UPDATE ON LLW REGULATORY GUIDES

AND TOPICAL REPORTS

T.C. Johnson, K.C. Chang, T.L. Jungling, L.S. Person,
C.H. Peterson, G.W. Roles, D.H. Tiktinsky, J.C. Voglewede
Division of Waste Management
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

ABSTRACT

The Nuclear Regulatory Commission has promulgated regulations and published technical positions on the land disposal of low-level waste. To expedite determination of compliance, the NRC has encouraged the preparation of a topical report by each vendor on his particular packaging method or system. This approach provides a centralized national level of review with active participation by the States. This paper updates the technical positions and presents information on practical experiences obtained from implementing the recommendations in those positions and from reviewing topical reports.

INTRODUCTION

Background

In December 1982 the Nuclear Regulatory Commission (NRC) promulgated the low-level waste management regulation 10 CFR Part 61 (1). One year later the waste classification and waste form requirements went into effect. To provide waste generators early guidance for complying with these requirements, the NRC published in May 1983 the Technical Positions on Waste Classification (2), and on Waste Form (3).

Compliance with the regulatory requirements and recommendations would normally require detailed inspections at each licensee facility. To expedite determination of compliance, NRC has encouraged preparation of a Topical Report (TR) by each vendor for his particular packaging method or system. The TR approach was adopted to provide a centralized national level of review with active participation by the States. The NRC now has in process 23 TRs covering waste classification codes, high integrity containers, and solidification systems.

Scope

This paper describes pending updates of the Technical Positions and presents information on practical experiences from implementing the recommendations in those positions and from reviewing TRs. Two main areas will be covered. First, the TR review process will be outlined, the status of the TRs will be given and experience in reviewing these TRs will be described. Second, two draft regulatory guides based on the Waste Form and Waste Classification Technical Positions will be discussed.

Due to activities mandated by Congress under the Low-Level Waste Policy Amendments Act, TR reviews have been a lower priority work item. We, therefore, want to emphasize that delays in the review process can be minimized if the TRs submitted are of high quality.

Regulatory Requirements

The basic technical requirements for waste classification and waste characteristics are given in 10 CFR Sections 61.55 and 61.56, respectively. The waste classification system divides low-level wastes acceptable for near-surface disposal into three categories designated as Classes A, B, and C. Class A wastes have the lowest concentrations of radionuclides and are required to meet only minimum waste form requirements. Class B wastes have higher concentrations and must also meet stability requirements. Class C wastes have even higher concentrations of radionuclides and besides meeting the requirements of Class B wastes must be disposed of with protection for an inadvertent intruder. The structural stability requirements for Classes B and C wastes currently are achieved by the use of high integrity containers (HICs), by solidification of the waste, or by taking credit for the inherent stability of the waste. The minimum requirements (10 CFR Section 61.56(a)) are intended to ensure operator safety during handling of the wastes. The stability requirements are intended to minimize subsidence effects in the disposal facility by maintaining gross physical properties and identity for a minimum of 300 years. Section 61.56(b) clarifies the meaning of stability and identifies several stresses which the wastes must withstand: external load, moisture, microbial activity, radiation, and chemical attack. With respect to Class C wastes, barriers against inadvertent intrusion should have an effective life of at least 500 years.

Additional Guidance

The Technical Position papers the NRC has issued provide guidance to aid in implementation of the regulations. The additional information is presented as recommendations. These are not legal requirements and, therefore, a vendor can offer alternatives.

Technical Position on Waste Classification

Section 61.55 of 10 CFR Part 61 contains two tables listing limiting radionuclide concentrations for three classes of wastes considered suitable for near-surface disposal. The classifications take into account the radiological hazard of the nuclides of concern and also provide for wastes containing mixtures of nuclides. Any licensee who transfers waste either to a land disposal facility or to a waste collector must classify the waste transferred. Any licensed waste processor who treats or repackages waste for disposal must also classify those wastes.

All licensees must carry out a compliance program to assure proper classification of waste. The objective of these programs is to ensure realistic representation of the distribution of radionuclides within the wastes. The programs are expected to be more sophisticated for wastes containing higher concentrations of nuclides, as in waste Classes B and C, and for cases in which minor variations in process conditions could result in a change in classification or in which there is a reasonable chance that Class C limits might be exceeded.

In recognition of the difficulties in sampling and measurement, a reasonable target for accuracy is determination of concentrations to within a factor of 10. Concentrations may be determined by direct measurement but may also be determined indirectly by correlation factors, by materials accounting, by source, or by gross activity measurements.

