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APPENDIX A
SUMMARY OF ISSUES

Unresolved from the NRC perspective as of June 1, 2000.

A1. LEVEL OF DETAIL

Statement of the Issue

The documents describe the proposed facility, buildings, processes, and operations at an early stage of design, nominally 14 percent according to the Contractor (the basis for identifying this level of design has not been provided). However, the descriptions are frequently general and there are many places where the information is labeled as "TBD" (to be determined) or to be determined by future program activities. Items relied on for safety (IROFS) are not consistently identified and described in these reports. The integrated safety management process appears to be at a preliminary draft stage.

Specific Example(s)

The Firm Fixed Price (FFP) contract contains numerous equipment lists and data sheets that do not specify either the materials, construction requirements, or the safety significance. The FFP system descriptions likewise do not identify the IROFS and their performance requirements for many systems.

U.S. Department of Energy Position

The U.S. Department of Energy (DOE) believes the facility and process design information in the FFP submittal falls far short of the information required for the Preliminary Safety Analysis Report (PSAR). "Significant additional design information is required" (May 25, 2000 letter to DOE/Office of River Protection [DOE/ORP] from the Regulatory Unit [RU]).

U.S. Nuclear Regulatory Commission Concerns

The U.S. Nuclear Regulatory Commission (NRC) would expect an application to focus on the salient design features and their safety implications, and their required performance requirements for IROFS. While this does not necessarily correspond to a set percentage of design or design level, sufficient information would be anticipated to allow the verification of the calculations and conclusions, and the identification of safety parameters. This would subsequently allow the determination of adequate assurances of safety.

NRC Evaluation and Assessment

At the present time, it would appear that the information lacks the level of detail that the NRC would normally anticipate in an application (e.g., see the standard review plan (SRP) (NUREG-1702)), and, as such, it would be unlikely that the NRC would accept such a document as an application from a potential licensee. Given the magnitude of the safety information requirements, the frequent design changes, and the ongoing DOE contractual changes, it is unlikely that the detailed safety information will be available for sometime.

A2. REASONABLE CONSERVATISM AND ADEQUATE ASSURANCES OF SAFETY

Statement of the Issue

Many of the calculations presented to date appear to be based upon best bases or some form of average/mean values that represent actual process design points. Based upon a review of the FFP submittal, some of these best basis values may be an order of magnitude or more, lower than values allowed by the contract.

Specific Example(s)

The FFP contains two mass balances that indicate feed concentrations one order of magnitude lower for cesium-137 and other radionuclides, as compared to the upper bound of the contract range. Sodium values are in the 3M range as compared to a 10M upper bound in the contract. There are many systems with single point failure modes in the proposed design (e.g., single pumps in the evaporators) that would require shut down and drainage of the lines/vessels prior to maintenance.

DOE Position

In the May 25, 2000, letter from the RU to ORP, DOE states, "The level of conservatism and design margins are not mentioned for operations or safety parameters." However, DOE has challenged the contractor about conservatism in design in prior Topical Meetings and related discussions.

NRC Concerns

The usual approach followed in licensing commercial nuclear facilities incorporates conservatism and margins into design activities so that flexibility is maintained and adequate levels of safety are assured. In addition, the usual engineering practice is to compensate for less design detail and more uncertainty by increasing the degree of conservatism in the safety analyses. Furthermore, the emphasis on cost (see item 6) has resulted in the (nonconservative) reduction of building footprints and cell sizes (i.e., the Contractor has assumed that this will reduce the program cost). However, this is likely to have unintended consequences that may actually increase costs (e.g., via maintenance); for example, multiple repositioning of manipulators during a task because of the tight space. Standard NRC guidance, such as the SRP and the Risk-Informed, Performance Based (RIPB) approach, would expect some level of conservatism in an application. The NRC would likely require incorporation of a level of conservatism into the design in order to maintain adequate assurances of safety.

NRC Evaluation and Assessment

It would be anticipated that a reasonable amount of conservatism would need to be incorporated into the design and safety analyses.

A3. RISK BASED DESIGN APPROACH

Statement of the Issue

BNFL Inc. appears to be incorporating risk and probabilistic approaches into many aspects of the design process, and appears to be conducting the equivalent of a Level 3 probabilistic risk assessment (PRA) (i.e., estimates of reliability/failure probabilities, release source terms, and dose consequences). However, the equivalent of Level 3 PRAs are difficult to do and usually require a completely designed facility supported by historical operating information. Such a level of design and operational information is not available in the existing documents and is not likely to exist until significant additional design efforts are completed or the plant is constructed and operated. The approach also places a higher level of credence in the analytical methods and results than appears warranted. Furthermore, this approach appears to introduce substantial additional levels of difficulty into the design process and subsequent regulatory reviews.

Specific Example(s)

The Integrated Safety Management (ISM) 2 report and Seismic PRA reports both use PRA type methods. They are based upon an earlier design than the FFP submittal. Calculations and control strategies are based upon the numerical results without consideration of standard approaches (e.g., hydrogen monitoring for flammable gas accumulation, weld radiography). Proposed controls vary considerably from one iteration to the next.

DOE Position

DOE has endorsed a risk-based approach without consideration of baseline criteria or minimum standards.

NRC Concerns

Few baseline design criteria appear to be used in the design (see NUREG-1702). In the recent NRC white paper entitled, "Risk-Informed and Performance-Based Regulation," it is stated that, "... the use of PRA technology should be increased in all regulatory matters to the extent supported by the state of the art in PRA methods and data, and in a manner that complements [not replaces] the NRC's deterministic approach and supports the NRC's traditional defense-in-depth philosophy." The white paper notes that the NRC does not endorse an approach that is risk-based or make decisions based solely upon the numerical results of risk assessments. Stated succinctly, the combined RIPB approach uses risk insight, engineering analysis, and judgement, including the principle of defense-in-depth and the incorporation of safety margins and performance history.

NRC Evaluation and Assessment

The risk-based approach being taken by DOE and BNFL Inc. in the Tank Waste Remediation System-Privatization (TWRS-P) design process is a significant departure from that endorsed by the NRC. Such an approach is not likely to be acceptable in the NRC regulatory arena.

A4. REDUNDANCY AND DEFENSE-IN-DEPTH

Statement of the Issue

In the current facility design, some systems have multiple lines to provide for redundancy, while other systems have fewer lines or redundant flow paths or even single lines with single point failure modes. For example, the Process Vessel Ventilation System has three 100 percent fans with emergency power—one fan running, one fan on standby, and one fan assumed to be unavailable due to maintenance. However, the cell ventilation systems have three 50 percent fans (two running, one in standby). Some pumps have duplicates. However, the evaporators (i.e., in two separate areas—low activity waste (LAW) receipt and Melter Feed Preparation) represent single point failure nodes in their areas, with one 100 percent pump each; maintenance requires drain down and flushing as there are no isolation valves. The normal process industry approach would have three pumps for each intended use.

Another possible single failure vulnerability in the design is the single 7-day fuel oil tank serving the three emergency diesel generators (EDGs). The current system description for the EDGs indicates that there is a 2-hour fuel supply for each EDG. If the duration of the loss-of-offsite power extends beyond 2 hours, the EDGs (as implied by the system description) would only be supplied fuel from the single 7-day tank which does not meet the single failure criterion and Institute of Electrical and Electronics Engineers (IEEE) Std 308 (referenced in the current Safety Requirements Documents [SRD]). Also, the current system description for the 4.16 kV power distribution system states that dividing loads into separate load groups is not a design criterion. This is counter to the redundancy requirements needed to support safety functions such as 3-100% trains of process vessel exhaust fans per the current ISM Summary.

Based upon the provided information, some IROFS may not have adequate redundancy (e.g., cooling water coils). Dedicated spare tanks do not appear to have been incorporated into the approach—for example, only a single cesium concentrate tank is shown in the current design, even though it might contain tens of megacuries of activity. Supporting information is either nonexistent or appears insufficient to justify the differences in approaches. It appears that data for design and safety analysis originate from different sources and contexts, and apparently are not checked for compatibility including basic assumptions. This issue may be the result of an incomplete safety classification of the structures, systems, and components (SSC) at the current time as described in item 5 of these issues. To assure that the facility will be capable of planned operation and that excessive maintenance will not be needed, the NRC would anticipate that these deficiencies would be addressed in the near-term.

A5. DESIGN/AUTHORIZATION BASES, CONCEPT EVOLUTION, DESIGN CHANGES, AND INTEGRATION

Statement of the Issue

It appears that safety analyses are being performed using designs and/or bases that may be incompatible or have changed. For example, while it was anticipated that the design would meet the standards identified earlier during the hazard analysis and standards identification process, decisions have been made on specific design characteristics/components, with the intent of later modifying the standards to match the design.

Significant design changes have occurred (e.g., extra tanks, changes in the buildings, less shielding) and may be continuing to occur, often without documentation of an explanation. In other words, the design basis (and "Authorization Basis") have been changed but the analyses—and particularly the safety analyses—were using different bases and justifications.

In addition, the Contractor did not appear to be following the SRD and its change process, and was not maintaining the Authorization Basis current.

Many SSCs have been and are being designed at nominal service conditions and not for design basis conditions that envelope anticipated, off-normal and accident conditions. Some parameters have limited margin.

Specific Example(s)

Currently, many system descriptions for electrical systems and the ISM Summary pertaining to instrumentation and control (I&C) components do not reference the appropriate IEEE standards listed in related SRD safety criteria. The facility's inventory has been significantly increased due to the addition of the LAW tanks (the "six-pack" of 400 kgal per tank) and the storage of ultrafiltered high level waste (HLW) solids, yet this has not been reflected in the Authorization Basis over the past eight months. There is little documentation linking design changes (such as the elimination of the sulfate removal step) and their impacts from 1 month to the next. The FFP submittal is the first design update since the Initial Safety Analysis Report (ISAR)—a 2-year time period. The ISM Cycle 2 submitted one month after the FFP submittal is based upon an earlier design.

DOE Position

DOE and BNFL, Inc. have stated that there is an ongoing "tailoring" effort to take exception to specific SRD standards and to delete and/or substitute all or parts of standards. Although this "tailoring" is going on, there is little formal documentation which evaluates the adequacy of the exceptions.

As the result of a a special inspection in December 1999, the RU issued a Corrective Action Notice (CAN) against the Contractor for failing to adequately maintain the Authorization Basis. In response, the Contractor submitted several Authorization Basis Amendment Requests (ABAR's) documenting some of the changes.

NRC Concerns

The Hazards Analysis Report (HAR), SRD, Integrated Safety Management Plan (ISMP), and ISAR are all part of the Authorization Basis. The Contractor failed to make changes in the Authorization Basis and to apply to the RU for approval. The design effort continued using different standards and bases. A design basis approach is not being followed from either the design or regulatory perspective.

NRC Evaluation and Assessment

The NRC would anticipate a more traditional approach to Authorization Basis/Design Basis management. For example, using the SRP, it would be expected that the documents would display an integrated and consistent level of design for the facility, with consistency in the design bases, codes, and standards for the safety structures, systems, and components.

A6. SAFETY EMPHASIS

Statement of the Issue

Cost and schedule are mentioned numerous times as the rationale for considering certain design approaches (e.g., the use of passive systems to avoid the cost of emergency/safety-designated backups, reducing backup equipment). Thus, in an effort to reduce projected capital costs, design decisions are being made that may increase safety concerns and maintenance issues, and, for that matter, may even ultimately result in increased overall costs.

Specific Example(s)

Cost and schedule topics have arisen at essentially every Topical Meeting. In the June 2000 Topical Meeting, there were several questions about the cost (material and machining) of Hastelloy for the melters without a discussion of technical or safety-related functions/requirements, etc.

DOE Position

DOE/RU frequently broaches the subject of cost and schedule in regulatory and safety meetings. Some acquiescence on cost issues occurs. Frequently, it has been stated by both the RU and the Contractor that regulation can only occur by the contract.

NRC Concerns

This apparent design emphasis on cost and schedule perspectives dilutes the safety issues and may overlook safety requirements, thus requiring additional efforts by the Contractor and the regulators that may impact subsequent safety reviews. It is worth noting that the FFP submittal and associated decisions have not included reviews of the safety aspects of the proposed facility.

A7. DOSE ASSESSMENT METHODOLOGY INCLUDING DATA SOURCES

Statement of the Issue

BNFL Inc. has provided substantial information regarding the methodology (i.e., equations) that it intends to use for evaluation of worker, co-located worker, and public doses under both normal operating and accident conditions. However, as noted in item 16, there remain differences in what are considered acceptable approaches for certain accident scenarios. Regardless of the scenario, there are issues concerning (a) the sources of data to be used for evaluation of doses and (b) the degree of conservatism to be employed, as well as (c) the means by which uncertainty of many parameters would be addressed.

Specific Examples

1. BNFL Inc. should clearly state the justification for the selection and use of its sources of data. A particular concern is the use of data derived from small deviations from normal conditions applied to accident conditions, without an assessment of its accuracy, validity, and pedigree. The use of the "Best Basis" inventory in various scenarios should be justified as this may not adequately represent all feeds or be adequate for enveloping expected inventories for accident scenarios (i.e., it's nonconservative). Also, as the RU has pointed out, BNFL Inc. needs to provide a comparison with DOE-HNDB-3010-94 and NUREG/CR-6410 if other parameters are used. While the use of the Sellafield Database was withdrawn (letter CCN011928, Dobson to Gibbs, dated March 10, 2000), the use of BNFL Inc. data for reliability, corrosion, and filling voids in other data has been verbally mentioned in the April-June 2000 timeframe.

2. The dose methodology appears to rely too heavily upon optimistic considerations, averages, and probabilities in the consequence estimates that imply but do not identify safety controls; these would be necessary items for review when the Construction Authorization Request (CAR) is received.

3. By letter dated October 25, 1999, BNFL Inc. provided a report RPT-W375-NS00001, Rev. 0, "Dose Assessment Methodology Description." The RU responded in a letter dated December 20, 1999, which indicated that ". . . the [BNFL Inc.] document did not explain how a measure of conservatism in the analysis would be achieved to account for the level of uncertainty in the parameters." The TWRS staff agrees with the position stated in this letter and has provided written comments (e.g., internal memo from Struckmeyer through Tokar to Leach dated March 8, 2000 and entitled, "Background Information and Comments on TWRS-P Project: 'Dose Assessment Methodology Description,' 'Seismic Probabilistic Risk Analysis Dose Assessment Methodology Report,' and 'Seismic Probabilistic Risk Analysis Methodology Report.'"

DOE Position

In letter 00-RU-0292 (Gibbs to Bullock, dated April 6, 2000), the RU accepted the final BNFL Inc. dose methodology described in a BNFL Inc. letter dated February 23, 2000. However, DOE submitted additional questions for consideration.

NRC Concerns

Additional radiological protection issues that were raised during the course of the NRC's involvement in the TWRS-P project

The co-located worker issue:

1. A difference in regulatory approach between DOE and NRC appears in the concept of a co-located worker.

2. For the TWRS-P facility, in addition to the categories of general employee and radiological worker (defined in 10 CFR Part 835) and member of the public (defined in both 10 CFR Part 20 and Part 835), a third category known as the co-located worker

(CLW), has been defined within the "Top-Level Radiological, Nuclear, and Process Safety Standards and Principles for TWRS Privatization Contractors," DOE/RL-96-0006, Revision 1, July 1998. The co-located worker is defined in Chapter 6.0, "Glossary," as the following:

> An individual within the Hanford Site, beyond the Contractor-controlled area, performing work for or in conjunction with DOE or utilizing other Hanford Site facilities.

3. No equivalent concept exists for NRC licensees. The co-located worker definition contains the term "controlled area," which is defined differently for DOE and its contractors (10 CFR Part 835) than it is for the NRC and its licensees (10 CFR Part 20).

> 10 CFR Part 835: Controlled area means any area to which access is managed by or for DOE to protect individuals from exposure to radiation and/or radioactive material.

> 10 CFR Part 20: Controlled area means an area, outside of a restricted area but inside the site boundary, access to which can be limited by the licensee for any reason.

Note that the DOE term "controlled area" is virtually identical to the NRC term "restricted area." There is no defined DOE term called "restricted area."

> 10 CFR Part 20: Restricted area means an area, access to which is limited by the licensee for the purpose of protecting individuals against undue risks from exposure to radiation and radioactive materials. Restricted area does not include areas used as residential quarters, but separate rooms in a residential building may be set apart as a restricted area.

4. The co-located worker concept would be a difficult issue to resolve if regulatory control of the TWRS-P contractor were to shift from DOE to NRC. It would require either an exception to the NRC regulations or a change in (a reduction of) the exposure permitted to persons beyond the controlled area boundary (per 10 CFR Part 835) or restricted area boundary (per 10 CFR 20). [To accomplish a reduction in exposure after construction of the facility had been completed, it would be necessary to require the contractor to invoke one or more of the following remedies: retrofit with additional shielding, dilute the radioactive waste feed streams to lower the activity (and thereby increase the total volume of vitrified waste), moving co-located workers farther away from the contractor's facility, and possibly other methods.] Discussion of this issue between the two organizations produced no concession or compromise. When DOE concluded that there was little or no likelihood that such a transition would occur, the issue was left unresolved from the NRC point of view.

Distance to site boundary:

Although the concept of "site boundary" may appear to be self-evident, it is not defined in 10 CFR Part 835. A definition is provided by Part 20:

Site boundary means that line beyond which the land or property is not owned, leased, or otherwise controlled by the licensee.

A consequence of the lack of a definition in 10 CFR Part 835, at least from the NRC point of view, is that DOE and/or its contractor can specify a "fence-line" for the calculation of dose to the public that is well beyond the boundary that is under direct oversight of the contractor. The area between the contractor's oversight and the boundary of the DOE-defined controlled area is the realm of the co-located workers. It should also be noted that most persons who are granted access within the Hanford site boundary will be considered occupationally exposed personnel by DOE, whereas under NRC regulations, many such persons would be considered members of the public.

NRC Evaluation and Assessment

It is imperative that the necessary justifications, as well as the information lacking in the report, be provided at or before the submittal of the CAR, as it has a potentially major bearing on the design of the facility. For example, if the dose consequence methodology underestimates the consequences and/or frequencies of potential events, IROFS and safety related SSC's may not be appropriately identified, and the facility may expose the workers, the public, and the environment to potentially excessive risks and hazards. Without this information, the regulators will be faced with having to make a decision on whether to approve the construction of a facility, based upon the acceptability of the facility design and proposed operations, but in the absence of key information needed to demonstrate that acceptability.

A8. OPTIMISTIC DESIGN ASSUMPTIONS IMPACT ON OPERATIONS AND MAINTENANCE

Statement of the Issue

The design approach assumes that the process and systems function as designed and planned, but some assumptions on operations and maintenance are outside the envelope of experimental or literature results. Shielding designs assume a full decontamination result without consideration of "bleed-through," carryover, or cross-contamination. It is not clear that the design addresses potential safety issues associated with the process not meeting its intended parameters (e.g., decontamination factors, concentrations, aging). Consequently, it may prove difficult for the facility to carry out planned operations or meet throughput expectation, and radiation field accrual due to these effects may increase worker doses and safety concerns. Though the regulatory review at a subsequent Safety Analysis Report (SAR) stage may show the need for design modifications with subsequent delays, it is also possible that these concerns will not be realized until the plant is in operation, resulting in plant derating or shutdown until the modifications can be completed.

Specific Example

The Contractor uses a "best basis inventory" value for most of the feed concentrations. The FFP submittal contains two activity balances with feed concentrations approximately 2 percent of that allowed by the contract. From the same submittal and LAW building design reviews, the designers assume full cesium decontamination without provision for additional shielding (e.g., stronger foundations). The FFP design includes several single point failure nodes (e.g., the feed evaporator).

DOE Position

DOE/ORP appears to be encouraging this optimistic approach; one way is by emphasizing the DOE desire for higher capacities. For example, the FFP submittal includes a short report on facility capacity increases that does not evaluate any safety or regulatory concerns. This report also states the plant can increase the glass production rate of the melters by 100 percent. This corresponds to 100 percent availability of the melters and continuous operation beyond testing conditions with very high bubbling rates. In addition, increases in carryover into the offgas system and maintenance are not evaluated.

DOE/RU has not assessed this aspect of the Contractor's activities.

NRC Concerns

The NRC would anticipate both realism and conservatism in a design submittal. The NRC would also expect an integrated approach that evaluates potential safety issues from all perspectives, including design, construction, operation, maintenance, replacement, and decontamination and decommissioning (D&D). An overly optimistic design may translate into significant maintenance and exposure issues. Also, optimism and higher capacity operation may overlook safety considerations and change the parameters/bases for the safety analyses (e.g., higher carryover of radionuclides to less shielded areas, higher frequency of accident precursor events due to more wear), potentially resulting in unanalyzed safety questions.

NRC Evaluation and Assessment

Both DOE and the Contractor need to incorporate realistic approaches to the proposed design.

A9. UNCERTAINTIES

Statement of the Issue

All mathematical and computer models have uncertainty. Atmospheric transport, dispersion, and consequence models have uncertainties that can be large, approaching several hundred percent at times. From the perspective of the proposed TWRS-P facility, these uncertainties arise from these main areas:

1. Uncertainties in the waste analyses.

2. Variability in the waste feeds and at surge/inventory points in the facility.

3. Model limitations caused by an incomplete understanding of the phenomena involved in the accident scenario or the transport, dispersion, and consequence to the human receptors.

4. Partial modeling of the phenomena or the scenario events and sequences.

5. Unknowns, uncertainties, or the lack of information in the numerical input required by the models.

6. The impact of assumptions and default input data values.

7. Design uncertainties (i.e., the facility is not fully designed and is unlikely to be so for a considerable time period).

The Contractor has not considered these uncertainties in the analyses to date.

Specific Example(s)

The material at risk calculations primarily use either best basis inventory or specific tank inventory data (based upon limited sampling). No uncertainty bounds are carried through the calculations. No percentile levels or other statistical bounds are identified. The respirable fraction (RF), airborne release fraction (ARF), and dispersion calculations by the Contractor sometimes use distributions in the input data as part of a PRA type of analysis. However, this approach confuses time dependence with uncertainty. In addition, the Contractor frequently mentions the mean or average for comparison with regulatory limits (e.g., the seismic PRA presentation at the October 1999 Topical Meeting). Inclusion of uncertainties or the consideration of uncertainties would exceed the limit, thus implying that adequate assurances of safety are not being achieved.

NRC Concerns

The NRC is concerned with adequate assurances of safety for the workers, the public, and the environment. On an experiential basis, the NRC has used and recommended for use conservative parameters and assumptions that would be expected to envelope uncertainties by a wide margin and beyond credible questioning of results. This approach might overestimate unmitigated doses but it results in the imposition of safety controls that reduce estimated doses from nuclear facilities that were significantly removed from any regulatory limits. Thus, compliance could be assured and adequate assurances of safety demonstrated relatively easily. However, the emphasis of DOE and the Contractor on the use of realistic values implies much smaller margins that may not accommodate uncertainties and may challenge regulatory limits. Fundamentally, if realistic assumptions and values approach a regulatory limit (say, within an order of magnitude), how is compliance demonstrated, and at what point/margin should as low as reasonably achievable (ALARA) be applied to the design process?

