



UNITED STATES
NUCLEAR REGULATORY COMMISSION

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MEMORANDUM FOR: Bill M. Morris, Director
Division of Regulatory Applications
Office of Nuclear Regulatory Research

FROM: John T. Greeves, Director
Division of Low-Level Waste Management
and Decommissioning
Office of Nuclear Material Safety
and Safeguards

SUBJECT: REVISION OF THE USER NEED STATEMENT FOR THE LOW-LEVEL
RADIOACTIVE WASTE MANAGEMENT PROGRAM

On June 8, 1988, the Office of Nuclear Materials Safety and Safeguards (NMSS) submitted the "NMSS Statement of LLWM Research Needs" (User Need Statement) to the Office of Nuclear Regulatory Research (RES). RES was responsive to our request and used it as a basis to develop a Low-Level Radioactive Waste Research Program Plan as documented in NUREG-1380. Many elements of our June 8, 1988, request have been addressed by existing or completed research projects. Understandably, some elements were not addressed because of fiscal constraints. However, over the last five years, our knowledge of low-level radioactive waste and decommissioning issues has expanded considerably. In particular, the evolving technology for assessing the long term performance of low-level waste (LLW) disposal facilities has identified areas where research should be focused. Experience gained in the actual decommissioning of facilities has also identified areas where research is needed, particularly for the disposal of wastes contaminated with uranium and thorium. NMSS and RES staff have coordinated changes in research needs on an individual basis. Now it is time to reassess our total research needs in the area of LLW and decommissioning and to establish current priorities consistent with the challenges and constraints that face the waste management program.

Our assessment of research needs involved several separate functions. We reviewed the various elements of the 1988 User Need letter to determine the current validity of research requests not yet initiated. We reviewed existing research contracts associated with LLW and decommissioning activities. The Performance Assessment Working Group (PAWG), which contains staff from both NMSS and RES, was contacted to identify areas needing attention. The joint PAWG effort was a valuable tool in focusing the efforts of the LLW research program. Finally, a draft version of the revised user need was shared with the Waste Management Branch, and we received both verbal and written feedback. We appreciate the cooperation of the Research staff in coordinating with the LLWM staff in our efforts to revise our User Need Letter. Your staff input has been carefully considered in our final decision.

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The enclosure identifies current regulatory issues in the Division of Low-Level Waste Management and Decommissioning (LLWM) that need investigative and confirmatory research to provide technical support for licensing assessment and safety reviews and which should be considered for inclusion into RES's Low-Level Radioactive Waste Research Program Plan. The enclosure both replaces our June 8, 1988, memorandum and represents an update and reassessment of our previous request. We have identified individual priorities on each project listed in the enclosure. However, from an overall perspective, our top priority would be projects which support LLW performance assessment and decommissioning activities.

Performance assessment activities, in general, dominate our overall request and are associated with all five areas defined in the enclosure. As you are aware, a large portion of the needs identified in the performance assessment category result from activities that were developed in response to the Commission's June 14, 1991 Staff Requirements Memorandum, which directed the staff to provide a comprehensive performance assessment program plan. Based on programmatic needs, we are implementing plans to modify phase 2 of the Performance Assessment Program Plan to focus on potential decommissioning activities for major facilities. One result of this effort may be a need to revise either the scope or priority of specific research projects. Additional thought needs to be given to the level of research in support of this program area. LLWM will coordinate with RES, if such changes appear necessary. A second result will be to delay issuance of a final version of the Performance Assessment Branch Technical Position, a NUREG documenting the test case results, development of a Regulatory Guide on LLW Performance Assessment, and revising the Standard Review Plan for the review of a license application for a LLW disposal facility.

RES is requested to review the projects described in the enclosure and to evaluate the extent to which the current research efforts fulfill the identified needs. Meetings should be held between the RES and LLWM staff at the Branch Chief level to: (1) discuss RES's findings on how the current work specifically fulfills the identified user need; and (2) decide what changes or redirection of existing research contracts should be made.

We would be pleased to work with your staff to refine the definition of the enclosed research needs as specific projects are developed. LLWM staff will continue to work closely with RES to ensure that existing and future research is consistent with identified research needs and priorities, that research activities are integrated with the LLWM Technical Assistance Program, and that RES products are provided in a timely manner consistent with the programmatic needs. LLWM staff will also continue to assess confirmatory research needs and update the statement of LLWM research needs accordingly.

Bill M. Morris

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Please contact me on 504-3334 or Mike Bell of my staff on 504-3785, if you have any questions or comments about the enclosed statement of LLWM research needs.

ORIGINAL SIGNED BY
John T. Greeves

John T. Greeves, Director
Division of Low-Level Waste Management
and Decommissioning
Office of Nuclear Material Safety
and Safeguards

Enclosure: As stated

DIVISION OF LOW-LEVEL WASTE MANAGEMENT AND DECOMMISSIONING
1993 RESEARCH USER NEED STATEMENT

The research needs that are listed below have been categorized into the program areas of (A) Low-Level Waste (LLW) Management and Treatment, (B) Engineering Material Behavior, (C) Site Characterization and Monitoring, (D) Performance Assessment (PA), and (E) Decommissioning. Each of the listed research needs has been assigned a priority ranging from "A" to "B" based on Low-Level Waste Management's (LLWM's) judgment as to the specific project's importance and immediacy in fulfilling licensing and regulatory responsibilities. To the extent practical, priority A projects should be initiated first. Other research needs of lower priority have also been identified by the LLWM staff, but these needs have not been included in this enclosure in recognition of funding limitations. It should be noted that the category titled PA contains elements that are integral with all four of the other categories. We have tried not to duplicate identified needs across categories. Nevertheless, it may be practical to satisfy multiple user needs with a single research effort.

In addition, the field of PA is an evolving technology. Staff from the offices of Nuclear Material Safety and Safeguards (NMSS) and Nuclear Regulatory Research (RES) are gaining valuable experience in PA through the joint development of a performance assessment Branch Technical Position (BTP) and the development and exercising of a test case model for the BTP. The joint effort of the RES/NMSS staff in the Performance Assessment Working Group (PAWG) is not identified as a distinct user need. However, the PAWG efforts have had a direct relationship in deriving the identified user needs. Since this is an evolving function, additional user needs may be identified as the work progresses.

The informational needs identified in this document do not necessarily mean that new, independent research is requested. In some instances, information obtained in a literature search or as a result of a cooperative agreement with other agencies or organizations may be sufficient to answer the needs identified herein or more narrowly focus the need for additional research.

A. LOW-LEVEL WASTE MANAGEMENT AND TREATMENT

1. Radionuclide Characterization and Assessment (Priority A)

Research is needed to support adequate identification of difficult-to-detect radionuclides in radioactive waste streams from nuclear power plants. Various waste streams from nuclear power production are assumed to contain concentrations and quantities of certain difficult-to-detect radionuclides based on scaling factors (SF) and lowest limits of detection. The difficult-to-detect radionuclides may be very significant in calculated exposures via ingestion pathways in a low-level waste disposal facility performance assessment. Thus, there is a need to identify and accurately measure low concentration, weak beta, and alpha emitting isotopes in reactor effluent waste streams. Research products should include: (1) a literature search for any previous analysis of the types identified in (2) - (4) below, (2) analysis of comparative SF developed and used in waste classification in industry;

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(3) a review of the industry's theoretical calculation of radionuclides produced in nuclear power operations by fuel type and use characteristics [note, RES should consider but not duplicate topical report reviews by NMSS or the Office of Nuclear Reactor Regulation such as the current review of the VANCE 3RSTAT code or the proposed review of the EPRI RADSOURCE code]; (4) analysis of a variety of representative samples to determine appropriate concentrations or activities in waste streams for isotopes such as Cl-36, C-14, Tc-99, Sr-90, and I-129; and (5) an assessment of present conditions and the significance of overly conservative estimates by licensees of concentrations for radionuclides such as I-129 and Tc-99. The research should provide recommendations for integrating the findings of the investigation into licensing considerations covering both waste classification and waste disposal facility performance assessment. This research should be coordinated with other research being developed for isotope transport in the environment.

2. Screening Test for LLW Form and Container Stability (Priority B)

Research is needed to examine the screening tests and test procedures that are identified in NRC's Technical Position on Waste Form (January 1991) to determine if other tests, test methods, or testing criteria are more effective in evaluating long-term physical properties of LLW forms and container materials. Nuclear Regulatory Commission's Technical Position (TP) on Waste Form recommends testing procedures to be used by generators in demonstrating that their LLW forms and container materials meet the 300-year stability requirement in 10 CFR Part 61. These tests are based on short term accelerated testing and the results extrapolated into long term performance.

As new information becomes available for specific materials, both as a result of laboratory and empirical field data, there is a need to improve the projections of material performance in the long-term. Therefore, research is needed to evaluate whether other tests and/or testing criteria provide results that are more representative of the long-term performance of the LLW forms and container materials. The research should provide specific recommendations about the need for revising the tests, methods, or criteria in NRC's TP on Waste Form and, if appropriate, identify suitable alternatives that provide greater assurance that LLW forms and container materials will remain structurally stable for at least 300 years.

For example, the long-term applicability of short term diffusional and non-diffusional leaching tests is uncertain. In particular, because the standardized ANSI 16.1 leach test for cementitious waste forms is suggested in the Branch Technical Position (BTP) on Waste Form - Revision 1 (January 1991), this test is often used to characterize a multitude of different waste forms; yet this test is inappropriate for projecting long-term release characteristics for non-diffusional releases. Moreover, the test procedure does not provide information that may be used to estimate either thermodynamic solubility or a kinetics model of radionuclide release. Thus research is needed to develop better leach testing protocols that can provide this type of information. Because this approach will be waste form specific it should only be applied to specific waste forms and waste streams identified by the staff as significant sources of uncertainty in performance assessment.

B. ENGINEERING MATERIAL BEHAVIOR

1. Cover Performance (Priority A)

Cover designs for LLW disposal facilities are becoming fairly complex, multi-layered engineered systems. As cover designs become more complex, questions are raised on topics such as: (1) the appropriateness of analytical parameters (e.g., van Genuchten parameters) used for PA analysis, (2) the long-term behavior of graded filters, geotextiles, and geomembrane materials, and (3) the response of multi-layered covers to load deformation. Research is needed to address these questions and to supplement existing guidance for reviewing a license application which depends on the long-term performance of the cover design. This regulatory guidance would be applicable to both the engineering design and the review of long-term performance. Specific aspects which should be addressed by this research include the following:

(a). A fundamental practice in unsaturated flow studies is to base the analysis on characteristic curves which relate hydraulic conductivity and moisture content to pressure head. However, these characteristic curves require high suction pressures in order to permit development of the curves. Research is needed to assess the appropriateness of the characteristic curves used in unsaturated flow analysis that represent the clean, coarse-grained, permeable, sands and gravels typically used in drainage layers. Questions to be addressed in this research include the reasonableness of using the assumed high suction pressures to develop the characteristic curves and van Genuchten parameters for these clean granular types of materials. Associated with this concern is also the need to determine whether the magnitude of these high suction pressures actually occur in the natural environment. The research should begin with an evaluation of the available information on these types of materials followed by an assessment of the reasonableness of current practice. Recommendations for field confirmation testing to support the findings of the research study should be considered by the LLWB management. Consideration should also be given to recommendations for analyzing the performance of capillary barriers. Based on the results of the above reasonableness study, the research effort should determine which characteristic curves and van Genuchten parameters are reasonable to represent the conductive and capillary break layers and the research should identify and evaluate methods available to analyze the performance of capillary barriers. Because of the differing professional opinions that exist with aspects of unsaturated flow analysis, it is recommended that the results of this requested research be subjected to independent peer review before final publication. The results of this research effort would be directly applicable to the PA test case modeling effort in progress.

(b). Most cover designs for LLW disposal facilities incorporate at least one graded natural filter that allows collection and drain-off of subsurface fluids. Research is needed to define the long-term behavior of graded natural filter materials used in the cover designs. The most common type of failure for such filters is the migration of fines, resulting in filter clogging. This can be caused by poor design (inappropriate particle sizes placed against each other) or by poor control of materials or the placement of materials in the field. Also of concern is loss of filter flow capacity from encrustation.

which could result from deposition of chemicals that reduce the void volume and flow capacity. Other long-term mechanisms may also impact the flow capacity when the filter's needed service life is several hundred years.

Field data of actual filter performance of existing LLW facilities should be obtained and evaluated to ascertain if any of the potential mechanisms have been observed. If so, the conditions that lead to the reduced flow should be defined and an assessment methodology developed that is consistent with observations and provides an analytical approach to predict performance.

This effort is related to the ability to assess the long-term performance of graded natural filters which can influence the performance of a low-level waste disposal facility. Information in this area will help provide additional supporting background for PA. The time frames for filter performance to be considered are 300 to 500 years and beyond.

(c). Some current concepts for LLW disposal incorporate geotextile and geomembrane materials. If an applicant uses geotextile and/or geomembrane materials as either an independent engineered barrier or a barrier component and seeks to credit the barrier performance in a PA, the NRC staff needs information which can be used to help support a regulatory judgment regarding performance of these materials. This research should address material degradation with time and provide analytical tools for use in PA to evaluate long-term performance. Information is needed on the performance of these materials as filters, reinforcement, or fluid barriers. The ability of the staff to evaluate the performance should be based on available data related to a combination of actual field experience and observation, laboratory testing, and simulations as well as results from analytical methods.

Data relative to the performance of these materials should be gathered and evaluated to determine what information can be used in PA relative to properties, behavior, and service life. Typical considerations that would be relevant for such a study would include the ability of the material to be placed in the field in the design condition, the ability of the material to withstand deformation without rupture, an understanding of the aging process under the range of conditions that can occur in LLW disposal sites based on current knowledge, and a methodology to extrapolate physical characteristics into the range of 300 to 500 years.

(d). Settlement and subsidence may be a cumulative response of LLW disposal facility components and may adversely affect the performance of multi-layered cover systems consisting of various layers of clays, gravels, geotextiles, filters, riprap, and concrete. As part of the review of a license application, the NRC staff will need to evaluate the applicant's analysis of long-term settlement and subsidence of a proposed LLW disposal facility. Research is needed to: (1) improve our understanding of the characteristics of the load-deformation response of various components of a LLW disposal facility, including the waste itself, backfill surrounding the waste, structural components of disposal units, and multi-layered covers; and (2) model the long-term settlement and subsidence of a LLW disposal facility.

Short- and long-term degradation of heterogeneous wastes coupled with infilling and gradual consolidation and settlement may disrupt the layers of the cover systems, thus degrading their ability to minimize infiltration. The research should develop an analytical framework, including supporting computer codes, to assess load-deformation and differential settlements. The research should provide specific recommendations about typical values and ranges of parameters to be used in settlement evaluations. In addition, the research should: (1) compile information about past settlement histories at existing LLW disposal facilities; (2) identify design, construction, operation, and closure features that significantly affect cover settlements; and (3) recommend revisions to review and acceptance criteria for NRC staff reviews of settlement evaluations that are provided in support of LLW disposal facility license applications.

2. Concrete and Concrete Structures (Priority B)

Because of past experiences with shallow land burial of LLW, many potential future host States for LLW disposal facilities have passed laws specifically banning shallow land burial. Therefore, developers in those States are proposing a disposal facility involving engineered structures that are principally made of concrete. Concrete structures are also being investigated to enhance a site's capability to meet PA objectives. Research is necessary to help in the review of a license application which depends on the performance and longevity of concrete engineering designs. This regulatory guidance would be applicable to both the engineering design review and the review of long-term performance. Specific aspects which should be addressed by this research include the following:

(a). Research is needed to evaluate environmental and chemical effects on the durability of concrete and reinforcing steel to ensure that the protection provided by the structure as an engineered barrier in PA conservatively represents the future behavior of the as-built barrier.

(b). Research is needed to gather, develop, and evaluate actual field behavior of reinforced concrete material and structures relative to the important parameters for PA. Of most importance are the characteristics that: (1) impact the water permeability of the concrete material or the concrete structure; and (2) affect the strength of the material and the structure, both considering the effect of time. In the recent past and currently, there is a great deal of research effort based on theoretical models, some of which incorporate some empirical data, but are largely based on highly idealized materials and do not generally represent the materials as they are integrated into actual use in the field. Consequently, there is a need to understand the capability of the developed theories to predict performance for time frames over which there are historical data available, or for which data can be obtained. With such data and the capability to correlate observations with the theories for known time frames, the degree of confidence in long-term predictions of behavior will be enhanced.

This effort should use the results from previous research projects for correlation with actual field behavior using data that can be collected for increments of time that are an order of magnitude less than the time frames

over which projections of performance are to be made. Parameters of importance relate to the capability of the concrete to perform as a structural material and to function in a structure to retard the flow of water. These parameters are to be considered with the impact of aging as well as the range of degrading mechanisms that may be present.

(c.) Most current proposals for LLW disposal facilities that incorporate reinforced concrete structures as part of the disposal units will not be built monolithically. Consequently, the behavior of the disposal units important to PA may be controlled by the performance of the joints and waterstops. To improve our ability to allow credit in PA for the reinforced concrete structures, an improved basis for defining the performance of joints and waterstops is needed. Research is needed to study the performance of such materials in the field under conditions that are similar to those that may be present in a LLW disposal facility. Parameters important to the ability of the materials to retard the flow of water and the passage of moisture with respect to time, considering the potential degradation mechanisms should be the main focus of the work. Development of predictive models for performance that have been correlated with known data is the goal of this research so that projections of performance in the 300-500 year time frame or greater can be enhanced. The purpose of this research is to develop improved guidance and criteria for reviewing an applicant's analysis of the long term performance of a LLW disposal facility.

3. Conditioning Near-Field Environment to Enhance LLW Disposal Facility Performance (Priority B)

Research is needed on methods for conditioning the near field environment of LLW disposal facilities to enhance facility performance. Chemical conditioning of the near-field environment around waste packages and the facility is one possible method. Chemical conditioning can be done by the use of additives which enhance performance of concrete engineered structures and by conditioning agents which retard releases of radionuclides. For example, clay rich soils are generally effective in retarding cations. However, under natural conditions, certain long-lived radionuclides such as I-129 and Tc-99 may migrate in an anionic form. Therefore there is a need to investigate media which could be used to retard anion migration of key long-lived radionuclides. The purpose of this research is to assist in the development of further guidance and criteria for reviewing an applicant's analysis of the long term performance of a low level waste disposal facility. This research should be conducted in concert with user need D.4, Speciation and Solubility Data to Support Geochemical Models.

C. SITE CHARACTERIZATION AND MONITORING

1. Unsaturated Zone Monitoring (Priority A)

Research is needed to identify and assess techniques and integrated programs for monitoring moisture movement and contaminant transport in the unsaturated zone at LLW disposal facilities. NRC's regulations in 10 CFR Part 61.53 require that environmental monitoring systems provide early warning of radionuclide releases. Unsaturated zone monitoring may be capable of

providing such early warning of releases. In addition, such monitoring may prove useful in verifying performance assessment results used to demonstrate compliance with the performance objectives in Part 61. Research should especially focus on techniques applicable in low moisture (arid) environments, the long-term durability of unsaturated zone monitoring systems, and assessment of monitoring parameters as indicators of facility performance. The research should provide: (1) an assessment of the capabilities, limitations, and usefulness of alternative techniques for monitoring moisture movement and contaminant transport in the unsaturated zone; (2) recommended techniques for unsaturated zone monitoring at LLW disposal facilities; (3) guidance on the design, installation, use, maintenance, and decommissioning of unsaturated zone monitoring systems; and (4) an evaluation of the extent to which unsaturated zone monitoring systems may compromise the performance of natural and engineered barriers at LLW disposal facilities and recommendations on how to eliminate or mitigate such compromises.

2. Integrating Ground-Water Site Characterization Information for Operational Monitoring and Performance Assessment (Priority B)

The ground-water data needed to establish an operational monitoring program is generally different and more extensive than that needed for site suitability analysis and performance assessment. Current methods for developing monitoring programs are directed at detecting large releases and not at detecting very small releases from LLW disposal units. The anticipated small release of radionuclides at a typical LLW disposal facility may require a more extensive operational monitoring network. Therefore, research is needed to develop a more specific and improved methodology for designing an operational monitoring program for detecting releases to the ground water from LLW disposal units. This methodology should integrate the needs for ground water data necessary to satisfy site characterization, performance assessment, and long-term monitoring. The methodology developed should allow uncertainties in data and the performance assessment analysis to be considered in developing the monitoring program. This research should provide an analytical tool for improving our ability to assess the capability of a monitoring program to detect releases from a LLW facility at levels anticipated based upon the performance assessment. The formalized methodology to be developed should provide a means for determining the optimal location and number of monitoring installations needed and the range of conditions to be monitored. The methodology developed should supplement the guidance provided in NUREG/CR-5054 and Standard Review Plans (NUREG-1200) 2.4.2, 2.9, and 4.4.

D. PERFORMANCE ASSESSMENT

The topics encompassed by Performance Assessment span a wide range of subjects. Current research identified as necessary to support the PA effort is listed below.

1. Application, Evaluation, and Validation of the Low-Level Waste Performance Assessment Methodology (Priority A)

A Performance Assessment Methodology (PAM) was developed under technical assistance FIN A1764 for analyzing the performance of below ground low-level

waste disposal systems, including earth mounded concrete bunkers (EMCBs). Additional research is needed to develop enhanced methods for conducting uncertainty analysis in performance assessment as part of the performance assessment methodologies being improved or developed. Furthermore, research is needed to make the PAM applicable to analyzing the performance of above ground vault (AGV) and mined cavity LLW disposal options licensable under Part 61. The same techniques that were used to develop the PAM under FIN A1764 for below ground facilities should be applied to this research. As with the work being performed under FIN L1153, objectives of this new research should also include identifying and implementing validation procedures that can be used to access the adequacy or validity of the PAMs for AGVs and mined cavity LLW disposal facilities, and which can provide a basis for future improvements in PA modeling.

Research conducted under FIN L1153 is applicable for addressing this user need. The additional research requested on developing uncertainty analysis for the PAM is high priority because it directly supports the BTP on PA currently being developed. However, FIN L1153 needs modification to include the additional work on methods for assessing AGV and mined cavity disposal. A lower priority can be placed on the mined cavity activity effort. To date, mined cavity disposal interest has been limited to New York. However, as alternative disposal techniques for uranium and thorium wastes (such as for Louisiana Enrichment Services) are investigated, mined cavity disposal may be desired. Research into mined cavities, when initiated, should start with a literature review and, in particular, focus on international efforts.

2. Infiltration Evaluation Methodology (IEM) for Low-Level Radioactive Waste Disposal Facilities (Priority A)

Research is needed to develop and improve evaluation techniques and procedures for reviewing earthen and other engineered subsurface drainage control systems to minimize infiltration into LLW disposal units. Improvements are needed to the IEM developed under FIN L1007 to enhance its use in LLW PA. Specifically, the stochastic analytical approach needs to be tested for its applicability over a broader range of cover designs and site conditions. A review is also needed of existing computer codes suitable for implementation in the integrated numerical modeling approach. The review should identify specific codes suitable for each component of the integrated approach and identify limitations of the specific codes recommended. The range of codes recommended should be wide enough to cover a full range of possible cover designs and site conditions expected for LLW disposal sites. The IEM should also provide specific recommendations on how to resolve issues that are considered key to the infiltration evaluation.