Technical Position on Waste Form

This document elaborates on the provisions of Section 61.56. Class A wastes, having low concentrations of nuclides, do not have to be stabilized, but on disposal must be segregated from Classes B and C wastes. If Class A wastes are solidified and segregated from Class B and Class C wastes, they need only be free-standing monoliths having a free liquid content no more than 0.5% by volume. If not segregated, such wastes must meet the structural stability requirements of Classes B and C wastes.

Classes B and C wastes are intended to maintain their gross physical properties and physical identity over a 300-year period. The demonstration of the required structural stability can be made by subjecting samples of the waste forms to a series of tests. The recommended tests include initial compressive strength, leach resistance to an appropriate aqueous media, compressive strength after immersion in water, resistance to biological attack, radiation resistance and thermal cycling stability.

Stability can also be achieved through use of high integrity containers (HICs). These should also have a minimum life-time of 300 years. Tests to which HICs must be subjected include consideration of their mechanical strength, the impact of thermal loads, chemical and biological interactions with both the disposal environment and the contained waste, gamma and ultraviolet radiation, and the ability to withstand various handling tests.

TOPICAL REPORTS

Review Process

TRs have been submitted to the NRC in three categories: computer codes for classifying wastes, high integrity containers, and solidification processes. Review effectively begins with formal submittal of the TR. In the case of a solidification process, the vendor can elect to precede this step by submittal of a test plan through which he will collect the necessary data to qualify his waste forms. It is clearly desirable to do this as it will avoid delays in acceptance of the TR because of insufficient or inappropriate test data.

Comments and requests for clarification of material in the TR are generated by the NRC reviewing offices and transmitted to the vendor. They are also sent for review to the States having regulatory authority over disposal of LLW. Comments received from the States are also referred back to the vendor.

Responses received from the vendor and from the States are reviewed by NRC and, if necessary, remaining differences are resolved through additional rounds of formal comments and/or meetings. The States are kept informed of the progress of these discussions. When all issues have been resolved, the NRC will prepare a Safety Evaluation Report (SER) detailing the findings of the review. The SER is transmitted to the States and to the vendor who then prepares a revised TR. This document is thoroughly reviewed by the NRC and the States to make certain that all agreed upon changes have been made. It is then given final approval and will thereafter be acceptable for referencing as part of demonstrating compliance with regulations. The States are responsible for issuing the actual Certificate of Compliance.

Comments on Topical Reports Received to Date

As feedback to vendors contemplating submission of TRs in the future, we would like to make some general observations on those we have received to date. First, each TR will necessarily contain a great deal of technical information. Review of this information is facilitated by presenting it in a well-organized manner. All of the information dealing with a particular subject should be presented in its own section. In some TRs reviewed, material addressing particular aspects of the test work was presented in different parts of the TR. Information initially encountered in the text would convey one picture, whereas subsequent information would modify the initial understanding, sometimes substantially.

The descriptive material should be clear as to exactly what was tested, how were the tests carried out, how many replicates were used, how were the test specimens prepared, and to what extent did the simulated wastes represent actual wastes. Visual observations made on the specimens following testing should also be included.

The data should provide adequate support for the conclusions drawn. On the other hand, exhaustive studies are not currently required. Thus, if one can show that a particular leachant, such as demineralized water, results in lower leach indices than some other type of water, then demineralized water leach data would be sufficient. It also appears reasonable to expect a monotonic effect of waste loading on compressive strength or leach index. Therefore, data at the highest waste loading would be required, but only enough data at lower loadings to support this expectation would be needed.

In cases where a full matrix of test data is not obtained, the logic of the conclusions must be clearly presented. Justification for omission of data must be made. Data reports must be included for all testing done.

In addition, the permissible waste loadings claimed must take into account the variability of the data. An estimate of the variability can be made from the use of replicates. Because of this variability, the mean value of a parameter such as compressive strength must be greater than the minimum required (60 psi). In cases where the compressive strengths obtained for solidified waste forms are close to the minimum, the data may be judged insufficient when the variability is taken into account.

Calculations of Leach Indices should be made correctly and should include the geometry factor when the cumulative releases exceed 20% of the initial loading. Complete leach test data should be submitted to facilitate evaluation of the conclusions.

Referenced data may be used to support vendor conclusions. However, these data should be applicable to the materials and wastes proposed for qualification.

