophy*]

- Any systems containing radioactivity should have double boundaries to the environment, inspection capabilities, be part of a routine maintenance program (i.e., seals), undergo periodic verification of integrity, implement specific environmental monitoring (e.g., sampling of ground water in close proximity to the source) and implement environmental monitoring for overall site monitoring.
- Licensees should establish a comprehensive groundwater monitoring program beyond the normal radioactive effluent monitoring program (REMP). REMP is not intended to define and monitor on-site conditions and contamination. In addition, REMP is not adequate for future site characterization and to support dose assessments. A comprehensive groundwater monitoring program, beyond the normal REMP, will provide assurance that leaks and spills will be detected before radionuclides migrate offsite via an unmonitored pathway and allow licensees to gather sufficient data in order for the NRC staff to fully understand the types and movement of radioactive material contamination in groundwater at the facility, as well as the extent of this contamination.

[*siting*]

- Licensees should consider site suitability for mitigating any unplanned liquid releases into the soil and surrounding environment. Perform detailed site surveys before reactor construction takes place, for establishing radioactive background levels. Perform detailed site characterization to determine contamination pathways for the release of radionuclides.

- Licensees should adequately characterize the subsurface hydrologic characteristics of a site prior to construction to understand how potential contamination resulting from daily operation of the facility will migrate through the soil and possibly into the groundwater. After the facility is built, licensees should verify that the subsurface hydrologic (e.g., directions and flow rates of groundwater aquifers, geochemistry, etc.) characteristics remain consistent with the hydrologic profile prior to construction. If there are changes, licensees may need to evaluate those changes and address them during operations and before starting decommissioning.

[*leakage detection*]

- Minor leaks over long periods of time can contribute to significant contamination in soil and groundwater that result in significant costs for remediation. Tanks (e.g., radioactive waste storage tanks, chemical storage tanks, etc.), spent fuel pools, and process/transfer lines should be designed to resist corrosion and minimize leaks. They should be provided with leak detection and monitoring capabilities. For example, the detection system of a spent fuel pool should be capable of detecting minor leaks from the pool. This system should have the ability to be flushed with clean water to remove small quantities of borated water, and dissolve boric acid solids resulting from minor leaks from the spent fuel pool wall and floor welds, bellows to transfer channels and access gates areas. In addition, an operational program should be implemented throughout the life of the facility to monitor and remediate any leaks
- Leak detection systems for a spent fuel pool should be capable of detecting minor leakage from the pool.
- Storage tanks for radioactive material should have leak detection systems to ensure that any leakage of material is detected to prevent contamination of the soil and groundwater under the tank. In addition, these tanks should have a catch basin around the base of the tank to collect minor thru-wall leaks and ensure adequate collection and monitoring of precipitation on the outside of the tank.
- Leak detection systems' instrument sensitivity should at least be consistent with those established for the routine REMP.

[*structures, systems and components*]

- Plant designs should minimize the use of embedded pipes, to the extent practicable, consistent with maintaining radiation doses ALARA during operations and decommissioning. Embedded pipes, especially those that are small in diameter (less than 6 inches), could complicate decommissioning activities because they can be very difficult to remove or to survey.
- There should be no bypasses or drains in the radioactive liquid waste treatment system by which waste may inadvertently circumvent treatment equipment components or be released directly to the environment.
- Liners should be provided for sumps and retention ponds. Overflow of sumps should go to a monitored release path.
- Know what is underground. Avoid use of underground piping (or place into structured pipe chases). Piping located within pipe chases should have provisions for inspection capability (visual or leak detection system) to verify or ensure integrity of the piping. Eliminate floor drains and buried piping where possible. Double-walled lines should also be considered in this instance. Minimize storm drains.
- The usage and design of seals should consider access for periodic maintenance and visual inspection to verification their integrity.