NRC Evaluation and Assessment

BNFL Inc. and the RU have not identified an approach that addresses these uncertainties. The NRC would likely anticipate that uncertainties would be adequately addressed prior to a major submittal, in order to avoid additional regulatory reviews and potential delays.

A10. LACK OF METHODOLOGY AND "REASONABLE CRITERIA" FOR SELECTING APPROACHES AND INPUT VALUES

Statement of the Issue

The design and analyses use mathematical models which require the selection of appropriate computer codes/algorithms and significant amounts of input data. Different models and input produce different results (e.g., dose consequence estimates from analyzing potential accidents), which can correspond to different potential severity levels, event frequencies, and reliabilities. The results (output) influence safety requirements, including identification of IROFS. BNFL Inc. has not clearly established the methodology for selecting models and input parameters that are consistent and appropriate for identifying and analyzing safety requirements, and that adequately incorporate reasonable conservatism/margin to address potential unknowns and uncertainties.

Specific Example(s)

The seismic and PRA models require a large amount of input data. When questioned about the sources and validity of the data at the October 1999 Topical Meeting, the Contractor responded that the data represented examples for exercising the models. Subsequent meetings, reports, and further responses to questions have not elicited any methodology and reasonable criteria for selecting models, approaches, and input values.

DOE Position

DOE is aware of the problem.

NRC Concerns

Standard NRC practice requires validation of models and input data. The NRC would anticipate that such validation would have occurred and been documented. Similarly, it would be anticipated that a methodology for selecting approaches and models that represent the system and safety conditions would exist and be documented. In short, the "GIGO" (garbage-in, garbage-out) phenomena needs to be avoided.

NRC Evaluation and Assessment

In the absence of such methodology for model selection and validation, and clear criteria for data selection, it would not be possible to demonstrate adequate assurances of safety.

A11. DEFINITION OF UNMITIGATED EVENTS

Statement of the Issue

The current approach does not appear to adequately address the significance of unmitigated events and their use in identifying IROFS. Currently, implicit assumptions are made about barriers; for example, a cell is assumed to provide certain decontamination factors (DFs) in accidents which result in a less severe consequence. A lower consequence usually translates into lower reliability and quality assurance/quality control (QA/QC) requirements. The DF assumption may result in overlooking and not identifying safety controls and their requirements, including reliabilities. Without a suitable definition for unmitigated events, safety requirements and controls may not be adequately identified and evaluated in safety analyses and submittals that might be evaluated under the SRP.

Specific Examples

The chemical safety analyses assume the function of diluting, identifying, and containment mechanisms, and include their source reduction effect without attributing any safety significance to these mechanisms. The ISM cycle 2 analyses use a cell DF of 10 for leak events and an aerosol concentration based upon a restricted volume. The FFP submittal mass balances use values for radionuclides that are well below the contract allowables (in some cases, 5 percent of the allowable value); mitigating mechanisms are not identified.

DOE Position

The RU is aware of the concerns.

NRC Concerns

Some of the ISM analyses are now using unmitigated analyses. However, there still is an apparent bias by the Contractor ISM review teams to implicitly rate hazards in a mitigated manner. In addition, the rationale for the selection of input parameters is not clear. Often, the parameters selected appear low for the situation and for regulatory and safety purposes. Thus, it is not clear that safety requirements are being adequately identified and categorized.

NRC Evaluation and Assessment

The Contractor has previously identified its approach for using unmitigated analyses for safety determinations and average parameters for determining mitigated effects and risk. This approach has been confused and muddled in many of the submittals received to date. The ISM process appears to contribute to this confusion. Future safety-related submittals will have to be closely reviewed to verify that the distinction of unmitigated analyses is maintained.

A12. CRITICALITY ANALYSIS

Statement of the Issue

Based upon submittal of four interim criticality evaluations, BNFL Inc. has developed its criticality safety program by bounding k_{eff} for nearly dry waste solids with maximum Pu content as specified in the BNFL Inc. Contract, Revision 6. This approach relies upon providing controls on the feed and analyzing the process to ensure that no normal operations or process upsets could result in formation of a critical mass. BNFL Inc. has not adequately addressed how double contingency will be applied to the feed sampling control nor is it clear that BNFL Inc. has addressed all potential concentration mechanisms in their interim criticality reports to date. A second issue is that BNFL Inc. has committed to only one criticality detector in each area requiring alarms which is inconsistent with the requirements of 10 CFR 70(a)(1) which requires "coverage of all areas shall be provided by two detectors."

Specific Examples

1. In BNFL Inc.'s "Interim Criticality Evaluation of HLW/LAW Ultrafiltration," dated September 29, 1999, in Section 4, "Methodology," it states that "it is assumed that the fissile concentration of the feed when received at the WTP is equal to the maximum concentration specified in the contract."

2. On BNFL Inc.'s SRD, page 3-9 (dated November 2, 1999), safety criterion 3.3-8, states "Coverage of all areas requiring detection may be provided through a single detector" in respect to criticality alarms.

DOE Position

Although the RU considers the overall criticality safety case developed in the interim assessments to be likely to succeed, the RU still maintains a list of open issues which were expected to be closed through a July 2000 BNFL Inc."s final criticality report. These open issues were provided in November 30, 1999, letter to Mr. M.J. Lawrence (BNFL Inc.) from Dr. D. Clark Gibbs, titled "Regulatory Unit Response to the Interim Criticality Evaluation for Cesium Ion Exchange, Technetium Ion Exchange and LAW Melter Feed Evaporation." The RU has not objected to BNFL Inc.'s implementation of only one criticality detector.

NRC Concerns

In each of the evaluations, BNFL Inc. has relied upon concentration limits for special nuclear material as provided for in their contract with DOE as an upper boundary for criticality analyses, despite the fact that there are waste forms within the Hanford tank waste that may be above those limits. The criticality values are from the Carter Handbook that is widely used in the DOE Complex. However, these have not undergone rigorous validation. The NRC uses American National Standards Institute/American Nuclear Society (ANSI/ANS) 8.1 and other ANS standards that have undergone rigorous validation (see NRC Regulatory Guide 3.71). A review using the SRP would expect BNFL Inc. to indicate their control methods for ensuring that materials of higher concentration will not enter the facility and that accumulation will not occur due to the processing. The SRP would also expect BNFL Inc. to complete their criticality evaluations of all process areas and update those already completed to account for any design changes. Thus, the main concerns are:

1. NRC is concerned that waste forms outside of the contract scope may intentionally be introduced in the future because of the planned expanded use of the plant. Further, that the current controls for introduction of materials into the facility need to be better defined.

2. NRC is also concerned that not all concentration mechanisms (e.g. preferential settling of specific isotopes) have been evaluated in the accident evaluations.

3. BNFL Inc. has committed to only one criticality alarm in each area requiring alarms which is inconsistent with the requirements of 10 CFR 70(a)(1) which requires "coverage of all areas shall be provided by two detectors." This position is in direct conflict with NRC regulations and would require exemption or facility changes should NRC ever assume regulatory authority.

NRC Evaluation and Assessment

Although it appears that BNFL Inc.'s criticality approach may be acceptable, additional information would be required to resolve the concerns in items 1 and 2, above. BNFL Inc. will have to revise their SRD to meet the third concern.

A13. FUTURE SITE CONDITIONS

Statement of the Issue

It does not appear that adequate consideration has been given to the potential for future changes that may occur at the Hanford site relative to the impact of changing site activities and land use changes. For example, there have been discussions regarding the addition of other industrial facilities onsite and the possibility of a reduction in the site area. Such changes could result in significant reductions in the distance to the offsite receptor and thus impact the dose calculations.

Specific Example

On page ES-24, DOE/EIS-0222D (Hanford land use plan) displays a map indicating an industrial area 1-2 miles east of the proposed location for TWRS-P.

DOE Position

DOE and the Contractor have not examined and considered the potential effects of future site boundary changes that are likely to occur during the facility's operational period.

NRC Concerns

Future site changes will result in receptors being closer to the facility. This is likely to produce changes in the safety analyses that require more important-to-safety (ITS) SSCs in order to demonstrate adequate assurances of safety. For an existing facility, shutdown for backfits may become necessary.

NRC Evaluation and Assessment

It would be expected that the possible site and surrounding area conditions in the future and during the projected design/operating life of the facility would be reflected in information reviewed under the SRP and used to estimate the consequences from the various design scenarios. This would include determination of ITS SSC's that encompass the effects of land use changes over the facility's lifetime.

A14. PROCESS TECHNOLOGY

Statement of the Issue

1. Technology Development and Testing

   Technology development and testing for the facility are not yet complete. Without testing results, performance of the selected technologies to be used in the TWRS-P facility may not be demonstrated, and design/operating parameters may not be properly formulated.

2. Process Technology and Safety

   Very limited information has been presented on the process technology and its relationship with safety. An incomplete understanding of the facility operation may lead to the use of an unrealistic model in the accident and consequence calculations.

Specific Examples

Unknowns continue to exist in the areas of radioisotope removal efficiency through various ion exchange operations; for example, an additional column has been added as a polishing step and cooling coils are shown on the columns, but no additional data is provided. The technology to be used for sulfur removal keeps changing. These unknowns will impact downstream process shielding and, therefore, may potentially impact the safety analysis of the facility.

In addition, BNFL Inc. has not evaluated the potential generation and impact of ion exchange resin fines throughout the process due to erosion and degradation. If resin fines are generated throughout the process, they may be radioactive and could move to other process units and eventually impact downstream radiation levels. Adequate information on these technologies would be expected to be available in licensing-type submittals reviewed subject to the SRP.

Few tests appear to be planned to verify safety parameters prior to construction. In addition, several of the design points (e.g., melter performance) appear to be significantly outside the current window of experimental results (the normal design approach would select operating conditions within the window of results). Additional testing may be necessary to identify, adequately parameterize, and substantiate some safety requirements prior to the submittal of licensing documents in order to demonstrate adequate assurances of safety.

DOE Position

Preliminary screening tests were completed in July 1999 for the pretreatment unit operations. At the July 1999 Topical Meeting, the RU expressed disappointment at the lack of safety emphasis in the presentation and, by implication, the test plan. However, a follow-up Topical Meeting or status reporting was not pursued. DOE subsequently received a number of short test reports in April 2000, and noted that additional, operational-type parameters have been tested and evaluated. The NRC has not seen these test reports, but DOE indicates testing to assess and verify safety parameters has not been performed and is not planned.

NRC Concerns

The Contractor has specified a large amount of research and technology development testing, including testing to support environmental permits for the treated melter offgasses. The test results discussed at the April 1999 Topical Meeting were screening tests to identify potential methods and ion exchange media. As already noted, the NRC has not seen the April 2000 short test reports. The NRC is concerned that safety issues related to the technologies may not be adequately addressed by the experimental programs. In addition, the test quality level and experimental variability (including a limited number of tests and repeatability) may introduce additional uncertainty into the safety analyses.

NRC Evaluation and Assessment

Additional information would be expected to verify operational parameters, identify potential hazards and their parameters (e.g., the resin fines), estimate safety parameters and, ultimately, provide sufficient information to show adequate assurances of safety.

A15. CONSEQUENCES OF EXTREMELY UNLIKELY SEISMIC EVENTS

Statement of the Issue

Earthquakes in the extremely unlikely range as defined by DOE standards (i.e., 1E-4/yr to 1E-6/yr) are not supposed to result in unacceptable accident consequences (dose consequences). The NRC SRP provides similar guidance. The proposed modification of 10 Part 70 places frequency limits on events; as an example, a high consequence event has to be rendered highly unlikely by the facility's design and/or controls (IROFS) and this is furthered defined in the SRP as 1E-5/yr. It would be expected that BNFL Inc. would consider earthquakes that are less frequent but more severe than the 2000-year interval design basis earthquake, and show that the facility has been designed such that earthquakes in the extremely unlikely range will not result in unacceptable radiation exposures. In the review of a licensing submittal, the SRP would anticipate that the consequence methodology for these earthquakes would be clearly delineated and readily available for detailed review.

Specific Example(s)

The staff reviewed the BNFL Inc. proposed "Interpretation of the Requirements for Meeting the Radiation Exposure Standards in Table 1 of DOE/RL-96-0006," stated in an enclosure to the September 20, 1999, letter from A. J. Dobson, BNFL Inc., to D. Clark Gibbs, Department of Energy/Regulatory Unit (DOE/RU) (CCN#: 006158).

Note: The referenced document, DOE/RL-96-0006, contains Table 1, Dose Standards Above Normal Background, which was left incomplete at the time of its release. The standards for Unlikely Events and Extremely Unlikely Events, for workers and co-located workers, were purposely left open, i.e., "to be derived" by the contractor, BNFL Inc. These dose standards were derived by the contractor and implemented in Revision 1 of Volume II, Table 2-1, Radiological Exposure Standards Above Normal Background, of its Safety Requirements Document regulatory submittal (BNFL-5193-SRD-01, Volumes I and II, Rev. 1, June 1998). The latter table provides the complete set of standards, filling in the "to be derived" portions of Table 1 of DOE/RL-96-0006.

BNFL Inc. proposed that "For a design basis natural phenomena hazard (such as the design basis earthquake), a frequency of occurrence is established and, from that frequency, the appropriate public, facility worker, and co-located worker dose standards are then determined from the Table. For natural phenomena events, the table is only applicable at frequencies down to and including those established as the design basis for the facility. The table is not applicable to the evaluation of natural phenomena events, with frequencies lower than the frequency of the design basis event."

DOE Position

A reply dated October 5, 1999, from D. Clark Gibbs, DOE/RU, to M. J. Lawrence, BNFL Inc. (99-RU-0570), indicated the DOE/RU's rejection of the BNFL Inc. proposal. The staff concluded that the BNFL Inc. proposal also would not appear to be acceptable within the NRC regulatory framework.

Using the example of the design basis earthquake cited by BNFL Inc., this interpretation would establish its frequency, which is defined as having a 2000-year recurrence interval (i.e., a frequency of occurrence of 5×10^{-4} yr^{-1}), as the lowest probability to be considered with regard to the dose standards. According to Table 2-1 this frequency of occurrence would be in the category of "Unlikely Events." The frequencies of other design basis natural phenomena hazards are not addressed by this example, but presumably would be handled in a similar fashion under the BNFL Inc. proposed interpretation.

RU Response to BNFL Inc.: A reply dated October 5, 1999, from D. Clark Gibbs, DOE/RU, to M. J. Lawrence, BNFL Inc. (99-RU-0570), indicated the RU's rejection of the BNFL Inc. proposal. The reason for rejection was summarized in the letter as follows:

1. BNFL must ensure that for any credible event (one with frequency greater than 10^{-6} per year), the event will not result in radiation doses that exceed the values given in the Table [2-1].

2. The BNFL Inc. proposal confuses the requirements for "design basis earthquake" with the broader requirements specified in the Glossary of DOE/RL 96-0006 and the SRD for "design basis events."

3. To meet the dose standards in the table, the facility analyses must consider less frequent but more severe earthquakes than the defined "design basis earthquake," which has a recurrence interval of 2000 years.

To summarize the RU response, the 2000-year recurrence interval of the design basis earthquake (i.e., a frequency of occurrence of 5×10^{-4} yr $^{-1}$) is not sufficiently low to meet the guidelines of the "extremely unlikely events" category of Table 2-1, which range from 10^{-6} to 10^{-4} yr $^{-1}$.

NRC Concerns

NRC staff Comments: The NRC staff reviewed the BNFL Inc. proposal and the DOE/RU response, and agree with the position taken by the RU; i.e., that the BNFL Inc. interpretation should be rejected. The basis for the NRC staff's agreement on this issue is derived from the following considerations:

1. A Commission Policy and Guidance White Paper on Risk-Informed and Performance-Based Regulation, dated March 1999, which refers to the PRA Policy Statement (60 FR 42622, August 16, 1995). This Policy Statement formalized the Commission's commitment to risk-informed regulation through the expanded use of PRA. The PRA Policy Statement states, in part, "The use of PRA technology should be increased in all regulatory matters to the extent supported by the state of the art in PRA methods and data, and in a manner that complements the NRC's deterministic approach and supports the NRC's traditional defense-in-depth philosophy."

While no specific numerical criteria are mentioned in the White Paper or the PRA Policy Statement, an earlier (August 1986) policy statement ["Safety Goals for the Operation of Nuclear Power Plants; Policy Statement; Correction and Republication," 51 FR 30028, August 21, 1986.] concerning risks to the public from nuclear power plant operation stated that guidance to be derived from additional studies to be performed by the staff would be based on the following general performance guideline:

> Consistent with the traditional defense-in-depth approach and the accident mitigation philosophy requiring reliable performance of containment systems, the overall mean frequency of a large release of radioactive materials to the environment from a reactor accident should be less than 1 in 1,000,000 per year of reactor operation.

This performance guideline is specifically concerned with nuclear power plant operation, in which there are multiple levels of defense (i.e., containment systems). The guideline indicates that the containment systems are part of the accident mitigation philosophy, which means that an accident (initiating event) may occur more frequently than 1 in 1,000,000 years of operation, as long as the mitigative features function in such a manner as to reduce the probability of a release below this value. Although there are many differences between a nuclear reactor and the proposed TWRS-P facility, it should be noted that the latter may have levels of some radionuclides comparable to a reactor in shutdown condition, but in more dispersible forms.

The TWRS-P facility is also being designed with mitigative systems, which are not identical to those in a nuclear power plant, but serve a similar purpose. However, in Section 6.0 of RL/REG-98-18, the DOE-RU defines the event probability ranges in terms of the frequency of the event, not the frequency of consequences ["Regulatory Unit Position on Radiological Safety for Hanford Co-located Workers," RL/REG-98-18, Rev. 0, September 16, 1998], e.g., a large release. Thus the "Estimated Frequency of Occurrence" in Table 2-1 (the second column of the table in Appendix A) is the frequency of the event (accident), not the frequency of the consequences of the event. Therefore BNFL Inc. must show that the dose standards in Table 2-1 will be met for events having the stated frequency ranges using mitigative features as necessary in order keep exposures to workers, co-located workers, and the public within the standards.

Although the NRC guideline and the DOE-RU requirements are not intended to cover the same types of facilities, there is consistency in the regulatory approach; i.e., that given an extremely unlikely event (accident) having a credible frequency of occurrence between 1×10^{-6} yr^{-1} and 1×10^{-4} yr^{-1} (per DOE/RL-96-0006), the facility must be designed in such a manner so as to reduce the consequences of the event to an acceptable level, usually expressed as a dose to workers and the public.

2. If the NRC were to assume regulatory authority over the TWRS-P project, and assuming no substantial changes are made in the guidance as outlined in Draft NUREG-1520 (Standard Review Plan for the Review of a License Application for a Fuel Cycle Facility), then, according to Draft NUREG-1520:

> The applicant describes the maximum earthquake magnitude and peak ground acceleration at the site and its expected likelihood, in terms of return period at which the plant processes can be shut down safely with acceptable risk of radiological exposure to workers, public, and the environment. Applicant compares the design basis earthquake with the maximum earthquake accelerations expected on the site with a return period of 10,000 years. The purpose of the comparison is to evaluate the likelihood of the design basis earthquake to ensure that such an event is properly considered in the applicant's ISA. [Standard Review Plan for the Review of a License Application for a Fuel Cycle Facility, NUREG-1520, July 16, 1999, Office of Nuclear Material Safety and Safeguards, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001]

This requirement obligates the applicant to consider earthquakes with a recurrence interval of no less than 10,000 years (i.e., at least 1×10^{-4} yr^{-1}). Therefore, if the TWRS-P facility were subject to NRC regulatory authority, the 2000-year recurrence interval proposed by BNFL Inc. for the design basis earthquake (i.e., a frequency of occurrence of 5×10^{-4} yr^{-1}) is not sufficiently low to meet this requirement.

3. In 10 CFR Part 20, the annual dose limits of 5 rem to the worker and 0.1 rem to members of the public are stated, with the application of the principles of as low as reasonably achievable (ALARA) in both the design and operation of facilities. These dose limits correspond to relative risks of latent cancer fatalities of 2×10^{-3} yr^{-1} and 4×10^{-5} yr^{-1}, respectively. (This is based on Biological Effects of Ionizing Radiation

(BEIR) V risk estimates of 4×10^{-4} fatal cancers per rem for acute doses less than 10 rem, and 1×10^{-3} fatal cancers per rem for acute doses greater than 10 rem.) For the workers, ALARA generally results in doses of 100-300 mrem (risks of 4×10^{-5} yr^{-1} to 1.2×10^{-4} yr^{-1}). Part 20 limits on decommissioning (10 CFR 20.1402, Radiological criteria for unrestricted use) and Part 61 limits on waste disposal (10 CFR 61.41, Protection of the general population from releases of radioactivity) display lower annual public limits of 0.025 rem (a risk of 1×10^{-5} yr^{-1}), again subject to the application of ALARA. Typical public doses from commercial nuclear operations are well below 0.001 rem yr^{-1} (a risk below 4×10^{-7} yr^{-1}).

The risk values stated in the previous paragraph are measures of consequence, not event frequency; however, an event frequency may be derived and compared to the frequency of the design basis earthquake (or the design basis event) if sufficient information is available concerning the source term and the mode(s) of exposure. While such a calculation is somewhat outside the scope of this paper, it may be noted that per Table 2-1, an extremely unlikely event (an event having a frequency of occurrence between 1×10^{-4} yr^{-1} and 1×10^{-6} yr^{-1}) must result in a consequence of no more than 25 rem dose to a worker. Therefore, event frequencies corresponding to the doses for workers in the previous paragraph would need to be well below the frequency of occurrence of 5×10^{-4} yr^{-1} proposed by BNFL Inc.

4. The revised 10 CFR Part 70 discusses both high and intermediate consequence events in the context of frequency ranges. High consequence events are those that might exceed acute doses of 100 rem to workers and/or acute doses of 25 rem to individuals outside the controlled area. Section 70.61(b) states that high-consequence events must meet a likelihood standard of highly unlikely. The risk of each credible high-consequence event must be limited, unless the event is highly unlikely, through the application of engineered controls, administrative controls, or both, that reduce the likelihood of occurrence of the event or its consequence.

Intermediate consequence events are those that might exceed acute doses of 25 rem to workers and/or acute doses of 5 rem to individuals outside the controlled area. Proposed Section 70.61(c) requires that intermediate-consequence events must meet a likelihood standard of unlikely. The risk of each credible intermediate-consequence event must be limited, unless the event is unlikely, through the application of engineered controls, administrative controls, or both, that reduce the likelihood of occurrence of the event or its consequence.