This research effort should identify and list all potential failure modes for the cover and subsurface drainage systems which could adversely affect the cover performance to permit improved verification in a license review that all potential detrimental modes have been properly addressed in the PA. Examples of the failure modes that should be considered would include the disrupted performance of a multi-layered cover because of excessive differential settlement or subsidence, or the allowing of uncontrolled infiltration through

unlined drainage ditches between disposal units or at the lateral extremities of the cover system.

An improved methodology is needed to assess water balance calculations performed as part of LLW disposal facility PA's. The methodology should identify acceptable procedures for determining the appropriate sequence, range, and type of climatological data to be used in water balance calculations. The methodology should identify acceptable procedures for estimating evaporation, evapotranspiration, runoff, and methods to account for snowmelt. The methodology should address improved means of reducing and accounting for uncertainty within water balance calculations. In developing this methodology, consideration should be given to the long time frames over which site performance will likely have to be assessed. In addition, the methodology should be flexible enough to assess water balance calculations performed for sites in both humid and arid settings.

3. Improved Source Term Modeling Codes (Priority A)

Research is needed to improve existing source term modeling codes for the purposes of better estimating radionuclide releases from LLW disposal facilities in PA's. The existing codes; Breach, Leach, and Transport (BLT) and Disposal Unit Source Term (DUST), developed by Brookhaven National Laboratory, need to be improved in several areas. The following areas need to be addressed: (1) A new transport code should be incorporated into BLT since some numerical errors have been identified with using FEMWASTE. The successor code to FEMWASTE (LEWASTE for Lagrangian-Eulerian Finite Element Model of WASTE Transport through Aquifers) needs to be evaluated for possible inclusion in BLT. This code may resolve the problems with numerical dispersion and non-convergence that are present in FEMWASTE. In addition, the code HYDROGEOCHEM, which is a coupled geochemical modeling and transport code, also needs to be evaluated for possible use in BLT; (2) a pre/post processor should be developed for BLT to help with the massive data input; this would likely increase future use of the code; (3) both the BLT and DUST code should be modified to handle decay chains, gaseous release, and changes in distribution coefficient with changes in moisture content; (4) verification analyses should be performed using the waste forms containing radionuclide or ion-exchange resins that are a part of the FIN L1808 field lysimeter study; (5) any technical assistance provided under FIN J5007 should be taken into consideration in determining ways of improving the BLT code for use by licensees.

4. Support for Geochemical Modeling and Understanding Sorption and Solubility in Groundwater Transport (Priority A)

Source term modeling suffers from a lack of knowledge of the chemical speciation of radionuclides that will occur inside a concrete vault disposal facility. In particular, the chemical effects of a vault system, with large amounts of concrete present, may have a large impact on parameters that control the speciation of specific radionuclides (e.g., pH, alkalinity, ionic strength, oxidation/reduction potential, moisture content, etc.) and hence effect radionuclide mobility (e.g., solubility, sorption, complexation, etc.). In addition, the use of a chemically engineered backfill will require this

type of data for determining radionuclide retention properties. Also, improved knowledge of speciation data and its effects on sorption and solubility for groundwater transport will assist in better dealing with radionuclide sorption in PA's of LLRW facilities and to better constrain the uncertainty associated with radionuclide transport. In particular, research should be focused in the following areas:

(a). Research is needed to better apply geochemical modeling to source term analyses in PA's of concrete vault disposal facilities. A better knowledge of the chemical speciation that might be expected to occur in a concrete vault disposal facility will play a fundamental role in determining what kind of release model to apply in a PA. Geochemical modeling of LLW facilities involves a large number of variables and significant uncertainty in the thermodynamic data for some chemical species. It is important to better constrain this uncertainty, which has an important effect on source term release models. The specific goal of this research work is to improve the thermodynamic data base through appropriate laboratory and field experiments. This area of work will directly support specific needs identified in NMSS Technical Assistance projects in geochemical modeling under FIN J5008 (PNL): "Geochemical Modeling for Performance Assessment of LLW Disposal Facilities." In addition, this work will support the development of chemically engineered backfill by providing thermodynamic data to support long-term modeling of retention properties.

(b). Research is needed to better quantify geochemical effects in transport models. Existing transport models treat sorption as a single variable (K_d) that is constant in both time and space. Yet numerous field, laboratory, and theoretical studies have established that sorption effects may range over orders of magnitude. The goal of this research is to develop specific parametric approaches to sorption modeling and to generate the necessary supporting data (including field studies and laboratory experiments) to implement improved sorption models. This research will directly support specific needs identified in NMSS TA projects in geochemical modeling under FIN J5008 (PNL): "Geochemical Modeling for Performance Assessment of LLW Disposal facilities."

5. Radionuclide Release Characteristics and Models for LLW (Priority A)

Research is needed to better estimate the release and transport of radionuclides from particular waste forms used in LLW disposal relevant to the licensing requirements in 10 CFR Part 61. Field lysimeter studies need to be continued so as to gain the long term benefit from these projects. Short-term and long-term radionuclide leaching studies are needed and should be continued to provide realistic releases from actual LLW and to provide an improved basis for evaluating source term models. There is a need to develop a specific methodology for using this information in PA. The current approach, which is focussed on release rates from individual waste forms, needs to be modified in terms of usefulness to large disposal systems. In addition, there is a need to develop system experiments, which better reflect leaching conditions in a degraded vault system as opposed to individual waste form experiments, that more closely mimic a trench environment.

6. Release, Transport, and Uptake Behavior of Carbon-14 (Priority A)

Research is needed to improve NRC's ability to analyze the release, transport, and uptake behavior of Carbon-14 from LLW disposal facilities. Existing assumptions about C-14 releases may be inappropriate for the types of waste currently being disposed. In addition, parameters used for C-14 transport in the geosphere and for uptake in the biosphere, may be unrealistically conservative, given the large amount of information developed for the carbon system, in general, and for C-14 in particular. The research should characterize the release and subsequent transport behavior of C-14, and provide information that may be used to review and confirm assessments of radionuclide transport in support of license applications. The research should also attempt to gain benefit from ongoing studies of C-14 being done both domestically (e.g., USGS programs at West Valley) and internationally (e.g., in Canada). The goal would be to integrate diverse information and specific studies into a methodology for modeling C-14 impacts in a PA.

The research should assess the following: (1) identification of significant C-14 waste streams and waste forms, in Class A, B, and C waste; (2) identification of leaching mechanisms for C-14 containing waste forms and development of approaches for estimating releases to be used in source term models; (3) elucidation of transport properties and attenuation mechanisms of C-14 under varying geochemical conditions that can be used in PA's; (4) development of gaseous release models and partitioning of C-14 between air and groundwater pathways; and (5) uptake of C-14 by plants (e.g., soil to plant transfer coefficients) and aquatic organisms (e.g., bioaccumulation factors that can be used in dose assessments).

7. LLW Disposal of Uranium and Thorium (Priority A)

Research is needed to improve NRC's ability to analyze the release, transport, uptake behavior, and long-term dose potential of uranium and thorium disposed at LLW facilities. Analyses of the inventory data bases indicate that the quantities of uranium and thorium that are currently being disposed of at LLW sites are much higher than those used in the Draft Environmental Impact Statement for Part 61. Examination of shipping manifests indicate that both radionuclides are virtually all in Class A waste, that the uranium currently being disposed of in LLW sites is a waste product from the production and machining of depleted uranium metal (primarily for defense purposes), and that thorium is a byproduct of a small number of industrial processes. In the future, LLW disposal sites could be receiving thorium and uranium from decommissioning sites. Research is needed to enhance our understanding of the impact of uranium and thorium daughter products on the long term performance of LLW disposal sites and on the potential exposures of individuals who may in the future inhabit a site that has been released from further controls.

The research should assess the following: (1) identification of significant uranium and thorium waste streams and waste forms, in Class A waste; (2) identification of leaching mechanisms for these waste forms and development of approaches for estimating releases to be used in source term models; (3) elucidation of transport properties and attenuation mechanisms of uranium and thorium under varying geochemical conditions that can be used in

PA's; (4) development of appropriate intruder analysis methodologies for these radionuclides; (5) development of a better understanding of the long-term accumulation, uptake, and dose potential of uranium, thorium, and daughters that can be used in dose assessments; and (6) the development of alternative disposal techniques. This research should be conducted in concert with user need E.3, Disposal of Thorium and Uranium for Decommissioning.

8. Decontamination LLW: Characterization, Processes, and Effects of Chelating Agents and Other Constituents on Radionuclide Releases and Transport (Priority B)

Research is needed to improve understanding of both the identification and impact of chelated radionuclides that could affect PA's. This research should include the following activities: (1) characterization of decontamination waste streams by process (e.g., LOMI, CAN-DEREM, CITROX, ...), chemical constituents (e.g., EDTA, citric acid, oxalic acid, ...), physical form after processing (e.g., sorbed onto resin beads), and radionuclide contents; and (2) thermodynamic and kinetic properties of the chelated nuclei that could affect transport phenomena and thus the performance and/or modelling of the facility. The research should reflect current disposal technologies (i.e., dried resins, unconsolidated, and placed in liners).

9. Revise USGS Groundwater Flow and Transport Code (VS2DT) to Handle Decay Chains (Priority B)

VS2DT is a finite difference code developed by the U.S. Geological Survey to simulate fluid flow and solute transport in variably saturated porous media. Sandia National Laboratories, after conducting an independent bench making study of VS2DT and other similar flow and transport codes, including VAM2D, recommended the use of VS2DT over the other codes for assessing vadose zone problems. SNL concluded that VS2DT's was more versatile, easier to use, better documented in terms of code development QA, and required less CPU time than the other codes. VS2DT is also in the public domain. However, VS2DT would be enhanced greatly if features such as hysteresis, state-dependent anisotropy, free drainage boundaries, and radioactive decay during transport were added to the code.

Although this is a priority B task, this is a fairly low cost request which could be implemented in a fairly short schedule.

10. Role of Organic Complexation and Microparticulates in Enhancement of Radionuclide Migration in Groundwater (Priority B)

Research is needed to better understand the role of organic complexation and microparticulates (colloids) in the enhancement of radionuclide migration from LLW disposal sites and to enhance our understanding of retardation factors for modeling PA's. An improved understanding of these processes will enhance the staff's ability to model long-term performance of a low-level waste disposal facility.

E. DECOMMISSIONING

1. Methodologies for Translating Residual Contamination Levels Into Dosimetric Impacts (Priority A)

Research is needed to define appropriate mathematical models and develop applicable software that will allow assessment of the dosimetric impacts of residual radioactive contamination in soils or on structural surfaces. The development of this software under an appropriate quality assurance program will not only be useful to NRC's enhanced participatory rule making activity but also could provide a consistent and defensible methodology for evaluating the remedial action options at sites included in the Commission's Site Decommissioning Management Plan (SDMP).

2. Assessment of Technology, Safety, and Costs of Decommissioning Power Reactors and Other Nuclear Facilities (Priority A)

Research is needed to update information on the technology, safety, and costs of decommissioning power reactors and other nuclear facilities to reflect consideration of the financial assurance requirements in the Decontamination and Decommissioning rule, revised cost estimates based on decommissioning experience (e.g., manpower and waste disposal), and improvements in technology. In particular, research is needed to continue collection of information from actual decommissioning projects. This information will be used in reviewing decommissioning plans and financial assurance cost estimates and assessing waste disposal needs.

3. Disposal of Thorium and Uranium Wastes (Priority A)

Research is needed to identify safe alternatives for the disposal of large volume, low activity wastes contaminated with thorium and uranium. Over the last several years, the NRC has been emphasizing the safe and timely decommissioning of contaminated materials facilities under the SDMP. Approximately half (24) of the sites listed in the SDMP have soils that are contaminated with thorium and uranium and 14 of the sites have large volumes of soil, sludges, and slags contaminated with thorium and uranium. In some situations, the contaminated material was stored or disposed of in accordance with NRC requirements in effect at the time the contamination was generated. However, under NRC's current requirements in 10 CFR Part 40, decommissioning of these sites would require removal of contamination to an offsite, licensed, disposal facility and stabilization onsite of any residual contamination in compliance with radiological criteria established in the SDMP Action Plan (57 FR 13389; April 16, 1992). Such disposal and stabilization activities require large financial resources that are generally not available to a significant portion of the sites on the SDMP. This situation has been exacerbated by the recent increases in disposal fees and surcharges at operating disposal facilities for LLW. In addition, even if it is within the licensee's financial capabilities to pay for disposal of the waste at a bulk disposal facility (such as Envirocare), the waste may not be acceptable for disposal because concentrations of thorium in the waste may exceed the waste acceptance criteria (e.g., 680 pCi/g total thorium). Further, some of the waste is regulated as mixed waste under the Resource Conservation Recovery Act and does

not currently have sufficient commercial disposal capability. Consequently, a number of the licensees and responsible parties would prefer to defer decommissioning the contaminated sites until reasonably priced disposal options exist or the NRC grants regulatory relief to allow the contaminated material to remain onsite.

Research is needed to assess whether NRC should revise its existing regulatory framework to accommodate large volumes of low activity wastes contaminated with uranium and thorium while ensuring protection of the public and environment. The research should either identify reasonable processing and disposal alternatives that conform with the existing regulatory framework or suggest specific regulatory modifications under the NRC program to encourage decommissioning and provide a sufficient level of protection to members of the public. For example, research could identify and access viable treatment and volume reduction methods employing chemical and physical processes to remove and concentrate the uranium and thorium into a smaller volume waste that could be more readily disposed of at licensed LLW disposal facilities. In addition, research is also needed to assess the potential public health and safety implications of including such long-lived radioactive materials in the waste inventories at LLW disposal facilities, particularly considering potential doses to members of the public over long time periods. Building on these assumptions, the research could identify viable treatment methods to reduce the leachability, mobility, and environmental hazards of the uranium and thorium in the wastes. The research could also be extended to include field-scale or pilot-scale demonstrations of the technology through integrated projects with the DOE, the Environmental Protection Agency, or other appropriate entities.

4. Disposal of Contaminated Baghouse Dust (Priority B)

The recurrence of contamination events involving industrial gauge radiation sources being inadvertently melted with steel scrap at Electric Arc Furnaces (EAF) has led to general agreement that NRC should investigate the potential health risks of possible remediation alternatives. Research is needed to identify acceptable alternatives for the disposal of contaminated EAF baghouse dust. A range of recycle, treatment, and disposal alternatives should be considered including, but not limited to, hazardous waste landfill disposal, treatment for recovery of residuals, and processing into abrasive blast or roofing granule glass frit products. Specifically, the research should assess the potential health risks of these alternatives as a function of dust contamination levels, including the impacts of mixing contaminated and uncontaminated dust.

ENCLOSURE 2

DRAFT REVISION 4 TO NUREG-1200



STANDARD REVIEW PLAN 2.4.1 - APPENDIX A
GUIDANCE ON SITE SUITABILITY REQUIREMENTS
RELATED TO FLOODPLAINS, FLOODING, AND WETLANDS

1 INTRODUCTION

10 CFR 61.50(a)(5) states "The disposal site must be generally well-drained and free of areas of flooding or frequent ponding. Waste disposal shall not take place in a 100-year floodplain, coastal high-hazard area or wetland, as defined by Executive Order 11988, 'Floodplain Management Guidelines'." SRP 2.4.1, Section 4.3 provides criteria for determining if a proposed site meets these requirements. The SRP states that the basis for acceptability is that the site is not located in an area of frequent flooding and that the requirements of Executive Order (E.O.) 11988 are met.

The purpose of this guidance is to supplement previous NRC guidance and to provide information regarding the NRC staff's position on siting in floodplains and wetlands and meeting the requirements of 10 CFR 61.50(a). The guidance and procedures presented in this document are not requirements and provide one acceptable method for meeting NRC regulations. Exceptions to the staff's guidance recommendations will be considered on a case-by-case basis.

2 DISCUSSION

In evaluating the requirements of 10 CFR 61.50(a)(5), the staff considers it important to provide clarifying definitions and interpretations of terms used in that regulation which may not be clear or are not specifically defined. For clarification, the following staff definitions and interpretations are provided:

Waste Disposal Area. While 10 CFR 61.50 states that waste disposal shall not take place in a floodplain or wetland, no specific definition of the waste disposal area is provided in the siting regulations. For clarification, the area of waste disposal is considered by the staff to be the immediate area of waste emplacement (e.g., trenches and vault structures); the disposal site is defined in the regulations (10 CFR 61.2) as the area designated for waste disposal activities and includes the immediate area of waste emplacement and the buffer zone.

Wetland. While 10 CFR 61.50 states that waste disposal may not take place in a wetland, as defined by E. O. 11988, it should be pointed out that this Executive Order did not provide a definition of a wetland. A wetlands definition is

however, provided in E. O. 11990, "Protection of Wetlands," which was issued at approximately the same time as E. O. 11988. As defined in E. O. 11990, wetlands are:

"those areas that are inundated by surface or ground water with a frequency sufficient to support and under normal circumstances does or would support a prevalence of vegetative or aquatic life that requires saturated or seasonally saturated soil conditions for growth and reproduction. Wetlands generally include swamps, marshes, bogs, and similar areas such as sloughs, potholes, wet meadows, river overflows, mud flats, and natural ponds."

The NRC staff seeks to be consistent with the approach for defining wetlands that will be employed by other federal agencies. Accordingly, the staff will follow the approaches for defining wetlands and implementing the Executive Orders that are used by agencies such as the Corps of Engineers. The Orders cited in 10 CFR Part 61 were issued to protect floodplains and wetland areas from unnecessary use and development. The staff considers that the environmental considerations related to development in floodplains and wetlands would need to be satisfied through the issuance of a permit from another Federal or State agency. The safety intent would need to be satisfied by meeting the requirements of Part 61.

The staff is also aware that criteria used by other agencies for delineating wetlands are often controversial and are currently being considered for revision. Presently, it appears that very small puddle-like areas could possibly be designated as wetlands. It is possible that there may be certain small wetland areas that: would have little significance to safety at a low-level waste facility; could be permanently eliminated by normal site grading practices; and would not re-occur at a later time. The intent of NRC's wetland provision in 10 CFR 61.50 is to avoid sites with poor drainage to minimize the risk of contact between water and waste. When 10 CFR Part 61 was promulgated, the staff did not envision that small inconsequential areas could be designated as wetlands. The regulations intended to avoid the placement of waste in submerged and relatively large wetland areas, such as marshes, bogs, swamps, and tidal areas.

Based on the definitions and discussions above, and in accordance with 10 CFR 61.50 (a)(5), the staff concludes that a disposal unit should not be located in a 100-year floodplain or wetland area. However, the staff considers that other portions of the disposal site (e.g., a portion of a buffer zone) may be located in a 100-year floodplain or wetland area, provided that Part 61 requirements are met. In such cases, conclusive documentation should be provided to justify that the floodplain or wetland area is insignificant to the safety and performance of the site. Further, as discussed in Section 2.2, below, the final conclusions regarding acceptability of a specific site will depend on the ability of an applicant to justify that all of the siting requirements are met. A site with numerous wetland areas or wetland areas formed by discharge of groundwater onto the site surface will generally not meet the other requirements of 10 CFR 61.50(a).

An applicant may seek an exemption from the floodplain or wetland requirements, if the applicant concludes that the placement of a facility in a particular location does not violate the intent of NRC regulations. The staff will review such requests on a case-by-case basis.

2.1 Floodplains

In the development of the siting requirements in 10 CFR 61.50, the NRC staff emphasized (USNRC, 1981) the need for avoidance of the 100-year floodplain, indicating that avoiding the floodplain and coastal high hazard areas will reduce the potential for flooding and erosion of the disposal site. The siting requirements, as finally promulgated, express two general criteria related to flooding:

(1) the site must meet the requirements of E.O. 11988, related to the 100-year floodplain; and

(2) flooding potential must be reduced by precluding the use of a site that has obvious flooding and drainage problems, is located in a flood-prone (or frequently-flooded) area, or could be affected to a significant degree by flooding from a large upstream drainage area.

NUREG-0902 (USNRC, 1982) was developed to provide guidance regarding siting in floodplains and to expand on other site suitability requirements. In NUREG-0902, the staff noted that there are other considerations which should be evaluated, in addition to the 100-year floodplain requirement. These considerations include a determination of whether the site is located in an area which is subject to flooding, a determination of the extent of engineering measures needed to protect sites in flood-prone areas, and a determination of the degree to which natural processes (in this case, processes such as erosion and deposition) could invalidate the use of certain predictive models.

2.1.1 Floodplain Determinations

Based on NRC staff review of E.O. 11988 and United States Water Resources Council (USWRC) guidelines (USWRC, 1978) for implementing the Order, it appears that very little flexibility exists in interpreting the Order. The guidelines discuss the need to avoid development in a floodplain, if there is a reasonable or practicable alternative for doing so. The Order also requires consideration of various alternatives to developing, inhabiting, and otherwise using land that is considered to be in the 100-year floodplain. Therefore, the principal finding to be made is whether or not the site is actually located in the 100-year floodplain.

The 100-year floodplain is normally defined as the lowland and relatively flat areas adjacent to stream channels or waterways which are subject to flooding by a flood having a probability of occurrence of 1 in 100 in any particular year (USWRC, 1978). Such a definition, however, requires some interpretation, since practically any land area will be covered with runoff during a storm event. The differentiation is normally made on the basis of the degree of inundation, where flood depths above specified minimum values are used to define a floodplain. Such differentiation can be made using guidelines developed by the Federal Emergency Management Agency (FEMA) related to floodplain studies (FEMA, 1985). In general, land areas are classified as hazard zones in various categories, depending on the depth of flooding.

There are also distinctions to be made regarding types of floodplains and exactly what constitutes a floodplain. Clarification may be provided by examining USWRC guidelines, which address riverain floodplains, coastal floodplains, and special

floodplains (such as alluvial fans). Depending on the type of floodplain, computational procedures and determination of the floodplain may be different.

For many areas of the United States, maps have been developed which delineate floodplain boundaries. These maps may be used, when available. E.O. 11988 states: "...Before taking action, each agency shall determine whether the proposed action will occur in a floodplain...This determination shall be made according to a Department of Housing and Urban Development (HUD) floodplain map or a more detailed map, if available. If such maps are not available, the agency shall make a determination...based on the best available information..."

Based on staff review of the requirements of the Order, the first step in determining if a site is located in a floodplain is to consult published maps. If such maps are not available, detailed maps should be developed by the applicant in accordance with USWRC guidelines. If the immediate area of waste disposal is located in a 100-year floodplain, as defined by the maps, the site is not acceptable; if other portions of the site, such as the buffer zone, are located in a floodplain, the site may not be acceptable. The final determination is made by meeting the requirements of E.O. 11988, which defines many general goals and requirements related to siting in floodplain areas. The USWRC guidelines provide criteria for implementing the requirements of the Order. The USWRC guidelines provide a step-by-step method for evaluating any proposed floodplain action, including evaluation of alternatives. NRC staff consideration of these guidelines indicates that one of major provisions is to minimize the occupation and development of floodplains, if there is a reasonable and practicable alternative. If an applicant proposes to use floodplain lands, a detailed analysis and justification, following the USWRC procedures, should be developed.