Status of Topical Reports

Waste Classification Computer Codes

Several computer-based approaches have been developed to characterize packaged wastes, classify packages as per the Part 61 criteria, and prepare the required shipment manifest documentation required. The latter is based on NRC's 10 CFR Part 61 and 10 CFR Section 20.311, the Department of Transportation (DOT) requirements, and license requirements at existing near-surface disposal facilities. The structure, scope, and capability of these methodologies are not identical, but all are intended to reduce significantly the manpower needed and potential personnel exposure to perform the above tasks and to assist waste generators in carrying out waste tracking and control activities. The approaches must be based on the types and forms of wastes actually generated and must take into account radionuclide distributions in specific facilities and waste streams.

Three vendors have submitted TRs on codes as shown in Table I:

Waste Management Group, Inc.	RADMAN
Impell Corporation	WASTETRAK
Cygna Corporation	CYTRAK

RADMAN was the first TR received by the NRC and was approved for referencing on July 25, 1983. It operates on a waste stream characteristics data base which is specific to the types, radionuclide distributions and forms of waste generated by individual facilities. Waste characterization involves estimation of radionuclide content by gamma radiation measurements, by analysis of samples, or by material balances. Records that can be prepared include waste inventories, sampling activities, radwaste reports, and shipping documents. Packaged radwaste can be tracked from generation through disposal. The data base can be updated as needed to change the waste types, the waste characteristics, and the radionuclide library.

The Impell WASTETRAK TR is similar to the RADMAN TR but also provides economic analyses of shipping alternatives. The NRC staff is preparing an SER for this TR.

Cygna submitted a TR for a waste classification code which performs dose-to-curie calculations, classifies wastes and prints out manifest documents. A draft SER is being prepared.

High Integrity Containers (HICs)

High integrity containers are designed and constructed to meet the structural stability requirements of Part 61. The NRC has received eight HIC TRs using four material types: polyethylene (PE), fiberglass-reinforced plastic (FRP), polymer impregnated concrete, and a duplex stainless steel.

Four vendors have proposed use of PE: Chem-Nuclear Systems, Inc. (CNSI), NUS Process Services Corporation (NUS), TFC Nuclear, and Westinghouse Hittman Nuclear (WHN). The TR submitted by NUS was withdrawn in 1985. The other designs utilize Marlex CL100, which is a high density cross-linked polyethylene, and vary in size from 55 gallons to cylinders 6 feet in diameter by 6 feet high (300 CF). All of the PE HICs are made by a rotational molding process. They are proposed for use in disposal of bead and powdered ion exchange resins, filter sludge, solid wastes, fibrous filter media, and solidified waste forms. The CNSI TR contains considerable information on materials properties and chemical compatibility. It was not developed, however, to address burial at Hanford but has been tested at the shallower depth practiced at Barnwell. Comments on all three TRs have been sent to the respective vendors.

Because of generic questions involving the structural stability of PE HICs, the NRC contracted with Brookhaven National Laboratory (BNL) to recommend stress-strain criteria and to develop a finite element computer code incorporating long term creep and buckling criteria to evaluate the response of polymeric HICs to the burial loads expected at the burial sites. This is expected to be available in early 1987. Following NRC's analyses of these HIC designs, additional comments may be sent to the vendors for resolution.

The Chichibu Cement Company has designed a steel fiber polymer impregnated concrete (SFPIC) HIC. The SFPIC material has significantly better strength and toughness properties relative to plain concrete. The polymer also greatly decreases the permeability of the composite. This HIC is currently designed in 55 and 110 gallon sizes. The TR was approved on June 25, 1986 for the disposal of ion exchange media, filter media, solid wastes, filter cartridges, and solidified resins and sludges.

Nuclear Packaging has submitted two TRs for HICs made of a duplex stainless steel, Ferralium alloy 255. Ferralium is a registered trademark of Bonar Langley Alloys, Ltd. The first TR covered the design of a 50 CF HIC designated as the FL-50/EA-50 HIC. The second TR describes larger HICs to 210 CF designated as the Enviralloy Family. All of the Ferralium HICs have excellent corrosion resistance to potential chemical environments including liquids with pH as low as 3. The FL-50/EA-50 HIC was approved on November 7, 1985. Subsequent minor modifications to the structural criteria were made and the final TR was submitted in late 1986. Responses to the remaining questions on the Enviralloy Family are expected in early 1987.

CNSI also submitted a TR on a fiberglass-reinforced plastic (FRP) HIC. Comments were sent to CNSI in October 1985 but the TR was withdrawn in May 1986.

Solidification Processes

Twelve TRs have been submitted utilizing various solidification agents. A discussion of the status of each follows.