- Berms should be provided outside all doors associated with radioactive materials to prevent flow to outside grounds/soil.
- Penetrations through outer walls of a building containing radiation sources are sealed to prevent miscellaneous leaks to the environment. Thoroughly apply sealant to original construction joints.
- Licensees should develop a quality assurance inspection program that ensures that grouted areas have no cracks or fissures to allow fluids to bypass the floor drain and into unmonitored areas beneath the floors and foundations. Concrete grouted connections for floor drains should be constructed such that leaks and spills on the floor will be collected in the floor drains.
- Construct clear separation between containment and the spent fuel pool in fuel transfer canal. Consideration should be given to using continuous concrete pours for major containment barriers such as the spent fuel pool and transfer canal.

3. FACILITATE DECOMMISSIONING

[*philosophy*]

- Licensees should keep good plant records and establish a program to ensure adequate and complete documentation of corporate knowledge and operational events, beyond those required by NRC in 10 CFR 50.75(g). This program can assist licensees in preparing a good historical assessment of a nuclear facility. An adequate historical assessment can help to save time and effort during decommissioning planning.

[*planning*]

- At some time during design and construction, either the architect-engineer or the operator should make comprehensive video tapes of equipment layout in areas where radiation fields are expected to be high following operations. Design should consider that reactor system areas should be designed for ease of robot access for carrying out inspections, maintenance operations, surveys, sample taking, etc. Ensure as-built drawings are available after the plant is constructed. GPS readings that pinpoint all buried component locations should be made available.
- During decommissioning planning, licensees should establish adequate measurement capabilities at the facility (e.g., onsite radiological laboratories, mobile units, etc.). This approach could increase efficiency by ensuring early in the decommissioning process that site characterization measurements to establish radiological conditions in the field or onsite are accurate and reliable. Licensees should develop and implement a comprehensive site characterization plan before starting decommissioning activities. Comprehensive site characterization allows licensees to properly identify and quantify the amount and extent of contamination that needs to be remediated.
- Licensees that conduct radiological work in onsite areas not designated for radiological work should upgrade these areas. For example, this applies to the storage of radioactive waste. Upgrades could include, for example, increased effluent monitoring for turbine building sumps, and temporary or permanent enclosures of areas. Surveillance programs for these areas should include the monitoring of liquid and airborne effluents. Improvements to control contamination will facilitate decommissioning planning. Licensees should collect radiological information from these areas, which could be used later during decommissioning planning.

- Planning should be considered to minimize replacement of contaminated components, as well as methods to reduce their degree of contamination prior to disposal. Mock ups and procedure development should also be considered to help ensure that the equipment or systems used are appropriate.
- Ensure removal of all field run piping during construction so as not to have random piping in the field that when uncovered will raises questions at decommissioning time. No construction debris should be disposed of onsite.
- Consideration should be given to design for easier removal of any equipment and/or components that may require removal and/or replacement. Mechanisms, such as cranes, lifts, etc. should be given placement and type consideration for use and conveniences to facilitate removal of any equipment and/or components. When designing enclosures for large pieces of equipment (e.g., steam generators, large piping, tanks, etc.), the licensee should determine how these pieces will be removed for replacement or permanently removed at the time of decommissioning. Licensees should evaluate:
  - size/space clearances
  - installation of removal roofs/walls
  - installation of lifting lugs
  - anchor points for lifts
  - shearable nuts and bolts
  - quick-disconnect components
  - ease of removal of insulation

4. GENERATION OF WASTE

[*philosophy*]

- Generators of any new waste stream should perform life-cycle waste management planning to define the strategy for its conditioning, storage or disposal. Systems should be designed to enable operators to carry out decontamination efficiently, with a minimum of collective dose and production of radioactive waste.
- Workers should know how to inspect for leakage. Workers should also know how to use any liquid contamination removal equipment and/or techniques in a responsive way at anytime during reactor operations.
- Ship waste offsite when generated; avoid legacy wastes.
- Licensees should establish onsite decontamination facilities and/or waste segregation facilities in order to manage large quantities of radioactive material/waste. Component placement and packaging should also be considered to provide for waste compaction and contaminant disposal minimization.