If the site is not located in the mapped 100-year floodplain, this does not necessarily indicate that the site is acceptable. The USWRC procedures are intended to merely identify the 100-year floodplain for insurance and hazard classification purposes. They are not necessarily intended to identify every flood-prone, low-lying, or poorly-drained area (particularly for small streams). For example, any area flooded by a stream with a drainage area of less than one square mile is not considered to be in the 100-year floodplain, according to FEMA procedures. However, such a low-lying area could be inundated with several feet of water from a 100-year flood and have a drainage area of less than one square mile. This area may also be subject to frequent ponding if site soils are relatively impermeable. In such a case, the staff would consider this area to be flood-prone and thus, likely not acceptable, particularly if other siting requirements (such as wetlands, high groundwater levels, etc.) are questionable. Therefore, an applicant may need to make a further determination, as discussed below, that the site is not located in a flood-prone or high-hazard area. This determination should be made very early in the site selection process, if possible.

2.1.1.1 Flood Hazard Determinations

Based on review of FEMA guidelines, a floodplain classification is related to the hazards associated with flooding. The mere presence of shallow flow does not require a floodplain classification, since the hazards associated with such flows may be minimal and easily mitigated. Based on these risks and hazards, FEMA has provided extensive discussion of hazard zones and has developed procedures for

delineating 100-year floodplains, including procedures for special areas (such as alluvial fans).

However, the staff considers that FEMA 100-year floodplain analyses alone do not necessarily address potential problems related to flood hazards at low-level waste sites. In most cases, additional analyses will be needed to document the acceptability of the site. Other areas which should be addressed include: (1) use of special procedures for certain areas; (2) other flooding requirements of 10 CFR 61.50; and (3) significance of flood hazards caused by floods larger than the 100-year flood and use of engineering measures to mitigate flood hazards.

2.1.1.2 Use of Special Procedures for Certain Areas

NRC staff analysis of the FEMA guidelines indicates that additional considerations may be required with regard to determination of floodplains in high-hazard or flood-prone areas. Since the guidelines present only generalized procedures for determining flow depth and velocity, it appears that specialized analyses may be needed to more accurately compute flood depths and velocities in certain areas. In addition, the use of other, more detailed hydrologic computational techniques and special geomorphic studies may be needed to evaluate flooding depths and velocities and the potential for rapid changes to occur. Such changes could include erosion, deposition, channel avulsions, and other potential problems. For example, if a channel avulsion were to occur, the new channel location could occur in the area of waste emplacement or could result in the need to redefine the 100-year floodplain. The overall assessment, therefore, necessitates the use of a systematic approach which identifies the hydrogeomorphic processes in a specific site area. An example of such an approach is discussed by Rhoads (1986).

2.1.2 10 CFR 61 Requirements Related to Flooding

Other NRC regulations address the need to avoid disposal sites which are subject to flooding and/or erosion, or are located in unstable areas. 10 CFR 61.50(a)(6) requires that upstream drainage areas be minimized. 10 CFR 61.50(a)(10) requires that unstable areas be avoided. The staff concludes that the siting requirements must be considered collectively, in order to reach any meaningful conclusions regarding flood potential and flood hazards. The staff considers that the potential for significant inundation and erosion of a site can be essentially eliminated by meeting several siting requirements, as follows:

- (1) minimizing upstream drainage areas, in accordance with 10 CFR 61.50(a)(6), preferably to the extent that the site is well above flood levels in nearby streams, and insignificant sheet flow is the only runoff past the disposal site (even for large floods such as the probable maximum flood [PMF]), resulting in the need for only minor engineering enhancements to protect the site from flooding and erosion;
- (2) locating a disposal site in a well-drained area free of significant ponding outside the 100-year floodplain, in accordance with 10 CFR 61.50(a)(5), to minimize the potential for large volumes of runoff to contact waste;
- (3) locating a disposal site where flood velocities are insignificant, in accordance with 10 CFR 61.50(a)(10), to minimize potential for erosion; and

(4) locating a disposal site in an area that is not undergoing changes which could invalidate predictive performance models, in accordance with 10 CFR 61.50(a)(10), to provide confidence in the disposal site's ability to isolate waste, or to accurately monitor potential waste migration.

If a disposal site is poorly-drained, in a low-lying area, or could be affected by floods, it will also be necessary to evaluate the impacts of floods on groundwater levels. 10 CFR 61.50(a)(7) prohibits waste disposal in the zone of fluctuation of the water table. If a disposal site is located in an area where floods can cause groundwater levels to rise and come into contact with waste, the disposal site would be unacceptable. In such cases, a transient analysis of flooding and groundwater levels would be needed to verify the adequacy of the site.

The staff recognizes that the siting requirements of 10 CFR 61.50 may be general. In particular, requirements such as those related to minimizing upstream drainage areas can be subject to different interpretations, and there will always be some question regarding how much minimization is enough. The staff considers that, in those cases where there is some subjectivity in the regulations and no specific minimum or maximum criteria are stated, the siting requirements will need to be analyzed in conjunction with each other. With few exceptions, sites that have met the requirement to minimize upstream drainage areas, for example, will not be subject to significant flooding, are likely to be well-drained, will be out of the 100-year floodplain, will not be located in an area of frequent ponding, and will not be located in an area of erosion.

2.1.3 Significance of Hazards Associated with Large Floods and Use of Engineering Measures for Flood Hazard Mitigation

Another important question that should be resolved regarding flooding and floodplains is whether the hazards posed by floods or flood velocities are significant to the long-term performance of the disposal site. As discussed above, the determination of a floodplain location (using FEMA guidelines, for example) is principally dependent on the degree of inundation and the risks associated with flooding. However, the staff considers that there may be many proposed disposal sites which may meet the depth and velocity guidelines, but may be significantly inundated if a large flood (e.g., greater than the 100-year flood) occurs. This factor should be considered in selecting a waste disposal site.

The staff considers that the major risks associated with flooding would not be produced by a 100-year flood. The purpose of providing siting criteria for broad screening of sites is to avoid, if possible, disposal sites that would be inundated or significantly affected by "smaller" floods such as the 100 year flood. It is expected that LLW sites will be designed and protected from the effects of much larger floods; such design floods may be as large as the 1000-

Therefore, another important decision regarding site acceptability is related to the extent that engineering measures would be needed to mitigate flood hazards. Since it is generally recognized that some protection and enhancement will always be needed against flood runoff, the degree of site enhancement and flood protection may become a very important issue. The staff further considers that the intent of the siting requirements is to direct the site selection process towards a site where flood protection is provided to the maximum extent by the nature of the site location. Such a site would be well above flood levels and would

insignificantly affected by major floods. Acceptable sites, while needing some minor drainage enhancements and minimal flood protection, would not rely on extensive engineering measures to provide flood protection, especially after site closure. Sheet flow and minor gully flows at disposal sites located near the upstream portion of a drainage basin (where drainage areas have been minimized) could be easily diverted away from disposal units using very simple, low-cost berms and diversion channels, even if major floods were to occur. Such engineering measures are considered to be acceptable. However, significant flood flows resulting in several feet of inundation (or high velocities) in the waste disposal area, particularly for floods larger than a 100-year flood (including the PMF), may not be easily mitigated. Elaborate and extensive embankments and diversion structures, used to provide the required flood protection, may be unacceptable. Because of the possible degradation and ultimate failure of extensive engineered structures over the long-term, the staff is less confident that the performance objectives of 10 CFR 61 Subpart C can be met if such measures must be relied upon following site closure. The staff concludes that the bulk of the erosion protection should be provided by the disposal site's natural location and elevation. Given the obvious fact that many sites exist which do not require significant flood protection measures, the staff concludes that such sites are preferable and that low-lying, flood-prone, and poorly-drained sites should be rejected, whenever practicable.

The burden of proof is placed on the applicant to justify that the flood protection measures that will be employed are not extensive or elaborate. Applicants will be expected to demonstrate that flood protection designs are reasonable enhancements to the disposal site's capability to isolate the waste in accordance with the performance objectives of Subpart C of 10 CFR 61. In order to determine the reasonableness of flood protection measures, a comparison with "expected" or "typical" measures, as discussed by the NRC staff (NRC, 1981), may be used. Another test of the reasonableness of engineering measures is a comparison of the required measures at a proposed disposal site with the designs that would be needed for a well-drained site located near a drainage divide (where only minimal engineering measures, such as small drainage channels and low berms, would be needed).

2.2 Wetlands

In developing the wetland requirements of 10 CFR 61.50, the principal concerns of the staff were to (1) avoid contact of waste with standing water in poorly drained, low-lying, and/or swampy areas, and (2) meet the requirements of all applicable Executive Orders. Of particular concern were large, low-lying areas which would be frequently saturated and difficult to eliminate by normal site grading practices.

However, the staff has become aware that the use of guidance recently developed by Federal agencies (FICWD, 1989; EPA, 1991) for determining wetlands can result in delineation of wetlands which are extremely small (e.g., less than 100 square feet). It is not the staff's intention, under the provisions of 10 CFR 61, to restrict siting where wet soils are located in small isolated areas, such as localized wet areas, surface depressions, or puddles. Waste disposal in these isolated wet areas may be acceptable, if the condition is determined to be unimportant to safety or to meeting the performance objectives. The burden of proof is on the applicant to (1) determine if wetlands exist onsite, (2) demonstrate conclusively that all siting requirements of 10 CFR 61.50 have been

met, and (3) determine the significance of the wetland to safety and performance, on a site-specific basis.

2.2.1 Determination of Wetlands

Detailed guidance for wetlands has been developed by the Federal Interagency Committee for Wetland Delineation (FICWD) and was presented in "Federal Manual for Identifying and Delineating Jurisdictional Wetlands," (FICWD, 1989). Revisions to this report were developed in "Proposed Revisions to the Federal Manual for Delineating Wetlands (EPA, 1991). The procedures presented in the interagency report and the subsequent revisions provide detailed guidance for determining wetland areas. These procedures should be followed for wetlands at a proposed LLRW disposal site.

2.2.2 10 CFR 61 Requirements Related to Wetlands

The staff considers that the requirements of 10 CFR 61.50(a)(5) were developed to avoid sites with poor drainage and especially to avoid any sites with drainage so poor that wetland areas exist. The staff further recognizes that wetlands located in the buffer zone are likely to be less important to safety and performance than those located in the immediate waste disposal area, since the main thrust of the requirements is to avoid contact of water and waste.

2.2.2.1 Buffer Zone

Similar to floodplains, the staff concludes that certain portions of the site, such as small portions of the buffer zone, may be located in a wetland area if a permit is obtained from the appropriate permitting agency and all of the other siting requirements of 10 CFR 61 are met. It should be emphasized that the wetlands siting requirement and the other siting requirements must be analyzed collectively. For example, a wetland area onsite, even though small in areal extent, may be indicative of high groundwater levels or indicative of poorly-drained areas; thus, it may be difficult to show that the depth to groundwater requirement of 10 CFR 61.50(a)(7) and the well-drained requirement of 10 CFR 61.50(a)(5) have been met. Additional information is presented in Section 2.2.3, below, regarding all of the other requirements which must be met.

2.2.2.2 Area of Waste Emplacement

As discussed above, the staff concludes that the immediate waste disposal area may not be located in a wetland area. An exemption from the regulations will be required if such actions are proposed.

2.2.3 Significance of Wetlands

Similar to floodplains, an important decision regarding site acceptability is related to the extent that engineering measures are needed to mitigate drainage, ponding, and wetland problems. While some site grading will always be performed to enhance site drainage, the degree of site enhancement and drainage improvement may become an important issue. The staff further considers that the intent of the siting requirements is to direct the site selection process towards a site where the site itself is well-drained and free of areas of significant ponding. Acceptable sites, while needing some minor drainage enhancements, would not rely on extensive engineering measures to prevent the reoccurrence of drainage problems, especially after site closure when active maintenance cannot be relied

upon. Elaborate systems to mitigate drainage problems (such as gravel drains, pumpback systems, re-channelization, and diversion structures) are considered by the staff to be generally unacceptable. Because of the possible degradation and ultimate failure of extensive engineered structures over the long-term (greater than 100 years), the staff is less confident that the performance objectives of 10 CFR 61 Subpart C can be met if such measures are relied upon following site closure. The staff concludes that adequate drainage should be provided by the disposal site's natural slopes, location, and elevation. Given the obvious fact that many sites exist which do not require significant drainage enhancement measures, the staff concludes that such sites should be preferentially selected and that low-lying, poorly-drained sites should be rejected.

The staff recognizes that certain designated wetlands of limited areal extent may be easily remediated and eliminated as a problem. If the engineering measures needed to eliminate drainage problems at a site are very minor, such as regrading in a small area, and a wetlands permit can be obtained, the staff would likely conclude that portions of the site may be located in this small area. However, if there is a potential for re-formation of the wetland or for high groundwater levels to occur, the disposal site would not be considered to be acceptable, since reliance must be placed on active maintenance and/or monitoring of the wetland condition. This may be particularly important for the buffer zone, for example, where an area is set aside for observation and possible mitigation of problems, which could be complicated by wetlands, poor drainage, or high groundwater tables. In such instances, it may be difficult for an applicant to justify that all siting requirements have been met.

Further, the staff considers that if a permit can be obtained from the responsible governmental agency to eliminate designated wetland areas, the environmental intent of the regulation has also been met. The environmental intent of the siting regulation is to comply with the requirements of E.O. 11988 and E. O. 11990, and the staff considers that intent to be adequately satisfied by complying with applicable requirements of those orders, as related to wetlands.

When very small areas of designated wetlands exist prior to construction and are proposed for permanent removal, the process for reviewing applicant's information, data, and analyses that demonstrate compliance with the siting regulations will be very site-specific. However, the staff will request additional information and will generally review this supporting information to determine compliance with other requirements, as follows:

1. Compliance with Applicable Environmental Requirements. The applicant should verify that all necessary permits have been obtained from the Corps of Engineers or other appropriate permitting agency. Such permits authorize elimination of the wetland areas.
2. Compliance with 10 CFR 61.50(a)(5). The applicant should verify that there is no mechanism by which the wetlands and areas of poor drainage could recur. Site grading alone (minor cuts and fills) should be the only measures taken to eliminate the wetland and prevent recurrence.
3. Compliance with 10 CFR 61.44. The applicant should verify that active maintenance is not needed to prevent recurrence of the wetlands. Measures such as pumping and gravel drains are not

acceptable. The applicant should demonstrate that the placement of additional fills at a later date will not be needed, due to any special or unique site configurations.

4. Compliance with 10 CFR 61.50(a)(7-8). The applicant should verify that sufficient depth to groundwater exists, prior to placement of engineered fills; that there is no hydrogeologic mechanism which is producing or exacerbating the wetland situation; and that there is no discharge of groundwater onto the surface of the site.
5. Compliance with 10 CFR 61.50(a)(10). The applicant should verify that the occurrence of the wetland areas is not a result of surface slumping, subsidence, flooding/erosion, or other phenomena which could result in significant changes to the site following closure. Karst topography, for example, would not be acceptable, since future subsidence could potentially create wetland areas. It would also be unacceptable to locate a site in a relatively level area just outside the 100-year floodplain, if it is determined that flooding/erosion/subsidence originally caused the ponding and drainage problem. Also, a flood larger than the 100-year flood could result in flooding and erosion of the site area, causing reoccurrence of ponding and wetland problems.
6. Compliance with 10 CFR 61.52(a)(8) and 61.53. The applicant should verify that any wetlands on or near the site will have no adverse effects on the ability to carry out an adequate monitoring program or to take corrective actions, if needed.

3 RECOMMENDATIONS

3.1 Floodplains

Based on staff review of applicable criteria and implementation guidance, the following procedures should be followed to determine if a site meets the requirements of 10 CFR 61.50(a) and E.O. 11988, with respect to flooding and other related siting factors.

1. The license applicant should consult published floodplain maps (such as those developed by HUD or FEMA). If the area of waste emplacement is located in the floodplain, it is not acceptable, in accordance with 10 CFR 61.50(a)(5). If other portions of the disposal site (e.g., small portions of the buffer zone) are located in the mapped floodplain, it may or may not be acceptable; justification for use of floodplain lands, and evaluation of alternatives, should be provided in accordance with E.O. 11988 and USWRC guidelines. The evaluation is a rather complex one and includes the following steps:

1. Determination of floodplain(s)
2. Early public review of proposed action
3. Identification and evaluation of alternatives
4. Identification of impacts
5. Determination of methods to minimize, restore, and preserve floodplains

6. Reevaluation of alternatives
7. Publication of findings
8. Implementation of proposed action.

If the disposal site is not located in a designated floodplain, the initial screening test has been met. However, if well-defined streams or dry stream channels exist nearby, the disposal site will need to be evaluated, since HUD or FEMA maps may not be sufficiently detailed to adequately define floodplains in the proposed site area.

2. The applicant should conduct detailed site-specific flooding analyses to verify that the immediate area of waste emplacement is not located in 100-year floodplain or a flood-prone area. If other portions of a disposal site are proposed in the 100-year floodplain, the disposal site is acceptable only if the applicant can demonstrate that all requirements of E. O. 11988 have been met. The justification should follow the USWRC guidelines related to evaluation of alternatives and justification of the proposed action. If the disposal site is located in a flood-prone area, it may not be acceptable; the final determination of acceptability is based on the applicant's justification that engineering measures to be used are reasonable enhancements to the disposal site's natural capabilities to provide adequate flood protection. If a disposal site is located adjacent to a stream with a drainage area of less than one square mile (even though it may be technically out of the FEMA 100-year floodplain), analyses should be performed to show that the disposal site will not be frequently flooded by floods from this stream.

3. The applicant should evaluate the disposal site with respect to the other criteria contained in 10 CFR 61.50 related to minimizing upstream drainage areas, avoiding areas of erosion/deposition, and avoiding the contact of waste with flood-induced groundwater levels. The applicant should also demonstrate that site flooding problems and other related phenomena will be easily mitigated by minor engineering modifications and that flood flows reaching the disposal site from upstream drainage areas are minor and can be easily diverted. The applicant should also demonstrate that active site processes (such as erosion, deposition, etc.) will not affect the long-term performance of engineered design features and will not invalidate the use of predictive performance models.

3.2 Wetlands

The staff concludes that the waste emplacement area or disposal units may not be located in an area designated as a wetland, as required by 10 CFR 61.50(a)(5). However, if a wetland permit can be obtained and all other siting requirements are met, other portions of the disposal site (such as small portions of the buffer zone) may be located in a wetland area. If portions of the disposal site are located in an area determined to be a wetland, the applicant should demonstrate that the areal extent of the wetland is small, that engineering measures needed to alleviate and/or eliminate the wetland situation are of limited extent, and that long-term maintenance is not required to prevent reoccurrence of the wetland condition. Since wetlands may be indicative of high groundwater levels and/or poor drainage, justification should also be provided that all of the other siting requirements and requirements of the Executive Order

have been met. These requirements include those listed in 2.2.3 of this Appendix.

4 REFERENCES

Essential

Environmental Protection Agency, "Proposed Revisions to the Federal Manual for Delineating Wetlands," 56 FR 40446, August 14, 1991.

Executive Order 11988, "Floodplain Management," 42 FR 26951, May 24, 1977.

Executive Order 11990, "Protection of Wetlands," 42 FR 26961, May 24, 1977.

Federal Emergency Management Agency (FEMA), "Flood Insurance Study, Guidelines and Specifications for Study Contractors," September, 1985.

Federal Interagency Committee for Wetland Delineation (FICWD), 1989, "Federal Manual for Identifying and Delineating Jurisdictional Wetlands," U.S. Army Corps of Engineers, U.S. Environmental Protection Agency, U.S. Fish and Wildlife Service, and U.S.D.A. Soil Conservation Service, Washington, D.C. Cooperative technical publication.

Rhoads, Bruce L., "Flood Hazard Assessments for Land-Use Planning near Desert Mountains," Environmental Management, Vol. 10, No. 1, 1986.

U. S. Nuclear Regulatory Commission (USNRC), "Draft Environmental Impact Statement on 10 CFR Part 61, Licensing Requirements for Land Disposal of Radioactive Waste," September, 1981.

---"Site Suitability, Selection, and Characterization," NUREG-0902, 1982, reprinted 1986.

U. S. Water Resources Council (USWRC), "Floodplain Management Guidelines," 43 FR 6030, February 10, 1978.



NUREG-1200

U.S. Nuclear Regulatory Commission
Office of Nuclear Material Safety and Safeguards

LOW-LEVEL WASTE DISPOSAL LICENSING PROGRAM

STANDARD REVIEW PLAN 8.4 EMERGENCY PLANNING

1. RESPONSIBILITY FOR REVIEW

1.1 Primary - Health Physicist (HP)

1.2 Secondary - None

1.3 Support - None

2. AREAS OF REVIEW

The Low-Level Waste Management Branch (LLWB) staff will review the information on emergency planning in the SAR to determine if the applicant has provided emergency preparedness plans for situations involving real or potential radiological hazards.

The LLWB staff has the overall review responsibility for emergency preparedness, although, certain aspects of the technical reviews, if necessary, will be performed by or through other branches. Examples of these technical review aspects include: review of meteorological information; review of emergency action level determination and; review of emergency response facilities.

3. REVIEW PROCEDURES

3.1 Acceptance Review

The staff will review for completeness the information on emergency planning in the SAR in accordance with NUREG-1199 and this SRP.

3.2 Safety Evaluation

Following the acceptance of the license application, a review of the applicant's onsite emergency procedures will be conducted according to a schedule established by the staff.

Most of the information to be reviewed should be found in the section of the SAR reviewed under this SRP. However, in performing the review, the staff will use as references portions of the SAR that discuss facility design and layout, routine operations, demography, land use, and accidents, including the maximum credible accident postulated by the applicant. The staff also should become

familiar with proposed radiation protection activities and other operational matters that are related to emergency plans. The applicant's Environmental Report and staff reviews thereof should also be consulted. Written information may also be supplemented, when appropriate, with site visits and meetings with the applicant.

Based on a selective radioactivity inventory and a postulated major trench fire, NRC determined in NUREG 1140 (August 1991) that accident doses for waste burial are far below the EPA's protective action guides and do not require special offsite emergency preparedness. Therefore, as long as the licensee's radionuclide inventory and/or postulated doses can be bounded by NUREG 1140, no offsite emergency planning is considered necessary. However, staff review of onsite emergency planning is necessary.

The staff must determine whether or not the acceptance criteria in Section 4 have been satisfactorily met. Any deficiencies should be identified and should form the basis for a request for additional information or transmittal of position statements to the applicant. Such further review may result in a determination that (1) the applicant has proposed acceptable alternatives, (2) the facts of the case do not warrant the application of the criterion in question, or (3) the facts do warrant the application of the criterion in question and no acceptable alternative has been proposed or identified. If any deficiencies remain in the last category at the conclusion of the review, they must be identified in the Safety Evaluation Report (SER) and subsequently resolved with the participation of higher level NRC management staff.

It should be recognized that the detailed application of the acceptance criteria will in many instances require the exercise of judgment on the part of the staff. The reasonableness and adequacy of the factors involved should be viewed in the light of general emergency planning and response experience, bearing in mind that the broad objective of radiological emergency plans is to protect workers and the public by mitigating the potential health and safety consequences of radiation exposure.