Cement

Five cement solidification systems have been proposed that utilize conventional cement technology augmented by the use of proprietary additives and methods.

TABLE I

STATUS OF TOPICAL REPORTS

Vendor	System Name/Type	Status
	A. Classification Codes	
Waste Management Group	RADMAN	Approved
Cygna	CYTRAK	Preparing SER; Note 2
Impell	WASTETRAK	Preparing SER; Note 2
	B. High Integrity Containers	
Chem-Nuclear Systems	Polyethylene	Vendor to respond; Note 3
	Fiber-reinforced plastic	Withdrawn
NUS Process Services	Polyethylene	Withdrawn
TFC Nuclear	Polyethylene	Vendor to respond; Note 3
Westinghouse Hittman	Polyethylene	Vendor to respond; Note 3
Chichibu	Cement	Approved
NUPAC	FL-50	Approved
	Enviralloy	Vendor to respond
	C. Solidification Systems	
Chem-Nuclear Systems	Cement	Preparing SER; Note 4
NUS Process Services	Cement	Preparing SER; Note 4
Stock Equipment Co.	Cement	Review initiated
VIKEM	Cement	Closing out: lack of information
Westinghouse Hittman	Cement	Preparing SER; Note 4
	SG-95	Vendor to respond; Note 4
Pacific Nuclear	Envirostone	Withdrawn
U. S. Gypsum	Envirostone	Vendor to respond; Note 4
General Electric Co.	Organic polymer	Approved
Dow Chemical Co.	Organic polymer	Preparing SER; Note 5
ATI	Asphalt	Review begun
WasteChem	Asphalt	Vendor to respond

Note 1. SER = Safety Evaluation Report
Note 2. Reviewing vendor responses
Note 3. Awaiting information from BNL polyethylene structural study
Note 4. Reviewing Brookhaven data on effect of cure time
Note 5. Awaiting biodegradation data

The TR submitted by CNSI covers cement solidification of five types of wastes: (1) powdex and filter media, (2) mixed bed bead resins, (3) 25% sodium sulfate evaporator bottoms, (4) 12% boric acid evaporator bottoms, and (5) diatomaceous earth.

Questions have been raised as to the acceptability of the curing procedures used for resin solidification. These questions apply to all the proposed cement systems. BNL has performed confirmatory tests and an evaluation of these data is in progress. A draft Safety Evaluation Report (SER) for the CNSI system is being prepared contingent upon a satisfactory resolution of the questions on curing procedures.

CNSI has also proposed a cement encapsulation method for the stabilization of filters, machinery and equipment, and other solid or semi-solid objects which cannot meet the 10 CFR Part 61 stability requirements. Completion of a final review of the structural integrity of this solidification method is expected to be completed in early 1987.

NUS Process Services Corporation (NUS) has requested certification for the cement solidification of five wastes, four of which are similar to those in the CNSI TR. In place of diatomaceous earth, however, NUS addresses stabilization of activated carbon waste. NUS has also proposed a filter encapsulation method. Review of this TR has generated an initial round of questions that were transmitted to NUS in August 1986.

Westinghouse Hittman Nuclear (WHN) has submitted a TR covering cement solidified wastes similar to those in CNSI but adding filter sludge, oil, grit, and a decontamination solution. A generic process control program has also been submitted. Most of the requests for additional information and clarification have been answered. A draft SER is being prepared and will be completed after resolution of the cure procedure issue.

The Stock Equipment Company has just submitted a TR for a cement solidification process and review of this TR has begun.

VIKEM submitted a TR for an oil solidification process but has not yet responded to requests by the NRC for additional information.

Gypsum

U. S. Gypsum, Inc. (USG) submitted a TR covering solidification of Classes B and C wastes by means of a product known as ENVIROSTONE gypsum cement. This is a finely ground non-flammable powder consisting of calcium sulfate hemihydrate and a polymer. The purpose of the polymer is to seal interstices in the waste form to inhibit permeation of liquid into the hardened mass. For solidification of non-polar organic wastes, an emulsifier is included.

The TR contains data on eight waste types that simulate typical nuclear power plant low-level radioactive wastes: boric acid solutions, unexpended mixed bed bead resins, unexpended powdered resins, mixtures of these resins and boric acid solutions, lubricating oil, decontamination solutions, and miscellaneous wastes such as spent filter cartridges and used equipment. Packing efficiencies in the range 50 to 83% are claimed for this process.

A second set of comments was transmitted to U.S. Gypsum in October 1986.