The safety program may be graded such that management measures applied are commensurate with the reduction of risk attributable to that item. The frequency terms "highly unlikely" and "unlikely" are not defined in the proposed rule, but guidance is given in NUREG-1702, Section 3.7 of the draft TWRS-P Standard Review Plan (SRP), [Standard Review Plan for the Review of a License Application for the Tank Waste Remediation System Privatization (TWRS-P) Project, Draft Report, March 1999] which lists "highly unlikely" as corresponding to 1×10^{-5} yr^{-1} and below, and "unlikely" as corresponding to the frequency range of 1×10^{-2} yr^{-1} to 1×10^{-5} yr^{-1}. (The Contractor-tailored standards, at 1×10^{-4} yr^{-1} to 1×10^{-6} yr^{-1} for "highly unlikely" events, and 1×10^{-2} yr^{-1} to 1×10^{-4} yr^{-1} for "unlikely" events, are more conservative than those stated in the draft TWRS-P SRP.) While these are goals and provide insight, this additional conservatism of the frequency/consequence standard provides some assurance that the BNFL Inc. design would meet the NRC guidance as described in the TWRS SRP, as long as the event frequencies considered in the analyses are not arbitrarily limited to a higher value such as the frequency of the design basis earthquake (i.e., 5×10^{-4} yr^{-1}) as proposed by BNFL Inc.

NRC Evaluation and Assessment

To summarize, the NRC staff considers PRA and risk-based analyses to be important parts of the safety analyses, but not the only part. The NRC staff recognizes that risk analyses need to be supplemented with traditional deterministic analyses, appropriate conservatism, and defense-in-depth for effective regulatory decision making, as indicated in the Commission's policy statement. BNFL Inc.'s proposed "Interpretation of the Requirements for Meeting the Radiation Exposure Standards in Table 1 of DOE/RL-96-0006" would not be in conformance with Draft NUREG-1520, which states that the applicant must compare the design basis earthquake with the maximum earthquake accelerations expected on the site with a return period of 10,000 years (a frequency of 1×10^{-4} yr^{-1}). The contractor's proposal for the design basis earthquake would be less conservative than this standard, as well as the implied standards based on the 10 CFR Parts 20, 61, and 70 dose limits. As the RU indicated in its rejection of the proposal, the Contractor appears to confuse the design basis earthquake with the design basis event.

A16.1 SEISMIC PROBABILISTIC RISK ANALYSIS

Statement of the Issue

As stated in Item A.15 the radiological consequences of events in the extremely unlikely range as defined by DOE standards are not supposed to result in unacceptable accident consequences (dose consequences). In order to assess the radiological consequences of seismic events with a return period of greater than 2000 years that was established as the design basis earthquake (DBE) for the facility, BNFL Inc. proposed a seismic probabilistic risk analysis be performed. The general methodology for that analysis has been provided by BNFL Inc. and it has been consistent with current PRA assessment methods. There are, however, specific areas within the application of the methodology where there are issues that are yet to be resolved. These issues are generally associated with the availability of failure data that are relevant for seismic fragility curves that are used in the methodology.

Specific Example

As a result of the hazards analyses performed to date for the facility, it has been determined that the major contributor to the dose consequences for the events in the extremely unlikely range of occurrence is the loss of the containment/confinement boundaries for the materials being processed. This has been translated into the identification of process vessels and tankage as well as the process cells as these boundaries. Consequently, the basis for a fragility curve for a tank designed, for example, for a peak horizontal ground acceleration of 0.24 g that shows an 80 percent probability of rupture at 0.80 g has not been established. Similarly, the structural failure of cell walls designed to the same acceleration that is stated to have a failure probability of 14 percent has also not been substantiated.

DOE Position

DOE has been in the process of attempting to follow the application of the PRA methodology through a series of PRA Status Meetings that were still ongoing at the time of the contract termination. This issue apparently remains open.

NRC Concerns

Since the consequences are evaluated in terms of the radiological doses, structural failure, for example, in the cell walls that are considered in this project as mitigation elements, does not necessarily define the onset of damage significant enough to permit loss of confinement of a portion or all of the radiological inventory. Therefore, to use the PRA methodology will require the capability to predict the progression of cracking/distress of the concrete sections under increasing seismic loads to define fragility curves that relate structural behavior to leakage pathways and subsequent loss of confinement. It is not clear if all of the input data can be adequately represented with distribution functions for the purposes of safety regulation.

NRC Evaluation and Assessment

Without additional information and qualification of these issues, it is not possible to determine if the proposed approach is suitable for quantifying the risk and assuring adequate safety of the proposed facility.

A16.2 RADIOLOGICAL RELEASES FOR SEISMIC EVENTS

Statement of the Issue

Certain documents transmitted from BNFL Inc. to the DOE-RU in October and December 1999 discuss the assessment of radiological releases from the proposed TWRS-P project. These documents discuss:

1. The general methodology of assessing radiological releases.[96]

2. Methods for assessing such releases following a seismic event[97] (BNFL Inc. stated that this report is based in part on the document in (1) above, and that this report is a part of the overall Seismic PRA Methodology contained in (3) below).

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[96] BNFL Inc., letter to U.S. Department of Energy, with attachment, "Methods for Assessing Consequences of Potential Accidental Radiological Releases from the WTP," (RPT-W375-NS00001, Rev. 0, October 12, 1999), October 25, 1999

[97] BNFL Inc., letter to U.S. Department of Energy, with attachment, "Methods for Assessing Consequences of Potential Accidental Radiological Releases from the RPP-WTP Facility Following a Seismic Event" (RPT-W375-NS00006, Rev. B, December 7, 1999), December 8, 1999.

3. Aspects of the techniques of probabilistic risk assessment (PRA) methodology as related to seismic events, including risk quantification.[98]

The attachment to an NRC memorandum[99] to the DOE-RU addresses the NRC comments on these documents, as well as the RU's response to the BNFL Inc. methodology of assessing radiological releases, and the RU's response to BNFL Inc.'s seismic PRA document.

Specific Example

The seismic report (item (2) above) indicates that its methodology is based in part on the general dose assessment methodology report (item (1) above); however, the general report uses bounding, conservative values, whereas the seismic instead uses best estimate values and distribution functions.

DOE Position

DOE has accepted the basic, dose methodology approach taken by the Contractor. DOE has requested clarification of several points but appears receptive to the general, seismic approach being followed by the Contractor.

NRC Concerns

The NRC staff indicated in its comments that it would be helpful to include a definition of "best estimate values" and the sources of these data, as well as the justification for using these data, and the criteria for their selection. The staff also indicated that it would be useful to explain how the purpose of the Seismic Probabilistic Risk Analysis Methodology Report (and the related Seismic Probabilistic Risk Analysis Dose Assessment Methodology Report) are met using best estimate values and distribution functions. These two documents appear to imply that the primary reason for performing the analyses of dose consequences arising from seismic events is to determine the risk of incurring a given level of dose (i.e., the consequence) to the facility worker, co-located worker, and the public. It did not seem clear from either document whether PRA methodology will be used to identify and categorize those SSCs that may require additional strengthening or enhancement for situations in which conservative values of the various inputs are hypothesized to occur simultaneously. Accordingly, without knowledge of the specific input data and its associated level of conservatism, it was not possible to validate the results of the analyses. In addition, the NRC would expect validation of the model, the input data, and the results. It should be recognized that additional communications between the RU and BNFL Inc. may have resolved some of these concerns, but may have not come to the attention of NRC staff.

NRC Evaluation and Assessment

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[98] BNFL Inc., letter to U.S. Department of Energy, with attachment, "Seismic Probabilistic Risk Analysis Methodology" (RPT-W375-NS00005, Rev. B, December 17, 1999), December 20, 1999.

[99] Struckmeyer, R.K., U.S. Nuclear Regulatory Commission, memorandum to M. Leach, U.S. Nuclear Regulatory Commission, "Background Information and Comments on TWRS-P Project: "Dose Assessment Methodology Description, Seismic Probabilistic Risk Analysis Dose Assessment Methodology Report, and Seismic Probabilistic Risk Analysis Methodology Report." March 8, 2000

Without qualification of these issues, it is not possible to determine if the proposed approach is suitable for determining acceptable risk and adequate assurances of safety from the proposed facility.

A16.3 AVAILABILITY OF DOCUMENTS

Statement of the Issue

In its submittals, BNFL Inc. refers to a document that does not appear to be publicly available.

Specific Example

For example, BNFL Inc.'s SRD, Rev. 2d (November 2, 1999), Vol. II, under Safety Criterion 4.1-2 on page 4-4 references under "Implementing Codes and Standards," ASCE 4-98 (Draft), "Seismic Analysis of Safety-Related Nuclear Structures and Commentary." This document is apparently intended to update and replace ASCE 4-86 with the same title. The referenced document describes the seismic analysis methods that will be used to perform the seismic analysis of safety-related structures of the facility. The document provides a methodology for calculating seismic responses in structures and provides input motions for use in the seismic qualification of electrical and mechanical systems and components.

DOE Position

DOE has not pursued this matter nor the applicability of the draft standard.

NRC Concerns

The document in its current state of development does not constitute a standard that can be used as a reference since the ASCE Rules for Standards Committees have apparently not been fully executed for the standardization of the draft document. If BNFL Inc. wants to follow the draft requirements of such a document, those document provisions would have to be incorporated in toto into the text of the SRD document, and then acceptability would need to be determined by the DOE RU staff.

NRC Evaluation and Assessment

This draft standard needs to be reviewed for its acceptability for regulatory purposes.

A17. FIRE PROTECTION

Statement of the Issue

There were several fire protection comments generated during review of the SAP and ISAR submittals. Most dealt with clarifications or omission of details. Since that time, there have been two Level 1 meetings on fire protection: September 1999 and March 2000. From these meetings, four major issues, and a number of minor issues remain.

Specific Examples

1. Process building construction classification: BNFL Inc. proposed a construction type which would not meet the requirements for Type 1 construction per National Fire Protection Association (NFPA) 220, nor the fire resistive construction types required by a strict interpretation of the Uniform Building Code (UBC).

2. Steel fireproofing: The steel fireproofing issue is related to the construction classification issue. If fire resistance of the outside walls is not required, fireproofing of structural steel for these walls would not be required. In addition, BNFL Inc. wished to avoid fireproofing of structural steel in areas of low combustible loading.

3. Protection of final high efficiency particulate air (HEPA) filters from fires: BNFL Inc. has stated in the fire protection Level 1 Meeting that no water sprays would be employed in filter plenums based on the superior qualifications of the circular filters to be used.

4. BNFL Inc. has proposed modified requirements for the use of sprinklers in radioactive areas of the facility:

    a. C5 Areas (most contaminated with low fire loading): No sprinklers or steel fireproofing in C5 areas.

    b. C3 Areas (moderate contamination with varying degrees of combustible loading and safety significance): Sprinklers used selectively in these areas with justification provided where sprinklers are not used.

    c. C2 Areas (low potential for contamination, with in-situ and transient combustibles, such as maintenance supplies): These areas would likely be sprinklered.

DOE Position

1. DOE criteria require compliance with the UBC. The RU has commented to BNFL Inc. (Gibbs to Bullock, letter dated 5/3/00) that a justification for the selection of nonfire resistive construction type would have to include identification and analysis of building areas with unusual or concentrated hazards, bounding fuel packages, and critical structural members whose failure due to fire could structurally undermine a significant portion of the facility. The analysis would also be expected to address any fire protection administrative controls, such as transient combustibles and vehicle access to the proximity of process buildings (e.g., control of exterior fire exposure hazards).

2. The RU has commented to BNFL Inc. (Gibbs to Bullock, letter dated 5/3/00) that the RU continues to expect that TWRS-P structural steel fireproofing will meet the requirements of the UBC. The RU also expects that any type of equivalency analysis will demonstrate that there are no fire hazards that present a potential threat to structural steel integrity.

3. Both NRC and DOE fire protection criteria call for water spray protection in the final filter bank of the confinement system. At this time, the RU (Gibbs to Bullock, letter dated 5/3/00) is requesting clarification of the BNFL Inc. position.

4. DOE/RU requested that the contractor establish a definitive set of criteria for the use of sprinklers in a given area. The contractor wished to rely on the Fire Hazard Analysis (FHA) and judgement because of the uniqueness of the different fire areas in terms of type and distribution of combustibles, heat release rates, ventilation, etc.

<u>NRC Concerns</u>

1. NRC has stated (Tokar to Gibbs, letter dated 6/5/00) that the staff was in agreement with the RU criteria for resolution of this concern: a justification of non-fire resistive construction type based on analysis of hazards, fuel loading, and the expected fire protection administrative controls.

2. NRC stated (letter dated 6/5/00 M. Tokar, NRC, to D.C. Gibbs, DOE,) that the NRC staff was in agreement with the RU comments requiring an equivalency analysis for compliance with the UBC, and added two additional points:

    a. Lack of steel protection based on intended use would severely limit any future modifications for use of that area.

    b. Lack of fire suppression capability along with lack of steel protection in the same area makes administrative control of combustibles the only defense measure, and makes the fire protection in the area a vulnerability that would be identified in a FHA or Integrated Safety Analysis (ISA).

3. Both NRC and DOE fire protection criteria call for water spray protection in the final filter bank of the confinement system.

4. NRC reviewers feel that there is too much uncertainty regarding the concern about sprinkler coverage.

<u>NRC Evaluation and Assessment</u>

1. Regarding building construction classification, NRC criteria would require Type 1 construction per NFPA 220.

2. A letter providing comments on the Explosive Hazards 1 and 2 Topical Meetings (Pierson to Gibbs, letter dated 11/4/99) contained a short description of the NRC criteria for building construction and expressed concern about the stated BNFL Inc. position regarding fireproofing of structural steel.

3. Since protection of the final HEPA filters involves the basic design of the ventilation system, NRC staff preferred to make this a plant systems or radiation protection issue for the time being.

4. NRC has requested a set of definitive criteria for determining the use of sprinklers in a given area.

Finally, the Hanford site recently experienced a large brush fire that burnt approximately 50 percent of the site's total land area. Circa 200,000 acres were burnt, along with some structures in west Richland. Additional fire breaks and berms had to be constructed around some of the facilities for protection. Therefore, the NRC would anticipate that the Contractor would also factor this experience in the facility's design.

A18. EXPLOSIVE HAZARDS

Statement of the Issue

The last topical meetings in which explosive hazards for the TWRS-P project were discussed in detail were in August and September 1999. The August Topical Meeting (Explosive Hazards I) addressed hazards from melter steam explosions, explosions from nitrate organic reactions in the melter offgas system, over pressurization of an ion-column, ammonium nitrate explosion in the off-gas system, and a sugar dust explosion in the feed preparation vessel. None of these events were considered credible by BNFL Inc., although specific probabilities were not presented to support such conclusions and there appeared to be an over-emphasis upon routine and near-normal conditions. Consequently, all of these events were left as potential issues by NRC and the RU pending further information and analysis. A resubmittal of the August 1999 Topical Report in March 2000 and information from design review meetings alleviated some of the NRC concerns about steam explosions, nitrate-organic reactions, and sugar dust explosions. Current NRC staff concerns about steam explosions are primarily the potential for a refractory failure allowing molten glass to contact water in the cooling jacket. Potential explosions caused by the contact of water and the cold cap were partially addressed by the BNFL Inc. responses to comments; nonideal behavior and misfeeds appear to require further analysis. Also, the BNFL Inc. process does not appear to be as vulnerable to radiological releases from organic-nitrate and sugar explosions as originally determined from the first submittal, although some questions still remain, primarily dealing with misfeeds and frequencies. Potential explosions from ammonium nitrate formation and over pressurization of the ion exchange column are still considered as open issues requiring considerable progress.

The September Topical Meeting (Explosive Hazards II) was concerned with the potential for explosion of hydrogen gas in approximately 40 process tanks. At this time an active ventilation system for hydrogen build-up was proposed to take the place of the passive release system that was proposed earlier, probably for a single tank. This active system consisted of an air extract system with two 100 percent fans and one 100 percent backup fan. Process air is used for dilution during normal operation. An air vent system is provided for loss of off site power (with loss of process air) conditions. Although the staff considered this design a significant improvement over the passive system, there were concerns from the presentation and report. These concerns included:

1. Hazard evaluations based on normal operating conditions rather than off normal.

2. Rupture of vessel vent jumper was not considered in hazard evaluation.
3. Loss of ability to maintain pressure control in vessel vent system was not considered.
4. Large surges in offgas were not considered.
5. The worse case detonation scenario was not properly evaluated.

Specific Example(s)

(Already cited.) In addition, at the June 2000 Topical Meeting on closing out issues, there was an ISM presentation on hydrogen explosion concerns. However, the presented ISM was very subjective with few quantitative analyses that supported its intended conclusion of no hydrogen monitoring requirements. Furthermore, previously unmentioned components of the system were introduced, such as the dampers and air flow monitors, without reliability analyses.

DOE Position:

DOE finds the additional information interesting but insufficient to adequately explain (and address) the issues. After the June 2000 Topical Meeting, DOE is requesting another demonstration of the ISM process on the hydrogen explosion concerns with more quantitative information and reasoning.

NRC Concerns

A review of the resubmittal in February 2000 also led to a re-evaluation of the open issues. The NRC staff concluded that rupture of the vessel vent jumper and loss of ability to maintain pressure control can probably be nearly eliminated by an expanded set of performance requirements on the system. The other concerns remain however.

The June 2000 Topical Meeting introduced dampers, flow monitors, and other equipment on the ventilation system for the first time. No reliability information was provided. However, a cursory review by NRC staff indicates a frequency of failure of circa 1E-4/yr (assuming perfect operation of the fan system), which would not render hydrogen explosion events incredible.

Details of the NRC staff's concerns with the original submittals and presentations for the Explosive Hazard Topical Meetings may be found in R. Pierson's, NRC, letter of November 4, 1999, to D.C. Gibbs, DOE, entitled "NRC and CNWRA Comments on the Explosive Hazards Topical Meetings I and II, August 24, 1999 and September 28, 1999." Details of the review of the resubmittals may be found in M. Tokar's, NRC, letter of April 27, 2000 to D.C. Gibbs, DOE, entitled "NRC Response to March 23, 2000, Letter Concerning the Resubmittal of the August and September 1999 Topical Meeting Reports on Explosive Hazards."

NRC Assessment and Evaluation

It would be anticipated that the Contractor will complete the design in sufficient detail, with quantitative analyses, and with identification of IROFS, before the explosion issues can be adequately addressed and closed.

A19. COMPLIANCE WITH NQA-1

Statement of the Issue

BNFL Inc., in its QA Program Implementation Plan (QAPIP) has committed to implementing a QA program in accordance with applicable requirements of American Society of Mechanical Engineers (ASME) NQA-1-1989, as well as the DOE QA requirements of 10 CFR 830.120. BNFL Inc. has not adequately identified its commitments or interpretations related to the applicability of specific NQA-1 requirements, either as full and explicit commitments to NQA-1, nor have exceptions to and applicability of the provisions of the document been identified. Implementing procedures for NQA-1 requirements appear not to have been fully and completely developed, and there is no explicit commitment to the records storage and software requirements of NQA-1.

Specific Example

Implementing procedures for all NQA-1 requirements appear not to have been fully and completely developed, and there is no explicit commitment to the records storage and software requirements of NQA-1. BNFL Inc. has not identified exceptions taken to NQA-1-1989.

DOE Position

DOE considers the BNFL Inc. commitment in its QAPIP to NQA-1-1989, to be a full and adequate commitment at this point in the project. Program implementation and NQA-1 requirement applicability will be addressed as necessary during inspections.

NRC Concerns

All applicable NQA-1 requirements needed for design, including records and software control programs, should be fully in-place during the current design phase, while others should be fully in-place before additional safety analyses, advance procurement or initial construction are begun. Correction and/or backfit of design analyses and documentation performed under an inadequate design control program could become necessary.

NRC Evaluation and Assessment

In the TWRS SRP, NUREG-1520, NRC endorsed NQA-1-1989 as an acceptable QA program standard for the TWRS project. Exceptions or "tailoring" of the NQA-1 requirements should be addressed, supported as technically adequate or rejected as early in the project as practical to avoid costly and laborious retrofits.

A.20 QUALITY ASSURANCE PROGRAM IMPLEMENTATION

Statement of the Issue

BNFL Inc. has committed to apply and implement the QA program across the entire project organization including the subcontractors for design, procurement, and construction. However, each of the various major subcontractors operate under their own individual QA program. There is the potential for conflicting and missing requirements for a project when a multitude of

QA programs are in-place. At this stage of the project there is concern regarding the adequacy of design control across the entire project for the detailed design and the beginning of procurement in areas such as the control of design inputs from the various subcontractors. The level of BNFL Inc. engineering verification and QA oversight of the subcontractors/team members activities to assure that adequate application and implementation of all QA requirements for ongoing design has not been evident to date.

Specific Example

BNFL Inc. conducts its activities in accordance with its QAPIP. GTS Duratek, who is designing the high and low level vitrifiers and the basic vitrification process, and offsite Bechtel engineering organizations operate to their own QA plans or manuals.

DOE Position

DOE considers that BNFL Inc. has committed to adequate QA program implementation and inadequacies will be addressed during inspections.

NRC Concerns

The adequacy and appropriateness of the QA program activities requires strong and effective QA oversight even when all participating organizations are operating to the same QA plan. The use of multiple QA plans by a variety of organizations and corporate entities in several locations requires application of QA oversight to assure adequacy and appropriate implementation by all participants. This level of oversight has not been evident in the project activities to date.

NRC Evaluation and Assessment

The appropriate and adequate implementation by all major team members and subcontractors of QA requirements should be verified prior to or early in the project design activities in order to preclude extensive avoidable retrofits for design, procurement or other project activities.

A.21 SAFETY CLASSIFICATION OF STRUCTURES, SYSTEMS, AND COMPONENTS, AND GRADED QA

Statement of the Issue

A complete safety categorization of the structures, systems and components (SSCs) has not been fully developed by BNFL Inc. or provided to DOE. The Design Safety Features (DSF) deliverable that BNFL Inc. submitted in February of 1999 was intended to be an initial identification of the DSF which would include identification of those elements of the facility important- to-safety (ITS) including SSCs that give assurance that the SSCs will perform the required safety functions. BNFL Inc., in the DSF submittal, provided two categories of ITS SSCs: those elements that were to be ITS based on previous experience in the design of similar plants and the other category being those SSCs that were identified in the application of the ISM process. At the time of the DSF submittal, BNFL Inc. had identified 568 SSCs that were expected to be ITS and 1003 DSFs had been identified. It was also clearly stated that the total number of ITS SSCs identified to date did not represent the number of elements that would be ITS in the final facility. Associated with the safety categorization of the SSCs is the related classification within the QA program that in this case is to use a graded approach to QA. Without a list of all SSCs for each of the safety categories, a logical and systematic graded QA program cannot be developed. Such a list has not been presented up to the time of the submittal of the Limited Construction Authorization Request (LCAR), dated June 26, 2000.