4. ACCEPTANCE CRITERIA

4.1 Regulatory Requirements

The regulations applicable to this SRP are

- (1) 10 CFR 61.12, "Specific Technical Information," (k), which requires that the applicant describe the radiation safety program as it relates to routine operations and accidents
- (2) 10 CFR 61.13, "Technical Analyses," which requires analyses for the protection of individuals during likely accidents

4.2 Regulatory Guidance

There are no regulatory guides that apply to emergency planning for a low-level waste disposal facility.

4.3 Regulatory Evaluation Criteria

The information on emergency planning is acceptable if the following conditions have been met:

- (1) The applicant has established plans considered by the reviewing staff health physicist to be satisfactory for responding to all credible accidents and emergencies of a radiological nature consistent with the proposed method of operations.
- (2) The applicant has performed an accident analysis which shows that the postulated doses for the most severe credible accident are bounded by NUREG 1140. This accident analysis should be performed assuming the proposed waste disposal facility design. Of course, evidence that the accident is bounded by NUREG 1140 should also include a determination that the physical and chemical characteristics of the radionuclides involved are not significantly different from those considered in NUREG 1140.

5. EVALUATION FINDINGS

5.1 Introduction

The staff's review should verify that sufficient information has been provided in the SAR to satisfy the 10 CFR Part 61 requirements and that the information is consistent with the guidance in this SRP. On the basis of this information, the staff should be able to conclude that this evaluation is complete. The staff can document its review as follows.

5.2 Sample Evaluation Findings

The staff has reviewed the information on emergency planning for [name of facility] low-level waste disposal facility according to Standard Review Plan 8.4.

On the basis of its review of the applicant's plans for coping with emergencies and subsequent consultation with [specify], the staff finds that such emergency plans are acceptable.

The applicant has established, and this review has confirmed, that the types of accidents given in Table [specify] are credible at the facility.

Table [specify number and title]

| Type of accident | Radionuclides released | Effective Dose Equivalent |
|------------------|------------------------|---------------------------|
| | | |

It has been determined that the maximum offsite release of radioactivity associated with these accidents is [specify], a fraction of the Environmental

Protection Agency's Protective Action Guideline 1 Rem limit established as the point at which offsite emergency planning and coordination is required.

6. IMPLEMENTATION

This SRP provides guidance to the NRC staff in its technical review of an SAR for a near-surface low-level radioactive waste disposal facility. In addition, it may be used as guidance by applicants and licensees regarding the NRC's plans for performing such a technical review.

Except when the applicant proposes an acceptable alternative method for complying with the Commission's regulations, the staff will use the methods described herein.

7. REFERENCES

Essential

Code of Federal Regulations, Title 10, "Energy," and Title 44, "Emergency Management and Assistance," U.S. Government Printing Office, Washington, DC, revised annually.

U.S. Environmental Protection Agency, EPA 400-R-92-001, Manual of Protective Action Guides and Protective Actions for Nuclear Incidents, May 1991.

U.S. Nuclear Regulatory Commission NUREG-1140, "Analysis on Emergency Preparedness for Fuel Cycle and Other Material Facilities," August 1991.

---, NUREG-1199, "Standard Format and Content of a License Application for a Low-Level Radioactive Waste Disposal Facility," Rev. 1, January 1988.



STANDARD REVIEW PLAN 9.1
QUALITY ASSURANCE DURING THE SITE CHARACTERIZATION, DESIGN, CONSTRUCTION,
OPERATION, AND CLOSURE

1. RESPONSIBILITY FOR REVIEW

1.1 Primary - Quality Assurance Engineer

1.2 Secondary - Mechanical Engineer, Civil Engineer, Health Physicist

1.3 Supporting - None

2. AREAS OF REVIEW

The staff will review the areas of the SAR discussed in the following sections as they pertain to the licensee's quality assurance (QA) program during the site characterization, design, construction, operation, and closure of the facility. The applicant's QA program description in the SAR should describe the management systems, assignment of responsibility, and the organizational structure in place to accomplish the performance objectives (10 CFR Part 61).

NUREG-1293, "Quality Assurance Guidance for a Low-Level Radioactive Waste Disposal Facility," provides guidance to an applicant for developing an acceptable quality assurance program. The guidance for an acceptable QA program is based on 18 criteria that are similar to the criteria developed for Appendix B to 10 CFR Part 50. The staff recognizes that certain elements of the QA program provided in Appendix B to 10 CFR Part 50 are not directly applicable to LLRW disposal facility. However, many of these criteria are basic elements for a QA program, and therefore Appendix B criteria have been to address the requirements for an LLRW disposal facility.

NUREG-1293 establishes QA program guidance for the design, construction, operation, and closure of structures whose function is required to meet the requirements of 10 CFR Part 61. The license application must demonstrate that the facility will meet the performance objectives and technical requirements of 10 CFR Part 61. A properly designed and implemented QA program will provide the mechanism for demonstrating the requirements are met.

2.1 Organization*

The following areas under the QA Program should be reviewed:

*NUREG-1293 defines each of the 18 criteria addressed in this SRP.

- (1) organizational description and charts of the lines, interrelationships, and areas of responsibility and authority for all organizations performing quality-related activities, including the applicant's organization and principal contractors (architect/engineer, constructor, and construction manager when other than the constructor),
- (2) organizational location, degree of independence from the performing organization, and authority of the individuals assigned the responsibility for performing QA functions, and
- (3) organizational provisions for ensuring the proper implementation of the QA program.

| 2.2 Quality Assurance (QA) Program*

The following areas under the QA Program should be reviewed:

- (1) scope of the QA program,
- (2) provisions to ensure proper definition of the QA program,
- (3) programmatic provisions to ensure proper implementation of the QA program, and
- (4) provisions to ensure the adequacy of personnel qualifications.

| 2.3 Design Control*

The following areas under design control should be reviewed:

- (1) scope of the QA program for design activities,
- (2) organizational structure, activity, and responsibility of the individuals or groups responsible for all design activities and supporting analysis,
- (3) provisions to carry out design activities in a planned, controlled, and orderly manner,
- (4) provisions to verify or check the technical adequacy of design documents including documentation of all computer codes, and
- (5) provisions to control design changes.

| 2.4 Procurement Document Control*

The following areas under procurement document control should be reviewed:

*NUREG-1293, "Quality Assurance Guidance for a Low-Level Radioactive Waste Disposal Facility," defines each of the 18 criteria addressed in this SRP.

- (1) provisions to ensure that applicable regulatory requirements, technical requirements, and QA program requirements are included or referenced in procurement documents and
- (2) provisions for the review and approval of procurement documents.

| 2.5 Instructions, Procedures, and Drawings*

The following areas under instructions, procedures, and drawings should be reviewed:

- (1) provisions for ensuring that activities affecting quality are prescribed by and accomplished in accordance with documented instructions, procedures, or drawings and
- (2) provisions for including quantitative and qualitative acceptance criteria in instructions, procedures, and drawings.

| 2.6 Document Control*

The following areas under document control should be reviewed:

- (1) provisions to ensure that documents, including changes, are reviewed for adequacy, approved for release by authorized personnel, and distributed and used at the location where the prescribed activity is performed and
- (2) provisions to prevent the inadvertent use of obsolete or superseded documents.

| 2.7 Control of Purchased Material, Equipment, and Services*

The following areas under Purchased Materials, Equipment, and Services should be reviewed:

- (1) provisions for the control of purchased material, equipment, and services; for the selection of suppliers; and for the assessment of quality and
- (2) provisions to ensure that documented evidence of the conformance of material and equipment to procurement requirements is available at the plant site before installation or use.

| 2.8 Identification and Control of Materials, Parts, and Components*

The following areas under identification and control of materials, parts, and components should be reviewed:

- (1) provisions to identify and control materials, parts, and components and
- (2) provisions to ensure that incorrect or defective items are not used.

| 2.9 Control of Special Processes*

The following areas under control of special processes should be reviewed:

- (1) provisions to ensure the acceptability of special processes such as welding, heat treating, nondestructive testing, and chemical cleaning and
- (2) provisions to ensure that special processes are performed by qualified personnel using qualified procedures and equipment.

| 2.10 Inspection*

The following areas under inspection should be reviewed:

- (1) provisions for the inspection of activities affecting quality, including the items and activities to be covered,
- (2) organizational responsibilities and qualifications established for individuals or groups performing inspections, and
- (3) prerequisites to be provided in the written inspection procedures with provisions for documenting and evaluating inspection results.

| 2.11 Test Control*

The following areas under test control should be reviewed:

- (1) provisions for tests that ensure that structures, systems, and components will perform satisfactorily in service,
- (2) prerequisites to be provided in written test procedures with provisions for documenting and evaluating test results, and
- (3) personnel qualification programs established for test personnel.

| 2.12 Control of Measuring and Test Equipment*

Under the area of control of measuring and test equipment, the review should focus on provisions to ensure that tools, gauges, instruments, and other measuring and testing devices are properly identified, controlled, calibrated, and adjusted at specified intervals.

| 2.13 Handling, Storage, and Shipping*

Under the area of handling, storage, and shipping, the review should focus on provisions to control the handling, storage, shipping, cleaning, and preservation of items in accordance with work and inspection

*NUREG-1293, "Quality Assurance Guidance for a Low-Level Radioactive Waste Disposal Facility," defines each of the 18 criteria addressed in this SRP

instructions to prevent damage, loss, and deterioration caused by environmental conditions such as temperature or humidity.

| 2.14 Inspection, Test, and Operating Status*

Under the area of inspection, test, and operating status, the review should focus on provisions to indicate the inspection, test, and operating status of items to prevent inadvertent use or bypassing of inspections and tests.

| 2.15 Nonconforming Materials, Parts, or Components*

Under the area of nonconforming materials, parts, or components, the review should focus on provisions to control the use or disposition of nonconforming materials, parts, or components.

| 2.16 Corrective Action*

Under the area of corrective action, the review should focus on provisions to ensure that conditions adverse to quality are promptly identified and corrected and that measures are taken to preclude repetition.

| 2.17 Quality Assurance Records*

Under the area of quality assurance records, the review should focus on provisions for the identification, retention, retrieval, and maintenance of records that furnish evidence of activities affecting quality.

| 2.18 Audits and Surveillance*

The following areas under audits and surveillance should be reviewed:

- (1) provisions for audits and surveillance to verify compliance with all aspects of the QA program and to determine the effectiveness of the QA program and
- (2) responsibilities and procedures for auditing, documenting, and reviewing audit and surveillance results and designating management levels to review and assess audit and surveillance results.

3. REVIEW PROCEDURES

3.1 Acceptance Review

The staff will review the application to assess the adequacy of the applicant's quality assurance (QA) program. The staff will use the guidance in NUREG-1293, NUREG-1199, "Standard Format and Content of a License

*NUREG-1293, "Quality Assurance Guidance for a Low-Level Radioactive Waste Disposal Facility," defines each of the 18 criteria addressed in this section.

Application for a Low-Level Radioactive Waste Disposal Facility," NUREG 1383, "Guidance on the Application of Quality Assurance for Characterizing a Low-Level Radioactive Waste Disposal Facility," and this SRP as criteria to measure the adequacy of the applicant's QA program. The staff should not only determine that the criteria outlined in NUREG-1199 and this SRP are addressed, but also determine that the QA program is designed to put in place management systems to ensure the requirements of 10 CFR Part 61 are accomplished.

3.2 Safety Evaluation

The staff will review each element of the QA program description against the acceptance criteria in Section 4.3. The staff's judgment during the review is to be based on an assessment of the material presented. The staff review should also determine if the applicant has adequately planned the work to be accomplished and whether necessary policies, procedures and instructions will be in place before work starts. The staff should determine if "quality achieving" and "quality assuring" responsibilities are clearly assigned and should verify that the activities of both are well integrated so that the QA program is an integral part of the daily work activities. The staff review should determine if the applicant will be able to monitor the effectiveness of the QA program implementation and make needed adjustments on a timely basis. The staff is to look for and measure the effectiveness of the QA program design, not just look for the existence of its elements.

Changes to the QA program will be evaluated to ensure at a minimum that such changes have not degraded the previously approved program. Consideration should be given to the current regulatory position in the area of the change in determining acceptability of the change.

4. ACCEPTANCE CRITERIA

4.1 Regulatory Requirements

The regulation applicable to the areas of review of this SRP is

10 CFR 61.12, "Contents of Applications; Technical Information," 61.12(j), as it relates to a QA program description in the Safety Analysis Report

4.2 Regulatory Guidance

Regulatory guidance to aid the applicant in the guidelines in Section 4.1 is provided in the following documents:

NUREG-1199, "Standard Format and Content of a License Application for Low-Level Radioactive Waste Disposal Facility," January 1988.

NUREG-1293, "Quality Assurance Guidance for a Low-Level Radioactive Waste Proposal Facility," December 1988.

NUREG-1383, "Guidance on the Application of Quality Assurance for Characterizing a Low-Level Radioactive Waste Disposal Facility," Final Report, October 1990.

4.3 Regulatory Evaluation Criteria

The applicant (and its principal contractors such as the architect/engineer, constructor, and construction manager) must establish a QA program for the site characterization, design, construction, operations, and closure of the facility. The applicant's QA program (including that of its principal contractors) must describe in the SAR how each criterion will be met. The criteria used to evaluate this QA program are listed in Sections 4.3.1 through 4.3.18 of this SRP. The criteria include a commitment to comply with the regulations and NUREG-1293. Thus, the commitment constitutes an integral part of the QA program description and requirements. Exceptions and alternatives to the criteria may be adopted by the applicant provided adequate justification is given; the review allows for considerable flexibility in defining methods and controls while still satisfying pertinent regulations. When the QA program description meets the criteria of this SRP or provides acceptable exceptions or alternatives, the written program is considered to be in compliance.

The staff will ascertain if the commitments and the description of how the commitments are implemented, to the extent necessary, are objective and stated in inspectable terms.

4.3.1 Organizational Elements*

The organizational elements responsible for the QA program are acceptable if:

- (1.1) That organization or individual responsible for submitting the license application exercises retains the responsibility for the establishment and execution of the overall program.
- (1.2) The authority and duties of persons and organizations performing functions related to meeting the performance objectives and technical requirements of 10 CFR Part 61 are clearly established and delineated in writing. These functions include both the performing functions of attaining the requisite quality of work (quality achieving) and the assurance functions of verifying the attainment of quality (quality assuring).
- (1.3) The applicant described major delegations of work and the organizational responsibilities and methods for controlling each of the delegated tasks. It is of extreme importance that the applicant fully

*The designation for each criterion in this section is related to the designation for each area of review listed in the corresponding section in Section 2. NUREG-1293 defines each criterion for application to a low-level waste disposal facility.

- describe how responsibility for delegated work is to be retained and exercised.
- (1.4) The applicant and its prime contractors describe how responsibility is exercised for the overall QA program. The extent of the management responsibility and authority of the applicant are addressed.
 - (1.5) The applicant and its contractors evaluate the performance of work delegated to other organizations. This should include audits and surveillance of the contractor's QA programs and audits and surveillance of subcontractors, consultants, and vendors furnishing equipment or services to the applicant or its contractors. The frequency and method of evaluation should be specified.
 - (1.6) Organization charts clearly identify all the onsite and offsite organizational elements that function under the cognizance of the QA program.
 - (2.1) The applicant (and principal contractors) identifies a management position that retains overall authority and responsibility for the QA program (normally, this position is filled by the QA Manager), and this position has the following characterizations:
 - (a) The position is the same as or is at a higher organization level than the position of the highest line manager directly responsible for performing activities affecting quality (such as engineering, procurement, construction, and operation) and is sufficiently independent from cost and schedule restraints. This does not mean that the QA position must report outside of the project or program.
 - (b) The person in the position has effective communication channels with other senior management personnel.
 - (c) The person in the position has responsibility for approval of QA manual(s).
 - (d) The person in the position has no other duties or responsibilities unrelated to quality assurance that would divert his/her full attention to QA matters.
 - (2.2) Persons and organizations performing quality assuring functions have sufficient authority and organizational freedom to:
 - (a) Identify quality problems.
 - (b) Initiate, recommend, or provide solutions through designated channels.
 - (c) Verify implementation of solutions.

- (d) Assure that further processing, delivery, installation, or operation is controlled until proper disposition of a nonconformance, deficiency, or unsatisfactory condition has occurred.

The persons and organizations with the above authority are identified and a description of how those actions are carried out is provided.

- (2.3) Provisions are established for resolving disputes involving quality arising from a difference of opinion between QA personnel and other department personnel.
- (2.4) Provisions are established for resolving allegations of inadequate quality. These allegations may originate within the responsible organization(s) or from outside the responsible organization(s).
- (2.5) When unsatisfactory work has to be stopped, the following provisions apply:
 - (a) Designated QA personnel, sufficiently free from direct pressures resulting from cost and schedule, have the responsibility, delineated in writing, to stop unsatisfactory work and control further processing, delivery, or installation of nonconforming material.
 - (b) The organizational positions with stop-work authority are identified.
- (2.6) Designated QA individuals are involved in day-to-day activities important to the accomplishment of the performance objectives (i.e., the QA organization staff members routinely attend and participate in status meetings to ensure they are kept abreast of day-to-day work and that there is adequate QA coverage).
- (3.1) Policies regarding the implementation of the QA program are documented and made mandatory.
- (3.2) The position description (see item (2.1) in Section 4.3.1 of this SRP) ensures that the individual directly responsible for the definition, direction, and effectiveness of the overall QA program has sufficient authority to effectively implement responsibilities. This position is to be sufficiently free from cost and schedule responsibilities. Qualification requirements for this individual are established in a position description that includes the following prerequisites:
 - (a) management experience through assignments to responsible positions,
 - (b) knowledge of QA regulations, policies, practices, and standards, and

- (c) experience in performing QA-related activities in design, construction, or operation in a low-level waste facility or similar high technology industry.
- (3.3) The person responsible for the onsite QA program is identified by position and has the appropriate organizational position, responsibilities, and authority to exercise proper control over the QA program. This individual is free from non-QA-related duties and can thus give full attention to ensuring that the QA program at the plant site is being effectively implemented.

4.3.2 Quality Assurance Program*

Activities related to the quality assurance program are acceptable if:

- (1.1) The scope of the QA program includes:
- (a) A commitment that activities affecting the quality of site characterization, design, construction, operation, and closure will be subject to the applicable controls of the QA program. Activities covered by the QA program are identified on program-defining documents.
 - (b) A commitment that the test program will be conducted in accordance with the QA program and a description of how the QA program will be applied.
 - (c) A commitment that the computer code programs will be developed, controlled, and used in accordance with the QA program, and a description of how the QA program will be applied.
 - (d) A commitment that special equipment, environmental conditions, skills, or processes will be provided as necessary to ensure the accomplishment of performance objectives.
- (1.2) A brief summary of the company's corporate QA policies is given.
- (2.1) The following provisions are established to ensure that qualityaffecting procedures required to implement the QA program are consistent with QA program commitments and corporate policies and are properly documented, controlled, and made mandatory through a policy statement or equivalent document signed by the responsible official.
- (a) Provisions are established to ensure that technical and quality assurance procedures required to implement the QA program are

*The designation for each criterion in this section is related to the designation for each area of review listed in the corresponding section of Section 2. NUREG-1293 defines each criterion for application to a waste disposal facility.

- consistent with regulatory, licensing, and QA program requirements and are properly documented and controlled.
- (b) The QA organization reviews and documents concurrence in these quality-affecting procedures.
 - (c) The organizational group or individual responsible for the policy statement is identified.
 - (d) The quality-affecting procedural controls for the applicant to review with documented agreement of acceptance before the activities affected by the program begin.
- (2.2) Provisions are included for notifying NRC of changes (a) for review and acceptance in the accepted description of the QA program as presented or referenced in the SAR before implementation and (b) in organizational elements within 30 days after the announcement of the changes. (Note: Editorial changes or personnel reassignments of a nonsubstantive nature do not require NRC notification.)
- (2.3) The QA organization and the necessary technical organizations participate early in the QA program definition stage to determine and identify the extent QA controls are to be applied to specific site characterization, design, and construction activities. This effort involves applying a defined, graded approach to certain activities, structures, systems, and components in accordance with their importance to the accomplishment of the performance objectives of 10 CFR Part 61.
- (2.4) A description is provided that emphasizes how the detailed QA program description, particularly that pertaining to the 10 CFR Part 61 regulations will be properly implemented and carried out.
- (3.1) A description is provided of how management (above or outside the QA organization) regularly assesses the scope, status, adequacy, and compliance of the QA program. These measures should include:
- (a) frequent appraisal of program status through reports, meetings, and/or audits and
 - (b) performance of an annual assessment that is preplanned and documented with identification and tracking of corrective action.
- (3.2) A summary description is provided on how responsibilities and control of quality-related activities are transferred from the principal contractors to the applicant during the completion of the design and construction and the preparation to operate the facility.
- (4) Indoctrination, training, and qualification programs are established so that:

- (a) Personnel responsible for performing activities affecting quality are instructed as to the purpose, scope, and implementation of the quality-related manuals, instructions, and procedures.
 - (b) Personnel verifying activities affecting quality are trained and qualified in the principles, techniques, and requirements of the activity being performed.
 - (c) For formal training and qualification programs, documentation includes the objectives and content of the program, attendees, and date of attendance.
 - (d) Proficiency tests are given to those personnel performing and verifying activities affecting quality, and acceptance criteria are developed to determine if individuals are properly trained and qualified.
 - (e) Certificate of qualifications clearly delineates (i) the specific functions personnel are qualified to perform and (ii) the criteria used to qualify personnel in each function.
 - (f) Proficiency of personnel performing and verifying activities affecting quality is maintained by retraining, reexamining, and/or recertifying as determined by management or program commitment.
- (4.1) Measures are provided describing the extent to which a readiness review program will be established and executed at appropriate major milestones to complement the inspection program.
- (4.2) A self-assessment program will be developed and implemented to confirm that activities affecting quality comply with the QA program and will be acceptable if:
- (a) Persons performing self-assessment activities are to be technically proficient and performance-oriented, with their primary focus on the quality of the end product and a secondary focus on procedures and processes.
 - (b) Persons performing self-assessment activities are not to have direct responsibilities in the area they are assessing.
 - (c) Persons performing self-assessment activities are to use instructions, procedures, or other appropriate means that are of a detail commensurate with the complexity of the activity and its importance to safety.