[*structures, systems and components*]

- Volume reduction systems should be considered for minimizing the volume of generated waste, consistent with American National Standard for Volume Reduction of Low Level Radioactive Waste, ANSI/ANS-40.35-1984.
- Continuous pours eliminate potential leakage in seams, but are difficult to dismantle and could create significant quantities of contaminated waste at decommissioning. Modular construction permits separate layers of contaminated material to be removed to minimize the volume of contaminated waste.

Attachment 2

Results of Regulatory Guide and Document Reviews

The Project Team (ISL, Inc. and Chesapeake Nuclear Services (CNS)) completed a screening and review of the Division 1, 3, 4 and 8 regulatory guides. The results of this review are provided in this attachment. In addition to reviewing the existing regulatory guides for relevant information, the Project Team reviewed additional documentation and captured the relevant information in the database just as was done for the existing regulatory guides as discussed above. The review of this additional information is discussed under the "Review of Other Documents" heading.

Screening of Regulatory Guides (RGs)

Because not all of the existing regulatory guides are likely to be affected by or contain information useful to the development of new regulatory guidance to support implementation of 10 CFR 20.1406, a screening of the Division 1, 3, 4 and 8 regulatory guides was performed. The Project Team developed criteria for the purpose of screening and eliminating from further review those regulatory guides that clearly would not require revision/updating or provide useful information. The screening criteria, listed below, were applied to all active (i.e., not withdrawn) Division 1, 3, 4 and 8 Regulatory Guides. If during the initial screening, a RG met any of the criteria below, it was included in the set of RGs which would receive a more detailed review.

Screening Criteria

1. Pertains to the design, operation or programmatic control of a radioactive system or a clean system that can become radioactive through normal use.

2. Pertains to systems, structures or components (SSCs) designed to contain, monitor or control radioactivity or radioactive material.

3. Pertains to SSCs that prevent leakage, degradation, or corrosion by chemical control or through cathodic protection.

4. Does not pertain to license renewal applications.

5. Does not contain enough specific information such that it can be excluded from review.

The results of the screening process are listed below.

Division	Number of RGs Screened Out	Number of RGs Retained for Review
1	95	85
3	13	43
4	7	11
8	19	15
Totals	134	154

Review of RGs

Those regulatory guides that were retained were reviewed against criteria obtained from 10 CFR 20.1406. These criteria were presented to the NRC staff and accepted as valid review criteria during a meeting held on August 4, 2006. The review criteria that was used are as follows.

Review Criteria

contamination of the facility -- design
contamination of the facility -- operation
contamination of the environment -- design
contamination of the environment -- operation
facilitate decommissioning -- design
facilitate decommissioning -- operation
generation of waste -- design
generation of waste -- operation

If any of the above criteria applied, the pertinent information was captured and put into a database for later retrieval and possible use.

In addition to identifying information in the existing regulatory guides that might be useful for new regulatory guidance, an attempt was made to identify those RGs that: 1) need possible revision; 2) need to be referred to in the proposed RG for implementation of 10 CFR 20.1406 (e.g., RG 1.143); or, 3) have possible conflict(s) with the intent of 10 CFR 20.1406.

As the result of reviewing the154 RGs against the above criteria, the following was concluded:

1. 14 RGs contain useful information for consideration in the proposed RG for implementation of 10 CFR 20.1406,

2. 14 RGs potentially need some type of revision to reference 10 CFR 20.1406,

3. 4 RGs possibly need a reference back to the proposed RG for implementation of 10 CFR 20.1406,

4. 1 RG contains a potential conflict that should be resolved.

Regulatory Guides that Contain Pertinent/Useful Information for New Regulatory Guidance

RG No.	Example of Pertinent/Useful Information
1.54	The functions of Service Level 2 coatings are to provide corrosion protection and facilitate decontamination in those areas outside the reactor containment that are subject to radiation exposure and radionuclide contamination.
1.56	Water quality control starts during construction when extensive efforts are necessary to ensure that components and piping are clean. Concern with proper water quality must start even before the plant operates and continue through all operations until final shutdown.