Specific Example

BNFL Inc. intends to use confinement as a DSF. For example, an element within the facility that can function as a secondary confinement barrier is one of the individual process cells within the pretreatment building. Credit will be taken for such confinement barriers as passive barriers achieved with the stainless steel liner of the cells, the seals on the penetrations and by the fact that there will be a limit on the thru-wall cracking of the reinforced concrete cell walls. These are considered by BNFL Inc. as DSF to protect against loss of material and to provide adequate shielding. The cell wall was designated as ITS. Other DSFs associated with the cells that were identified by BNFL Inc. include the use of design codes, use of a suitably qualified and experienced person ("SQEP") in design and construction, seismic design, material selection, nondestructive testing/inspection/QA during design and construction, shielding assessment, design to withstand maximum cell temperature and analytical assessment of structural stability.

In spite of the words in the DSF submittal, and the fact that no complete list of ITS SSCs has been provided, the LCAR, dated June 26, 2000, contains the following statement. "Stainless steel liners are not designated as Important to Safety." This is apparently believed to be justified by the statement that, "Process cells are provided with liners (typically stainless steel) to prevent leakage of spilled process liquor into the soil column over time. The liners also facilitate decontamination of the process cells to minimize the contamination spread during operation and to facilitate deactivation and decommissioning. Containment of spilled liquor as a means to reduce operating risk to within exposure standards for workers or members of the public relies on the concrete structure itself and does not require liners."

The DSF submittal contains the following statements. "Specification for materials used for stainless steel cladding have been developed based on extensive experience gained in cladding process cells on many projects. Specified tolerances for materials along with welding and weld test procedures ensure quality of secondary confinement provided by the cladding. All welded seams are examined to ensure they are free of unacceptable defects." The submittal also provided information that would indicate some safety level and quality levels are envisioned, although not well defined at this time. Listed below are some of the tests that were indicated would be performed.

1. Visual inspection
2. Dye penetrant examination.
3. Ferrite meter check.
4. Ultrasonic examination.
5. Radiographic examination.
6. Copper tests.
7. Pneumatic pressure test.
8. Ponding test.

DOE Position

DOE has identified the need for the completion of the safety classifications and has expected this information to develop from the completion of the Integrated Safety Management system approach which had not been completed at the time of contract termination. While the LCAR has been rejected by DOE, its rejection was not based on this issue. This issue is expected to be an open issue when the project resumes.

NRC Concerns

Until there is an adequate list, meaning most major SSCs, of the SSCs in each of the designated safety categories and graded QA classes, and whatever other logic systems are associated with the facility provided, there is a concern that the initiation of construction under the LCAR may allow SSCs that should be ITS and in a certain quality class to be addressed in a substandard level when compared to the needs of the facility.

NRC Evaluation and Assessment

Because there is a strong emphasis on the design margins being only sufficient enough so that the target consequences are met based on the ISA, there is concern that the initiation of construction activities prior to a completed design being available for hazards analyses will result in judgements being made later that are not necessarily well founded when compared to what is built and in-place at that time. For any SSCs involved in any LCAR activity, the safety class and quality class should be soundly based or there should be conservative assumptions made and documented for the future verification.

A.22 CHEMICALS AND THEIR SAFETY

Statement of the Issue

Several chemical safety issues were initially identified in the ISAR. The DSF submittal further analyzed one of these scenarios. However, the analysis may have been incomplete. From subsequent discussions, it is not clear if chemical safety issues (in either radioactive or nonradioactive areas of the facility) are being evaluated and addressed as necessary, and would be available for regulatory evaluation in the near term. In addition, the design of the cold chemical storage areas is very general and the detail may not be completed and available for specific safety analyses. Thus, the safety evaluation of those areas and their effects could not be performed. The changes in the storage and handling system concepts for the wet chemicals need to be resolved and integrated into subsequent safety submittals.

Specific Example(s)

1. Several chemical safety issues were initially identified in the ISAR, including storage of concentrated nitric acid, concentrated sodium hydroxide handling, anhydrous ammonia handling, and dry glass formers storage and handling.

2. The Design Safety Features (DSF) subsequently analyzed the concentrated nitric acid spill. However, the analysis was inconsistent and incomplete.

3.. The Contractor intends to subcontract much of the nonradioactive chemical handling area. This has contributed to the current lack of attention and detail in this area, and the lack of a complete hazards and operability (HAZOP) study of the chemical handling areas.

4. The Contractor performed an initial safety screening of chemical spills (in the ISAR and DSF) using the Automated Resource for Chemical Hazard Incident Evaluation (ARCHIE) model, available from the U.S. Environmental Protection Agency (EPA) public domain website. ARCHIE was apparently selected because of its wide use for screening potential events, simple Gaussian plume algorithm, and little modeling experience is required for its use. For this application, however, there are a number of uncertainties regarding its use without considering uncertainties and the appropriate vapor pressures. As an example, ARCHIE indicated there would be no ITS SSCs from chemical incidents. However, the ISM Cycle 2 utilized a different model that indicated there might be ITS SSCs associated with the prevention and mitigation of concentrated nitric acid spills.

5. The following additional examples accrue from the April and June 2000 Topical Meetings:

   a. Limited detailed information, particularly for quantitative and reliability analyses.

   b. Incomplete and uneven application of the HAZOP process—for example, offnormal conditions and the significance of pump and flow controls for static mixers are overlooked.

   c. Inconsistency with NRC guidance (the issued NUREG-1702) and draft regulations (the revised 10 CFR Part 70).

   d. Potential high level of risk, some two orders of magnitude or more greater than radiological risks.

DOE Position

From the April 2000 Topical Meeting minutes the RU questioned:

1. The proposal to have different connection types and sizes to prevent unloading, misloading, and inadvertent mixing of incompatible chemicals, because most trucks carry multiple connectors.

2. The same piping and equipment in facility bulges for more than one chemical, thus risking an incident of mixing incompatible chemicals.

3. The general risks from frequent tank truck deliveries to the facility (eight or more a day).

   At the June 2000 Topical Meeting, DOE/RU has stated that they are inclined to accept the Contractor's chemical safety approach that considers ITS only when a potential scenario involves multiple hospitalizations, a worker fatality, or exceeding Emergency Response Planning Guideline-3 (ERPG) levels for the CLW.

NRC Concerns

The safety evaluations of the chemical areas cannot be completed without sufficient design and hazards information. In addition, the NRC is concerned that the proposed approach constitutes a significantly greater risk from chemicals than from radiological incidents and is inconsistent with commercial nuclear industry practice at fuel cycle facilities. The approach is also inconsistent with the revised 10 CFR Part 70 and related guidance that has been developed in conjunction with the industry.

NRC Evaluation and Assessment

The chemical safety area needs to be revisited and the design finalized and quantitatively analyzed.

A.23 IODINE REMOVAL

Statement of the Issue

The status of iodine removal from the process system needs to be resolved and the supporting information would be expected in safety submittals. A condensed history of the iodine-129 issue follows:

1. From the ISAR review in February 1998, DOE/RU question 102 asked about the projected iodine-129 release rates as well as the effectiveness of absorption unit operations in the HLW primary offgas system. There was little response by the Contractor.

2. Subsequently at the May 1999 Topical Meeting, BNFL Inc. stated that iodine-129 removal was not required. The RU requested additional information that might support this assertion. On September 7, 1999, BNFL Inc. provided estimates of iodine releases and the associated doses in letter CCN 005716 and its Attachment 1. The RU questioned the assumptions in the letter because they were lower than the contract specifications. On October 5, 1999, BNFL Inc. clarified the situation by claiming that iodine controls "other than caustic scrubbers" (e.g., silver zeolite beds) were unnecessary.

3. In March of 2000, BNFL Inc. provided additional information supporting the sole use of caustic scrubbers for iodine control, including the basis for decontamination factors (DF's), in CALC-W375HV-PR00092 (also referenced in the BNFL Inc. letter CCN 012970, Dobson to Gibbs, dated 5/5/00). BNFL Inc. also submitted a draft of the Best Available Radiological Control Technology (BARCT).

Specific Example

The Contractor estimated a dose of circa 0.3 mrem/yr to the public from anticipated iodine-129 releases, based upon a DF of 100 across the caustic scrubbing system.

DOE Position

The DOE/RU performed an independent dose calculation using conservative assumptions and obtained similar results as the Contractor (see RU internal memorandum REG:JLP/00-RU-0318, dated April 11,2000). Consequently, the RU has concluded that the Contractor is proposing effective control strategies for iodine-129 and that the doses will be a small fraction of the annual limits. This conclusion still requires the use of an effective scrubbing technology, such as the caustic scrubber approach presented by BNFL Inc. at the March 2000 Topical Meeting. However, the RU has not limited the Contractor to caustic scrubbing as the decontamination technology.

NRC Concerns

The NRC is concerned that effective control measures are applied to iodine due to its biological significance and known thyroid effects. These concerns are magnified by the arid environment around the Hanford site. At face value, the proposed caustic scrubber approach would seem to give acceptable dose results. However, there is a lack of detailed information on the design and approach - all caustic scrubbers do not perform equally well for iodine removal. Furthermore, an assessment of the caustic scrubbing systems reliability, performance (particularly with time), offnorrnal effects, and safety significance would be anticipated. For example, failure of the system (a DF of 1) could result in doses of circa 30 mrem/yr to the public if it is not repaired or maintained in a timely fashion. This would exceed air permit limits (NESHAP - 10 mrem/yr) and would be at least an ALARA design issue from the NRC perspective. Additionally, the anticipated doses are strong functions of distance from the stack, and since the NRC considers the CLW as a member of the public, a functioning system could correspond to doses of circa 0.3 rem around the proposed facility's fenceline. The Hanford land use EIS anticipates site privatization initiatives and an industrial park about 1 mile from the 200-East area. Thus, even if the NRC were to accept the CLW approach, anticipated public doses would still be higher than the 0.3 mrem/yr estimate. The NRC would also expect an assessment of offnormal effects upon the scrubbing system's performance, such as differing feed compositions (iodine amounts), scrubbing medium composition, packing deterioration, liquid/gas ratios, monitoring systems, and associated management measures. Like the RU, the NRC would not limit the Contractor to a specific scrubbing technology although the characteristics and experience of the technology would be factored into the NRC evaluation of its ability to meet the performance requirements.

NRC Evaluation and Assessment

The NRC would expect the previously mentioned concerns to be fully addressed in safety documentation.

A.24 INCREASED TANKAGE AND INVENTORIES

Statement of the Issue

As the design has evolved during the Phase I.B-1 period, the potential quantity of waste that could be stored within the tankage volume now being proposed for the facility has increased considerably and may contain the equivalent waste volume of up to three of the double-shell tanks (DST). It is not clear if additional increases in tank volumes will occur because a sizing rationale for the tanks has not been presented. For example, there are now six circa 380 Kgal tanks for LAW receipt and six circa 90 Kgal tanks for HLW receipt and storage. In addition, separated and concentrated radionuclides may also be stored (e.g., cesium, technetium, strontium/transuranic waste, and UF [ultrafiltration] concentrates). To date, the Contractor has not used a consistent and reasonably conservative approach for estimating tank and radionuclide inventories. For example, the mass balances in the FFP submittal use radionuclide values potentially at least an order of magnitude lower than the contract allows. Per the SRP, the NRC would expect that the design basis for the facility is clearly described and that the volumes and the associated activity have been adequately analyzed in the dose assessments for the various scenarios.

Specific Example(s)

Per the FFP submittal, there are at least 3 million gallons of tank storage space at the facility, as identified in the previous paragraph. This is equivalent to three DSTs at Hanford.

DOE Position

DOE does not have a clear position on tank storage. The large amount of tankage appears to be driven by DOE concerns for batching flexibility, HLW storage space, and higher plant capacities.

NRC Concerns

The tankage represents a significant radiochemical inventory in a mobilized or easily-mobilized form.

NRC Evaluation and Assessment

NRC evaluations indicate the tanks represent a significant source term for leakage, spill, misrouting, and external event accident scenarios. In addition, they will contribute to operations and maintenance activities at the facility (e.g., for pumps, instrumentation, agitators, sampling, breather filters, etc.). The NRC would anticipate that there would be safety controls associated with this large tankage. The presence and identity of these controls is not apparent in the FFP submittal and related documentation.

A.25 INSPECTION FEATURES

Statement of the Issue

A complex radiochemical facility such as TWRS-P is likely to need numerous inspections over its design and operating periods. These would include inspection of SSCs, such as acceptance during construction, and corrosion of pipes and vessels, weld/connection integrity, instruments and calibration, cleaning, removal of deposits, and seal integrity during operations. In addition, additional inspections would focus on the operator and procedural issues, radioactive and material flow through the facility, and general conditions (of plant, people, and organization). The deliverables for this project did not contain or imply that inspections were included during the design or operating periods.

Specific Examples

Section 3.13, "Reliability, Availability, Maintainability, and Inspectability (RAMI)" of the Contractor's ISMP, BNFL-5193-ISP, rev. 4, dated December 2, 1998, requires that testability and inspectability of Safety Design Class systems and components be facilitated during design by such features as redundancy, that allow for a system or component to be removed from service for maintenance or testing without loss of safety protection and provisions.

Contrary to the above, the Contractor had neither proceduralized nor implemented the requirement to consider inspectability and testability in the evolving facility design. No special features are identified in the designs submitted with the FFP material that would assist inspection of SSCs for construction acceptance or continued operation. Special ports for probes (e.g., eddy current, ultrasonic, radiation) and scopes are not apparent. There are many components that are in continuous use without built-in spares. Many of the pumps (e.g., the evaporator recirculation pumps) have neither a spare nor isolation valves to facilitate testing and inspection.

DOE Position

Members of the Design Process Inspection Team had identified this omission in the Design Process Inspection of January 2000. Because the ISMP represented part of the project Authorization Basis, this was considered an Inspection Finding. This information was conveyed to the Contractor via letter 00-RU-0210, Gibbs to Bullock, dated February 8, 2000, which transmitted the Design Process Inspection Report, IR-00-001. Additional follow-up has not occurred at this time.

NRC Concerns

NRC staff participated in the Design Process Inspection Team, and inspectability considerations were included in NRC Inspection Report 70-3091/0001. Without adequate means to inspect and test SSCs built into the design, it will be difficult for the Contractor to demonstrate adequate safety, particularly as the plant ages. Since it is required by regulation, then, without adequate design features to simplify inspection, the plant is likely to suffer capacity losses to accommodate the inspection needs.

NRC Evaluation and Assessment

NRC would anticipate that approaches and specific design features for inspection would be described as part of the management measures in a potential license submittal.

A.26 CHEMICAL VERSUS RADIOLOGICAL RISK

Statement of the Issue

The NRC approaches the potential hazards and risks form radioactive materials, chemicals generated by radioactive materials, and chemicals that may impact the safe handling of radioactive materials in a uniform manner via an ISA. Per the revised 10 CFR Part 70 and the SRP, potential hazards of high consequence identified by the ISA should be rendered highly unlikely by design and controls, while potential hazards of medium consequences should be rendered unlikely by design and controls. The SRP further identifies 1E-5/yr or lower as highly unlikely and the range of 1E-2/yr to 1E-5/yr as unlikely. The effects from chemicals are delineated in terms of emergency planning levels (essentially one hour or less exposures). The Contractor has identified process industry guidance as the basis ("standard") for potential chemical hazards at the TWRS-P facility and intends to use standard, off-the-shelf equipment. However, this appears to result in a significantly higher, accepted level of risk from chemical events as compared to radiological events.

Specific Examples

As an example with the FFP submittal design, an offgas release to the gallery around the LAW melters would likely have fatal consequences for the personnel present with a potential frequency of circa 1E-3/yr. This is two orders of magnitude above the SRP value and potentially a thousand times greater than the SRD value for high dose, radiological accidents. The personnel would be exposed to radiological, chemical, and physical consequences (jetting, temperature, and pressure); however, the radiological consequences would not likely constitute the greatest risk or cause the potential fatalities. No IROFS were identified for this event.

DOE Position

From the April 2000 Topical Meeting minutes, the RU questioned:

1. The proposal to have different connection types and sizes to prevent unloading, misloading, and inadvertent mixing of incompatible chemicals, because most trucks carry multiple connectors.

2. The same piping and equipment in facility bulges for more than one chemical, thus risking an incident of mixing incompatible chemicals.

3. The general risks from frequent tank truck deliveries to the facility (eight or more a day).

At the June 2000 Topical Meeting, DOE/RU stated that they are inclined to accept the Contractor's chemical safety approach that considers ITS only when a potential scenario involves multiple hospitalizations, a worker fatality, or exceeding ERPG-3 levels for the CLW, because the approach was previously approved in the SRD by the RU.

NRC Concerns

The proposed approach is inconsistent with NRC guidance, the revised 10 CFR Part 70 regulations, and commercial fuel cycle approaches that balance chemical and radiological risks at fuel cycle facilities. It is worth mentioning that the American Institute of Chemical Engineers has printed material (see, for example, Guidelines for Engineering Design for Process Safety) that discuss in detail the desire for "inherently safer" plants with "multiple safety layers" (redundancy). In addition, best handling practices are available from manufacturers of specific chemicals (e.g., nitric acid) and chemical categories - these generally emphasize precautions and redundancy. The Contractor does not appear to be following this chemical process industry guidance.

NRC Evaluation and Assessment

The level of risk associated with chemical events is relatively high and incongruous with NRC regulations and guidance, and nuclear and process industry trends towards lower risk. It would seem that the potential risk level from chemical events should be lower and comparable to the radiological risk level, as noted by the revised 10 CFR Part 70 and the SRP.

It should be noted that the use of Emergency Response Planning Guidelines (ERPGs) for analyzing chemical exposure may not be sufficiently conservative for some scenarios. ERPGs are intended to be used for evaluating emergency escape only, where the unit of the "effect" from exposure for 1 hour is not a "time weighted average" (TWA). Also, the ERPG values are deterministic and represent significantly different acute effects - ERPG-1 corresponds to irritation and annoyance, ERPG-2 represents an injury level that does not impede emergency egress, and ERPG-3 denotes a level corresponding to irreversible injury. Thus, while generally accepted as a screening tool, the use of ERPG values may be inappropriate for longer duration scenarios such as control room habitability. Instead, lower values (e.g., TWA) may be better choices for those situations.

A.27 RELIANCE ON THE OPERATORS

Statement of the Issue

The proposed TWRS-P handles relatively large quantities of materials and activities for a radiochemical plant and contains numerous cells. While some of the cells are remotely operated, personnel access is planned for many of these cells for routine maintenance and recovery. In addition, the Contractor has indicated a preference for administrative controls and operator actions (including evacuation) over engineering and design controls.

Specific Example(s)

1. The Contractor has elected to use a locally-shielded LAW melter in lieu of the traditional, remotely operated melter. The replacement of melter consumables, such as bubblers and thermowells, is intended to be done manually using a Consumable Changeout Box (CCB). This might occur 10% of the time and, in addition to the CCB procedures, requires an operator procedure to place the melter into idle mode.

2. The same LAW melter is located in a gallery with two other melters. Operators will be present in the gallery 30 percent or more of the operating time. The Contractor intends to use evacuation procedures in the event of an accidental release of radioactive materials into the gallery.

3. In the current design, the pump bulges and canister decontamination cells rely upon operator entry for maintenance. Per NRC regulations, these would likely be categorized as "very high radiation areas" and require procedures for decontamination, canister movement, and/or door interlocks to prevent overexposures.

4. Many of the tables in the ISM Cycle 2 list "operator actions," procedures, and/or administrative controls. "Restricted access" is frequently listed as a primary control strategy to reduce operator exposure.

DOE Position

During the March, 2000 Topical Meeting on Melters and Offgas Treatment, DOE/RU viewed a computer-generated model of the operation of the Consumable Changeout Box (CCB). DOE appears to be willing to accept reliance upon the operators as part of the primary hazard control strategy.

NRC Concerns

This approach of relying on administrative controls and operator actions runs opposite to the preference stated in the SRP NUREG-1702 and the revised 10 CFR Part 70 Statement of Considerations.

NRC Evaluation and Assessment

The NRC would look more favorably upon approaches that do not rely upon operator actions as either the primary or the secondary control strategy.

A.28 TWRS-P SITE SPECIFIC GEOPHYSICAL AND GEOTECHNICAL INVESTIGATION REPORT

Statement of the Issue

The analysis and design of the structural foundation system of the existing site materials and those materials that may be transported to the site as well as the concrete and steel structures to be constructed on or in the site materials should reflect the site specific conditions. Pre-topical meetings on the subject of seismic analysis and design that were held in 1998 and 1999 targeted the report of the site specific geophysical and geotechnical investigations and recommendations to be available in mid-1999 to correspond to the start of the seismic analysis in March 1999 and the completion by the end of December 1999. This schedule would allow, based on the project schedules, to have the structural analysis completed by mid-April 2000. This schedule would provide for the completion of the development of structural and civil information for input to the LCAR. Repeated delays in the initiation of the work as well as in the completion of the work occurred in 1999 with meetings to discuss the data, findings and recommendations being postponed in August, September and October of 1999, and then no meetings being identified. Until the LCAR, dated June 26, 2000, was submitted no information has been available relative to the site subsurface investigations. The LCAR identifies the document as, "Geotechnical Investigation Report," Shannon and Wilson, Inc., H-161-51, dated May 2000.

Specific Example

The basis for the analysis and design of the pretreatment building may be based on assumed information and the actual report of the geotechnical conditions has not been reviewed and evaluated by the regulatory authority.

DOE Position

DOE recognizes that this report and the information it contains is long overdue, however, the contract for the work was apparently under DOE control, not BNFL Inc.

NRC Concerns

While the report is late and untimely, the data and recommendations in the report must be thoroughly reviewed for adequacy and the final regulatory evaluation and recommendations will have to be reflected in the analysis and design completed to date. Assumptions made during the period of time when the design parameters from the actual report were not available must be verified as conservative. The adequacy of the complete analysis and design work should not be influenced by the fact that rework will have to be performed.

NRC Evaluation and Assessment

NRC did not receive the report in the LCAR material provided by the RU just as the project was being terminated, so no evaluation or assessment of this issue was made.

APPENDIX B

January 29, 1997

MEMORANDUM OF UNDERSTANDING BETWEEN THE NUCLEAR REGULATORY COMMISSION AND THE DEPARTMENT OF ENERGY

COOPERATION AND SUPPORT FOR DEMONSTRATION PHASE (PHASE 1) OF DOE HANFORD TANK WASTE REMEDIATION SYSTEM PRIVATIZATION ACTIVITIES

B1. PURPOSE

The purpose of this Memorandum of Understanding (MOU) between the Nuclear Regulatory Commission (NRC) and the Department of Energy (DOE) is to establish the basis for cooperation and mutual support during the demonstration phase (defined as Phase I) of DOE's Tank Waste Remediation System-Privatization (TWRS-P) activities. An objective of this DOE/NRC interaction is the development and execution of a comprehensive regulatory program by DOE that is consistent with NRC's regulatory approach for protecting workers, the general public, and the environment. DOE's regulatory program is to be structured to facilitate the possible transition of regulatory responsibilities from DOE to NRC at the start of the full-scale operations phase (defined as Phase II). During Phase I, DOE is responsible for implementing the TWRS Privatization regulatory program. This MOU provides for cooperation and mutual support in an integrated effort that provides for:

1. DOE to acquire capability to implement a program of nuclear safety and safeguards regulation consistent with NRC's regulatory approach.