4.3.3 Design Controls*

*The designation for each criterion in this section is related to the designation for each area of review listed in the corresponding section in Section 2. NUREG-1293 defines each criterion for application to a low-level

Activities related to design control are acceptable if:

- (1) The scope of the design control program includes design activities associated with the preparation and review of design documents including the correct translation of applicable regulatory requirements and design bases into design, procurement and procedural documents. Included in the scope are field design engineering; physics, seismic, stress, thermal, and geotechnical, associated computer programs; compatibility of materials; accessibility for inservice inspection, maintenance, and repair; quality standards; etc.
- (2) Organizational responsibilities are described for preparing, reviewing, approving, and verifying design documents such as system descriptions, design input and criteria, design drawings, design analyses, computer programs, specifications, and procedures.
 - (3.1) Organizational responsibilities are described for planning and conducting site characterization, including reviewing, approving and verifying analyses and conclusions.
 - (3.2) Errors and deficiencies in approved design documents, including design methods (such as computer codes), that could adversely affect structures, systems, and components performance are documented; and action is taken to ensure that all errors and deficiencies are corrected.
 - (3.3) Deviations from specified quality standards are identified, and procedures are established to ensure their control.
- (4.1) Internal and external design interface controls, procedures, and lines of communication among participating design organizations and across technical disciplines are established and described for the review, approval, release, distribution, and revision of documents involving design interfaces to ensure structures, systems, and components are compatible geometrically and functionally.
 - (4.2) Procedures are established and described requiring documented verification of the dimensional accuracy and completeness of design drawings and specifications.
 - (4.3) Procedures are established and described requiring that design drawings and specifications be reviewed by the QA organization to ensure that the documents are prepared, reviewed, and approved in accordance with company procedures and that the documents contain the necessary QA requirements such as inspection and test requirements, acceptance requirements, and those pertaining to the extent of documenting inspection and test results.

| waste disposal facility.

- (4.4) Guidelines or criteria are established and described for determining the method of design verification (design review, alternate calculations, or test).
- (4.5) Procedures are established and described for design verification activities that ensure the following:
- (a) The verifier is qualified, and neither the verifier nor his/her immediate supervisor is directly responsible for the design. In exceptional circumstances, the designer's immediate supervisor can perform the verification provided:
 - The supervisor is the only technically qualified individual.
 - The need is individually documented and approved in advance by the supervisor's management.
 - QA audits cover frequency and effectiveness of the use of supervisors as design verifiers to guard against abuse.
 - (b) Design verification, if other than by qualification testing of a prototype or lead production unit, is completed prior to release of procurement, manufacturing, or construction to another organization for use in other design activities. When this schedule cannot be met, the design verification may be deferred, provided the justification for this action is documented and the unverified portion of the design output document and all design output documents, based on the unverified data, are appropriately identified and controlled. Construction site activities associated with a design or design change should not proceed without verification past the point where the installation would become irreversible (i.e., require extensive demolition and rework).
 - (c) Procedural control is established for design documents that reflect the commitments of the SAR; this control differentiates between documents that undergo formal design verification by interdisciplinary or multiorganizational teams and those that can be reviewed by a single individual (a signature and date is acceptable documentation for personnel certification). Design documents subject to procedural control include, but are not limited to, specifications, calculations, computer programs, system descriptions, and drawings including flow diagrams, piping and instrument diagrams, control logic diagrams, electrical single-line diagrams, diagrams of structural systems for major facilities, site arrangements, and equipment locations. Specialized reviews should be used when uniqueness or special design considerations warrant them.
 - (d) The responsibilities of the verifier, the areas and features to be verified, the pertinent considerations to be verified, and the extent of documentation are identified in procedures.

- (4.6) The following provisions are included if the verification method is only by test:
- (a) Procedures provide criteria that specify when verification should be by test.
 - (b) Prototype, component, or feature testing is performed as early as possible before installation of plant equipment or before the installation would become irreversible.
 - (c) Verification by test is performed under conditions that simulate the most adverse design conditions as determined by analysis.
- (4.7) Procedures are established to ensure that verified computer codes are certified for use and that their use is specified.
- (5.1) Design and specification changes, including fields changes, are subject to the same design controls that were applicable to the original design.

4.3.4 Procurement Document Control*

Activities related to procurement document control are acceptable if:

- (1.1) Procedures are established for the review of procurement documents to determine that technical and quality requirements are correctly stated, inspectable, and controllable; there are adequate acceptance and rejection criteria, and procurement documents have been prepared, reviewed, and approved in accordance with QA program requirements. To the extent necessary, procurement documents should require that contractors and subcontractors provide an acceptable QA program. The review and documented concurrence of the adequacy of quality requirements stated in procurement documents are performed by independent personnel trained and qualified in QA practices and concepts.
- (1.2) Procedures are established to ensure that procurement documents identify applicable regulatory, technical, administrative, and reporting requirements; drawings; specifications; codes and industrial standards; test and inspection requirements; and special process instructions that must be complied with by suppliers.
- (2.1) Organizational responsibilities are described for (a) procurement planning; (b) the preparation, review, approval, and control of procurement documents; (c) supplier selection; (d) bid evaluation; and (e) the review of and concurrence in supplier QA programs before

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initiation of activities affected by the program. The involvement of the QA organization is described.

4.3.5 Instructions, Procedures, and Drawings*

Activities related to instructions, procedures, and drawings are acceptable if:

- (1) Organizational responsibilities are described for ensuring that activities affecting quality are (a) prescribed by documented instructions, procedures, and drawings and (b) accomplished through implementation of these documents.
- (2) Procedures are established to ensure that instructions, procedures, and drawings include quantitative acceptance criteria (such as those pertaining to dimensions, tolerances, and operating limits) and qualitative acceptance criteria (such as workmanship samples) for determining that important activities have been satisfactorily performed.
- (3) Provisions are described for controlling changes to field and laboratory procedures associated with exploratory investigations within the site characterization program to ensure that such changes are subsequently documented and verified in a timely manner by authorized personnel.

4.3.6 Document Control*

Activities related to document control are acceptable if

- (4.1) The scope of the document control program is described, and the types of controlled documents are identified. As a minimum, controlled documents include:
 - (a) design documents (e.g., calculations, drawings, specifications, and analyses) including documents related to computer codes
 - (b) procurement documents
 - (c) instructions and procedures for such activities as fabrication, construction, modification, installation, testing, and inspection
 - (d) documents pertaining to as-built conditions
 - (e) quality assurance and quality control manuals and quality affecting procedures

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(f) technical reports

- (1.2) Procedures for the review, approval, and issuance of documents and changes thereto are established and described to ensure technical adequacy and inclusion of appropriate quality requirements before implementation. The QA organization, or an individual other than the person who generated the document but who is qualified in quality assurance, reviews and concurs in these documents with regard to QA-related aspects.
- (1.3) Procedures are established to ensure that changes to documents are reviewed and approved by the same organizations as those that performed the initial review and approval or by other qualified responsible organizations delegated by the applicant.
- (1.4) Procedures are established to ensure that documents are available at the location where the activity will be performed prior to commencing work.
- (2.1) Procedures are established and described to ensure that obsolete or superseded documents are removed and replaced by applicable revisions in work areas in a timely manner.
- (2.2) A master list or equivalent document control system is established to identify the current revision of instructions, procedures, specifications, drawings, and procurement documents. When such a list is used, it should be updated and distributed to predetermined responsible personnel.
- (3) Procedures are established and described to provide for the preparation of drawings pertaining to as-built conditions and related documentation in a timely manner to accurately reflect the actual design.

4.3.7 Control of Purchased Material, Equipment, and Services*

Activities related to the control of purchased material, equipment, and services are acceptable if:

- (1.1) Organizational responsibilities are described for the control of purchased material, equipment, and services, including interactions between design, procurement, and QA organizations.
- (1.2) Verification of suppliers' activities during fabrication, inspection, testing, and shipment of materials, equipment, and components is planned and performed with QA organization participation in accordance with written procedures to ensure conformance to the purchase order

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requirements. The procedures, as applicable to the method of procurement, provide for:

- (a) the specification of the characteristics or processes to be witnessed, inspected or verified, and accepted; the method of surveillance and the extent of documentation required; and the personnel responsible for implementing these procedures
 - (b) audits, surveillance, or inspections that ensure that the supplier complies with the quality requirements
- (1.3) Procurement of spare or replacement parts for structures, systems, and components important to safety is subject to present QA program controls, to codes and standards, and to technical requirements equal to or better than the original technical requirements, or as required to prevent the procurement of defective parts.
- (1.4) Selection of suppliers is documented and filed. If the "CASE" register is used to establish the qualifications of the supplier, the documentation should identify the "audit" used.
- (2.1) The material, component, or equipment is inspected when it is received to ensure
- (a) The material, component, or equipment is properly identified and corresponds to the identification on the purchase document and the documentation when the item is received.
 - (b) The material, components, equipment, and acceptance records satisfy the inspection instructions before installation or use of the item.
 - (c) Specified inspection, test, and other records (such as certificates of conformance attesting that the material, components, and equipment conform to specified requirements) are available at the facility before installation or use of the item.
- (2.2) Items accepted and released are identified as to their inspection status before they are forwarded to a controlled storage area or released for installation or further work.
- (2.3) The supplier furnishes the following records to the purchaser:
- (a) documentation that identifies the purchased item and the specific procurement requirements (e.g., codes, standards, and specifications) met by the item,
 - (b) documentation that identifies any procurement requirements that have not been met, and

- (c) a description of those items that do not conform to the procurement requirements and that are designated "accept as is" or "repair."

The review and acceptance of these documents should be described in the purchaser's QA program.

- (2.4) For commercial off-the-shelf items where specific QA controls appropriate for nuclear applications cannot be imposed in a practicable manner, special quality verification requirements shall be established and described to ensure that an acceptable item has been received by the purchaser.
- (2.5) Supplier's certificates of conformance are periodically evaluated by audits, independent inspections, or tests to ensure they are valid and the results are documented.

4.3.8 Identification and Control of Materials, Parts, and Components*

Activities related to the identification and control of materials, parts, and components are acceptable if:

- (1) Controls are established and described to identify and control materials (including consumable material), parts, and components including partially fabricated subassemblies. The description should include organizational responsibilities.
- (2.1) Procedures are established that ensure that identification is maintained either on the item or on records traceable to the item to preclude use of incorrect or defective items.
- (2.2) Identification of materials and parts important to the function of structures, systems, and components important to safety can be traced to the appropriate documentation such as drawings, specifications, purchase orders, manufacturing and inspection documents, deviation reports, and physical and chemical mill test reports.
- (2.3) Correct identification of material, parts, and components is verified and documented before they are released for fabrication, assembling, shipping, and installation.

4.3.9 Control of Special Processes*

Activities related to control of special processes are acceptable if:

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- (1.1) Organizational responsibilities including those for the QA organization are described for the qualification of special processes, equipment, and personnel.
- (1.2) Procedures are established for recording evidence of acceptable accomplishment of special processes using qualified procedures, equipment, and personnel.
- (2) Qualification records of procedures, equipment, and personnel associated with special processes are established, filed, and kept current.

4.3.10 Inspection*

Activities related to inspection are acceptable if:

- (1) The scope of the inspection program is described that indicates an effective inspection program has been established. Program procedures provide criteria for determining the accuracy requirements of inspection equipment and criteria for determining when inspections are required or for defining how and when inspections are performed. The QA organization participates in the above functions.
- (2.1) Organizational responsibilities for inspection are described. Individuals performing inspections are other than those who performed or directly supervised the activity being inspected and do not report directly to the immediate supervisors who are responsible for the activity being inspected. If the individuals performing inspections are not part of the QA organization, the inspection procedures, personnel qualification criteria, and independence from undue pressure such as cost and schedule should be reviewed and found acceptable by the QA organization before the initiation of the activity.
- (2.2) A qualification program for inspectors is established and documented, and the qualifications and certifications of inspectors are kept current.
- (3.1) Inspection procedures, instructions, or checklists provide for the following:
 - (a) identification of characteristics and activities to be inspected
 - (b) a description of the method of inspection
 - (c) identification of the individuals or groups responsible for performing the inspection in accordance with the provisions of item (2.1) in this section
 - (d) acceptance and rejection criteria
 - (e) identification of required procedures, drawings, and specifications and revisions

- (f) a recording inspector or data recorder and the results of the inspection operation
 - (g) specification of the necessary measuring and test equipment including accuracy requirements
- (3.2) Procedures are established and described to identify, in pertinent documents, mandatory inspection hold points beyond which work may not proceed until it is inspected by a designated inspector.
- (3.3) Inspection results are documented and evaluated and their acceptability is determined by a responsible individual or group.

4.3.11 Test Control*

Activities related to test control are acceptable if:

- (1.1) The description of the scope of the test control program indicates an effective test program has been established for tests including proof tests before installation and preoperational tests. Program procedures provide criteria for determining the accuracy requirements of test equipment and criteria for determining when a test is required or how and when testing activities are performed.
- (1.2) The applicant describes the measures that establish a test program that identifies all testing required to demonstrate that the intrinsic characteristics of the site's geologic, hydrologic and geochemical environment are capable of providing long-term isolation to meet the requirements of 10 CFR Part 61.
- (2.1) Test procedures or instructions provide, as required, for the following:
 - (a) the requirements and acceptance limits in applicable design and procurement documents,
 - (b) instructions for performing the test,
 - (c) test prerequisites such as calibrated instrumentation, adequate test equipment and instrumentation including their accuracy requirements, completeness of item to be tested, suitable and controlled environmental conditions, and provisions for data collection and storage,
 - (d) mandatory inspection hold points for witness by owner, contractor, or inspector (as required),

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- (e) acceptance and rejection criteria,
 - (f) methods of documenting or recording test data and results, and
 - (g) provisions for ensuring test prerequisites have been met.
- (2.2) Test results are documented and evaluated and their acceptability is determined by a responsible individual or group.
- (3) A qualification program is established and documented for those individuals conducting the tests and certification of those individuals performing the tests are kept current.

4.3.12 Control of Measuring and Test Equipment*

Activities related to the control of measuring and test equipment are acceptable if:

- (1.1) The scope of the program for the control of measuring and test equipment is described and the types of equipment to be controlled are established. This information indicates an effective calibration and adjustment program has been established.
- (1.2) QA and other organizations' responsibilities are described for establishing, implementing, and ensuring effectiveness of the calibration and adjustment program.
- (1.3) Procedures are established and described for calibration (technique and frequency), maintenance, and control of the measuring and test equipment (instruments, tools, gauges, fixtures, reference and transfer standards, and nondestructive test equipment) that is used in the measurement, inspection, and monitoring of structures, systems, and components. The review of and documented concurrence in these procedures is described, and the organization responsible for these functions is identified.
- (1.4) Measuring and test equipment is identified and traceable to the calibration test data.
- (1.5) Measuring and test equipment is labeled or tagged or "otherwise controlled" to indicate due date of the next calibration. The method to "otherwise control" equipment should be described.
- (1.6) Measuring and test equipment is calibrated at specified intervals on the basis of the required accuracy, purpose, degree of usage, stability characteristics, and other conditions affecting the measurement. This

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equipment is calibrated against standards that have an accuracy of at least four times the required accuracy of the equipment being calibrated or, when this is not possible, have an accuracy that ensures the equipment being calibrated is within required tolerance, and the basis of acceptance is documented and authorized by responsible management. The management authorized to perform this function is identified.

- (1.7) Calibrating standards have greater accuracy than standards being calibrated. Calibrating standards with the same accuracy may be used if they can be shown to be adequate to meet the requirements, and the basis of acceptance is documented and authorized by a responsible member of the management staff. The management staff member authorized to perform this function is identified.
- (1.8) Reference and transfer standards are traceable to nationally recognized standards; where national standards do not exist, provisions are established to document the basis for calibration.
- (1.9) Measurements are taken and documented to determine the validity of previous inspections and the acceptability of items inspected or tested since the last calibration when measuring and test equipment is found to be out of calibration. Inspections or tests are repeated on items determined to be suspect.

4.3.13 Handling, Storage, and Shipping*

Activities related to handling, storage, and shipping are acceptable if:

- (1.1) Special handling, preservation, storage, cleaning, packaging, and shipping requirements are established and implemented by suitably trained individuals in accordance with predetermined work and inspection instructions.
- (1.2) Procedures are established and described to control the cleaning, handling, storage, packaging, and shipping of materials, components, and systems in accordance with design and procedure requirements to preclude damage, loss, or deterioration caused by environmental conditions such as temperature or humidity.

4.3.14 Inspection, Test, and Operating Status*

Activities related to inspection, test, and operating status are acceptable if:

*The designation for each criterion in this section is related to the designation for each area of review listed in the corresponding section in Section 2. NUREG-1293 defines each criterion for application to a low-level waste disposal facility.

- (1.1) Procedures are established to indicate the inspection, test, and operating status of structures, systems, and components throughout fabrication, installation, and testing.
- (1.2) Procedures are established and described to control the application and removal of inspection and welding stamps and status indicators such as tags, markings, labels, and stamps.
- (1.3) Procedures are established and described to control the alteration of the sequence of required tests, inspections, and other operations important to safety. Such actions should be subject to the same controls as those for the original review and approval.
- (1.4) The status of nonconforming, inoperative, or malfunctioning structures, systems, and components is documented and identified to prevent inadvertent use. The organization responsible for this function is identified.

4.3.15 Nonconforming Materials, Parts, or Components*

Activities related to nonconforming materials, parts, or components are acceptable if:

- (1.1) Procedures are established and described for the identification, documentation, segregation, review, disposition, and notification to affected organizations of nonconforming materials, parts, or components and as applicable to services (including computer codes) if disposition is other than to scrap. The procedures identify authorized individuals responsible for the independent review of nonconforming items, including their disposition and closeout.
- (1.2) QA and other organizational responsibilities are described for the definition and implementation of activities related to nonconformance control. This includes identifying those individuals or groups with authority for the disposition of nonconforming items.
- (1.3) Documentation identifies the nonconforming item; describes the nonconformance, the disposition of the nonconforming item, and the inspection requirements; and includes signature approval of the disposition. Nonconformances are corrected or resolved before the initiation of the preoperational test program on the item.
- (1.4) Reworked, repaired, and replacement items are inspected and tested in accordance with the original inspection and test requirements or acceptable alternatives.

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- (1.5) Nonconformance reports are periodically analyzed by the QA organization to show quality trends, and the significant results are reported to upper management for review and assessment.

4.3.16 Corrective Action*

Activities related to corrective action are acceptable if:

- (1.1) Procedures are established and described indicating an effective corrective action program has been established. The QA organization reviews and documents concurrence in the procedures.
- (1.2) Corrective action is documented and initiated following the determination of a condition adverse to quality (such as nonconformance, failure, malfunction, deficiency, deviation, and defective material and equipment) to preclude recurrence. The QA organization is included in the concurrence chain regarding the adequacy of the corrective action.
- (1.3) Followup action is taken by the QA organization to verify proper implementation of corrective action and to close out the corrective action in a timely manner.
- (1.4) Significant conditions adverse to quality, the cause of the conditions, and the corrective action taken to preclude repetition are documented and reported to immediate management and upper levels of management for review and assessment.

4.3.17 Quality Assurance Records*

Activities related to quality assurance records are acceptable if:

- (1.1) The scope of the records program is described. QA records include results of reviews, inspections, tests, audits, and material analyses; monitoring records of work performance; records on the qualification of personnel, procedures, and equipment.
- (1.2) QA and other organizations are identified and their responsibilities are described for the definition and implementation of activities related to QA records.
- (1.3) Inspection and test records contain the following where applicable:
- (a) a description of the type of observation,
 - (b) the date and results of the inspection or test,
 - (c) information on conditions adverse to quality,

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- (d) identification of inspector or data recorder,
 - (e) evidence as to the acceptability of the results, and
 - (f) action taken to resolve any discrepancies noted.
- (1.4) Suitable facilities for the storage of records are described and satisfy the requirements of ANSI/ASME NQA-1. Alternatives to the fire protection rating provisions are acceptable if records storage facilities conform to National Fire Protection Association Standard NFPA 232, Class 1, for permanent records and if the 2-hour fire-rating requirement contained in proposed ANSI N45.2.9 is met by the applicant in any one of the following three ways: (1) a 2-hour-rated vault meeting NFPA 232, (2) 2-hour-rated file containers meeting NFPA 232 (Class B), or (3) a 2-hour-rated fire-resistant file room meeting NFPA 232 if the following additional provisions are met:
- (a) Early warning fire detection and automatic fire suppression should be provided, with electronic supervision at a constantly attended central station.
 - (b) Records should be stored in fully enclosed metal cabinets. Records should not be permitted on open steel shelving. No storage of records should be permitted on the floor of the facility. Adequate access and aisle ways should be maintained at all times throughout the facility.
 - (c) Work not directly associated with records storage or retrieval should be prohibited within the records storage facility. Examples of such prohibited activities include, but are not limited to, records reproduction, film developing, and fabrication of microfiche cards.
 - (d) Smoking, eating, and drinking should be prohibited throughout the records storage facility.
 - (e) Ventilation, temperature, and humidity control equipment should be protected inside with standard fire-door dampers where they penetrate fire barriers bounding the storage facility.

| 4.3.18 Audits and Surveillance*

| Activities related to audits and surveillance are acceptable if:

- (1.1) Audits and surveillance are performed in accordance with pre-established written procedures or checklists and conducted by trained personnel not having direct responsibilities for the achievement of quality in the areas being audited.

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- (1.2) Audit and surveillance results are documented and then reviewed with management having responsibility in the area audited.
- (1.3) Provisions exist such that appropriate follow-up corrective action to audit and surveillance reports is undertaken by responsible management. Auditing organizations schedule and conduct appropriate follow-up to assure that the corrective action is effectively accomplished.
- (1.4) Both technical and QA programmatic audits and surveillance are performed to
 - (a) Provide a comprehensive independent verification and evaluation of procedures and activities affecting quality.
 - (b) Verify and evaluate suppliers' QA programs, procedures and activities.
 - (c) Ensure that performance objectives of 10 CFR Part 61 and design bases are accomplished.
- (1.5) Audits and surveillance are regularly scheduled on the basis of the status and the importance to accomplishment of the performance objectives of 10 CFR Part 61 and the design bases of the activities being performed and are initiated early enough to assure an effective QA program during the design, procurement and contracting activities.
- (1.6) Audits and surveillance objectively assess the effectiveness and proper implementation of the QA program and address the technical adequacy of the activities being conducted.
- (1.7) Provisions are provided such that audits and surveillance are required to be performed in all areas where the requirements of the QA program are applicable.
- (2.1) Audits are led by appropriately qualified and certified audit personnel from the QA organization. The audit team membership includes personnel (not necessarily QA organization personnel) having technical expertise in the areas being audited. Surveillance are conducted by qualified, but not necessarily certified, personnel.
- (2.2) Audit and surveillance deficiency data are analyzed and trended. Resultant reports, which indicate quality trends and the effectiveness of the QA programs, are given to management for review, assessment, corrective action and follow up.

5. EVALUATION FINDINGS

5.1 Introduction

The staff should verify that sufficient information has been provided in the SAR to satisfy the 10 CFR Part 61 requirements and that the information is consistent with the guidance in this SRP. On the basis of this information,

the staff should be able to conclude that this evaluation is complete. The staff can document its review as follows.

5.2 Sample Evaluation Findings

The staff has reviewed the QA program during the design, construction operation and closure phases for the [name of facility] low-level waste disposal facility according to Standard Review Plan 9.1.

The organizations and persons performing QA functions have the required independence and authority to effectively carry out the QA program without undue influence from those directly responsible for costs and schedules.

[Provide a brief description of the applicant's QA program highlighting the more important aspects of the program.]

The QA program covers any activities, structures, systems, and components important to safety as identified in the Safety Analysis Report important to meeting the performance objectives of 10 CFR Part 61.