A TR submitted by Pacific Nuclear, Inc. on filter encapsulation was reviewed by the NRC and comments were sent to the vendor in October 1985. This TR was withdrawn in November 1985 because the process was no longer needed.

Organic Polymers

The General Electric Company (GE) submitted a TR on their AZTECH Process, which is a transportable modular system using organic polymers to encapsulate wastes after removal of water by azeotropic distillation. The process and the generic process control program were approved in December 1985.

The Dow Chemical Company submitted a TR for their vinyl ester styrene solidification process. This differs from the AZTECH process in that water is not removed and is instead encapsulated along with the radioactive wastes. One of the remaining questions is resolution of indications of biological attack which is under further laboratory study.

Bitumen

Bitumen can be expected to offer excellent leach resistance and volume reduction. It is, however, viscoelastic and will flow (creep) under load. Based on this behavior, backfilling shall be provided around individual waste containers.

Associated Technologies, Inc. (ATI) uses thin film evaporator technology to eliminate water from radwastes while encapsulating them in bitumen. They are currently utilizing both the distilled and the blown (oxidized) bitumen. The TR has been under review since January 1986, and preliminary comments were sent to the vendor in May. Formal comments and questions are being drafted.

WasteChem Corporation has a similar process using oxidized asphalt. The TR is under review and comments were sent to the vendor in November 1986.

Other Solidification Agents

Westinghouse Hittman has submitted a TR based on a proprietary additive identified as SG-95 for boric acid wastes. Questions generated by an initial review of this TR were sent to the vendor in May 1986 regarding the nature of the solidification matrix and its long term performance in the disposal facility environment.

REGULATORY GUIDES

General

Regulatory Guides are issued to provide guidance to licensees and the public on methods acceptable to the NRC of implementing the regulations and to delineate techniques used by the staff in evaluating specific problems. They are not substitutes for regulations and compliance is not required. Other methods and solutions will be acceptable if they provide a basis for the requested licensing action.

This paper describes two draft regulatory guides developed from existing Technical Positions. One treats waste classification while the other covers waste form stability. These documents do not contain substantive changes from the TPs. They do provide clarification in areas where the NRC has responded to frequent questions since the issuance of the TPs. The Guides are undergoing internal review prior to release for public comment.

Waste Classification

This Guide formalizes recommendations on acceptable methods for classifying LLW. The main changes from the TP are recommendations for triennial rather than biennial assays for Tc-99 and I-129 and for more information on classifying activated metals.

The selection of the appropriate waste volume for use in waste classification calculations is also clarified. Some wastes may not be uniformly contaminated while other wastes may be packaged within a larger volume of nonradioactive material. The question arises as to whether the actual activity can be averaged over the total volume of the waste in determining the class of the waste. For large unpackaged items such as contaminated pumps and heat exchangers, the overall volume of the component is the appropriate volume. For packaged items, at least three cases may be identified in which the total package volume is greater than that of the waste itself. In the first, spent ion exchange resins left in a disposable demineralizer or placed in a HIC must be classified on the basis of the resin volume only. In the case of a cartridge filter, the volume is that of the filter itself if disposed of in a HIC, but if it is encapsulated in an agent such as cement, the total volume of the solidified product may be used. A specific limit on total volume in making these averaging calculations has not been set, but for guidance a 55-gallon drum size is acceptable while a 100 cu. ft. liner is not. Intermediate sizes will be considered on a case-by-case basis. Finally, small items with high activities if encapsulated (as in cement) may be classified on the basis of the total volume provided it is not excessive, i.e., no more than about 55 gallons. Examples are sealed sources and activated metal components less than about 0.5 cu. ft. in size. In all cases, solidified wastes must meet the stability requirements of 10 CFR Section 61.56. It should also be recognized that some States having regulatory authority over the operating disposal sites have taken more restrictive interpretations in their license conditions.

Waste Form Stability

This Guide will provide guidance to both fuel-cycle and non-fuel-cycle waste generators on waste form test methods and on what constitutes acceptable test results for demonstrating compliance with 10 CFR Part 61. The purpose is to provide recommended methods for demonstrating compliance with the 300-year stability requirement for Class B and Class C wastes.

General Changes for Solidified Wastes

Several of the recommendations in the TP have been clarified. One item is the definition of major waste streams needing classification. Certain wastes are specifically named and include bead resins, powdered resins, boric acid and sodium sulfate evaporator bottoms, and individual decontamination solutions. A composition change in excess of 5% is deemed to constitute a new waste stream.