2. NRC to acquire sufficient knowledge and understanding of the physical and operational situation at the Hanford waste tanks and the processes, technology and hazards involved in Phase I activities, to enable NRC (a) to assist DOE in performing reviews in a manner consistent with NRC's regulatory approach and (b) to be prepared to develop an effective and efficient regulatory program for the licensing of DOE contractor-owned and contractor-operated facilities that will process waste at Hanford during Phase II.

B2. INTRODUCTION

1. Background

During 1991, the DOE established the TWRS Program at the Hanford site to manage, retrieve, treat, immobilize, and dispose of certain radioactive waste in a safe, environmentally-sound, and cost-effective manner. The requirements and commitments for the TWRS cleanup activities are documented in the Hanford Federal Facilities Agreement and Consent Order, also known as the Tri-Party Agreement (TPA). Under the TPA, DOE, the U.S. Environmental Protection Agency (EPA), and the Washington State Department of Ecology have agreed to a timetable for cleanup of the Hanford site.

DOE, through the TWRS Program, is making a fundamental change in its contracting approach at Hanford, utilizing privately-owned facilities on the Hanford site for processing waste which contains special nuclear material. This change in contracting approach also necessitates a fundamental change in DOE's approach to regulation and oversight.

To accomplish the TWRS requirements, DOE plans to privatize treatment operations for the Hanford tank wastes. The TWRS-P is divided into two phases, a demonstration phase (defined as Phase I) and a full-scale operations phase (defined as Phase II). During both phases, DOE will purchase waste treatment services from a DOE contractor-owned, contractor-operated facility under a fixed-price type of contract; DOE will provide the feedstock to be processed. The DOE TWRS-P Contractor must finance the project; design the equipment and facility; apply for and receive required permits and licenses; construct the facility and bring it on line; operate the facility to treat waste; and deactivate the facility.

DOE will undertake nuclear safety and safeguards regulatory responsibility associated with the TWRS-P activities during Phase I. The EPA and the State of Washington have responsibility to regulate environmental issues and the Occupational Safety and Health Administration has responsibility to regulate occupational safety. NRC's participation during Phase I will primarily be of a cooperative nature for the purposes of information transfer and assisting DOE in the establishment of a regulatory program that is consistent with NRC's regulatory approach for protecting workers, the general public, and the environment.

This MOU describes the relationship between NRC and DOE for activities conducted during Phase I only. The relationship between NRC, DOE, and the DOE TWRS-P Contractors during Phase II remains to be clarified by legislation and/or regulatory requirements.

2. Phase Descriptions

Phase I

Phase I is a proof-of-concept/commercial demonstration-scale effort. The objectives of Phase I are to: (a) demonstrate the technical and business viability of using privatized facilities to treat Hanford tank waste, (b) define and maintain required levels of safety and safeguards, (c) maintain environmental protection and compliance, and (d) substantially reduce life-cycle costs and time required to treat Hanford tank waste.

Phase II

Phase II will be the full-scale production phase, in which the facilities are to be configured so that all the remaining tank waste can be processed. The objectives of Phase II are to (a) implement the lessons learned from Phase I, and (b) process all tank waste into forms suitable for final disposal. The current DOE proposal is to have NRC assume full regulatory responsibility (consistent with the manner in which NRC regulates its licensees) for Phase II, although certain operational, statutory, and regulatory issues must be clarified before the proposed Phase II regulation by NRC can be implemented. Current estimates are that DOE procurement documents and NRC regulatory requirements for Phase II would be needed by the year 2004.

This MOU does not apply to Phase II activities.

B3. AUTHORITY

1. Department of Energv

Sections 31, 91, and 161 of the Atomic Energy Act of 1954, as amended; Section 104 of the Energy Reorganization Act of 1974; and, Section 301 of the DOE Organization Act authorize DOE to provide for the safe storage, processing, transportation and disposal of hazardous waste, including radioactive waste, resulting from nuclear materials production and weapons production. In addition, with regard to activities under DOE's jurisdiction, Section 161.i.(3) of the Atomic Energy Act of 1954, as amended, permits DOE to prescribe such regulations or orders as it may deem necessary to govern DOE activities authorized by the Atomic Energy Act of 1954, as amended, including standards and restrictions governing the design, location, and operation of facilities used in the conduct of such activity, in order to protect health and to minimize danger to life or property.

2. Nuclear Regulatory Commission

Sections 53, 57, 62, 63, 81, 103, 104, and 161b, of the Atomic Energy Act of 1954, as amended, and Section 201(f) of the Energy Reorganization Act of 1974 authorize NRC to license and establish by rule, regulation, or order, standards and instructions to govern the possession and use of special nuclear material, source material, or byproduct material to protect health or to minimize danger to life or property, or to promote the common defense and security. This agreement is entered into pursuant to these and other applicable authorities, including the Economy Act of 1932, as amended.

B4. FOUNDATION UNDERSTANDINGS

1. This MOU applies to Phase I only.

2. DOE will regulate the DOE TWRS-P Contractors during Phase I under the terms and conditions agreed upon by DOE and the DOE TWRS-P Contractors, and will be responsible for the regulatory oversight of all design, construction, operational, and event-response activities. NRC will have no regulatory authority over the DOE TWRS-P Contractors during Phase I.

3. No regulatory action, process, or practice established by DOE during Phase I will be binding on NRC during any possible NRC regulatory oversight of DOE TWRS Privatization Contractors during Phase II.

4. NRC's regulatory approach is based (a) on reviewing the applicant's systematic and integrated identification of potential accidents and interactions resulting from radiological and related process chemical and fire hazards, and (b) on ensuring adequate protection against those hazards which could impact on the safety of the worker, the general public and the protection of-the environment.

B5. AGREEMENTS BETWEEN PARTIES

1. Responsibilities

Department of Energy

The Manager, Richland Operations Office, will be responsible for implementing the terms of this agreement. The TWRS Regulatory Official, who reports to the Manager, Richland Operations Office, will be the DOE point of contact for all communications relating to carrying out the provisions of this agreement.

Nuclear Regulatory Commission

The Director of the Office of Nuclear Materials Safety and Safeguards (NMSS) will be responsible for implementing the terms of this agreement. The Chief of the responsible Branch within NMSS will be the NRC point of contact for all communications related to carrying out the provisions of this agreement.

2. General Provisions

a. At the foundation of the DOE privatization approach is a predictability and reliability feature embedded in DOE's contracts with the TWRS-P Contractors—namely contractual commitments for DOE regulatory actions within specific time periods. Essential to timely and orderly DOE regulatory actions is the awareness by NRC of these contractual commitments and the need for timely interaction between DOE and NRC at all levels.

b. If an issue arises in the implementation of this MOU which cannot be resolved at the agency point-of-contact level, the NRC and DOE agree to refer the matter within 30 days to the Director, NMSS, and the Manager, Richland Operations Office, for appropriate action.

c. It is the intent of both parties to conduct the TWRS Regulatory Program in an open, public, and professional manner. NRC and DOE recognize the importance of providing timely and accurate information to the public regarding regulatory matters that may affect the protection of workers, the general public, and the environment. Meetings between NRC and DOE staff in connection with this MOU will be governed by NRC policy on open meetings (59 FR 48340; September 20, 1994). NRC will participate with DOE in public meetings and other public interactions, as appropriate. All transmittals between DOE and NRC regarding TWRS Privatization activities will be made publicly available, consistent with NRC and DOE policies and requirements, at an established local public document room.

d. Each agency recognizes that it is responsible for the protection, control, and accounting of classified, proprietary, and procurement-sensitive information; Safeguards Information (SGI); and Unclassified Controlled Nuclear Information (UCNI).

e. Each agency will be responsible for processing, under its established program(s), allegations—declarations or statements or assertions of impropriety or inadequacy whose validity has not been established—associated with the regulated TWRS-P activities covered by this MOU. Each agency will keep the other agency informed, as appropriate, of such allegations, the allegations' status, and the allegations' resolution. Each agency will assure that allegations are promptly referred to the agency or entity that has jurisdiction over the allegation.

f. support of the DOE TWRS Privatization activities, DOE will provide private office space and equipment, if needed, for NRC in the vicinity of the TWRS Regulatory Unit in the Richland, Washington area. DOE will provide the NRC with ready access to current TWRS regulatory information; access to key individuals in the Regulatory Unit for consistency discussions; access to TWRS general information, tank farm status and operational issues, and safety perspectives; and access to Hanford site safety perspectives.

3. Regulatory Interaction Activities

a. <u>Site Familiarization</u>

NRC will need to acquire knowledge of the physical and operational situation for the Hanford waste tanks and of the processes, technologies, and hazards involved in processing the tank wastes. The following activities will be performed to provide this familiarization:

I. NRC will visit the Hanford site, as necessary, to examine the conditions of the tank farms as they may relate to TWRS-P. As part of NRC's orientation, DOE will provide to NRC information on:

- The physical conditions and operational requirements necessary for safe storage, retrieval, transfer, and processing of the tank waste.
- Evaluations of the criticality potential for TWRS Privatization activities.
- Radiation levels of the waste and chemical forms of the waste.
- Contamination levels in the areas of the planned TWRS Privatization facilities and tanks.
- Hydrogen generation/flammable gas situation of tanks.
- Organic complexant/nitrate oxidizer situation of tanks.
- Other possible hazards associated with the waste.
- Available or planned waste movement systems.
- The Resource Conservation and Recovery Act (RCRA), Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), and Atomic Energy Act of 1954 for the TWRS.

II. DOE will provide NRC access to the tank farms, tank farm records and documentation, and other information concerning operational conditions and events that NRC may desire in order to understand the TWRS Privatization project and associated hazards, processes, and conditions.

III. Upon request by NRC, DOE will brief or hold discussions with NRC on issues related to the TWRS Privatization effort. The locations, timing, and content of these meetings will be agreed upon by the points of contact for each agency.

IV. NRC may occasionally conduct reviews and special audits or inspections at DOE's request to provide objective perspective on selected regulatory issues.

b. Regulatory Familiarization

To assist the DOE in establishing the capability to regulate consistent with NRC concepts and principles, the NRC will provide detailed briefings, guidance documents, and support in developing important administrative and technical program elements of a regulatory program. NRC will provide DOE access to regulatory training provided by NRC to its staff on a space available basis and, with specific agreement, will provide DOE opportunity to observe NRC's regulatory activities.

c. Development of DOE TWRS Regulatory Program

DOE guidance specific to the regulation of DOE TWRS-P Contractors will be prepared and issued by DOE. The guidance is for use by the DOE's TWRS Regulatory Unit in its execution of the regulatory reviews and resulting regulatory actions and is provided as information to the DOE TWRS-P Contractors for their preparation of regulatory submittals. The guidance will cover those submittals required of the Contractors by DOE such as the Quality Assurance (QA) program, essential set of safety standards and requirements (including the site-specific design basis), integrated safety management plan, safety assessment, construction authorization request, operating authorization request, operational reports and assessments, and deactivation authorization. DOE will be responsible for issuing this guidance in its final form.

The following activities will be performed by NRC and DOE to develop the guidance:

I. NRC will provide DOE with established and evolving NRC guidance and position documents as input for DOE to consider in the development and updating of its guidance for the DOE regulatory review. NRC will assist DOE in developing a DOE inspection program that will be applied during design, fabrication construction (e.g. acceptable codes and standards for concrete, electrical, welding, etc.), installation, and qualification testing.

II. DOE will develop guidance for the review of Contractor submittals and DOE reviews of TWRS-P activities. NRC will review and provide a basis for its comments on DOE's draft guidance to identify areas that may not be consistent with NRC's regulatory approach.

III. NRC will participate, as appropriate, with DOE in the joint development of guidance, based on industry standards, e.g., American Nuclear Society/American National Standards Institute (ANS/ANSI), for issuance by DOE as guidance for the DOE TWRS-P Program.

d. Regulatory Program Implementation

Specific DOE regulatory activities planned include design basis review, QA program evaluation, standards approval, initial safety evaluation, construction authorization and inspection, operating authorization oversight, and deactivation authorization. These actions will begin in Fiscal Year 1997 and continue throughout Phase 1. The following activities will be performed by DOE and NRC in fulfillment of their respective responsibilities under this MOU:

I. DOE will be responsible for safety (e.g. design basis) and safeguards reviews and determining acceptability of DOE TWRS-P Contractors' submittals against the DOE TWRS guidance. DOE will have final decision authority for regulatory implementation during Phase I and for all interactions with the DOE TWRS-P Contractors.

II. NRC will review and provide a basis for its comments on DOE TWRS-P Contractors' submittals to identify any areas that are not consistent with NRC's regulatory approach. These submittals will include all documents which address the technical and quality basis for the TWRS facilities and which could affect nuclear and process safety and safeguards in design, construction and operation.

NRC will assist DOE in evaluating submittals and in verifying effective implementation of:

- Design: design basis, design verification, level of design detail and documentation, design specifications, calculations and drawings, and procurement specifications.
- Quality assurance for design, procurement, construction, pre-operational testing and operation.
- Operator training and qualification
- Human factors.
- Emergency response.

B5. OTHER PROVISIONS

1. Nothing in this MOU will limit the authority of either agency to independently exercise its authority with regard to matters that are the subject of this MOU.

2. Nothing in this MOU will be deemed to establish any right nor provide a basis for any action, either legal or equitable, by any person or class of persons challenging a government action or a failure to act.

3. This MOU will be effective upon signature and upon satisfaction of conditions in Section VI.4 and will remain in effect until the end of Phase I. This agreement may also be terminated by mutual agreement or by written notice of either party submitted six months in advance of termination. Amendments or modifications to this agreement may be made upon written agreement of the parties.

4. This MOU will become effective and remain in effect during such time periods when Congress authorizes and provides appropriate funding (or when there is another acceptable form of reimbursement) for NRC's participation in this project.

5. Activities within the scope of this MOU and within the scope of appropriated resources are mutually agreed to be without reimbursement of cost for either organization. Special activities such as described in Sections V.C.1.d and V.C.2 may be negotiated for cost reimbursement as needed.

APPENDIX C
POINT PAPER SUMMARIES

C1. MATERIALS CONSIDERATIONS OF PROPOSED TANK WASTE REMEDIATION SYSTEMS

Technical approaches are being formulated for the treatment of DOE tank wastes into vitrified waste forms suitable for long term storage and disposal. Tank wastes from the Hanford site are likely to involve significant processing efforts for separating radionuclides from nonradioactive species and concentrating them in the high level waste (HLW) glass. The appropriate selection of materials of construction and their inservice corrosion/erosion performance monitoring impact the safety of the facility primarily from the perspective of adequate confinement of radioactive materials, and this paper provides an overview of materials selection concerns based upon the knowledge of the design approach at this point in time, corresponding to perhaps a 5 percent design level (i.e., very preliminary design). Both general and specific corrosion/erosion are likely to occur over the Tank Waste Remediation System (TWRS) operating lifetime of some 30-plus years. Potential areas of the TWRS-Privatization (TWRS-P) facility where corrosion/erosion induced loss of confinement could result in the potential for radiation exposures exceeding regulatory limits have been identified as follows:

1. Tanks.
2. Pressurized transfer piping.
3. Pump seal areas.
4. Melters.
5. Melter offgas treatment areas.

Analyses estimate both unmitigated and mitigated consequences from potential accident scenarios in these areas, using a conservative approach suitable and normalized volumes for safety categorizations and preliminary designs. Several corrosion/erosion scenarios have potential accident consequences to the workers and the public of sufficient severity and risk (in the 2E-2/yr to 6E-2/yr range) such that prevention (reduce probability) and mitigation (reduce consequences) become necessary, requiring the identification of items relied upon for safety. These include the following:

1. Leakage from HLW and low activity waste (LAW) storage tanks, with potential risks of 1.4E-3/yr to 1.4E-4/yr.

2. Pressurized transfer lines with potential risks around 4E-5/yr.

3. Pump seal areas with potential risks up to 4E-2/yr.

4. Corrosion failures in the HLW melter areas with potential risks up to 1.2E-2/yr.

Potential risks from corrosion/erosion related loss of confinement of the separated cesium storage tank and LAW melter areas are lower in the 1E-6/yr to 1E-7/yr range.

There are no clear definitions of "acceptable risk." However, the NRC public dose limit from routine operations and the average U.S. worker risk (all causes) both correspond to around 5E-5/yr risk, and it would be anticipated that "acceptable risk" would be some percentage of this. A small percentage (0.1-0.5 percent) of the average cancer risk (currently around 2E-3/yr) has also been mentioned. It seems likely that the total, potential risk level for a TWRS-P like facility would have to be below 1E-5/yr and probably close to 1E-6/yr in order to be acceptable to the public. Therefore, some equipment is likely to be designated as relied on for safety in order to address corrosion/erosion loss of confinement concerns and reduce the potential risks. The two most likely approaches are prevention, which depends heavily upon operator actions to detect corrosion/erosion and avoids loss of confinement events, and mitigation, which relies upon the cell and ventilation system for additional confinement after failure. Ideally, the selection of the appropriate materials of construction, in conjunction with robust designs, redundant features, safety controls, adequately conservative corrosion/erosion margins, inspections, monitoring, and operator intervention are likely to provide adequate assurances of safety and offer the potential for reducing materials-related accident risk to more acceptable levels (circa 2E-6/yr).

This effort has identified a relative lack of published corrosion and erosion information under expected operating conditions of the TWRS-P, particularly in the melter and offgas areas. Also, failure and release data for accident analysis are not well established for vitrification facilities in the expected TWRS-P environment. It is anticipated that additional information will become available from DOE and contractor efforts as the program continues to develop.

This paper has considered selected materials-related safety considerations with respect to the proposed TWRS-P facility. Since radioactive materials will be confined in vessels, pipes, pumps vitrification melters, waste canisters, and other associated confinements, the appropriate performance- and life-limiting factors due to corrosion, erosion, and the combined effects of corrosion and erosion have been considered in general terms. However, the design of the TWRS-P facility is very preliminary and ongoing as of December, 1999. Reportedly, the current status corresponds to about 5 percent of preliminary design, with major design changes occurring. Detailed information on materials selection for various major process vessels, piping, and other confinement is still not available. Careful monitoring of this critical aspect should be considered when the Contractor submits the construction authorization request (CAR) in November 2000.

C2. PROCESS SAFETY OF PROPOSED TANK WASTE REMEDIATION SYSTEMS

Technical approaches are being formulated for the treatment of U.S. Department of Energy (DOE) tank wastes into vitrified waste forms suitable for long term storage and disposal. Tank wastes from the Hanford site are likely to involve significant chemical processing for separating radionuclides from nonradioactive species with the intent of concentrating the radioactive species in the vitrified HLW and concentration of the nonradioactive species (including most of the sodium) into vitrified LAW. The current plan envisions treatment in a private contractor owned facility on the Hanford site with subsequent storage of the vitrified HLW at a DOE facility onsite. Disposal of vitrified LAW occurs in a near-surface DOE disposal unit at Hanford.

This paper presents analyses for chemical and process safety at potential TWRS-P facilities using generic and conceptual process approaches proposed by DOE contractors. These analyses identify the following areas of concern from the perspective of chemical and process safety:

1. Radiochemical inventories.
2. Process efficacy.
3. Organic ion exchange resin/nitrate interactions.
4. Crystalline silicotitanate (CST) drying.
5. Organic materials .
6. Radiolysis.
7. High temperature operations.
8. Nonradioactive chemical effects upon radiochemical processing.

Several of these areas of concern have events that can be analyzed at this early stage of design using a conservative, bounding approach suitable for structures, systems, and components (SSC) categorization. The remaining areas of concern are discussed qualitatively, but require a more detailed process and facility design for quantification. Analyses estimate both unmitigated and mitigated consequences and potential risks from these events. Several event scenarios involving resin interactions, CST, large radiochemical inventories, melter cold cap, and cold chemical releases have potential accident consequences to the workers and the public of sufficient severity such that the corresponding risk may not be acceptable, based upon comparisons to current limits. Consequently, prevention (reduce frequency and probability) and mitigation (reduce consequence severity) become necessary, requiring the identification of items relied on for safety. Analyses estimate the combined, unmitigated risk to the receptor at 100 meters as approximately 2.4E-2/yr, about an order of magnitude above the equivalent risk of the 10 CFR Part 20 radiation worker annual dose limit of 5 rem. Melter and organic resin scenarios dominate the potential unmitigated risk at 100 meters, accounting for about 94 percent of the risk total. However, the remaining risk from the identified potential events still is an order of magnitude greater than the average occupational risk for U.S. workers of 4.8E-5/yr.

Fortunately, relatively simple and effective prevention and mitigation methods are available to reduce the potential risk from the TWRS-P facility. Passive prevention methods rely upon high quality, inspected, and tested components with conservative design and corrosion margins. This is a standard approach for nuclear facilities. Active prevention uses controls to avoid operating sequences outside the design envelope that are precursors to events with consequences; the controls can be based upon instrumentation or administrative procedures. Mitigation reduces consequences primarily by confinement (e.g., cells with high efficiency particulate air [HEPA] filters), with adequate levels of defense-in-depth. Again, this is a standard approach in the nuclear industry. Prevention and mitigation offer the potential to reduce the risk from TWRS-P operations to around 2E-6/yr. This result is less than 5 percent of the average occupational risk, around 1 percent of the risk from the average background dose, and around 0.1 percent of the average cancer fatality rate and is likely to be acceptable.

Obviously, DOE and its contractors will include experimental testing as part of the program leading to the design, construction, and operation of the TWRS-P facility. Few appropriate safety related parameters, such as failure rates, modes, and release fractions, are available for HLW processing and vitrification facilities. It would be beneficial if the measurement of such safety parameters could be included in the DOE program.

A potential rupture of cold chemical storage tanks containing ammonia and nitric acid would have onsite and offsite effects exceeding Emergency Response Planning Guideline-3 levels and require evacuation of the facility. Consequently, the facility design should include provisions to address such an event, by either dedicated breathing air to control and operator areas of the facility during such an event, a remote control facility, automated operation/shutdown, effective mitigation of the chemical releases, or other means. In addition, some portions of the facility should be designed as shelter areas from potential events, including chemical releases.