Accordingly, the staff concludes that the applicant's description of the QA program complies with applicable NRC regulations and industry standards and can be implemented for the [specify] phases of [specify application].

6. IMPLEMENTATION

This SRP provides guidance to the NRC staff in its technical review of the SAR for a near-surface low-level radioactive waste disposal facility. In addition, it may be used as guidance by applicants and licensees regarding the NRC's plans for performing such a technical review.

Except when the applicant proposes an acceptable alternative method for complying with the Commission's regulations, the staff will use the method described herein.

7. REFERENCES

Essential

American National Standards Institute ANSI NQA-1, "Quality Assurance Requirements for Nuclear Facilities."

American National Standards Institute/American Nuclear Society, ANSI/ANS 3.1-1978, "Selection and Training of Nuclear Power Plant Personnel," New York.

Code of Federal Regulations, Title 10, "Energy," U.S. Government Printing Office, Washington, DC, revised annually.

National Fire Protection Association, NFPA 232, "Standard for the Protection of Records," Quincy, MA, 1986.

---, NUREG-1199, "Standard Format and Content of a License Application for a Low-Level Radioactive Waste Disposal Facility," Revision 1, January 1988.

---, NUREG-1293, "Quality Assurance Guidance for a Low-Level Radioactive Waste Disposal Facility," Revision 1, April 1991.

---, NUREG-1383, "Guidance on Application of Quality Assurance for Characterizing a Low-Level Radioactive Waste Disposal Site," Final Report, October 1990.



NUREG-1200

U.S. Nuclear Regulatory Commission
Office of Nuclear Material Safety and Safeguards

STANDARD REVIEW PLAN 10.1
FINANCIAL QUALIFICATIONS OF APPLICANT

1. RESPONSIBILITY FOR REVIEW
 - 1.1 Primary - Financial Analyst
 - 1.2 Supporting - Legal Counsel

2. AREAS OF REVIEW

The staff will review the financial information provided by the applicant, to ensure that the applicant can demonstrate that it either has the necessary funds or has reasonable assurance of obtaining the funds to cover the estimated costs of conducting all licensed activities over the planned operating life of the project, including costs of construction and disposal, as required by 10 CFR 61.61. Specific procedures for reviewing and evaluating these areas of the license application are presented below in Section 3, "Review Procedures" and Section 4, "Acceptance Criteria."

The staff will review the following information to ensure that it demonstrates the financial qualifications of the applicant:

- (1) A legal description of the applicant (individual, partnership, corporation, or public entity),
- (2) A description of the applicant's operations from all of its business activities, including those proposed to be conducted under the license,
- (3) A detailed financing plan,
- (4) Any information, on parent or holding company activities, U.S. Securities and Exchange Commission (SEC) forms submitted, bond ratings, or involvement in any litigation.

3. REVIEW PROCEDURES

The staff will review the financial information to ensure that it demonstrates that the financial qualifications of the applicant are adequate for it to perform the activities for which the license is sought. Sections 3.1 and 3.2 address the review of the application for completeness. Section 3.3 addresses

requests for additional information.

3.1 Acceptance Review

The staff will review, for completeness, the information in the Safety Analysis Report (SAR), on the applicant's financial qualifications, in accordance with NUREG-1199 and Section 3.2 of this Standard Review Plan (SRP).

3.2 Specific Information Requirements Pursuant to 10 CFR 61.61

In reviewing the financial qualifications of the applicant, the staff will ensure that the SAR includes the information discussed in the following sections.

3.2.1 Legal Description of Applicant

The staff will verify that the applicant submitted its exact legal name; its principal place of business; its designation as a corporation, an individual, partnership, or public entity; the State under whose laws the applicant is incorporated, organized, or authorized and headquartered; and the name, title, telephone number, and mailing address of the person(s) to whom communications concerning the financial information are to be addressed.

If the applicant is incorporated, a confirmed certified copy of its articles of incorporation and bylaws or other similar documents should accompany the application. If any persons or organized groups of persons, directly or indirectly, own, control, or hold the power to vote 10 percent or more of the outstanding voting securities of the applicant, a detailed explanation of such relationship should be included. If the applicant is a partnership, and the State in which the partnership was formed requires partnerships to submit their partnership agreement to the State, the applicant should submit a certified copy of its agreement. The applicant should finally list each State in which it is qualified to conduct business.

3.2.2 Applicant's Financing Plan

The staff will verify that the applicant submitted the following information:

- (1) If a State or compact authority has agreed to finance, guarantee, or underwrite any portions of the construction, operation, closure, or long-term care of the facility, notarized copies of any contracts with these parties, including an explanation of the amount, length, and type of financial commitment involved in this arrangement.
- (2) A statement explaining the extent to which the applicant will rely on short-term financing for the proposed construction, and statements that substantiate the fact that such short-term loans will be made available. The applicant should submit schedules showing the amount, terms, and repayment periods of short-term financing. To the extent that short-

term financing (i.e., debt payable within 1 year) will be used to finance long-term capital needs, the applicant should submit schedules showing the dates at which short-term financing must be renewed, the amounts of short-term financing that must be renewed at each date, and the assumed terms (interest rates) of these refinancings. Because financing long-term capital needs with short-term debt exposes the applicant to the risk of rising interest rates, applicants planning to finance long-term capital needs with short-term debt should provide sensitivity analyses indicating the extent to which rising interest rates would adversely affect the projected cash flow and income.

- (3) A detailed description of the applicant's outstanding and proposed securities and liabilities, showing amount (face value and number), interest or dividend rate, dates of issue and maturity, voting privileges, and principal terms and conditions applicable to each. Since long-term, variable-rate debt also entails higher-interest rate risk relative to long-term, fixed-rate debt, applicants relying on long-term, variable-rate debt to finance long-term capital needs should also submit sensitivity analyses indicating the extent to which rising interest rates would adversely affect projected cash flow and income.
- (4) Copies of the company's independently audited financial reports for the past 3 years. As a minimum, this must include balance sheets and income statements (both in consolidated form if available), accumulated retained earnings statement, and a statement of changes in financial position (sources and use of funds). A "newly formed" entity (an entity that has been formed in the last 3 years) should submit balance sheets, income statements, and statements of changes in financial position (sources and use of funds) for as many years as available. A new entity with no financial history should submit a balance sheet detailing assets, liabilities, and net worth (start-up capital contributed by owners).
- (5) A statement of anticipated cash flow, including provisions during the construction period and the first 3 full years of operation for paying interest and dividends and for retiring debt issues.
- (6) A statement showing, over the life of each issue, the annual amount of securities the applicant expects to retire through a sinking fund or other extinguishment of indebtedness.
- (7) Comparative pro forma balance sheets and income statement for the construction period and each of the first 3 full years of operation, stating the effect of the proposed construction and financing of the project.
- (8) Pro forma statements for each of the first 3 full years of operation showing: (a) annual revenues subdivided by type of service to be provided; (b) annual operating expenses, including labor cost, interest

expense, depreciation, depletion, taxes, and other expenses; and (c) net income and rate of return on net investment, including working capital. If an application is a public authority, it should submit similar data and amortization interest schedules for the life of each bond issue related to the facility.

- (9) A statement of the proposed rates to be charged, which should be subdivided by "type of service," to correspond with the subdivision of revenue in Item 8a above. Volume projections by type of service (e.g., waste volume) should also be presented. Projected volume multiplied by proposed rate should equal projected revenue in Item 8a. The applicant should present sensitivity analyses to indicate the extent to which revenue would be reduced (or rates increased) by volumes lower than projected.
- (10) A statement explaining the type and amount of property and liability insurance that will be obtained for the facility, along with copies of such policies and any attached riders.
- (11) Any additional data and information on sources on which the applicant proposes to rely, showing the adequacy and availability of resources for financing the proposed project. For example, the applicant should submit information about parents and affiliates.
- (12) A description of all aspects of a license applicant's business activities that contribute at least 10 percent to its gross revenues. Information of a proprietary nature should be so indicated.
- (13) A list and description of the qualifications of the principal officers of the license applicant, including relevant work experience of the management team proposed for the licensed facility. A newly formed entity should submit detailed resumes of the proposed principal staff. This information is provided in Section 8.2 of the application.

3.2.3 Other Applicable Information

The staff will verify that the applicant has submitted the following:

- (1) If the applicant has a parent or holding company, copies of any fiduciary guarantees provided by parent or holding company with regard to this project. If a parent company or other corporate affiliate is used as a source of funds for any portion of the project or its activities, the applicant should submit financial information of the type described in SRP 3.2.2, for the parent company or other corporate affiliate.
- (2) If the applicant is required to submit Form 10 K or Form 10-Q to the Security Exchange Commission (SEC), copies of these reports for the last 5 years.

- (3) If the applicant's company is evaluated by a bond-rating service such as Moody's Investors Service, Inc. or Standard and Poor's Corporation, copies of these ratings for the last 3 years and a statement of whether the bond ratings are secured by specific collateral or enhanced by a third-party guarantee. Unsecured and unenhanced ratings are a more accurate representation of credit qualifications.
- (4) A brief description of any litigation in which the applicant is involved that might have a negative economic effect on the operation of the facility.
- (5) If the applicant has ever filed or been forced by creditors to file for bankruptcy, specific details of these actions, including the bankruptcy case docket number, jurisdiction, and relevant dates, and the details of any corporate restructuring resulting from bankruptcy.

3.3 Requests for Additional Information

The staff may request additional information after conducting its review, if the information submitted was not adequate. Alternative programs proposed by the applicant must meet all the terms and conditions of U.S. Nuclear Regulatory Commission regulations.

4. ACCEPTANCE CRITERIA

4.1 Regulatory Requirements

The regulation applicable to this SRP is 10 CFR 61.61, "Applicant Qualifications and Assurances."

4.2 Regulatory Guidance

No regulatory guides that apply to the review of the financial qualifications of an applicant for a low-level waste disposal facility.

4.3 Regulatory Evaluation Criteria

The financial information submitted by the applicant should be specific, complete, and consistent and should provide evidence of the applicant's financial qualifications.

4.3.1 Conditions for a Positive Finding of Financial Qualification

The staff will perform the following:

- (1) Evaluate the qualifications of key personnel, to determine whether they have expertise and experience sufficient to provide reasonable assurance that the licensed activity will be conducted

such that health and safety will not be adversely affected.

- (2) Evaluate the costs incurred or projected to be incurred for personnel, equipment, and material, to determine that such costs are reasonable and consistent with those incurred by operators of similar facilities.
- (3) Evaluate the revenues obtained or projected to be obtained from operation of the licensed facilities, to determine that such revenues are reasonably consistent with those obtained by operators of similar facilities.
- (4) Analyze the financial statements (i.e., income statement, balance sheet, and statement of sources and uses of funds) submitted by the license applicant. Financial statements submitted by license applicants shall be certified without qualification by an independent Certified Public Accountant, as accurate and consistent with generally accepted accounting principles (GAAPs). Appendix A includes additional guidance in performing these reviews. Measures used to determine financial soundness will include the following:
 - (a) An analysis of net income achieved and projected. Net income should be positive for the years provided. Although a license applicant would not be required to show a profit in every year to be found financially qualified, a pattern of non-profitability would be of serious concern to NRC staff reviewers.
 - (b) Commensurate with item a, an analysis of return on equity that is reasonably consistent with that obtained by other firms in the industry. The staff will normally find unacceptable a return on equity that is, or is projected to be, consistently below that needed to attract capital necessary for the operation of the plant. However, the staff will consider mitigating circumstances such as a relatively low debt-to-equity ratio (i.e., less than 1.2) or a situation in which significant portion of equity is held by the licensee's management.
 - (c) An evaluation of short-term solvency by measures such as the current ratio (i.e., current assets divided by current liabilities). Current assets normally consist of cash on hand, marketable securities, and accounts receivable. Current liabilities normally consist of accounts payable, short-term debt, currently accruing long-term debt, accrued income taxes and other accrued short-term expenses, such as wages and salaries). Generally, the current ratio should be at least 1.5.
 - (d) As indicated in item b, a low debt-to-equity ratio will be viewed as an affirmative indication of a license applicant's ability to

attract unsecured capital. However, very low debt-to-equity ratios should be evaluated closely, to determine which is the case, because little or no debt can be an indication of either strong financial health or inability to attract capital from lenders. To make this determination and ensure that the applicant is able to attract capital, staff should review the level and market value of the applicant's current debt and equity.

- (5) Evaluate other general considerations, such as the health of the industry; general news in the financial press that may have either a positive or negative effect on a license applicant's financial health; and the business and labor climate in the license applicant's geographic area. In addition, with regard to the manner of litigation as treated under GAAPs, a firm must disclose a contingent liability in the notes to its financial statements, if significant amounts could be involved.

4.3.2. Conclusion

Reviews of financial qualifications are of necessity subjective. Although financial ratios and other objective factors provide a general indication of a license applicant's financial health, mitigating or exacerbating factors may alter conclusions that are based only on a narrowly focused analysis of objective measures. The staff will also review the licensee applicant's financial ability to conduct activities under the license (i.e., construction and operation of the facility) and the financial assurance mechanisms it intends to provide for site closure and monitoring.

5. EVALUATION FINDINGS

5.1 Introduction

The staff should verify that the SAR includes sufficient information to satisfy the requirements and guidance of this SRP and to enable the staff to conclude that this evaluation is complete. The staff can document its review as follows:

5.2 Sample Evaluation Findings

The staff has reviewed the financial assurance documentation submitted by the applicant for the [name of facility] low-level waste disposal facility, according to Standard Review Plan 10.1. The staff finds that the documentation demonstrates [does not demonstrate] to a reasonable degree of assurance that the applicant possesses the necessary funds to cover the estimated cost of conducting all licensed activities over the planned operating life of the project, including the costs of construction and disposal. The staff, therefore, concludes that the documentation provided by the applicant complies [does not comply] with the requirements established in 10 CFR 61.61.

6. IMPLEMENTATION

This SRP gives the NRC staff guidance for its technical review of an SAR for a low-level radioactive waste disposal facility. Applicants and licensees may also use this guidance regarding NRC's plans for performing such a technical review.

Except when the applicant proposes an acceptable alternative method for complying with the Commission's regulations, the staff will use the method described herein.

7. REFERENCES

U.S. Code of Federal Regulations, "Licensing Requirements for Land Disposal of Radioactive Waste," Part 61, Chapter 1, Title 10, "Energy."

U.S. Nuclear Regulatory Commission, NUREG-1199, "Standard Format and Content of a License Application for a Low-Level Radioactive Waste Disposal Facility," Revision 1, January 1988.



NUREG-1200

U.S. Nuclear Regulatory Commission
Office of Nuclear Material Safety and Safeguards

STANDARD REVIEW PLAN 10.1 - APPENDIX A
GUIDANCE FOR REVIEW OF FINANCIAL QUALIFICATIONS

1. INTRODUCTION

This appendix describes methods that staff may use to evaluate a firm's financial statements for purposes of evaluating an applicant's financial condition. The appendix presents specific financial ratios and size measures, along with how they may be used to evaluate an applicant's financial qualifications. Financial ratios and size measures are common analytical tools used to gain insight into the financial condition of a firm. Financial ratio measures, described in Section A.1, provide indications of an entity's financial health. Size measures, described in Section A.2, can help to determine if an entity possesses sufficient size to meet large obligations. The ratios and size measures examined in this section are among the most common employed in corporate financial analysis.

An applicant need not be required to meet all specified criteria, but would have to have adequate financial strength overall. For each applicant, all of the financial ratios and size measures presented should be reviewed and compared to other firms in the applicant's industry. Any values that stand out or appear unusual relative to typical values for other firms in the same industry should be investigated, with particular focus on any measure that helps licensing staff to better understand the applicant's industry and operations. The evaluation of trends over time may be particularly useful.

Comparative data should be referenced when evaluating an applicant's financial qualifications.¹ If one of an applicant's ratios is very poor relative to its industry (e.g., in the lower quartile of its industry), then the licensing staff should require the applicant to provide an adequate explanation. If an adequate explanation cannot be provided, then NRC may wish to ask the applicant to strengthen its financial position. If an applicant rates below the median in most or all of its financial ratios, then the U.S. Nuclear Regulatory Commission may also wish to ask the applicant to strengthen its financial position. Before issuing a license, licensing staff should investigate and understand the characteristics of an applicant's industry and operations well enough to determine whether differences between the applicant and other firms in its industry (and between the applicant's industry and

¹ Reference data for specific industries may be available from a variety of data vendors (e.g., Dun and Bradstreet, Ward's Business Directory) or from NRC Headquarters.

other industries) are indications of financial weakness or are simply reasonable differences due to dissimilar businesses.

2. FINANCIAL RATIO MEASURES

Ratio measures gauge some aspect of a firm's performance or financial characteristics. Because they attempt to adjust for size, ratios are used to directly compare the financial condition of different firms in an industry. Different industries, however, have different financial characteristics. For example, a mining company has very different characteristics than an electric utility. Therefore, while ratios may be used to analyze fundamental differences between firms in an industry, it is not appropriate to use ratio analysis to compare firms in different industries, without first accounting for the differences between the industries.

Within an industry, the differences between financial ratios among firms may be caused by several factors, all of which should be considered when evaluating a firm's financial ratios. Below are some potential reasons for differences between financial ratios among comparable firms:

- (1) There may be differences in management policies, efficiency, and profitability. Capturing these differences is the goal of ratio analysis.
- (2) There may be differences in the markets served. Even within an industry, different firms may manufacture or market somewhat different goods or services, or may serve different market sectors. (Generally such differences are not as great as the differences between firms in different industries.)
- (3) There may be differences in the level of firm diversification. Greater diversification may cause a firm to behave less like other, nondiversified firms in its industry.
- (4) There may be differences in accounting methods. Even identical firms may appear different if they use different accounting practices.² Often, however, firms in the same industry find the

² A number of different accounting practices could be used. For example, different inventory valuation methods could affect financial ratios as follows. In times of rising prices, the oldest items in inventory will be recorded at a lower cost than the newest items. Thus, when a firm uses or sells an item from inventory, both its profit and the value of its remaining inventory will vary, depending on whether it claims to have used or sold the oldest item from inventory or the newest item. If a growing firm claims to have sold the newest item in its inventory (this valuation method is called "LIFO" - Last In First Out), then the firm's profit will reflect current costs, but the value of the firm's inventory will reflect the older, lower prices. If, on the other hand, the firm claims to have sold the oldest item in its inventory (this method is called "FIFO" - First In First Out), then the firm's inventory will reflect current costs, but its profit will be based on the older, lower prices.

same accounting practices to be appropriate. The use of generally accepted accounting principles further ensures that financial condition is fairly presented.

The fourteen ratios discussed below are grouped into four categories: capital structure ratios, profitability ratios, liquidity ratios, and efficiency ratios.³ Each of these groups of ratios is designed to examine a different facet of a firm's abilities. No one ratio is always more important than any other. Licensing staff must consider any measure that provides insight into the applicant's financial qualifications.

Capital structure ratios provide insight into how a firm is financed. Of particular note are leverage ratios, which show the extent to which a firm is financed by debt versus equity capital. Firms with more debt relative to equity are generally less able to weather bad times than are firms with less debt. This is because equity financing, which does not require servicing (since dividend payments are not required⁴), does not have to divert funds from operations. However, debt (with interest) must be repaid according to fixed schedules. Four examples of capital structure ratios include the following:

Total Liabilities/Net Worth. This leverage ratio is often called the "debt-equity ratio." It indicates the mix of debt to equity capital. For example, if the value of this ratio for a given firm is 55 percent, then for every dollar of the firm's net worth, it has 55 cents of liabilities; put another way, the firm is "leveraged" by a factor of 0.55. Thus, a lower debt-equity ratio means a firm is less leveraged and has a stronger debt-equity position. Values of 1.5 (150 percent) are well above the median for most firms. Values of 2.0 (200 percent) are unusually high for most industries.

Current Liabilities/Net Worth. This leverage ratio considers the firm's liabilities that will come due within 1 year, relative to the firm's net worth. The lower this ratio, the better the relative proportions of net worth and current liabilities. If this ratio is less than one, then net worth is greater than current liabilities.

(Differences due to inventory valuation methods are likely to be important only during a significant inflation.)

³ Although efficiency ratios can be essential in determining a firm's relative performance within its industry, they are less useful than the other three groups, for evaluating the firm's solvency and financial health.

⁴ Some types of "preferred" stock issues require specified dividends and/or mandatory repurchase of shares. Such issues have many characteristics of debt. However, most preferred stock dividends and repurchase payments may be suspended indefinitely at management's discretion, if the payments would endanger the firm's financial health.

A more common value for this ratio would be 10 percent, which means that current liabilities are equal to 10 percent of net worth.

Fixed Assets/Net Worth. This ratio considers the firm's fixed assets (such as property, plant, and equipment) relative to the firm's net worth. The lower this ratio, the more of its fixed assets the firm could "buy," using its net worth, or the more of its assets the firm already owns. Values below 100 percent indicate that a firm is worth more than the value of its fixed assets, whereas values above 100 percent signify that the firm is worth less than its fixed assets. Thus, the lower this ratio, the better the proportions of fixed assets and net worth.

Current Liabilities/Inventory. This ratio considers the firm's liabilities that will come due within 1 year, relative to the firm's inventory. The lower this ratio, the more of its current liabilities the firm could "pay for," using its inventory. Thus, the lower this ratio, the better the relative proportions of current liabilities and inventory. Values for this ratio can range widely, depending on the nature and type of the specific firm or industry (e.g., manufacturing versus service industries).

Profitability ratios compare a firm's profit-generating ability (that is, its ability to generate revenues in excess of expenses) to its resource base. Profitability ratios should reflect a firm's stability, because the firm's continued existence depends on its earning power. Four profitability ratios include the following:

Net Income/Total Liabilities. This ratio shows profit relative to total liabilities and indicates the percentage of total liabilities that the firm could pay for with its profits this year. An important variation of this ratio compares the cash flow of the firm (net income plus depreciation, depletion, and amortization) with its total liabilities. Applicants should possess a ratio of cash flow to total liabilities of at least 0.1.⁵

Return on Net Worth. This ratio, also called the "return on equity" or "ROE" ratio, is computed by dividing net income by net worth. It indicates the efficiency with which shareholder equity is being employed. The higher the firm's return on net worth, the more profitably the firm is investing equity capital and the easier it will be for the firm to attract additional investment. Average ROE varies considerably by industry, with riskier industries averaging higher returns. In general, a firm should have a positive ROE comparable to those of other firms in the industry that are solid financial performers.

⁵ The cash flow variation is generally preferable to the "unadjusted" ratio, although the two measures are highly correlated.

Return on Assets. The "ROA" ratio is computed by dividing net income by total assets. It indicates the profitability with which a firm employs its assets. The higher the firm's return on assets, the more profitably the firm is investing its assets. A firm's return on assets will be less than its return on net worth.

Return on Sales. This ratio is computed by dividing net income by total sales (or revenues). It indicates how much profit a firm earns on each dollar of sales. The higher the firm's return on sales, the more efficiently the firm converts sales to profits. A value of 6.7 for this ratio would mean that a firm is earning 6.7 cents per dollar of sales.