1.143 The design should include provisions to prevent leakage from entering unmonitored and non-radioactive systems and ductwork in the area.

3.8 Design the isolation area so that seepage of toxic materials into the ground-water system would be eliminated or reduced to the maximum extent reasonably achievable.

3.10 There should be no bypasses or drains in the radioactive liquid waste treatment system by which waste may inadvertently circumvent treatment equipment components or be released directly to the environment.

3.11 Seepage through the embankment, foundation, abutments, and basin area should be controlled to prevent excessive uplift pressures, piping, slouging, and erosion of materials by loss into cracks, joints, and cavities.

3.12 The material of construction for the ventilation systems should be carefully selected according to such safety considerations as... smooth surface finish to aid in decontamination.

3.13 Provisions should be made to stabilize loose radioactive material produced by evaporation of liquid from (retention) basins (for liquid radioactive waste).

4.2 The applicant should also discuss the consideration given in the design of the station and its auxiliary systems relative to eventual decommissioning. ... However, since the environmental impact of terminating station operation is, in part, determined by station design, applicants should give attention to the subject in the project planning.

4.9 The applicant should describe his plans and policies regarding the actions to be taken at the end of the plant's useful life. Information should be provided on the long-term uses of the land; the amount of land irretrievably committed, if any; the expected environmental consequences of decommissioning; and the estimated monetary cost involved in decommissioning, discounted to present value.

4.17 Describe plans for mitigating any significant adverse environmental impacts caused by site characterization activities if such area is determined unsuitable for a construction authorization application for a geological repository operations area.

8.8 Leaks from pumps can be reduced by using canned pumps. ... Drains on pump housings and provisions for collection of leakage or disposal to a drain sump. These are examples from the RG. The RG should be consulted for the complete information.

8.25 Purposes of air sampling are ... (2) verify that the confinement of radioactive material is effective, (4) determining whether there is any leakage of radioactive materials from a sealed confinement system.

8.31 General features applicable to equipment that will be used for handling, containing, or contacting uranium and its daughters are as follows: 1. Equipment that contains large volumes of uranium-bearing liquids should be designed with sumps or dikes to contain the liquids in the event of leaks or spills; ...

For some of the RGs above, such as RG 1.143 and RG 8.31, it may be more prudent to refer to these RGs in the new RG for implementation of 10 CFR 20.1406 as a means of meeting the NRC's expectations for certain aspects of system design and operation.

Regulatory Guides that May Require Some Revision to Reflect Regulatory Requirement

When performing the review for this criterion, the potential was considered that 10 CFR 20.1406 might eventually be revised to be made applicable to license renewal (i.e., existing plants). Also, for some RGs, the reason for revision may be moot. The other thought is that revision to many existing RGs may be unnecessary, i.e., there is no conflict with the criteria in 10 CFR 20.1406. Instead, the new regulatory guide would contain all necessary guidance. Additionally, some specific RGs could be revised to reference the new RG for implementing 10 CFR 20.1406.

RG No.	Reason for Possible Revision
1.11	General discussion may incorporate a statement about minimizing debris traps in instrument lines to aid decommissioning
1.13	General discussion may incorporate a statement about designing system to facilitate decontamination upon decommissioning
1.26	General discussion may incorporate a statement about designing system to facilitate decontamination upon decommissioning
1.33	General discussion may incorporate a statement about designing system to facilitate decontamination upon decommissioning
1.37	General discussion may incorporate a statement about designing system to facilitate decontamination upon decommissioning
1.39	Discussion may be revised to include benefit of housekeeping with respect to decommissioning
1.45	Discussion may be revised to include benefit of detecting reactor coolant pressure boundary leakage with respect to decommissioning
1.70	Add possible new section about proposed plan for decommissioning as it pertains to all systems that meet 10 CFR 20.1406 criteria.
1.96	Maybe revise to add statement about existence of 10 CFR 20.1406
1.110	Should be revised to reflect the qualitative or quantitative considerations of decommissioning
1.132	May need to be revised to reflect 10 CFR 20.1406 criteria (ground water/siting concerns). RG also references RGs 1.59, 1.70, 1.138, and 4.7
1.138	May need to be revised to reflect 10 CFR 20.1406 criteria (ground water/siting concerns). RG also references RGs 1.70, 1.132, and 4.7