APPENDIX D
DISCUSSION OF POTENTIAL ISSUES FOR REGULATORY TRANSITION

This attachment provides a discussion of issues related to the potential transition of regulatory authority for the Tank Waste Remediation System/Waste Treatment Plant (TWRS/WTP) facilities from U.S. Department of Energy (DOE) to the U.S. Nuclear Regulatory Commission (NRC) based upon their status as of June 2000. Many of these issues are summarized in Main Reference 17 and have been discussed between the DOE and NRC over the 4-year length of the program. From the viewpoint of the NRC staff, most of the issues would be addressed by the legislation that enables NRC regulatory authority over the TWRS/WTP facilities or NRC external regulation of DOE facilities, and by continued refinement and detailing of the proposed facility designs. The remaining issues relate to DOE programmatic activities and not regulation. If the NRC had remained involved in the program, continuing activities and design refinements might have changed some of the conclusions.

D1 EMERGENCY PLANNING

Issue

Emergency planning is presently site-wide and is under the control of the DOE. Since the NRC normally regulates emergency planning at licensee facilities, this aspect of the TWRS/WTP contractor operation would become subject to NRC regulation.

Discussion

The emergency planning requirements of DOE and NRC are very similar. NRC requires some applicants for licenses under 10 CFR Part 70 to provide emergency plans.[100] Further guidance specific to the format and content for the emergency plans is given in Regulatory Guide 3.67.[101]

DOE's requirements for emergency planning are contained in DOE Order 151.1,[102] which supersedes the 5500 series of DOE Orders. However, the Hanford Emergency Response Plan[103] still invokes the 5500 series of DOE Orders until the new Order can be implemented. Further detailed guidance is provided in the Emergency Management Guide.[104] The guidance

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[100] Code of Federal Regulations, *Title 10, Energy,* Section 70.22(1)(ii).

[101] Nuclear Regulatory Commission (U.S.)(NRC). Regulatory Guide 3.67, "Standard Format and Content for Emergency Management System." NRC: Washington, D.C. January 1992.

[102] Department of Energy (U.S.)(DOE). DOE Order 151.1, "Comprehensive Emergency Management System." DOE: Richland, Washington. September 25, 1995.

[103] Department of Energy (U.S.)(DOE). DOE/RL 94-02, "Hanford Emergency Response Plan." DOE: Richland, Washington. 1994

[104] Department of Energy (U.S.)(DOE). DOE G 151.1, "Emergency Management Guide." DOE: Richland, Washington. August 1997.

in this document is very similar to that found in the NRC Regulatory Guide. It is, however, more specific.

Both DOE and NRC have a classification scheme for emergency events. DOE suggests three levels (alert, site area emergency, and general emergency),[105] while the NRC guidance provides for two different emergency event classifications (alert and site area emergency).[106] Both agencies support the use of offsite emergency resources in the event of emergencies and suggest written agreements between these local, state, and federal entities.[107,108]

Many DOE facilities have other facilities in close proximity and areas of public access (e.g., rivers, state or federal roads, etc.) within a short distance of the facility. In this situation, DOE usually develops a site-wide or reservation-wide emergency plan that incorporates the facility-specific plans. The approach is consistent with that of the NRC; however, more coordination of emergency planning activities with local, state, and Federal agencies is required. The DOE Field Office usually provides this coordination, particularly when there are multiple contractors on a site.[109]

In both its Integrated Safety Management Plan[110, 111] and its Initial Safety Analysis Report (ISAR), BNFL Inc. states that its emergency management plan will be implemented consistent with the Hanford Emergency Response Plan such that an integrated, timely, emergency response is assumed.

DOE's emergency planning activities cover the entire Hanford Reservation, which encompasses many more facilities than just the proposed TWRS/WTP facilities, and provides the primary interface with the appropriate local and state agencies. Facility-specific emergency plans are also prepared by the contractor; however, these plans primarily contain the facility-specific information required to comply with DOE Orders and define the conditions under which the DOE Operations Office is apprised of an emergency and the coordination between the

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[105] Department of Energy (U.S.)(DOE). DOE G 151.1, Emergency Management Guide, Vol. 3, Table 3.1, "Summary of Emergency Classes." DOE: Richland, Washington. August 1997.

[106] Nuclear Regulatory Commission (U.S.)(NRC). Regulatory Guide 3.67, Section 3, "Standard Format and Content for Emergency Plans for Fuel Cycle and Materials Facilities." NRC: Washington, D.C. January 1992.

[107] Department of Energy (U.S.)(DOE). DOE G 151.1, "Emergency Management Guide." DOE: Richland, Washington. August 1997.

[108] Nuclear Regulatory Commission (U.S.)(NRC). Regulatory Guide 3.67, Section 3, "Standard Format and Content for Emergency Plans for Fuel Cycle and Materials Facilities." NRC: Washington, D.C. January 1992.

[109] Department of Energy (U.S.)(DOE). DOE G151.1, Vol. 1, "Emergency Management Guide." DOE: Richland, Washington. August 1997.

[110] BNFL Inc. BNFL-5193-ISP-01, Rev. 2, "TWRS-P Project Integrated Safety Management Plan." BNFL Inc.: Richland, Washington. April 17, 1998.

[111] BNFL Inc. BNFL-5193-ISP-01, Rev. 0, "TWRS-P Project Integrated Safety Management Plan." BNFL Inc.: Richland, Washington. September 1997.

facility and DOE. As noted above, DOE then interfaces with the appropriate local and state authorities.

BNFL Inc. has stated in its submittals that it will develop its emergency plans consistent with the Hanford Emergency Response Plan and that it will work with DOE and its contractors to provide for integrated emergency management of the Hanford site.[112] BNFL Inc. has also committed to design its emergency management program to work within the existing emergency management programs and to entering into agreements with DOE and the DOE contractors operating other facilities on the Hanford site to share resources and equipment.[113] The NRC staff has reviewed Section 9 of BNFL's ISAR, which pertains to emergency management, and found that the format and content were consistent with the NRC's guidance. Furthermore, the NRC staff found no significant open items in the area of emergency management aside and that the DOE guidance is both generally consistent with the NRC's approach and more prescriptive. The NRC staff did find that the emergency management plans of TWRS/WTP should be integrated with those of the site, and responsibilities, authorities, etc., established in written documentation.

If regulatory oversight were to transition to the NRC, then the TWRS/WTP contractor's emergency program would likely fall under NRC jurisdiction. NRC may require the contractor to modify its Emergency Response Plan to be consistent with the NRC guidance. For example, the discussion of emergency planning in the ISAR defines three categories of emergencies, which is consistent with the DOE guidance. If NRC were to assume regulatory oversight, then the TWRS-P emergencies may have to be reclassified and other changes may be required to provide compliance with the NRC Regulatory Guide.[13]

The NRC staff has noted that the emergency classifications currently proposed by BNFL Inc. are consistent with the Hanford Emergency Response Plan but are inconsistent with the emergency event classifications in 10 CFR Part 70. The NRC staff noted that the TWRS-P project presents different hazards from those of the more traditional fuel cycle facilities so that a need for extending the emergency classifications to include the general emergency category might be warranted depending on the conclusions of the integrated safety analysis. However, the TWRS-P emergency event classifications would still not be consistent with the NRC guidance. The NRC staff has considered a number of alternatives ranging from modifying the regulations to allowing DOE to maintain the role of lead agency for emergency response. The alternatives ranging from modifying the regulations to allowing DOE to maintain the role of lead agency for emergency response. The alternatives also included using the licensing process to define the emergency event requirements. The NRC staff's concern is that, if the TWRS-P project had emergency event classifications different from other 10 CFR Part 70 licensees, this could be a source of NRC staff confusion in the NRC's Emergency Response Center during an actual event and that there could be confusion on training and procedures.

The TWRS-P situation is somewhat analogous to the Washington Public Power Supply System (WPPSS) nuclear plants, WNP-1 and WNP-2, that are situated on leased land on the DOE

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[112] BNFL Inc. BNFL-5193-ISP-01, Rev. 2, Section 3.10, "TWRS-P Project Integrated Safety Management Plan." BNFL Inc.: Richland, Washington. April 17, 1998.

[113] BNFL Inc. BNFL-5195-ISAR-01, Rev. 0, Section 9.1, "TWRS-P Project Initial Safety Analysis Report." BNFL Inc.: Richland, Washington. January 12, 1998.

reservation. However, the WPPSS facility is not situated in close proximity to other facilities, and there are no DOE workers in the immediate vicinity of the WPPSS facilities. WPPSS has established two Memoranda of Understanding (MOU) with DOE; one for cooperation and mutual use of emergency response personnel, and a second for use of DOE's decontamination facilities in the event of personnel contamination. WPPSS also has established agreement with the local and state emergency response organizations. Similarly, the Siemens fuel fabrication facility, which as an NRC licenses under 10 CFR Part 70, is located on property that it owns but which is adjacent to the DOE reservation. Like WPPSS, Siemens has established MOUs with DOE and the interested local and state agencies.

Preliminary NRC Staff Assessment

If the TWRS/WTP facilities were to transition to NRC regulation, the NRC staff would expect integration issues with other Hanford site operations to be fully addressed, communications and responsibilities clearly defined, and the appropriate authorities for the TWRS/WTP Emergency Plan (EP) managers to direct the Hanford site EP as necessary based upon the Integrated Safety Analysis (ISA). This would likely be formalized in MOUs similar to the existing NRC facilities on and adjacent to the Hanford site. The NRC staff does not view this as a significant issue.

D2 RADIOACTIVE WASTE REGULATORY AUTHORITY

Issue

DOE is concerned about the regulator, authority, and requirements for the radioactive wastes generated by TWRS-Privatization (TWRS-P).

Discussion

The DOE plans for long term storage and/or disposal of the vitrified low activity waste (LAW) from the TWRS-P facility locally (i.e., on the Hanford site) in near-surface facilities. The vitrified high-activity waste will be stored locally and subsequently sent to a Federal repository for permanent disposal.

The current framework for regulation of DOE radioactive waste provides for the NRC regulation of high level waste (HLW) and DOE regulation of other types of radioactive waste. A key consideration in identifying DOE-regulated waste is whether the waste was generated incidental to HLW reprocessing. Such wastes might include spent resins, failed melters, and high efficiency particulate air (HEPA) filters in addition to vitrified LAW. The critical importance of this determination is that waste determined to be incidental to HLW reprocessing is not classified as HLW and can be addressed by low level waste (LLW) regulations and storage/disposal facilities. Such facilities could be regulated by either DOE, NRC, or the State of Washington. If DOE decided to use existing DOE storage/disposal facilities at Hanford, these would not be subject to regulation by NRC. A significant portion of this issue is devoted to the examination of the nuances of identification of waste incidental to HLW reprocessing. Under the current regulatory structure, the NRC staff regards the identification of waste incidental to HLW reprocessing as the pivotal issue in assessing the adequacy of DOE plans for onsite disposal of LLW generated by TWRS-P.

The incidental waste issue stems from NRC's broad definition of HLW and the absence of a formal definition of incidental waste. HLW is defined as irradiated reactor fuel; liquid wastes from the first cycle of a solvent extraction system, or equivalent, and the concentrated wastes from subsequent solvent extraction cycles, or equivalent, in an special nuclear fuel (SNF) reprocessing facility; and solid materials into which those liquid wastes have been converted. Disposal of HLW requires a geologic repository. Land disposal requirements of radioactive wastes are contained in 10 CFR Part 61—such wastes are usually referred to as LLW. Incidental wastes are not mentioned in the regulations.

Appendix F of 10 CFR Part 50 sets the NRC policy relating to siting of fuel reprocessing plants and related waste management facilities. The policy sets the time limits for on-site storage of high level radioactive wastes and also defines high level radioactive waste. In 1970, with the promulgation of 10 CFR Part 70, the Atomic Energy Commission specifically noted that the term high level waste did not include waste resulting from HLW reprocessing plant operations such as ion exchange beds, sludges, and contaminated laboratory items, such as clothing, tools, and equipment. These excluded wastes were referred to as incidental waste.[114]

There are operational an economical incentives to demonstrate that waste is not high-level waste.[115] Once the highly radioactive component of waste is separated out, the resultant less radioactive (and potentially more voluminous) LAW is like incidental waste and is in a regulatory dilemma; it is not clearly covered under present NRC regulations and may be disposed of in accordance with DOE orders for LLW disposal[116] at DOE facilities provided the Washington Administrative Code (WAC) is satisfied. Under the present system, unless the NRC determines that this LAW/incidental waste is not HLW, the waste must be disposed of as HLW in a federal repository. However, if sufficient levels of radioactivity are removed from the LAW/incidental wastes, their potential hazards would be comparable to LLW. Hence, their disposal performance requirements could be achieved by near-surface facilities as well.

In January and July 1990, the states of Oregon and Washington unsuccessfully petitioned the NRC to formally promulgate rules for determining that wastes generated incidental to HLW reprocessing are not HLW. In denying the petition for formal rulemaking, NRC restated the criteria for determining the waste to be incidental and not HLW.[117] The NRC criteria were also stated in a letter to DOE and are summarized below:[118]

Criterion One: Wastes have been processed (or will be further processed) to remove key radionuclides to the maximum extent that is technically and economically practical.

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[114] Atomic Energy Commission (U.S.), Washington, D.C. *Federal Register.* Vol 35, p. 17533. November 14, 1970.

[115] U.S. Department of Energy (D. Wodrich) presentation to Oregon Department of Energy. "Classifying Hanford Tank Low Activity Waste Fraction." DOE: Richland, Washington. August 27, 1996.

[116] Department of Energy Order 5820.2A defines LLW as all radioactive waste that is not high level, transuranic, spent fuel, or byproduct material.

[117] Department of Energy (U.S.). Washington, D.C. *Federal Register.* Vol 58, p. 12342. March 4, 1993.

[118] Bernero, R., U.S. Nuclear Regulatory Commission, letter to J. Lytle, U.S. Department of Energy, March 2, 1993.

Criterion Two: Wastes will be incorporated in a solid physical form at a concentration that does not exceed the applicable concentration limits for Class C LLW as set out in 10 CFR Part 61.

Criterion Three: Wastes are to be managed, pursuant to the Atomic Energy Act, so that safety requirements comparable to the performance objectives set out in 10 CFR Part 61, Subpart C, are satisfied.

In short, the NRC position is that the vitrified LAW and incidental wastes can be treated like LLW if they have similar characteristics and hazards as LLW. In November 1996, the DOE Richland Operations Office (DOE-RL) requested NRC agreement that the Hanford tank waste planned for onsite disposal is incidental waste (i.e., not HLW) and, therefore, would not be under NRC licensing authority.[119] The basis for this request was an RL technical basis report that included an interim performance assessment of the waste disposal site. The NRC concluded that the Hanford tank waste planned for onsite disposal met the criteria for classifying it as incidental waste; however, because of the preliminary nature of the tank waste performance assessment submitted by RL, several conditions were stipulated.[120]

From the DOE/Regulatory Unit (RU) perspective, any agreement RL has in place with the NRC related to classification of incidental waste will not be affected by a transition to NRC regulation, so long as NRC grants the materials license to the TWRS-P Contractor on the basis of possession and not ownership of the waste. Under the current arrangement, DOE will retain title to all materials in the waste envelopes provided to the Contractor and in all intermediate and final waste products.[121] The NRC regulation under which the TWRS-P Contractor would likely be regulated (10 CFR Part 70) does not specifically require the contractor to take title or ownership of the waste material being processed.[122]

The State of Washington is an Agreement State[123] as provided by Section 274 of the Atomic Energy Act[124] (AEA). That provision of the AEA permits individual states to assume, with the concurrence of the NRC, regulation of some activities that would otherwise be regulated by the NRC. Low-level radioactive waste management and disposal are among the nuclear activities for which regulation can be assumed by Agreement States and the State of Washington currently regulates such activities within their borders except at DOE facilities. Agreement

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[119] Kinzer, J., U.S. Department of Energy, letter to C. Paperiello, U.S. Nuclear Regulatory Commission, November 7, 1996.

[120] Paperiello, C., U.S. Nuclear Regulatory Commission, letter to J. Kinzer, U.S. Department of Energy, June 9, 1997.

[121] U.S. Department of Energy. TWRS Privatization Contract No. DE-AC06-RL13308, Section C.4.c, page C-9. DOE: Richland, Washington. September 26, 1996.

[122] Code of Federal Regulations, *Title 10, Energy*, Section 70.1(a), "Domestic Licensing of Special Nuclear Material."

[123] Agreement State means a state that has developed a program for regulation of those aspects of radioactive materials and radiation-producing devices not reserved exclusively for the NRC and has signed an agreement with the Commission to assume that responsibility.

[124] Atomic Energy Act of 1954, as amended.

State regulations must be compatible with NRC regulations, but need not be identical. Because Agreement State programs are essentially an extension of the NRC regulatory regime, transition to external regulation of DOE facilities in an Agreement State suggests that the Agreement State would likely be responsible for regulation of LLW generated by TWRS-P. Any uncertainty with respect to the appropriate regulatory entity for management of such wastes could be explicitly addressed in federal legislation mandating external regulation of TWRS/WTP or DOE nuclear activities.

In a similar vein, Washington is a member of the Northwest Interstate Compact on Low-Level Radioactive Waste Management and has enacted into law the governing requirements[125] of that organization. The compact approach to providing for management of LLW was created by Federal statute and was designed to encourage development of regional LLW disposal facilities in part to promote economic viability. The Federal statue[126] allows the compacts to exclude waste from outside the compact. However, the Northwest compact language does not require that all LLW generated within the borders of the member states be disposed of at the compact's regional site. The compact even allows individual LLW generators to establish and maintain LLW management facilities for their sole use.[127] Furthermore, Federal waste facilities are excluded from the definition of "facilities" for the purpose of the compact statute.[128]

Some radioactive materials from remediation of DOE facilities are being disposed of in onsite facilities permitted under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).[129] In an effort to eliminate potential redundancies in the requirements of CERCLA and the DOE Order on radioactive waste management, DOE adopted a policy[130] allowing for the substitution of CERCLA requirements to satisfy similar requirements of the DOE Order if the CERCLA requirements could be demonstrated to yield results equivalent to the DOE requirements. In addition, DOE has prepared guidance to clarify how compliance with the policy can be achieved.[131] In fact, one of the DOE facilities that motivated DOE to develop and adopt the CERCLA policy was the Environmental Restoration Disposal Facility (ERDF) at the Hanford site.

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[125] Revised Code of Washington, *Title 43,* Chapter 145, Section 010, "Northwest Interstate Compact on Low-Level Radioactive Waste Management."

[126] Low-Level Radioactive Waste Policy Amendments Act of 1985, Pub. L. 99-240, as amended (January 15, 1986).

[127] Revised Code of Washington, *Title 43,* Chapter 145, Section 010, Article IV, "Regional Facilities."

[128] Revised Code of Washington, *Title 43,* Chapter 145, Section 010, Article II, "Definitions."

[129] Comprehensive Environmental Response, Compensation, and Liability Act. 1980/1986.

[130] Department of Energy (U.S.)(DOE). CERCLA Policy: "Policy for Demonstrating Compliance with DOE Order 5820.2A for Onsite Management and Disposal of Environmental Restoration Low level waste under the Comprehensive Environmental Response, Compensation, and Liability Act.," DOE: Washington, D.C. May 31, 1996.

[131] U.S. Department of Energy, submittal to Defense Nuclear Facilities Safety Board, "Guidance for complying with DOE Order 5820.2A, 'Radioactive Waste Management' for Onsite Management and Disposal of Low level waste (LLW) Resulting from Environmental Restoration Activities," January 9, 1997.

Both the current DOE Order on radioactive waste management and the proposed draft revision of the Order[132] include the assumption that HLW is mixed waste unless demonstrated otherwise. Mixed waste is waste that includes both a radioactive component and a hazardous component (as defined in the U.S. Environmental Protection Agency (EPA) Resource Conservation and Recovery Act (RCRA) regulations[133]). Such waste is subject to the requirements of EPA and to applicable radioactive waste management requirements. In addition, the Federal Facilities Compliance Act[134] imposes specific deadlines and other requirements on management of mixed waste at DOE facilities. An indirect consequence of the mixed waste assumption is that LLW and transuranic waste derived from HLW are likewise assumed to be mixed waste unless they are demonstrated to be otherwise or the HLW from which they are derived has been demonstrated to be otherwise. Fortunately, EPA regulations identify vitrification as the best achievable technology (BAT) for the hazardous constituents in HLW and LAW.

In the authorizing legislation for NRC regulation of LLW,[135] the responsibility for management of waste with radionuclide concentrations in excess of those allowed for Class C waste is delegated to the DOE. Consequently, the NRC has not promulgated regulations applicable to disposal of such waste. The DOE, on the other hand, does not classify LLW in the same manner as the NRC. DOE does not have explicit requirements for greater than Class C (GTCC) waste, but rather manages it to meet the usual LLW performance requirements of DOE. Transition to external regulation of DOE may produce a situation in which there are no explicit requirements for GTCC waste. The NRC staff believes the waste from vitrification and decommissioning will exhibit radionuclide concentrations less than Class C. In its role as final arbiter of classifications of waste incidental to HLW reprocessing, NRC can disallow such classification of specific waste streams that exceed Class C concentrations. That practice would leave the HLW repository as the most likely disposal facility for such waste, and certification of such waste forms for emplacement in the repository would be required.

Preliminary NRC Staff Assessment

The NRC staff does not consider this a significant issue for regulatory transition because the TWRS/WTP facility is being designed so that the vitrified and incidental wastes will have radionuclide levels meeting Class C criteria or lower. Appropriate qualification testing and documentation will be needed.

D3. SAFEGUARDS AND SECURITY

Issue

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132 Department of Energy (U.S.)(DOE). DOE Order 435.1 (Draft), "Radioactive Waste Management," (distributed for internal departmental concurrence). DOE: Richland, Washington. July 1, 1998.

133 Hazardous Waste Implementing Regulations under the Resource Conservation and Recovery Act 40 CFR 260 through 270, U.S. EPA.

134 Federal Facilities Compliance Act of 1992, Pub. L. 102-386, as amended. 1992

135 Low-Level Radioactive Waste Policy Amendments Act of 1985, Pub. L. 99-240, as amended. (January 15, 1986).

The application of safeguards and security requirements for both the DOE and NRC licensed facilities is based on the classification of the materials processed and/or stored at the facility. It appears there are many similarities in the DOE and NRC classifications of the materials for TWRS/WTP, but there are minor differences.

Discussion

The physical protection requirements for various classifications of special nuclear materials are very similar between DOE and the NRC. The requirements for the protection of special nuclear materials are provided in the 5600 series of the DOE Orders, and the NRC requirements are contained in 10 CFR Part 73. Both DOE and NRC also recognize the differences in the quantities and attractiveness characteristics (isotope, materials type, concentration, enrichment, and physical form) of the materials in the application of those requirements.[136]

The Hanford waste tanks include 177 tanks containing approximately 214 million curies in approximately 55 million gallons of waste. Most of the tanks contain several kilograms of U-235 at low concentrations and enrichment levels. Pu-239, also at low concentrations, is contained in 18 of the tanks, but small quantities (10 to 100 grams occur in all the tanks.
The Initial Safety Analysis Report (ISAR) for TWRS-P[137] characterizes the waste as containing "minor amounts of special nuclear material in the tank waste to be processed by the TWRS-P facility."