Liquidity ratios measure a firm's ability to pay its short-term debts and meet emergency expenditure needs without borrowing. To accomplish this, liquidity ratios typically compare a firm's liquid assets (i.e., assets that can be converted to cash in a short period of time) with its current liabilities (i.e., debts or obligations that must be paid within 1 year). Sufficient liquidity is essential to a firm's financial stability and viability. Two common liquidity ratios are the "current ratio" and the "quick ratio."

The "Current Ratio." A firm's current ratio is computed by dividing the firm's current assets by its current liabilities. Current assets are those that can readily be converted to cash. These assets include both the "quick assets" (i.e., cash, marketable securities, and accounts receivables) as well as assets that can generally be converted to cash within 1 year (e.g., inventories). High current ratios correspond to high liquidity. In general, most firms have current ratios of 1.5 or higher.

The "Quick Ratio." A firm's quick ratio is computed by dividing the firm's "quick assets" (that is, the sum of its cash, marketable securities, and accounts receivables) by its current liabilities. Because it considers only assets that are quickly convertible to cash, the quick ratio measures a firm's ability to meet obligations in a very short time period. Therefore, relative to the current ratio, the quick ratio is a more immediate measure of short-term liquidity. High quick ratios correspond to high liquidity (i.e., greater ability to meet short-term cash needs). A quick ratio of greater than 1.0 implies a firm should be able to quickly meet its current liabilities.

Efficiency ratios, often called "turnover ratios," can show the effectiveness with which a firm manages its resources. Four efficiency ratios are presented:

Sales/Net Working Capital. This ratio shows how many times sales covers net working capital (net working capital equals current assets minus current liabilities). The higher this ratio, the more efficiently the firm uses its net working capital to generate sales.

- Assets/Sales. This ratio shows how efficiently the firm uses its total assets to generate sales. The lower the ratio, the more efficiently the firm uses its assets.
- Accounts Payable/Sales. This ratio shows how much a firm owes its suppliers relative to its sales. The lower this ratio, the less of the firm's revenues must be used to pay its suppliers.
- Sales/Inventory. This "inventory turnover" ratio shows how many times inventory has been "turned over" into sales. The higher this ratio, the more efficient the use of inventory. (It is unclear how this ratio would apply to a firm whose only business is operation of a low-level radioactive waste disposal facility.)

3. SIZE MEASURES

Although ratio analysis makes it possible to distinguish firms in strong financial condition from weaker firms, ratios cannot distinguish large firms from small firms. A firm below a certain size may not have the requisite size to fund large costs, even if it operates profitably. Reviewers should, therefore, carefully consider an applicant's size. Adequate size standards ensure that licensees are of sufficient size relative to the activities and costs required under their licenses. Note that unlike ratios, the adequacy of a firm's size should not be judged relative to the firm's rank in its industry, but relative to the firm's costs. Even the smallest firm in an industry may have sufficient size to pay the costs required under its license.

The financial measures most commonly examined as indicators of a firm's financial size include net worth, tangible net worth, net income, total sales, and total assets.

- Net Worth. Net worth, or shareholders equity, represents the amount by which total assets are greater than total liabilities. The greater a firm's net worth, the more resources the firm owns that could be used to meet additional expenses.
- Tangible Net Worth. Tangible net worth is equal to net worth minus the value of intangible assets (e.g., copyrights, patents, trademarks, goodwill, organization costs, capitalized advertising costs, computer programs, government licenses, leases, franchises, mailing lists, exploration permits, import and export permits, construction permits, and marketing quotas). By excluding intangible assets, tangible net worth provides a more conservative estimate of the firm's value than does net worth.

Net Income.⁶ Net income represents the profits earned by the firm. The greater a firm's net income, the easier the firm can meet additional expenses without impacting its operations and jeopardizing its stability (i.e., its ability to generate cash).

Total Sales. Total sales represents the stream of revenues received by a firm. A firm with limited revenues, no matter how efficient it may be, can have only limited earnings. Thus, a cost of a given size will generally be less burdensome to a firm with more revenues than to a firm with fewer revenues.

Total Assets. Total assets represent all the resources under control of a firm. The more assets a firm controls, the higher the potential for profitable investment. A cost of a given size will generally be less burdensome to a firm with more assets than to a firm with fewer assets.

Numerous reference standards are available to evaluate an applicant's size. License reviewers should, for example, consider the following reference points for size measures:

Tangible net worth of at least \$10 million may substantially reduce the risk of bankruptcy among licensees. NRC's financial test for use by corporate guarantors requires a firm to possess tangible net worth of at least \$10 million. Studies have found that the bankruptcy rate of firms with at least \$10 million in tangible net worth is at least 50 percent lower than the bankruptcy rate for all firms. A variant of this measure would evaluate whether a firm's tangible net worth equals at least \$10 million plus the costs of NRC-related activities.

Net worth (or tangible net worth) greater than the applicant's costs of NRC-related activities may measure the applicant's ability to pay the costs if the firm were to be immediately dissolved. One alternative of NRC's financial test for use by corporate guarantors requires firms to possess tangible net worth of at least 6 times the costs to be covered.

Net income greater than the applicant's costs of NRC-required activities would measure the applicant's ability to pay all costs in a single year. Alternative versions of this criteria could measure the applicant's ability to pay the costs in 2 or more years.

⁶ Pre-tax income may be a more appropriate size measure than net income for purposes of this option, assuming that the NRC-related costs are legitimate business expenses.



STANDARD REVIEW PLAN 10.2
FUNDING ASSURANCES

1. RESPONSIBILITY FOR REVIEW

1.1 Primary - Financial Analyst

1.2 Supporting - Legal Counsel

2. AREAS OF REVIEW

The staff will evaluate the financial instruments required by 10 CFR 61.62, Subpart E, and the accompanying documentation submitted by the applicant, to ensure that sufficient funds will be available to perform disposal site closure and stabilization, including: (1) decontamination or dismantlement of land disposal facility structures; and (2) closure and stabilization of the disposal site so that, after the disposal site is transferred to the site owner, the need for ongoing active maintenance is eliminated to the extent practicable, and only minor custodial care, surveillance, and monitoring are required. These assurances shall be based on Commission-approved cost estimates reflecting the Commission-approved plan for disposal site closure and stabilization Standard Review Plan (SRP 5.2). The financial responsibility arrangements specifically allowed include: (1) surety bonds, (2) cash deposits, (3) certificates of deposit, (4) deposits of government securities, (5) irrevocable letters or lines of credit, (6) escrow accounts, (7) trust funds, and (8) combinations of the above or other such types of arrangements approved by the Commission. The U.S. Nuclear Regulatory Commission also allows the use of a corporate parent guarantee based on a financial test. However, self-insurance or any arrangement that essentially constitutes self-insurance (e.g., a contract with a State or Federal agency) will not satisfy the financial assurance requirements, since this provides no additional assurance other than that which already exists through license requirements. Recommended language for the different types of instruments is given in NUREG-1199.

The staff will ensure that the applicant has provided the following documentation for the financial instruments currently allowed.

(1) If the applicant chooses to use a performance or surety bond, the required documentation includes all of the following:

- A performance or surety bond, with the corporate seal affixed
- A standby trust fund agreement, or documentation pertaining to the applicant's arrangement with the State where the facility will be

located, regarding the State authority proposed as beneficiary for the bond.

(2) If the applicant chooses to use an irrevocable letter of credit, the required documentation includes all of the following:

- A letter of credit, addressed to NRC, stating that the letter of credit is subject to the most recent edition of the Uniform Customs and Practice for Documentary Credits, published by the International Chamber of Commerce, or the Uniform Commercial Code.
- A standby trust fund agreement or documentation pertaining to the applicant's arrangement with the State where the facility will be located, regarding the State authority proposed as beneficiary for the letter of credit.

(3) If the applicant chooses to use a corporate guarantee, the required documentation includes all of the following:

- A letter addressed to NRC, from the chief financial officer of the corporation, providing the guarantee for the applicant.
- A signed opinion, by an independent certified public accountant, of the parent corporation's year-end financial statements and footnotes for the latest complete fiscal year.
- A special report, from the independent certified public accountant, addressed to NRC.
- A signed and notarized written corporate guarantee from the corporate parent.

(4) If assets are to be held in trust by NRC or by the State (e.g., certificates of deposit or deposits of government securities, etc.), the required documentation of all of the following:

A trust agreement or documentation pertaining to the applicant's arrangement with the State where the facility will be located.

(5) If the applicant uses a statement of intent:

- A statement of intent indicating that funds will be requested and obtained sufficiently in advance to prevent delay of required activities.
- A description of the authority of the government entity to use the statement of intent.
- Evidence indicating that the parties signing the statement of intent are authorized to represent the government entity that funds will be obtained.

3. REVIEW PROCEDURES

The staff will evaluate the applicant's proposed financial assurance mechanism that will be used to ensure that sufficient funds will be available to perform the disposal site closure and stabilization. Consult Appendix A to this chapter for the checklists of materials for reviewing an application submission.

3.1 Acceptance Review

The staff will review the financial instrument, and accompanying documentation submitted by the applicant, by comparing them with those listed in NUREG-1199, to verify their completeness, and by comparing their language to that of the standard forms in NUREG-1199, to ensure that the appropriate information has been submitted.

The staff will review the financial instrument, to ensure that it contains language requiring that the financial institution issuing the financial instrument notify the applicant and NRC of its intent to cancel.

3.2 Financial Evaluation

The staff will review a financial instrument submitted by the applicant, by using the general and specific procedures provided in the following sections:

3.2.1 General Evaluation Procedures for All Financial Instruments

The staff will review the information provided by the applicant by comparing the content of the financial instrument with that of the standard financial instruments and accompanying documentation in NUREG-1199.

The staff will verify that the applicant has ensured that the parties signing the various documents are authorized to represent the firm in the transaction. If the applicant is a partnership, the signatory must indicate that he or she is signing for the partnership, that is, by using phrases such as "for the partnership" or "for the company." If the applicant is an individual, the signatory may be the applicant. If a power of attorney is needed for a signature, as may be the case if a surety bond is used, a copy of the power of attorney should be attached to the financial assurance mechanism.

The staff will ascertain if the financial instrument submitted by the applicant is allowable and effective in the State where the facility will be located and also in the State in which that provider of the instrument is located, and meets the conditions in Section 10.4.3.

The staff will determine if the financial assurance mechanism is signed as required, is complete, and will be in effect at the proper time. The staff will also determine if the face value is adequate to cover annual adjustments for inflation, changes in plans, and any changes in the disposal site closure and stabilization plan, including the costs that would be incurred if an independent contractor were hired to close and stabilize the disposal site.

3.2.2 Financial Instrument Evaluation Procedures

3.2.2.1 Surety Bonds

If a standby trust fund agreement accompanies the bond, the staff will ensure that it complies with the suggested wording and documentation in NUREG-1199.

If the applicant has not proposed a standby trust, the applicant should propose that an authority in the State where the facility will be located be named beneficiary for the surety bond. The applicant should submit a certification from the State's Attorney General, certifying that the State authority can legally enter into such an arrangement and, if necessary, use the funds for closure and stabilization of the disposal site, in accordance with the NRC-approved disposal site closure and stabilization plan.

The staff will ensure that the applicant has submitted a copy of the pertinent page of Circular 570, showing that the surety is licensed in the State where the bond was executed and that the penal sum of the bond does not exceed the surety's underwriting limit.

The staff will verify that the applicant reviewed the broker or agent's power of attorney to ensure that the broker or agent is authorized by the surety to issue bonds in the necessary amount. The power of attorney is needed only when the applicant is obtaining a bond from a broker or agent.

The staff will ensure that documentation submitted by the applicant shows that NRC and the applicant will be notified by the surety company of its intent to cancel at least 90 days in advance of cancellations.

3.2.2.2 Irrevocable Letters of Credit

The staff will ensure that the applicant has submitted information so that it can verify that the bank, savings and loan association, mutual savings bank, or credit union issuing the letter of credit has authority to issue letters of credit, and that the letter-of-credit operations are regulated and examined by a Federal or State agency.

The staff will verify that the applicant used the guidelines, for a letter of credit, found in regulations issued by the U.S. Department of Treasury, Comptroller of the Treasury (12 CFR 7.70.16), which include:

- (1) Letters of credit conspicuously stating that they are letters of credit
- (2) The bank's undertaking containing a specified expiration date, or being for a definite term.
- (3) The bank's obligation to pay arising only on the presentation of a draft or other documents, as specified in the letter of credit, and the bank not being called on to determine questions of fact or law at issue between the account party and the beneficiary.

- (4) The bank's customers having an unqualified obligation to reimburse the bank for payments made under the letter of credit.

The staff should verify that the applicant submitted both the letter of credit and a separate letter stating the amount of credit applicable to the licensed site. This letter must include the number of the letter of credit, the name of the insurer, the date, the license number, name and address of the facility, and the amount of funds ensured.

If the applicant has not proposed a standby trust, it should propose that a State authority in the State where the disposal facility will be located is named beneficiary for the letter of credit. The applicant should submit a notarized statement, from the State, certifying that the State authority has the legal authority to enter into such an arrangement and, if necessary, to use the funds for closure and stabilization of the disposal site, in accordance with the NRC-approved disposal site closure and stabilization plan.

3.2.2.3 Corporate Guarantee

The staff will verify that the applicant has provided a corporate guarantee document and a letter from the corporate parent's chief financial officer, including cost estimates and data from audited financial statements, which specifically cite the disposal site facility for which financial assurance is being demonstrated by the corporate guarantee and includes the cost estimates for the closure and stabilization of the site. The staff also will verify that the letter includes the financial test calculations identical to the samples in NUREG-1199.

The staff will verify that the applicant has submitted a copy of the opinion of an independent certified public accountant of the parent company's year-end financial statements and footnotes for the latest complete fiscal year.

The staff will verify that the applicant has submitted a special report on the corporate guarantor from an independent certified public accountant. The report should confirm that the financial data in the letter from the chief financial officer can be derived from the independently audited year-end financial statements and footnotes for the latest complete fiscal year. The report also should state that no matters came to the attention of the accountant that prompted him or her to believe that the information in the chief financial officer's letter should be adjusted.

If there is any doubt about the qualifications of the certified public accountant, the staff should verify the accountant's credentials by contacting the State Board of Accountancy in the accountant's State.

The staff will ensure that the applicant has provided information that enables it to verify that the corporate parent directly owns at least 51 percent of the applicant's voting stock and also satisfied the financial test. If there is any reason to question the validity of the financial data (e.g., if the corporate parent barely satisfies the financial test criteria), the staff may ask the firm to supply audited financial statements, or it may obtain Form

10-K, from the U.S. Securities and Exchange Commission (SEC), which provides Exhibit 22, which lists all subsidiaries of the company.

The staff will ask the corporate parent to provide NRC with documentation of any changes, in its financial condition, that would warrant filing Form 8-K with the SEC. The staff will also verify that, if applicable, the applicant using a corporate guarantee must submit SEC Form 13D. This form includes information on tender offers and acquisitions and must be submitted to the SEC by shareholders acquiring 5 percent or more of a public firm's equity. This information could alert NRC reviewers of a potential change of ownership.

The staff will verify that the corporate guarantor certified and demonstrated that it has full authority, under the laws of the State under which it is incorporated, and under its articles of incorporation and bylaws, to enter into the guaranty, and that it has full approval from its board of directors to enter into this guaranty.

If necessary, the staff may use Moody's or Standard and Poor's bond guides, in the NRC library, to verify that the bonds are rated as claimed.

If an accountant's opinion is without qualification, and the corporate guarantor meets all other requirements, the staff will approve the corporate guarantee. The financial statements should have been prepared according to generally accepted accounting principles (GAAP).

If an accountant's opinion is either adverse or a disclaimer of opinion, the staff will not allow the use of a corporate guarantee.

If an accountant's opinion is qualified by the phrase "except for" or a "subject to," the staff will do the following:

- (1) Ask the corporate parent to submit a copy of its latest financial statements. Alternatively, it could obtain a copy of the latest Form 10-K from the SEC.
- (2) Thoroughly evaluate the accountant's opinion, in the context of the financial statements, to determine the likelihood of the event occurring, the accuracy of the financial assessment, and the ability of the firm to meet the costs.
- (3) If unable to make a decision because the information in the opinion or the financial statements is insufficient, require that the corporate guarantor submit additional information.
- (4) If the matter is still unresolved, request assistance from the NRC legal counsel.

3.2.2.4 Assets Held In Trust by NRC or by the State

The staff will ensure that the applicant has submitted information so that it can verify that the applicant has demonstrated financial assurance by

depositing assets such as cash, certificates of deposit, or government securities with a third party, such as the State, where the facility will be located, or in a trust fund. The trustee should be an entity that has the authority to act as a trustee and whose trust operations are regulated and examined by a Federal or State agency.

This SRP does not address the possible contractual mechanisms that a State could arrange. If an applicant proposes to have a State hold its assets, the staff will evaluate the proposal individually. Additionally, if such a State-administered trust fund has a combined feature to guarantee similar specified activities at the facilities, the staff will carefully evaluate it, to ascertain if the trust has funds clearly dedicated to meet the requirements for funding the site closure and stabilization activities of the facility.

3.2.2.5 Trust Funds (including standby trusts)

The staff will ensure that the applicant has provided information so that it can verify that the bank, savings and loan association, or other financial institution has the authority to act as trustee, and that the trust operations are regulated and examined by a Federal or State agency. If a standby trust is used, the staff will verify that the trustee is qualified to act as trustee. It will also verify that the standby trust agreement is an originally signed duplicate, and that a certificate of acknowledgement accompanies the bond or letter of credit.

The staff will also verify that the following criteria have been met:

- (1) A trust fund can contain interest-bearing cash deposits. It can also contain property, such as securities or government notes. If other types of assets are allowed, the trustee should agree to pay the governmental authority a stipulated cash amount. If assets other than cash are deposited into the trust fund, it may be necessary for the trustee to buy and sell securities, with the approval of the governmental authority, or to take other steps to manage the assets, in order to maximize their value. However, unless specified under the terms of the trust, a trustee should invest under a "reasonably prudent" investor standard, as defined by statute or case law, of the jurisdiction where the trust is located.
- (2) In addition to financial institutions, the NRC staff will consider any individual or organization, for the position of trustee, who can succeed in obtaining insurance for the position. (This type of insurance is commonly obtained by banks and other financial institutions.) The trustee must be an entity whose trust operations are regulated by a Federal or State agency.
- (3) The terms of the trust should define the investment responsibilities of the trustee.
- (4) The trustee should possess the property or fund placed in trust by the party who created the trust. The trustee has legal interest in the funds, since it has control over them, can sue to protect them, and is responsible for their preservation.

- (5) The trustee should be under a fiduciary duty to comply with the terms of this trust and, unless the trust provides otherwise, is liable for breaches of this duty.
- (6) The trustee is allowed to invest in time or demand deposits of the trustee institution, up to the amount insured by law. The trustee is also permitted to put trust fund assets into any appropriate, common, commingled, or collective trust fund created by the trustee.
- (7) The trust agreement should contain language requiring the trustee to submit, to the applicant and NRC a statement of the valuation of the assets in the trust fund, detailing the results of investment activity and the expenses levied against the fund. Securities in the trust fund should be valued at their market value no more than 60 days before the anniversary date of the fund. The applicant may object, in writing, to the trustee's investment activities or to expenses levied against the trust fund, within 90 days of receiving the valuation statement. If objections do exist, the applicant is still obligated to deposit the necessary funds into the trust, to ensure that the amount available is equal to the cost estimates, in the approved plan, for site closure and stabilization.
- (8) The applicant should alert the trustee that the trustee is responsible for annual valuations of the trust, for notifying NRC if the applicant fails to make payment when directed to do so by the Commission, and for making payments out of the trust fund, at the direction of NRC.
- (9) A change in trustee does not affect the existence of the trust, itself. The trustee may be changed if the applicant is dissatisfied with the performance of the trustee or if the trustee resigns; the trustee should be changed if the trustee institution enters bankruptcy or ceases to meet the trustee qualifications. Either way, the trustee can be changed only on agreement by the applicant, the new trustee, and NRC.
- (10) The trust agreement should be signed by the applicant and the trustee and should be properly notarized.

3.2.2.6 Statement of Intent

A statement of intent may be used by Federal, State, or local government licensees to provide evidence of financial assurance for required activities. The purpose of the statement of intent is to ensure that, early in the life of the licensed facility, government licensees make their funding bodies aware of the costs of required activities and the eventual need for funding. The statement must identify the facility(ies) for which it provides financial assurance and the corresponding activities and costs. The statement must also indicate that funds will be requested and obtained sufficiently in advance to prevent delay of required activities. The submission should include evidence of the authority of the officials of the Federal, State, or local governmental agency to sign the statement of intent. Appendix A includes a checklist of evaluation criteria to be applied when reviewing statements of intent.

3.3 Requests for Additional Information

- After conducting its review, the staff may request that the applicant submit additional information, or modify the submittal, to meet the acceptance criteria in Section 4 of this SRP.

4. ACCEPTANCE CRITERIA

4.1 Regulatory Requirements

The regulation applicable to the areas of review for this SRP is 10 CFR 61.62, Subpart E, "Financial Assurances."

4.2 Regulatory Guidance

No regulatory guides apply to the review of an applicant's financial assurance mechanisms.

4.3 Regulatory Evaluation Criteria

The staff will determine if the financial assurance information is acceptable by ensuring that it complies with Chapter 10 of NUREG-1199 and of this SRP, with regard to its specificity, completeness, and consistency.