1.140 May need to be revised to reflect 10 CFR 20.1406 criteria

1.198 May need to be revised to reflect 10 CFR 20.1406 criteria (ground water/siting concerns). References RGs 1.70, 1.132, 1.138, and 4.7

Regulatory Guides that Should be Referred to in New Regulatory Guidance

RG No.	Reason for Need for Reference
1.143	RG 1.143 provides guidance to licensees and applicants on methods acceptable to the staff for complying with the NRC's regulations in the design, construction, installation, and testing the structures, systems, and components of radioactive waste management facilities in lightwater-reactor nuclear power plants. Useful information from this RG should be incorporated into new RG; however, a reference back to this RG should be made for detailed design information.
4.14	Consider including as reference for methods for environmental monitoring for early identification of environmental contamination.
4.15	This RG may need to be cited in the Discussion Section of the new guide to reference its applicability to QA for effluents and environmental monitoring.
4.16	Consider possible reference to acceptable program for environmental monitoring for environmental contamination.

Regulatory Guides that Contain Potential Conflicting Statements

RG No.	Potentially Conflicting Statement
8.8	Floor and equipment drains, piping, and sumps that are provided to collect and route any contaminated liquids that might leak or be spilled from process equipment or sampling stations can become substantial radiation sources. The drain lines can be located in concrete floors, concrete ducts, columns, or radwaste pipe chases to provide shielding.

Resource Estimate and Schedule for RG Revisions

Based on data from a recent project to develop minor revisions to existing RGs, the revisions which were identified during this project would take on average about 200 hours to prepare and submit for a revised RG for public comment. This does not include the NRC resources required internally to prepare a RG for public comment. The 200 hours is for drafting the revised RG and supporting resolution of NRC and public comments. The revisions identified were not significant enough that they couldn't be handled as part of the normal revision process for the specific RGs.

The Project Team recommends the creation of a new regulatory guide for the implementation of 10 CFR 20.1406 using Attachment 1 as technical input. This guide should be developed as soon as possible to support the review by the Staff of the combined operating license applications.

Review of Other Documents

The Project Team has completed a review of other pertinent documents such as NUREGs, NUREG/CRs, decommissioning lessons-learned reports (NRC and EPRI), and selected industry standards. These documents were reviewed using the aforementioned review criteria and any pertinent information was captured in the database. The results of this review is documented in Attachment 3 to this letter report which provides an electronic copy of the resulting database. The information judged to be relevant to the new proposed regulatory guide for implementation of 10 CFR 20.1406 was extracted from this database and organized into a document (Attachment 1) which provides technical input to the proposed new regulatory guide. This information was organized according to four criteria taken from 10 CFR 20.1406. These criteria are as follows:

- Contamination of the Facility
- Contamination of the Environment
- Facilitate Decommissioning
- Generation of Waste

Aspects related to both design and operation were considered for each of these criteria.

Attachment 3

Electronic Copy of Database Containing Detailed Information from the Document Reviews

This attachment contains an electronic copy of the ACCESS database file with the results from the detailed review of the RGs and other pertinent documents. This file can be imported into ACCESS and various views of the data can be obtained to study the results of the document review. This information could be useful in the development of the proposed new regulatory guide for implementation of 10 CFR 20.1406. This database provides the source information for most of the material provided in Attachment 1 as well as the linkage to the original basis document. In addition, this CD also contains an electronic file in portable document format (PDF) which provides a listing of the entire contents of the database.