The NRC notes that plutonium and U-235 are contained in the TWRS-P tanks in a Formula Quantity of Special Nuclear Material (i.e., greater than 5,000 grams - also called a Category I quantity). The protection requirements for Category I material are given in 10 CFR 73.45. The NRC would classify the materials as Category I since it is based on the characterization of the feed materials and the definition of Category I material as provided in 10 CFR 73.2. Section 73.2 states, "Formula quantity means strategic special nuclear material in any combination in a quantity of 5,000 grams... This class of material is sometimes referred to as a Category I quantity of material."

From the perspective of material control and accounting (MC&A), the NRC has indicated that because DOE sites contain different isotopes and higher concentrations or levels of enrichment of plutonium than NRC-licensed facilities, the categories in the NRC regulations do not overlap. The NRC has also indicated that sampling programs may be required for process control of the vitrification recipe as well as the pretreatment subsystems.

To further complicate the differences in classifying the material, the ISAR states, "For the TWRS-P facility to successfully process this waste, it must separate the radionuclides from the diluted waste while taking into account the additional chemicals (e.g., chelating agents)." This raises the question as to what isotopes are to be separated, to what concentrations, where will they be located within the facility, and what levels of protection will be provided at those locations. Guidance provided to the TWRS-P Contractor states: "The material to be provided to

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136 Code of Federal Regulations, *Title 10, Energy,* Sections 70.4, 73.2, and 74.4 and U.S. Department of Energy Order 5633.3B.

137 BNFL Inc. BNFL-5193-ISAR-01, Rev. 0, "Tank Waste Remediation System Privatization, Initial Safety Analysis Report." BNFL Inc.: Richland, Washington. January 12, 1998.

approaches have the potential to result in different consequence estimates that may produce differing classifications for systems, structures, and components (SSC) required for risk reduction to workers and the public. As a result, SSCs designated for worker protection may require upgrading to meet NRC requirements when regulatory oversight of the TWRS/WTP facilities transitions to the NRC.

Discussion

The DOE/RU position is that CLWs are a subset of workers and should not be classified as members of the public.[145]

The classification of an individual as a CLW is found in DOE safety analysis reports and a proposed standard.[146,147] In the DOE proposed standard for accident analysis, the CLW is defined as a worker in a fixed population outside the daily process safety management controls of a given facility area. In practice, this fixed population normally refers to the workers at an independent facility area located some distance from the reference facility area. The classification is particularly relevant to accident planning and emergency management.

Although the CLW classifications are not found in DOE rules, the definition for a general employee and a member of the public in the DOE rule 10 CFR Part 835, "Occupational Radiation Protection," provides the basis for the RU position that CLWs are considered a subset of workers rather than as members of the public.[148] A general employee is an individual who is either a DOE employee or a DOE contractor employee, an employee of a subcontractor to a DOE contractor or a visitor or a DOE contractor employee, an employee of a subcontractor to a DOE contractor or a visitor who performs work for or in conjunction with DOE or utilizes DOE facilities.[149] As a worker at an independent facility area, a CLW is a general employee under that activity and may receive an occupational exposure. A member of the public means an individual who is not occupationally exposed to radiation or radioactive material. An individual is not a "member of the public" during any period in which the individual receives occupational exposure.[150] Thus, by this DOE logic, a CLW should not be classified as a member of the public because CLWs may receive occupational exposure under 10 CFR Part 835. It should be noted that, under this approach, the CLW does not have to have

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[145] Department of Energy (U.S.)(DOE). RL/REG-98-18, Revision 0, "Regulatory Unit Position on Radiological Safety for Hanford Co-Located Workers." DOE: Richland, Washington. August 17, 1998.

[146] Department of Energy (U.S.)(DOE). EH-12-94-01, Vol. 2, Appendixes, "Method of Assessment of Worker Safety Under Radiological Accident Conditions at Department of Energy Nuclear Facilities." DOE: Richland, Washington. June 1994.

[147] Department of Energy (U.S.)(DOE). DOE-SP-STD-3005-93 Proposed, "Definitions and Criteria for Accident Analysis." DOE: Washington, D.C. March 5, 1993.

[148] Code of Federal Regulations, *Title 10, Energy,* Part 835, "Occupational Radiation Protection, Final Rule." December 1993.

[149] Code of Federal Regulations, *Title 10, Energy,* Section 835.2, "Definitions, General Employee." December 1993.

[150] Code of Federal Regulations, *Title 10, Energy,* Section 835.2, "Definitions, Member of the Public." December 1993.

dosimetry, bioassay monitoring, evacuation drills, personnel protective equipment (PPE), or radiation training, but can receive occupational exposure up to 5 rem per year. Some examples of CLW by this approach include postal workers, delivery drivers, secretaries, normal trades contractors, food service vendors, and Native American Indians.

DOE has not established a universal accident dose standard value for CLWs to be used for the design of nuclear facilities. Rather, DOE has proposed a method to assess worker safety under accident conditions.[151] The RU referenced the proposed method in the top-level standards document, DOE/RL-96-0006.[152] This method of assessing the adequacy of radiological design provisions and safety under accident conditions for DOE facilities classifies some individuals as CLW.[153] DOE has reported on accident dose guidelines proposed by Contractors for radiological consequence as a function of accident frequency for workers, CLWs, and the public.[154] For radiological consequence assessment, the Contractor-proposed accident dose standards for CLW's are identical to the values for workers at the reference facility for unlikely and highly unlikely events. Some DOE accident assessments do not distinguish CLWs from workers at the reference facility.[155] The impact of the accident dose value selected from the CLW to the facility design and selection of safety provisions under accident conditions depends on numerous factors. These include the proximity of the CLWs to the reference facility, the nature of the site and meteorological conditions, and the specifics of the accident, source term, and release.

Once the risk posed by an accident is quantified in terms of consequences to the worker, the CLW and the public, the need for safety controls/SSCs can be determined. Safety class SSCs are those systems, structures, and components required to mitigate the consequence or prevent an accident that poses an unacceptable risk to the public. Similarly, safety significant SSCs are required to prevent or mitigate the consequences or prevent an accident that poses an unacceptable risk to the worker or the CLW. Safety significant SSCs are subjected to more stringent design, fabrication, and construction requirements than SSCs that have no specific safety role. Safety class SSCs are subjected to even more stringent requirements than safety significant SSCs. Thus, the separate category of CLW might reduce the requirements of some SSCs.

The NRC approach usually does not recognize such an entity as the CLW. Other workers and people outside the specific facility and its area yet working on or visiting the DOE Hanford site—for any reason—would be considered members of the public. This is because such CLW may be operating under different management organizations and radiation protection programs, and

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[151] Department of Energy (U.S.)(DOE). EH-12-94--01, Volume 1, Main Report, "Method for Assessment of Worker Safety under Radiological Accident Conditions at Department of Energy Nuclear Facilities." DOE: Richland, Washington. June 1994.

[152] Department of Energy (U.S.)(DOE). DOE-RL-96-0006, "Top-Level Radiological, Nuclear, and Process Safety Standards and Principles for TWRS Privatization Contractors." DOE: Richland, Washington. February 1996.

[153] Department of Energy (U.S.)(DOE). EH-12-94-01, Volume 1. DOE: Richland, Washington. June 1994.

[154] Department of Energy (U.S.)(DOE). EH-12-94-01, Volume 1. DOE: Richland, Washington. June 1994.

[155] Department of Energy (U.S.)(DOE). E H-12-94-01, Volume 1. DOE: Richland, Washington. June 1994.

hence, the integration and control may be inadequate for managing the organizations and potential events. For TWRS-P, DOE plans to use a large portion of the Hanford site to define CLW, which typically results in minimum distances to members of the public (i.e., with lower dose and risk limits) of approximately 10 miles. In contrast, the NRC focuses on the concept of "controlled area" by the facility operator; at NRC facilities this is usually associated with a fence although the controlled area can extend beyond the fence and even beyond the site boundary. Thus, the NRC approach usually corresponds to a shorter distance (usually 100-200 meters) to the public for accident analysis purposes, which can translate into more items relied on for safety [IROFS]. However, the key concept is the TWRS/WTP operator's authority to exercise control over the Hanford site emergency plans; if such authority is granted by DOE to the TWRS/WTP operator, then the "controlled area" concept may be satisfied, and the issue is moot. This is the approach under discussion with a proposed mixed oxide (MOX) facility at Savannah River that will undergo NRC licensing[156].

The NRC approach uses accident analyses to estimate consequences (for workers and the public) and compare these to standards and limits in the regulations and guidance. Certain NRC regulations, including 10 CFR Part 72, provide numerical standards for evaluating the impacts of accidents on individual members of the public at the controlled area boundary. The revision to 10 CFR 70 includes accident standards for the facility worker, members of the public, and the environment but not for CLWs. In addition, the dose limits require comparison. Under the TWRS-P regulatory program the dose limits were 25 rem for the worker, CLW, and the public for highly unlikely events (the public had a target dose goal of 5 rem). In DOE, highly unlikely corresponds to the frequency range of 1E-4/yr to 1E-6/yr. From the perspective of the NRC staff, the revised 10 CFR Part 70 and standard review plan (SRP) have a worker dose limit of 100 rem and a public dose limit of 25 rem for high consequence events, and corresponding limits of 25 rem and 5 rem for intermediate consequence events. High consequence events are to be rendered highly unlikely (1E-5/yr or less in frequency) by safety controls, and intermediate consequence events are to be rendered unlikely (in the 1E-2/yr to 1E-5/yr frequency range) by safety controls. Thus, at face value, the DOE limits are more restrictive although the fuel cycle SRP[157] does allow grading of the frequency limit in inverse proportion to the magnitude of the consequences and this could result in the limits overlapping between frequencies of 1E-5/yr and 1E-6/yr. The application of as low as reasonably achievable (ALARA) (required under either DOE or NRC regulation) would probably render such differences insignificant.

As an aside, the NRC notes the DOE regulatory approach should consider future site changes planned that are likely to reduce the distances to the public for accident evaluation purposes (see Issue A.13 in Appendix A).

Preliminary NRC Staff Assessment

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[156] Persinko, A., U.S. Nuclear Regulatory Commission, memorandum to M. Leach, U.S. Nuclear Regulatory Commission, "Summary of Meeting with Duke Cogema Stone & Webster to Discuss Technical Topics Associated with the Mixed Oxide Fuel Fabrication Facility," February 24, 2000.

[157] Nuclear Regulatory Commission (U.S.)(NRC). NUREG-1520, "Standard Review Plan for the Review of a License Application for a Fuel Cycle Facility." NRC: Washington, D.C. 2000.

The NRC Staff considers this to be a resolvable issue either by the application of appropriate controls over the site or the application of ALARA.

D6. WASTE OWNERSHIP

Issue

The NRC would most likely regulate a TWRS/WTP facility under 10 CFR Part 70, a special nuclear materials license. The contract provides that DOE retains ownership of the waste material, even when it is inside the Contractor's facility. DOE is concerned this part of the contract may require revision, transferring material ownership to the Contractor when it enters his facility and back again to DOE when it leaves.

Discussion:

Section C.4.c of the contract between DOE and BNFL Inc.[158] states that DOE will retain title to the waste envelopes provided to the Contractor and all intermediate and final waste products. If regulatory oversight were to transition to NRC, DOE has a concern that the NRC may require transfer of the ownership of the waste to the Contractor as long as the intermediate and final waste products remained in TWRS/WTP Contractor facilities. Transfer of ownership of the waste was not provided for in the DOE contract with the TWRS-P Contractor; thus, the contract would have needed renegotiation if the NRC required waste ownership transfer. Information on waste ownership is not yet available for the new Management and Operations (M&O) style contracts proposed by DOE that replace the privatization approach.

From an NRC perspective, the TWRS-P facilities would likely be subject to a license under 10 CFR Part 70 which pertains to the issuance of licenses to receive title to own, acquire, deliver, receive, possess, use, and transfer special nuclear material.[159] The TWRS-P facility would be required to obtain a specific license under 10 CFR 70.22 to possess the special nuclear material in the TWRS waste; however, transfer of ownership of the waste is not required by 10 CFR Part 70.

NRC has issued special licenses to a number of licensees for possession of DOE-owned material. For example, Pacific Northwest National Laboratory was issued a special license for the conduct of research and development activities in the 300 Area of the Hanford site using DOE-owned fissile material. A private company, Applied Radiant Energy Corporation in Lynchburg, Virginia, has also received a special license for its possession of DOE-owned cesium capsules.

Preliminary NRC Staff Assessment

The NRC staff does not consider this an issue.

D7. PAYMENT FOR TRANSITION TO AND REGULATION BY THE NRC

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[158] Contract Number DE-RP06-96RL13308, Amendment A0005, August 24, 1998.

[159] Code of Federal Regulations, *Title 10, Energy,* Part 70, "Domestic Licensing of Special Nuclear Material."

Issue

Regulation of TWRS/WTP facilities requires funding.

Discussion

Regulatory costs are difficult to estimate accurately, especially for a new type of plant for which there is no licensing experience. Presently, the regulatory costs for the TWRS-P effort are born by DOE and NRC; both from budgeted line item funding. It is expected that, during transition, regulatory costs will increase for the NRC and decrease for DOE.

The funds for the current NRC activities related to the TWRS-P facility were a line item in the budget of about $2 million annually[160] (for approximately 13 full time equivalents [FTEs]). For comparison, the DOE RU costs for developing and executing a full scope nuclear, radiological, and process safety regulatory program have remained between $7 and $8 million per year, roughly split equally between contractor and federal employee. The average annual cost of one NRC staff person is around $260,000.00.[161] Therefore, $8 million corresponds to about 32 FTEs at the NRC. Given that the NRC has already developed regulations and guidance for regulating TWRS/WTP facilities, it is reasonable to expect that NRC costs would be significantly lower than $8 million for regulatory transition and licensing/certification activities, prior to full and stable operation. Following license issuance and full transition to NRC regulatory oversight, these costs would be expected to decrease slightly. NRC is, by statute, a full recovery agency for which all costs of operation are recovered by charges levied upon licensees.[162] Surcharges could also be added to cover other NRC overhead costs. Over a 10-year period, it would be expected that the costs for NRC regulation would be lower than the current costs of the regulatory activities.

There is no legislative bar to NRC assessing annual fees (under 10 CFR Parts 170 and 171) to Federal agencies who hold NRC licenses.[163] However, for either privatized or M&O facilities, DOE is not expected to be a licensee and, therefore, would not be subject to direct NRC fee assessment.

Preliminary NRC Staff Assessment

NRC involvement in TWRS-P has been funded via a line item in the budget. Future regulation of a TWRS/WTP facility by the NRC would require legislation that would also identify the

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[160] NRC line item budget for the Special Projects Branch regulatory activities for TWRS in 1998 is $1.9 million plus about $500 K for consultants' fees.

[161] Code of Federal Regulations, *Title 10, Energy,* Section CFR 170.20, "Average Cost per Professional Staff-Hour."

[162] Omnibus Budget and Reconciliation Act of 1990.

[163] Nuclear Regulatory Commission (U.S.)(NRC). SECY-98-050, "Development of Legislative Issues for Licensing a Mixed Oxide Fuel Fabrication Facility," pp. 33-35. NRC: Washington, D.C. March 16, 1998. [This reference provides an analysis of who pays NRC relative to the MOX fuel fabrication facility in which DOE is currently paying for NRC assistance on design and operation issues where DOE becomes the licensee. However, the analysis does not apply to the vitrification facility if the TWRS/WTP contractor were to become the licensee.]

funding mechanism, be it by line items, fee collection, DOE payments, or a combination thereof. It is anticipated that the NRC regulatory costs would be a small fraction of the actual DOE expenditures to the contractors on the tank waste programs. The NRC Staff does not see funding of regulatory activities as a significant issue.

D8. TRI-PARTY AGREEMENT

Issue

DOE is a party to the Tri-Party Agreement (TPA) and is responsible for TPA commitments. DOE has expressed a concern that NRC regulatory activities during and after regulatory transition could impact the TPA commitments, and, thus, DOE might request the NRC to become involved in the TPA.

Background

The Hanford Federal Facility Agreement and Consent Order (often referred to as the Tri-Party Agreement, or TPA[164]) is a legal agreement between DOE, EPA, and the State of Washington Department of Ecology (Ecology). Its legal authority stems from the RCRA and the CERCLA. The TPA contains provisions for the overall environmental management of the Hanford site. This includes provisions for management of hazardous waste treatment, storage, and disposal (TSD), and hazardous waste permitting.

The TPA includes details concerning the implementation of remedial and corrective actions including closure and post-closure activities. The TPA defines the respective roles, responsibilities, and interrelationships between DOE, EPA, and Ecology concerning these environmental management activities. It also defines interrelationships and responsibilities between RCRA and CERCLA. In addition, the TPA delineates authorities, identifies enforcement provisions, and provides for dispute resolution among the parties.[63]

The TPA contains an Action Plan that establishes plans for compliance with RCRA and CERCLA and the Washington State Hazardous Waste Management Act (HWMA). In addition, the Action Plan sets milestones for CERCLA and RCRA activities that must be met by DOE. Failure to meet these milestones can result in fines and lawsuits. These milestones represent the actions necessary to ensure acceptable progress toward Hanford site compliance with RCRA, CERCLA, and HWMA.[63]

The TWRS-P Contractor had agreed via Clause H.22 of the contract[165] to plan and perform work consistent with the requirements of the TPA even though it is not a signatory. It would be anticipated that future contractors under the new contracts would be asked to do the same.

As discussed in Section 1, DOE is using contract-based regulation for the regulatory oversight of the TWRS/WTP waste immobilization contractor(s). In the context of contract-based

[164] Department of Energy (U.S.)(DOE). DOE/RL-96-25, Revision 0, "Policy for Radiological, Nuclear, and Process Safety of TWRS Privatization Contractor." DOE: Richland, Washington. July 3, 1996.

[165] Department of Energy (U.S.)(DOE). "TWRS Privatization Contract No. DE-RP-96RL13308, Amendment A0005." DOE: Richland, Washington. August 23, 1998.

regulation, the regulatory agency has an incentive to conduct the necessary regulatory activities in such a manner that the project schedule is not unduly delayed and DOE's external commitments are satisfied, while simultaneously adhering to the principle of independence (from the DOE-RL TWRS program office) and its primary role of ensuring adequate safety[166] (Main Reference 17). The NRC would have no vested interest in regulating the TWRS privatized waste immobilization contractor in such a manner that would assure that DOE's TPA milestones could be satisfied (Chapter 7.0, Main Reference 17).

The NRC has assumed regulatory oversight of several DOE facilities or former DOE facilities. These facilities include the gaseous diffusion plants (GDPs) at Paducah and Portsmouth (in this case, DOE has leased the facilities to the U.S. Enrichment Corporation, which is the licensee to the NRC), and a storage facility at the Idaho National Engineering and Environmental Laboratory (INEEL) for dry storage of Three Mile Island waste. In all cases, the NRC has not become a party to the existing Federal Facility Compliance Agreements. In fact, the NRC enabling legislation probably would preclude it from becoming a party to the TPA. Furthermore, the NRC Principle of Independence would be compromised since its regulatory decisions would have to be made in the context of their impact upon schedules, milestones, and costs. Thus, the NRC would not attempt to become involved in the TPA and DOE would maintain sole responsibility for satisfying the provisions of the TPA.

The NRC does not generally commit to support external schedules such as licensee review schedules or the TPA. Any NRC regulatory actions that might affect DOE commitments to the TPA would probably be based upon significant findings and issues that would affect TPA commitments regardless of NRC involvement.

Preliminary NRC Staff Assessment

DOE is a party to the TPA and is responsible for TPA commitments. The NRC staff would expect the NRC to remain a non-party to the TPA, consistent with other regulators (e.g., Defense Nuclear Facilities Safety Board (DNFSB), WDOH) and NRC precedence. The NRC staff does not see this as a significant issue.

D9. DOE STOP WORK AUTHORITY

Issue

"Contract-based" regulation has been used on TWRS-P. A transition contractor is in place and new contracts will be issued. The DOE is unsure if it should retain its stop work authority under the contract and, if it does, should DOE conduct readiness reviews. Such activities could conflict with NRC regulatory oversight.

Discussion

From a regulatory perspective, DOE would not have any safety concerns for TWRS-P operations in Phase II that could not be adequately protected by NRC, the Occupational Safety

[166] Department of Energy (U.S.)(DOE). RL/REG-97-10, Rev. 1 "Radiological, Nuclear, and Process Safety Regulation of TWRS Privatization Contractors Regulatory Plan." DOE: Richland, Washington. January 7, 1998.

and Health Administration (OSHA), the EPA, and the State of Washington oversight. However, DOE may choose to retain a residual stop work authority in order to safeguard against the unknown and uncertainties.

The vitrification of DOE waste will be in the hands of a single contractor or contractor team. DOE will likely maintain oversight to ensure that the contractor meets its programmatic commitments to DOE to immobilize the waste in the tanks on an agreed-upon schedule. DOE will wish to protect its interests and commitment, in the event that the contractor delivers a product to DOE that fails to meet technical specifications satisfactory to DOE under the terms of the contract, by insisting on a non-safety-related "stop work" provision. This provision may prevent the production of more "off-spec" vitrified material. An appropriate method for handling (and possibly, reprocessing) off-spec products would need to be arranged by DOE. Fixing the technical problems or operational problems might involve a review of the contractor's technical approaches to vitrification of DOE waste (a "technical readiness review") by DOE prior to further waste processing. DOE might also incorporate a stop work authority for safety purposes into the contract.

If regulatory oversight responsibilities were to transition to the NRC, the contract(s) would require modification to define NRC as the authority for the radiological and nuclear process safety aspects of the TWRS-P effort. As a regulator, the NRC would anticipate DOE maintaining stop work authority in some form under its contracts, including retaining the authority to conduct a readiness review prior to restart. The NRC staff believes such activities would be transparent to its regulation provided that all other regulatory requirements and licensing conditions were being met by the TWRS/WTP facility.

Preliminary NRC Staff Assessment

The DOE currently has stop work authority for safety and programmatic concerns under the contracts. The NRC Staff anticipates both the NRC and DOE would have stop work authority for safety concerns after regulatory transition, and the Staff does not consider this to be an issue.

D10. CONTINUED SAFETY OVERSIGHT BY DOE

Issue

The DOE currently has total programmatic responsibility for the TWRS-P project. That programmatic responsibility includes a safety oversight content, which is exercised by the RU. It should be clear how DOE's safety responsibilities will be discharged or modified by external regulation by the NRC.

Discussion

The Contractor, as the owner of the plant, has the prime responsibility for safety. TWRS/WTP facilities will be built on the DOE Hanford site and DOE expects to retain ownership of the waste materials at all times. While the new contracts may not be finalized for several months, it is anticipated that some form of contract reimbursement or incentive will be included for the production of containers containing the vitrified wastes.