An Allowable Financial Instrument is acceptable if it meets the following conditions:

- (1) The financial instrument should be fully funded, before startup of operation, and should be organized so as to allow the staff (not less than annually) to review the adequacy of coverage, to account for variations in site conditions, inflation, and site closure and stabilization plans.
- (2) The financial instrument should state whether the principal is a corporation, partnership, or individual and should be in a form to allow the staff to determine if it has been properly signed and notarized and will be effective at the proper time.
- (3) The following apply to signatures on a financial instrument:
 - (a) The instrument should be legally binding on all the signatories.
 - (b) The applicant should ensure that the parties signing the various documents are authorized to act as representatives for the firm involved in the transactions. Persons signing on behalf of the corporate principal should designate their legal capacity and should hold the position of president or vice president of the corporation. If persons other than the president or vice-president are signing a resolution or other certified evidence of authority should be attached to the instrument, stating that the signatories have the authority to sign on behalf of the principal. If needed for a signature, a copy of the power of attorney should be attached to the

- financial assurance instrument, and the corporate seal should be affixed.
- (c) If the principal is a partnership, the firm's name should appear in the caption of the financial instrument.
 - (d) If the principal is under joint ownership, but is not a partnership, the firm's name should appear in the caption and all owners must sign the financial statement.
 - (e) If applicable, a signature of the attorney-in-fact acting on behalf of the issuing organization should appear on the financial instrument. The financial instrument should be accompanied by a properly executed authorization of the power of attorney for the person signing the instrument.
 - (f) If applicable, the financial instrument should contain the signature of the resident agent of the organization issuing the instrument. The agent should be qualified to do business in the State where the facility will be located.
 - (g) Each party should sign his or her own name.
- (4) The financial instrument should be issued by an organization that has the legal authority to execute such an arrangement.
 - (5) All financial instruments, including the original, any additions, and any replacements, should describe and pertain to the licensed facility under the original license.
 - (6) The financial assurance should be open-ended and cannot be cancelled without at least 90 days advance notice to NRC.
 - (7) The instrument should allow for automatic collection, by NRC before its expiration, if the applicant cannot provide an acceptable alternative financial assurance mechanism 60 days before its expiration. The instrument should not require proof of forfeiture.
 - (8) If the instrument is a bond or letter of credit, it should be accompanied by a standby trust, to receive assets in the event the applicant defaults or is bankrupt.
 - (9) The instrument should specify NRC, or a State agency satisfactory to NRC, as the beneficiary. If the instrument designates a State agency as the beneficiary, the applicant should submit written documentation, to NRC, that will allow NRC staff to verify that the State agrees to use any funds received to perform the activities required in the NRC-approved plan for site closure and stabilization.
 - (10) To maintain the necessary amount of coverage, the financial instrument should provide for the following:

- (a) The instrument should be sufficient, at all times, to cover all the costs of closure and post-closure care of the site.
- (b) The amount of the financial assurance or of multiple assurances should at least equal the current cost estimates in the plan, for site closure and stabilization, and should reflect total costs incurred if an independent contractor were hired.
- (c) The instrument or a succession of instruments should provide coverage throughout the term of the license.
- (d) An instrument used for multiple licensed facilities must specify the types and number of activities required for each facility, and the location of each facility.
- (e) The mechanism should be adjusted for inflation, using the following procedure:
 - The applicant should adjust the cost estimates for inflation within 30 days after each anniversary of the date on which the first cost estimate was prepared. The adjustment should be made using the inflation factor derived from the annual implicit price deflator for gross national product as published by the U.S. Department of Commerce, in its Survey of Current Business. The inflation factor is the result of dividing the latest published annual deflator by the deflator for the previous year.
 - The first adjustment should be made by multiplying the cost estimates by the inflation factor, giving the adjusted cost estimate. Subsequent estimates should be made by multiplying the latest adjusted closure cost estimate by the latest inflation factor.
 - The staff suggests this adjustment procedure because of the inherent time delay (of 9 to 18 months) in the publication of a historical annual implicit price deflator for gross national product (AIPD-GNP) by the U.S. Department of Commerce. The procedure will use both the latest published historical figure for AIPD-GNP and the latest forecast of AIPD-GNP.
- (f) If the current cost estimates exceed the coverage, because of inflationary increases or changes in plans, the applicant should arrange to increase coverage and submit evidence of the increase, to NRC, within 60 days after the cost estimates increase. If cost estimates decrease, the applicant may apply to NRC for approval of a decrease in coverage.

- (11) An applicant should obtain replacement financial assurance coverage in the event of bankruptcy of the institution issuing the financial instrument. The trustee should be changed if the trustee institution enters into bankruptcy.

- (12) The applicant should inform NRC, within 10 days after it or the organization issuing the financial instrument learns it is named as a debtor in a bankruptcy proceeding.
- (13) If ownership or operating responsibility for the activities is transferred, NRC will not allow the applicant to terminate the original financial instrument until such time as the new applicant has obtained an acceptable assurance.
- (14) An issuer of a financial instrument should notify both the applicant and NRC, by certified mail, of its intent to cancel the financial instrument. The financial instrument should ensure that the instrument is not cancelled during the 90 days beginning with the date the notice was received by both NRC and the applicant, as evidenced by the return receipts.
- (15) The applicant should be responsible for obtaining another financial assurance mechanism, if the financial institution or corporate guarantor gives notice that it intends to cancel.
- (16) The applicant may change the financial assurance mechanisms in use, with prior written approval from NRC. The new mechanism, if approved, should become effective before or at the time the previous mechanism expires. If a letter of credit or a surety bond is used, the applicant should also establish a standby trust fund.
- (17) The instrument should clearly state the terms and conditions under which the applicant may cancel the instrument, and should provide for notification and approval by the appropriate State or Federal authority, before cancellation by the company.
- (18) The instrument should be established so that the applicant will have the financial assurance released after NRC has agreed that all license conditions for closure and post-closure care have been met. NRC will send written notification, to the applicant, allowing termination of the financial assurance mechanism and a return of any funds held.

5. EVALUATION FINDINGS

5.1 Introduction

The staff should verify that the information in the Safety Analysis Report (SAR) is sufficient to satisfy the requirements and guidance of this SRP and to enable the staff to conclude that this evaluation is complete. The staff can document its review as follows.

5.2 Sample Evaluation Findings

The staff has reviewed the financial assurance documentation submitted by the applicant for [name of facility] low-level radioactive waste disposal facility, according to 10.2. The staff determined that the financial assurance mechanisms submitted by the applicant are sufficient to ensure that funds will be available to close and stabilize the disposal site so that, after the disposal site is transferred to the site owner, the need for active maintenance is eliminated to the extent practicable, and only minor custodial care, surveillance, and monitoring are required. The staff, therefore, concludes that the financial assurance mechanisms comply with 10 CFR 61.62.

6. IMPLEMENTATION

This SRP provides guidance, to NRC, in its technical review of the SAR low-level radioactive waste disposal facility. Applicants and licensees may also use this guidance regarding NRC's plans for performing such a technical review.

Except when the applicant proposes an acceptable alternative method for complying with the Commission's regulations, the staff will use the method described herein.

7. REFERENCES

Essential

Council of Economic Advisors, Economic Indicators, U.S. Government Printing Office, Washington, DC, published monthly.

International Chamber of Commerce, Uniform Customs and Practice for Documentary Credits, Paris, France, 1983.

U.S. Code of Federal Regulations, "Licensing Requirements for Land Disposal of Radioactive Waste," Subpart E Financial Assurance," Part 61, Chapter 1, Title 10, "Energy," U.S. Government Printing Office, Washington, DC, revised annually.

Lawyer's Cooperative Publishing Co., Uniform Commercial Code, Rochester, NY., 1985.

U.S. Department of Commerce, Bureau of Economic Analysis, Survey of Current Business, U.S. Government Printing Office Washington, DC 20004, published monthly.

U.S. Department of the Treasury, Circular 570, "Companies Accepted on Federal Bonds," Washington, DC, published annually in Federal Register.

U.S. Nuclear Regulatory Commission, "Standard Format and Content of a License Application for a Low-Level Radioactive Waste Disposal Facility," NUREG-1199, Revision 1, January 1988.

Dun and Bradstreet Corporation, Moody's Investors Service, 99 Church Street, New York, NY, 1993.

Standard and Poors Corporation, 25 Broadway, New York, NY, 1993.



STANDARD REVIEW PLAN 10.2 - APPENDIX A
CHECKLIST FOR REVIEW OF

FINANCIAL ASSURANCE INSTRUMENTS

CHECKLIST FOR REVIEW OF ESCROW AGREEMENTS

- Documentation is complete.
 - 1. Escrow agreement
 - 2. Certified resolution of Board of Directors authorizing the agreement.
 - 3. Certificate of names and specimen signatures of persons authorized to sign and direct the escrow account.
 - 4. Specimen certificate of events
 - 5. Specimen certificate of resolution
 - 6. Copy of corporate by-laws or other evidence indicating that parties signing the escrow (for the applicant) are authorized to represent the organization in the transaction.
- Evidence that the financial instrument is an originally signed duplicate (e.g., an executed copy of the instrument).
- Introduction explaining the nature of the agreement between the parties and referring to the U.S. Nuclear Regulatory Commission (NRC) license agreement concerning the regulatory obligations of the licensee or applicant.
- Identification of the escrow agent
 - 1. Name and address of escrow agent
 - 2. Position of escrow agent
 - 3. Duties and liabilities of escrow agent
- The name, address, and license number of the facility, corresponding estimated costs of required activities, and the amount of financial assurance provided by the escrow account.
- Recital of delivery of items placed in escrow.

- 1. Cash and/or
- 2. Other liquid assets
- Recital of conditions and terms of the escrow account.
- Terms and conditions upon which items in escrow will be disbursed.
 - 1. Disbursement to licensee, upon proper certification.
 - 2. Conditions that constitute default
 - 3. Rights of parties, upon default.
 - 4. Rights and duties of escrow agent, upon default.
 - 5. Persons or names or positions to which funds may be released.
- Maximum withdrawal of funds at one time from escrow account is limited to 10 percent of the amount of the account, unless NRC written approval is attached.
- Recital of irrevocability of escrow arrangement.
- Escrow agent's rights and duties
- Annual valuation requirement
- Method for amending or terminating escrow agreement, upon mutual consent of the parties and notice to escrow agent.
- Recital of instructions to the escrow agent
- Compensation and expenses of escrow agent
- Amendment of the escrow agreement
- Interpretation of escrow agreement
- Termination of escrow
- Acceptance of appointment by escrow agent
- Signature of parties and escrow agent

CHECKLIST FOR REVIEW OF TRUSTS AND STANDBY TRUSTS¹

- ___ Documentation is complete.
- ___ 1. Trust agreement
 - ___ 2. Schedule A
 - ___ 3. Schedule B
 - ___ 4. Schedule C
 - ___ 5. Specimen certificate of events
 - ___ 6. Specimen certificate of resolution
 - ___ 7. Letter of acknowledgement
 - ___ 8. Copy of corporate by-laws or other evidence indicating that parties signing the agreement (for the applicant) are authorized to represent the organization in the transaction.
- ___ Evidence that the financial instrument is an originally signed duplicate (e.g., an executed copy of the instrument).
- ___ Evidence that the financial institution has authority to act as a trustee.
- ___ Purpose of trust ("whereas" clauses).
- ___ Statement of licensee's or applicant's regulatory obligations as reason for the trust fund.
- ___ Grantor or grantors (introductory paragraph).
- ___ 1. Names
 - ___ 2. Addresses
- ___ Trustee or trustees
- ___ 1. Names and addresses
 - ___ 2. Bank or corporate trustee (introductory paragraph)
- ___ The name, address, and license number and cost estimates (Section 2)².

¹ Adapted from 17A Am Jur Legal Forms 2d (Rev) 251.94.

² References are to recommended wording or trust agreements provided in NUREG 1199.

- ___ Words of transfer, conveyance, and delivery in trust (Section 3).
- ___ Description of trust property (Schedule B)³.
 - ___ 1. Cash
 - ___ 2. Stock and other securities
- ___ Additions to trust
- ___ Distribution of trust principal (Section 5)
 - ___ 1. Disbursement to licensee, upon proper certification.
 - ___ 2. Payment for activities, at NRC's direction, in writing.
 - ___ 3. Refund to grantor, at NRC's specification, in writing, after completion of required activities.
 - ___ 4. Maximum withdrawal of funds at one time is limited to 10 percent of the amount of the fund, unless NRC written approval is attached.
- ___ Trust management (Sections 6-8)
 - ___ 1. Discretionary powers
 - ___ 2. Fiduciary duty
 - ___ 3. Commingling and investment
 - ___ 4. Sale or exchange of trust property
 - ___ 5. Scope of investments
 - ___ 6. Express powers of trustee
 - ___ 7. Borrowing money and encumbering trust assets
- ___ Optional provisions
 - ___ 8. Insurance
 - ___ 9. Operation of business
 - ___ 10. Compromise of claims
- ___ Taxes and expenses (Section 9)
- ___ Annual valuation (Section 10)
- ___ Advice of counsel (Section 11)

³ In the case of a standby trust, Schedule B should still be included, but may indicate minimal property in the fund, or no property in the fund.

- ___ Authority, compensation, and tenure of trustees (Sections 12-14).
 - ___ 1. Trustee compensation
 - ___ 2. Successor trustee
 - ___ 3. Instructions to trustee
- ___ Amendment of agreement (Section 15)
- ___ Irrevocability and termination (Section 16)
- ___ Immunity and indemnification (Section 17)
- ___ Law to govern construction and operation of trust (Section 18).
- ___ Interpretation and severability (Section 19)
- ___ Date (signature block)
- ___ Signatures and titles (signature block)
- ___ Acknowledgments, seals or attestations, if necessary or desired (witnessed by notary public).
- ___ Acceptance of trust by trustee or trustee (acknowledgment).

CHECKLIST FOR REVIEW OF CORPORATE GUARANTEES

___ Documentation is complete.

- ___ 1. Letter from chief executive officer of applicant or licensee.
- ___ 2. Letter from guarantor's Chief Financial Officer, including financial test Alternative I or II.
- ___ 3. Auditor's special report and attached schedule
- ___ 4. Guarantor's annual financial statements for the most recent fiscal year, including the auditor's opinion on the financial statements.
- ___ 5. Corporate guarantee agreement
- ___ 6. Evidence that the corporate parent has majority control of the applicant's voting stock.
- ___ 7. Standby trust agreement⁴ (see checklist for standby trusts).
- ___ 8. Copy of corporate by-laws or other evidence indicating that parties signing the financial instrument are authorized to represent the organization in the transaction.

___ Evidence that the financial instrument is an originally signed duplicate (e.g., an executed copy of the instrument).

___ Letter from the chief executive officer of the licensee verifies that the licensee is a going concern,⁵ with positive tangible net worth.

___ Name and address of guarantor

___ Name and address of the licensee

___ Name and address of the regulatory agency

___ Authority of guarantor to enter into the guarantee (Recital 1).

⁴ Use of a standby trust agreement is optional, but recommended, with a corporate guarantee.

⁵ A "going concern" is a firm that is expected to continue operating at least long enough for current expectations and plans to be carried out and for the reasonably foreseeable future period, after that.

- ___ Recitation of the guarantor's authority to provide the guarantee, such as ownership of the licensee, as evidenced by majority control of the voting stock of the licensee (Recital 5).
- ___ Name, address, and license number of the facility(ies) for which the guarantee provides financial assurance, and amounts guaranteed for required activities.
- ___ Description of the primary obligation (required activities)
- ___ Unequivocal statement of guarantee
 - ___ 1. Recitation of the consideration for the guarantee.
 - ___ 2. Condition(s) of liability
 - ___ 3. Effect on liability of a change in the status of the licensee.
- ___ Statement that guarantor remains bound despite amendment or modification of license, reduction or extension of time or performance of required activities, or any other modification or alteration of an obligation of license.
- ___ Notice requirements
- ___ Discharge of the guarantor (release of obligations).
- ___ Termination and revocation
 - ___ 1. Termination on occurrence of contingency
 - ___ 2. Voluntary revocation by guarantor
 - ___ 3. Effective date of termination or revocation
- ___ Date
- ___ Signatures
- ___ Signature of witness or notary (signature block)
- ___ Audited financial statements of guarantor
- ___ Standby trust, if used, is acceptable (see checklist for standby trusts).

CHECKLIST FOR REVIEW OF SURETY BONDS

- ___ Documentation is complete.
- ___ 1. Surety bond
 - ___ 2. Standby trust agreement (see checklist for standby trusts).
 - ___ 3. Copy of corporate by-laws or other evidence indicating that parties signing the financial instrument (for the applicant) are authorized to represent the organization in the transaction.
- ___ Evidence that the financial instrument is an originally signed duplicate (e.g., an executed copy of the instrument).
- ___ Surety is listed in the most recent edition of Circular 570 of the U.S. Department of Treasury.
- ___ Copy of broker/agent's power of attorney authorizing the broker/agent to issue bonds.
- ___ Signed statement from applicant indicating that it will notify NRC if the surety company intends to cancel or go bankrupt.
- ___ Date of execution of bond and effective date
- ___ Name and address of licensee (principal)
- ___ Type of business organization; State of incorporation, if appropriate.
- ___ NRC license number, name and address, and costs of required activities.
- ___ Identification of corporate or individual surety(ies)
- ___ 1. Name
 - ___ 2. State of incorporation
 - ___ 3. Qualification in jurisdiction where facility covered by the surety bond is located.
- ___ Designation of obligee (NRC)
- ___ Recitation of consideration (fee paid for surety bond).
- ___ Liability of surety
- ___ 1. Penal sum
 - ___ 2. Limitation of liability
 - ___ 3. Condition(s) of liability
 - ___ 4. Statement of joint and several liability

- ___ Statement of licensee's or applicant's regulatory obligations, as reason for bond.
- ___ Scope and duration of bond
 - ___ 1. Restricted to single obligation
 - ___ 2. Continuing
 - ___ 3. Provisions for renewal
 - ___ 4. Payable to a standby trust fund
- ___ Liability limit of bond
- ___ Termination
 - ___ 1. By surety
 - ___ 2. By principal
 - ___ 3. Effective date of termination or revocation.
- ___ The financial institution issuing the mechanism must notify the licensee and NRC at least 90 days before cancellation or non-renewal.
- ___ An automatic payment provision should be included that if the licensee is unable to secure alternative financial assurance to replace the bond, then NRC may draw on the bond before cancellation.
- ___ Adjustment of penal sum
- ___ Date
- ___ Signatures
- ___ Premium
- ___ Standby trust is acceptable (see checklist for standby trusts).

CHECKLIST FOR REVIEW OF LETTERS OF CREDIT

- ___ Documentation is complete.
 - ___ 1. Letter of Credit
 - ___ 2. Standby trust agreement (see checklist for standby trusts).
- ___ Evidence that the financial instrument is an originally signed duplicate (e.g., an executed copy of the instrument).
- ___ Evidence that the financial institution is regulated by Federal or State agency (e.g., member of FDIC, Federal Reserve System, etc.).
- ___ The name of the issuing financial institution must be identified on the letter of credit.
- ___ The instrument must be entitled an irrevocable letter of credit.
- ___ The instrument should be limited in amount.
- ___ The letter of credit must be automatically renewed at each expiration date, unless NRC and the licensee are notified at least 90 days before non-renewal.
- ___ An automatic payment provision should be included that if the licensee is unable to secure alternative financial assurance to replace the letter of credit within 30 days of notification of cancellation, then NRC may draw on the letter of credit before cancellation.
- ___ The issuer's obligation to pay the beneficiary should arise only upon presentation of a draft or other documents specified in the letter of credit.
- ___ Statement of licensee's or applicant's regulatory obligations as reason for the letter of credit.
- ___ The letter of credit must be payable to a standby trust.
- ___ The bank must not be called upon to determine a question of fact or law at issue between the licensee and NRC.
- ___ Notice of insolvency or violation of banking requirements
- ___ The licensee should have an unqualified obligation to reimburse the issuer for payments made under the letter of credit.
- ___ Signature and title of officials of issuing institution (signature block).
- ___ Date (signature block)

| Standby trust is acceptable (see checklist for standby trusts).

CHECKLIST FOR REVIEW OF STATEMENTS OF INTENT

- Documentation is complete.
 - 1. Statement of Intent
 - 2. Copy of evidence indicating that parties signing the financial instrument (for the applicant) are authorized to represent the organization in the transaction.
- Evidence that the Statement of Intent is an originally signed duplicate.
- Description of authority of government entity to make Statement of Intent.
- Identification of Federal, State, or local government license.
- Name, address, and license number of facility(ies) for which Statement of Intent provides financial assurance and corresponding costs of required activities.
- Statement of Intent must specify the amount of funds being ensured.
- Statement that funds for required activities will be obtained when necessary.
- Recitation of authority to sign the Statement of Intent.
- Date
- Names and positions of signatories
- Signatures

CHECKLIST FOR REVIEW OF LINES OF CREDIT

- Documentation is complete.
 - 1. Line of credit documentation/verification
 - 2. Standby trust agreement (see checklist for standby trust).
- Evidence that the financial instrument is an originally signed duplicate (e.g., an executed copy of the instrument).
- Evidence that the financial institution is regulated by Federal or State agency (e.g., member of FDIC, Federal Reserve System, etc.).
- Statement of licensee's or applicant's regulatory obligation as reason for the line of credit.
- The line of credit should be limited in amount.
- The line of credit should be either open-ended or renewed automatically.
- NRC may draw on the line of credit, on commencement of required activities.
- The financial institution must be obligated to provide funds, without reservation, as necessary for required activity.
- The issuer's obligation to pay the beneficiary should arise only on presentation of a draft or other documents specified in the line of credit.
- The financial institution issuing the instrument must notify, by certified mail, the applicant and NRC, at least 90 days before cancellation or non-renewal.
- An automatic payment provision should be included that, if the licensee is unable to secure alternative financial assurance to replace this line of credit, within 30 days of notification of cancellation, then NRC may draw on the line of credit before cancellation.
- The line of credit must be payable to a standby trust.
- The financial institution must not be called on to determine a question of fact or law at issue between the licensee and NRC.
- The licensee should have an unqualified obligation to reimburse the issuer for payments made under the line of credit.
- Signatures and titles (signature block)
- Date (signature block)
- Standby trust is acceptable (see checklist for standby trusts).

CHECKLIST FOR REVIEW OF CERTIFICATES OF DEPOSIT

- ___ Documentation is complete.
- ___ 1. Certificate of deposit
 - ___ 2. Standby trust agreement (see checklist for standby trusts) or escrow agreement (see checklist for escrow agreements).
- ___ Evidence that the financial instrument is an originally signed duplicate (e.g., an executed copy of the instrument).
- ___ Time or demand depots
- ___ Negotiable or non-negotiable instrument
- If negotiable, the certificate of deposit is in the possession of the trustee or escrow agent.
 - If non-negotiable, the certificate of deposit names the trustee or escrow agent as payee.
- ___ Terms and conditions include
- ___ 1. Name and address of bank
 - ___ 2. Number of certificate
 - ___ 3. Date of creation
 - ___ 4. Name of depositor
 - ___ 5. Name or position of payee or holder
 - ___ 6. Date of maturity
 - ___ 7. Sum deposited is adequate to fund required activities.
 - ___ 8. Rate of interest
 - ___ 9. Renewable or non-renewable, at maturity
 - ___ 10. Period of renewal
 - ___ 11. Power of bank not to renew
 - ___ 12. Limitations on withdrawal
 - ___ 13. Notice of requirements
- ___ Statement of licensee's or applicant's regulatory obligations as reason for the certificate of deposit.
- ___ The financial institution issuing the mechanism must notify the applicant and NRC at least 90 days before cancellation or non-renewal.
- ___ Deposit insurance
- ___ Standby trust or escrow is acceptable (see checklist for standby trusts or escrow agreements).

CHECKLIST FOR REVIEW OF GOVERNMENT SECURITIES

- ___ Documentation is complete.
- ___ 1. Verification of approval of securities
- ___ 2. Standby trust agreement (see checklist for standby trusts) or
escrow agreement (see checklist for escrow agreements).
- ___ Evidence that the financial instrument is an originally signed duplicate
(e.g., an executed copy of the instrument).
- ___ List of securities deposited
- ___ Federal Treasury bills, notes, and bonds
- Federal Treasury bills
 - Federal Treasury notes
 - Federal Treasury bonds
 - Government National Mortgage Association pass-through
certificates (GNMAs)
 - Federal National Mortgage Association bonds (FNMA's)
 - Federal Home Loan Mortgage Corporation (FHLM) bonds
- ___ State or municipal bonds rated
- BBB or higher, as rated by Standard and Poor's Corporation
 - Baa or higher, as rated by Moody's Investor Services, Inc.
- ___ Date when securities were transferred to trust or escrow account.
- ___ Current market value of securities deposited is stated and is sufficient
to cover ensured costs.
- ___ Certified or estimated cost of required activities
- ___ Standby trust or escrow is acceptable (see checklist for standby trusts
or escrow agreements).