The compressive strength requirement for solidified waste forms has been increased from 50 to 60 psi to reflect the change in burial practice at the Hanford disposal site from 45 to 55 feet of soil overburden.

Accelerated tests are permitted, recognizing that the mechanisms of corrosion and other forms of degradation of waste forms and containers may under accelerated conditions be different from those applicable to actual disposal site conditions. This simply means that the vendor must provide a basis or a rationale for concluding that his data are representative or at least conservative

Full scale waste forms or cores from such forms should be tested to correlate the results of laboratory scale specimens. The full scale specimens should employ the most conservative formulations. Current information, for example, suggests that for cement processes mixed bead resins should be tested whereas for bitumen processes sodium sulfate should be tested. The vendor in each case still needs to provide data supporting the conclusion that the formulations tested are indeed conservative.

Certain changes have been made in test conditions and requirements. The recommendation for acceptable performance in the immersion test has been tightened so that the compressive strength following 90-day immersion should be at least 80% of the pre-immersion strength. In the determination of Leach Index, seawater should be used in addition to deionized water. This follows from the finding that neither is always the stronger leaching agent. Cobalt, cesium, and strontium are recommended as tracers. It is still preferred that these be radioactive tracers. The thermal cycling test is clarified by stating that the time at temperature should be sufficient to permit the temperature at the center of the test specimens to reach the desired test value. In the biodegradation test, Penicillium jenseni, Ref. 4, is an acceptable substitute for P. funiculosum, Ref. 5, which has been found to be a plant pathogen and many testing laboratories are not licensed to use this fungus.

Specific Changes for Wastes and Waste Forms

Bitumen

Consideration of the viscoelastic behavior of bitumens under load and the current backfill procedures at operating disposal sites resulted in specific modifications regarding bitumen solidified wastes. Because viscoelastic creep can contribute to trench instability, a creep test has been proposed as a replacement for demonstration of stability. An alternative to the creep test is the use of an administrative backfill procedure to minimize voids between waste containers and, therefore, the space for bitumen to flow.

Cement

Based on recent test results, it is proposed that waste forms based on portland cement should be cured for at least 28 days prior to testing. In some cases specimens cured for 7 days may pass an immersion test but with a 28-day cure they may fail. It has been suggested that insufficiently cured samples will take up water needed to complete hydration reactions when subjected to the immersion test. In these cases, cure periods of less than 28 days can mask unacceptable formulations. This recommendation is still under laboratory investigation.

Ion exchange resins

The recommended total accumulated dose for these wastes remains at 100 Mrads, which includes beta as well as gamma dosages. This limit is being verified by examination of ion exchange resins generated early in the Three Mile Island cleanup that are approaching this total dosage.

Specific Changes for HICs

Several incidents of internal pressurization of HICs resulting from unrelated causes, such as biological activity, chemical contamination, and long storage times, have been observed. As a result, the HIC design now includes passive vents to prevent internal pressurization while minimizing water infiltration. The material used in the vent should also be subjected to other HIC material tests.

The references for the Type A package testing have been modified to reflect subsequent changes in the NRC and the Department of Transportation regulations. In addition, the 25-foot drop test required by the States of South Carolina and Washington has been incorporated into the draft Regulatory Guide.

With respect to mechanical strength, the HIC design should be conservative and should include a safety factor of approximately 2.0. In determining the effect of chemicals on the performance of the HIC, the full life of the HIC should be considered. At the end of 300 years, the HIC should still meet the stability requirement despite degradation through corrosion or other chemical attack by the contained waste or by the environment.

SUMMARY

The NRC has received 23 Topical Reports related to 10 CFR Part 61 activities. Of these, four have been approved, three have been withdrawn, and six SERs are in preparation. Since the promulgation of 10 CFR Part 61 and the development of Technical Positions on Waste Classification and Waste Form, additional information from laboratory data, review of topical reports, and field information has indicated the need to update the Technical Positions and to communicate some of this information to licensees and vendors.

REFERENCES

1. Title 10, Code of Federal Regulations, Part 61, Revised as of January 1, 1986.

2. Technical Position on Radioactive Waste Classification, Rev. 0, May 1983, U.S. Nuclear Regulatory Commission.

3. Technical Position on Waste Form, Rev. 0, May 1983, U.S. Nuclear Regulatory Commission.

4. American Type Culture Collection, Rockville, MD

5. ASTM G21-70 (Reapproved 1980), "Determining Resistance of Synthetic Polymeric Materials to Fungi". American Society of Testing and Materials.