In the wider world of commercial chemicals, toll-processing of chemicals may include operations for compounding, formulating, milling, custom blending, repackaging or separating and purifying materials which remain the property of the supplier. Companies toll-processing chemicals for others are answerable to OSHA for maintaining a safe workplace for employees and to EPA for protection of the environment. Operational safety is the responsibility of the toll-processor; the responsibility of the chemical supplier is to ensure that the toll-processor is made aware of the hazards associated with the process materials and does not usually extend to ensuring that the toll-processing is conducted safely. Typically, a chemical company wishing to subcontract out certain steps involved in the manufacture of a product will invite bids for the work and, for strategic reasons, provide feedstock to two or more toll-processors. The chemical supplier will want to ensure that the toll-processors are technically competent to perform whatever it is their tasked to do, meet the supplier's product specifications, and deliver the product on a mutually agreed upon schedule. At no time will the chemical supplier wish to take responsibility for safe operation of the toll-processor's facility, even if that facility is located adjacent to that of the chemical supplier's. However, if the supplier and toll-processor operate contiguous facilities, the two companies may agree to support each other in emergency planning and firefighting operations if an accident should occur.

For Hanford and TWRS/WTP, it is anticipated that DOE will take more interest in the safety aspects than a company contracting for toll-processing of materials due to the singular nature of the wastes, the plant location on the Hanford site, the presence of DOE facilities in close proximity to the planned location of the vitrification facility, the high profile of the project, and the large costs involved.

<u>Preliminary NRC Staff Assessment</u>

The DOE currently is the regulator for the proposed TWRS/WTP activities. After transition, the NRC would become the regulator. The NRC anticipates the DOE would want to perform some safety oversight activities, perhaps in a manner analogous to a corporate headquarters unit providing oversight to an operating facility. The NRC staff does not consider this to be an issue for regulatory transition.

D11. THE APPLICATION OF 10 CFR PART 2 HEARING REQUESTS

<u>Issue</u>

Under NRC regulation, the licensing of TWRS-P might be subjected to hearing requests under the "Rules of Practice," 10 CFR Part 2. This may require some time and has the potential to impact DOE schedules.

<u>Discussion</u>

The Rules of Practice, 10 CFR Part 2, provide for hearings. An Administrative Law Judge may be appointed whose principal objective would be to ensure that the process for airing all propositions is fair and equitable.

The NRC staff understands that 10 CFR Part 2 applies to 10 CFR Part 70 actions unless Congressional action is taken through amendment of the Administrative Procedures Act or as part of the legislation authorizing NRC regulation of TWRS/WTP. However, the NRC Staff believe that 10 CFR Part 2 hearings under 10 CFR Part 70[167] (without the Atomic Safety Licensing Board [ASLB] or discovery) are more focused on specific issues than general licensing and rulemaking hearings[168] (with the ASLB) and are intended to conclude expeditiously. Hearings requested for granting a license to possess special nuclear material under this section of the code may be conducted according to Subpart 1 of 10 CFR Part 2.

The certification of the GDPs, licensed under 10 CFR Part 76, required special legislation and was not subjected to a 10 CFR Part 2 public hearing process. This was because these were existing facilities and the facilities were certified rather than licensed. For Hanford, either licensing or certification could be used for NRC regulation.

Preliminary NRC Staff Assessment

Whether the route is licensing, certification, or Congressional mandate the NRC staff does not foresee a significant schedule impact from the hearing process and, therefore, does not consider this to be a significant issue for regulatory transition.

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[167] Code of Federal Regulations, *Title 10, Energy,* Part 2, subpart (1), Section 2.1205(h) "Request for a hearing: petition for leave to intervene," and Section 2.1209, "Power of Presiding Officer," which give wide latitude to the presiding officer in determining that "the specified areas of concern are germane to the subject matter of the proceeding and that the petition is time." Section 2.1211(a), "Participation by a person not a party" allows a person who is not a party to make a limited appearance to state his of her views on the issues. A limited appearance is not considered part of the decisional record.

[168] Code of Federal Regulations, *Title 10, Energy,* Part 2, subpart (h), Section 2.805 (a), "Participation by interested person," deals principally with rulemaking and affords opportunity for interested persons to participate "through the submission of statements, information, opinions, and arguments." There may also be informal hearings for interested persons. The opportunity on general matters appears much greater than allowed under Section 2.1211.

D12. CONTRACTUAL OBLIGATIONS FOR FEED DELIVERY

Issue

DOE will continue to deliver radioactive feed material to the Contractor. Presumably, DOE will agree to abide by the direction of the NRC-regulated Contractor as to the rate and characteristics of this feed material.

Discussion

The issue concerns the transfer of DOE-owned tank waste to the TWRS/WTP facility after transition to NRC regulation. The waste specifications in the current contract are principally based on a hypothetical Phase I plant which is operated for only 5-9 years. The facility is being designed to be operable for a period that can reasonably be expected to enable it to treat waste that is not enveloped by the current specifications in the contract. It is estimated that approximately 5 percent of the waste in the tanks is outside the envelope determined by the contract specifications. Although there exists conceptual solutions for dealing with this situation (e.g., blending with other tank contents or inert substances), the details of the waste characteristics may not become known until after their contents have been homogenized, which will occur only shortly before processing.

Preliminary NRC Staff Assessment

The NRC staff expects there will be specifications and safety requirements for the wastes and the plant operations. If the wastes cannot be blended, then an amendment process could be pursued by the licensee (this has already occurred at the GDP's). This is not an issue for regulatory transition.

D13. COMMUNICATION PLAN WITH STAKEHOLDERS

Issue

There are regulatory requirements for soliciting comments from the public and stakeholders.

Discussion

From the DOE perspective, input from interested stakeholders needs to be solicited. This includes the Contractors themselves, consensus groups such as the Hanford Advisory Board (HAB) and the Tribal Nations, Hanford workers, and other members of the public who have expressed interest.

DOE has a responsibility to obtain the input of stakeholders and the Tribes as the effective clients of all the agency's work. Furthermore, the RU has an Openness Policy[169] that makes it

[169] Department of Energy (U.S.)(DOE). RL/REG-97-04, Rev. 2, "Policy for Openness and Openness Plan." DOE: Richland, Washington. June 1998. The radiological, nuclear, and process safety regulation of TWRS Privatization contractors provide that the Hanford site shall be transacted publicly and candidly.... "The Tribal National and Public should be involved in decisions concerning privatization contractor regulations. Their involvement improves our processes and products and helps (to) ensure safety. We welcome and encourage this involvement."

clear that stakeholders' views are important and will be addressed. The RU is satisfying this policy in a number of ways, both in providing information and in listening to the views of others in open meetings and within such groups as the HAB. However, regulation does not occur in a vacuum, and the NRC recognizes DOE's responsibilities for communication[170]. The NRC also requires it of its licensees.

Previous DOE attempts at openness, particularly in interactions with the Agreement Tribes, have been to provide all DOE documents without focus or any attempt to indicate to the recipient as to the relevance of those documents. From the recipients' point of view, this flood of paper obscured communication.[171]

Preliminary NRC Staff Assessment

The NRC anticipates that the existing DOE communication plans (e.g., with the Hanford Advisory Board) would continue during and after transition to NRC regulation, as they are separate from the regulatory processes. In addition, the NRC also maintains public communication and openness as part of its regulatory practices. Therefore, the NRC staff does not consider this a significant issue.

D14. COST BENEFIT OF NRC REGULATION

Issue

DOE is concerned that NRC regulation might increase the costs of tank waste treatment.

Discussion

As background, it should be noted that the cost of NRC regulation is greater than that actually expended on an individual facility,[172] because collected fees include the costs of NRC's overhead activities.

From the perspective of Hanford and DOE, the issue is whether the transfer of regulatory authority from DOE to NRC provides a net benefit in safety for the additional costs involved, assuming that actual NRC costs will also include a surcharge to fund the above items.[173] It is not clear whether surcharges might be added to NRC fees for TWRS-P regulation.

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170 Nuclear Regulatory Commission (U.S.)(NRC). SECY-98-050, "Development of Legislative Issues for Licensing a Mixed Oxide Fuel Fabrication Facility," p. 3, item 7. NRC: Washington, D.C. March 16, 1998.

171 Donna Pouwakee, Manager, Waste Management, Nez Perce Indian Tribe, Consultancy with Council of Energy Resource Tribes, Lewiston, Idaho, 1992.

172 "In 1995...nuclear power plant operators paid over 80 % of all user fees. Almost half of that amount went to pay for NRC overhead and management costs." *Nuclear Energy Oversight*, Nuclear Energy Institute, p. 3. May 1998.

173 Code of Federal Regulations, *Title 10, Energy,* Section 171.16, "Schedule of Materials Annual Fee Surcharges."

The original 1996 MOU between the Secretary of Energy and the Chairman of the NRC was signed in the expectation of a net benefit in safety.[174] Just prior to that time, DOE had been the subject of audits by the General Accounting Office (GAO) and by the DNFSB which pointed to critical deficiencies in DOE safety programs and oversight.

Also qualitatively, there may appear to be a clear and visible benefit from separation of the operator from the regulatory—just as the NRC was separated from the Atomic Energy Commission. To effect this separation while working with DOE, the NRC has established a clear separation of its activities from those of the DOE/RL TWRS program.

Both DOE and NRC have reaffirmed their belief that "there would be clear benefits from external regulation of worker and nuclear safety at DOE facilities."[175]

Preliminary NRC Staff Assessment

The NRC staff notes that the likely, direct regulatory costs would be lower than the current costs (see Section D7 of this appendix) and the regulatory program and authority would be clearer, which would likely translate into lower, indirect costs. However, the total costs associated with regulation will probably be a small portion of the total program cost. Consequently, the NRC staff considers the NRC regulation of TWRS/WTP facilities to be a national policy issue that should not be decided by cost/benefit analyses. Therefore, the NRC staff does not consider this to be a significant issue.

D.15 DEFENSE NUCLEAR FACILITIES SAFETY BOARD ROLE

Issue

The Defense Nuclear Facilities Safety Board (DNFSB) currently has an oversight role for the TWRS/WTP program. It is not clear that this would continue after transition to NRC regulation.

Discussion

The DNFSB was created in 1988 to provide independent, external oversight of DOE defense nuclear facilities.[176] The specific functions of the DNFSB are to review and evaluate standards, conduct investigations, analyze design and operational data, review facility design and construction, and make recommendations to the Secretary of Energy.[177] The DNFSB has the

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[174] U.S. Department of Energy and U.S. Nuclear Regulatory Commission Memorandum of Understanding, November 1996.

[175] Statements by "officials of both agencies" before a House Commerce Subcommittee, May 20, 1998. *NUCLEAR WASTE NEWS*, page 203, May 21, 1998. Elizabeth Moler's and Shirley Jackson's testimony (18 and 17 pp.) are obtainable through BPI DocuDial as Nos. 48-2946 respectively.

[176] Pub. L. 100-456. September 29, 1988 and United States Code, Section 2286.

[177] Atomic Energy Act, as amended, Section 312. 1954

authority to conduct hearings, establish reporting requirements for the Secretary of Energy, and assign resident inspectors at DOE defense nuclear facilities.[178]

With regard to the DNFSB's scope of authority, a DOE defense nuclear facility means any of the following:[179]

1. A production facility or utilization facility[180, 181] that is under the control or jurisdiction of DOE and that is operated for national security purposes, but the term dose not include:

   a. Any facility or activity covered by Executive Order No. 12344, dated February 1, 1982, pertaining to the Naval nuclear propulsion program;

   b. Any facility or activity involved with the transportation of nuclear explosives or nuclear material;

   c. Any facility that does not conduct atomic energy defense activities; or

   d. Any facility owned by the United States Enrichment Corporation.

2. A nuclear waste storage facility under the control or jurisdiction of the Secretary of Energy, but the term does not include a facility developed pursuant to the Nuclear Waste Policy act of 1982 and licensed by the NRC.

Based on this definition, it is not clear whether the TWRS/WTP facility is a DOE defense nuclear facility. This definition does indicate that exceptions have been made for certain other facilities that appear to meet the basic criteria for being classified as a DOE defense nuclear facility but whose activities are overseen by agencies other than the DNFSB.

If the TWRS-P facility is determined to be a DOE defense nuclear facility and subject to DNFSB oversight after NRC regulation begins, the TWRS/WTP contractor will be subjected to dual oversight. This could result in the NRC and the DNFSB applying overlapping resources on TWRS-P activities and expending resources to resolve any conflicting recommendations made

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178 Atomic Energy Act, as amended, Section 313. 1954

179 Atomic Energy Act, as amended, Section 318. 1954

180 Atomic Energy Act, as amended, Section 11, defines a production facility as (1) any equipment or device determined by rule of the Commission to be capable of the production of special nuclear material in such quantity as to be significant to the common defense and security, or in such manner as to affect the health and safety of the public; or (2) any important component part especially designed for such equipment or device as determined by the Commission.

181 Atomic Energy Act, as amended, Section 11, defines a utilization facility as (1) any equipment or device, except an atomic weapon, determined by rule of the Commission to be capable to making use of special nuclear material in such quantity as to be of significance to the common defense and security, or in such manner as to affect the health and safety of the public, or peculiarly adapted for making use of atomic energy in such quantity as to be of significance to the common defense and security, or in such manner as to affect the health and safety of the public; or (2) any important component part especially designed for such equipment or device as determined by the Commission.

by the two organizations. Additionally, the TWRS/WTP contractor may have to employ additional resources to satisfy the needs of the two oversight bodies.[182]

Preliminary NRC Staff Determination

The NRC has determined that legislative authority is required for it to regulate TWRS/WTP facilities. As part of such legislation, the NRC staff anticipates that regulatory roles will be clearly defined, and based upon the precedent established at the enrichment and SNF storage facilities that the NRC regulates at DOE sites, the Staff does not expect a role for the DNFSB. The NRC staff does not consider this to be an issue.

D16. PRICE-ANDERSON INDEMNIFICATION

Issue

Price-Anderson indemnification may need changes in its application if the TWRS/WTP facility transitions to NRC regulation.

Discussion

Under Subsection 170.d of the Atomic Energy act of 1954, as amended,[183] the Secretary of Energy is required to enter into indemnity agreements with anyone conducting activities under contract with DOE that involve risk of public liability and that are not subject to Subsection 170.b., which addresses financial protection requirements for NRC licensees, or Subsection 170.c., which specifies indemnification agreements for NRC licensees.

In 1996, DOE issued a contract to BNFL Inc.[184] to conceptually design the TWRS-P tank waste treatment facility. This contract incorporates by reference the Department of Energy Acquisition Regulations (DEAR) clause on nuclear hazards indemnity,[185] which provides indemnification to BNFL Inc. pursuant to Subsection 170.d. of the AEA. This clause states, in part, "...the contractor will not be required to provide or maintain, and will not provide or maintain at Government expense, any form of financial protection to cover public liability...." The most recent contract negotiated with BNFL Inc.[186] incorporates this same clause. The new, M&O type contracts are likely to contain the same clauses.

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[182] DNFSB actions to date with respect to TWRS/WTP are consistent with the assumption that they interpret their scope of responsibility to include jurisdiction over the program.

[183] 42 USC 2210, The Atomic Energy Act of 1954, as amended, January 6, 1997.

[184] Department of Energy, (US)(DOE). DE-AC06-96RL-13308, Amendment A0005. DOE: Richland, Washington. August 24, 1998.

[185] Department of Energy, (US)(DOE). DEAR 952.250-70, "Nuclear Hazards Indemnity Agreement." DOE: Richland, Washington. January 1992.

[186] Department of Energy, (US)(DOE). DE-AC06-96RL-13308, "Amendment A0005." DOE: Richland, Washington. August 24, 1998.

If the TWRS/WTP facility transitions to NRC regulation, the operator would most likely become the single licensee. In this case, the Secretary of Energy would no longer be required by the AEA to offer indemnification to the contractor, because the Contractor would be "...subject to financial protection requirements under Subsection b. or agreements of indemnification under Subsection c...."[187] (It should be noted that, although Subsections 170.a., b., and c. of the AEA pertain to NRC licensees, it is not clear whether Subsection 170.d. would prohibit DOE from indemnifying an NRC licensee.)[188] Additionally, if DOE were to no longer provide indemnification, the contract may need other clauses and changes (e.g., removal of the DEAR clause).

With the TWRS-P contractor as an NRC licensee under 10 CFR Part 70, the NRC has optional regulatory authority under Subsection 170.a. of the AEA to require financial assurance, and if such financial assurance is required, indemnification may also be provided. Subsection 170.b. (1) requires that the amount of financial assurance be determined "...on the basis of criteria set forth in writing...." Subpart B to 10 CFR Part 140[189] provides this criteria and contains NRC's requirements for financial protection and indemnity agreements for applicants and licensees other than Federal agencies and nonprofit educational institutions.

Currently, 10 CFR Part 140, in addressing applicants for a license or licenses issued under 10 CFR Part 70[190] considers only plutonium processing facilities, fuel fabrication plants, and uranium enrichment facilities. Specifically, Subsections 140.13a and 140.13b address the financial protection required of those types of facilities.

In applying discretionary authority for Price-Anderson indemnity coverage, the NRC has in the past not extended the coverage if the potential public liability from a possible nuclear accident would not exceed the amount of the commercially available insurance. Such financial assurance and indemnification have been required as license conditions for a small number of 10 CFR Part 70 facilities, including plutonium processing and fuel fabrication facilities.

Earlier this year, DOE and the NRC evaluated a number of regulatory issues associated with NRC licensing a mixed oxide (MOX) fuel fabrication facility. The MOX facility would be located on a DOE site and designed, constructed, and operated by a private contractor. DOE would own the MOX facility; therefore, the NRC has stated its intention to make DOE and the operating contractor co-licensees. Regarding Price-Anderson indemnification for the MOX project, both DOE and NRC agreed that the operating contractor would be eligible for DOE indemnification if NRC did not extend its discretionary coverage, and hence, legislative clarification would not be required.[191] However, the DOE-NRC evaluation did not discuss the

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187 Atomic Energy Act of 1954, as amended, Section 170.d. 1954

188 Atomic Energy Act of 1954, as amended, Section 170. 1954

189 Code of Federal Regulations, *Title 10, Energy,* Part 140, "Financial Protection Requirements and Indemnity Agreements."

190 Code of Federal Regulations, *Title 10, Energy,* Part 70, "Domestic Licensing of Special Nuclear Material."

191 Section-98-050, "Development of Legislative Issues for Licensing of a MOX Fuel Fabrication Facility," March 16, 1998.

fact that if DOE indemnifies the operating contractor (which is also a co-licensee), DOE may assess civil penalties against the contractor for violations of DOE Nuclear Safety Requirements,[192] thereby establishing the potential for dual DOE-NRC regulation of the contractor.

Preliminary NRC Staff Assessment

The NRC staff believes the legislation enabling NRC regulation will define any Price-Anderson indemnification arrangements. The NRC staff does not consider this an issue.

D17. TIMING TO AVOID DELAYS FROM REGULATORY TRANSITION

Issue

If regulatory transition were to occur, DOE would like the timing to offer the best chance of avoiding unnecessary delays in removing and immobilizing the tank wastes.

Discussion

From the perspective of DOE, the timing for transition needs to be selected so as to reduce the potential for disruption to a minimum. Some timing considerations tend to conflict. In programmatic terms, it would be beneficial for DOE that transition occurs sometime after full and confirmed operation so that it could be assured that the plant meets its specifications. On the other hand, to minimize potential retrofit changes in meeting NRC's regulatory expectations, it might be preferable to make the transition as soon as possible. (This can also be accomplished by resolving all regulatory differences prior to construction and transitioning later.)

Legislation may be required if the 10 CFR Part 2 public hearings process is not to be invoked, perhaps by NRC's acceptance of DOE's prior authorization basis, or if there is intent to certify, rather than license, the facility. Legislation or Office of Management and Budget action may be needed on funding issues. DOE is of the opinion that potential delays involved in legislation and NRC review can best be accommodated in a process conducted in parallel with the DOE/RU authorization process during the TWRS-P design and construction activity.

As part of the MOU, ongoing cooperation has existed between DOE and NRC in identifying the full spectrum of differences in regulatory oversight between the two agencies. This work is intended to resolve technical differences in such a manner that the design will meet NRC requirements or that NRC will accept DOE's prior authorization basis.

DOE can authorize the design through construction on the basis of the PSAR. At that point, the RU intends a second licensing step to authorize operation after review and approval of a Final Safety Analysis Report (FSAR). This junction, normally involving revised documentation between the PSAR and FSAR, could beneficially be the time at which the documentation and the Safety Analysis Report (SAR) are upgraded and changed to meet NRC requirements for

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192 Code of Federal Regulations, *Title 10, Energy,* Section 820.20(b), "Basis for Civil Penalties."

format and content. With the forgoing cooperative work in hand, the disturbance could be minimal.

In order to have confidence that the design of the vitrification plan will operate as specified and that planning towards remediating the tank farm(s) will be successful, DOE must have confidence that the plant is constructed as planned. This includes actual design and construction. It could also be desirable, from DOE's perspective, to confirm operation and the end products of each section of the plant, including the pretreated wastes and the quality of the glasses.

The NRC staff believes that there are three alternatives for the timing of regulatory transition: 1) immediately, 2) overlapping, or parallel, regulatory transition process during design, or 3) regulatory transition during operations. Alternatives one and two correspond to licensing of the vitrification plant, for which rules and guidance already exist. Option 3 represents a certification route.

Preliminary NRC Staff Assessment

The NRC staff believes the legislation establishing NRC regulation of TWRS/WTP will define the timing for transition. Transition as soon as possible in the near-term offers the clearest benefits.

D18. DOE FINANCIAL INTERESTS

Issue

DOE has expressed concerns about protecting its financial interests in the vitrification facility.

Discussion

DOE has already invested several hundred million dollars in the Phase I activities. The completion of the design and construction activities in Phase I may amount to another $4 billion[193]. Thus, DOE has considerable financial interests in the program. DOE protects those interests, particularly through frequent meetings with the TWRS contractors to assess progress and by an inspection program during preliminary design and construction. Ordinarily, NRC would not become involved with the regulatory process until after completion of preliminary design. The NRC has no financial interests to protect.

Preliminary NRC Staff Assessment

The NRC staff does not consider this a regulatory transition issue because the NRC's mission is protection of the workers, the public, and the environment.

193 *Nuclear News Flash,* September 1, 2000.

D19. QUALITY ASSURANCE

Issue

The DOE TWRS Quality Assurance (QA) program requirements and the TWRS-P contractor's DOE-approved QA programs may need to be modified in order to facilitate the transition to NRC regulation.

Discussion

The QA of TWRS/WTP activities is governed by the DOE QA rule (10 CFR 830.120).[194] Although organized and worded differently, the DOE QA rule requirements are intended to be generally consistent with basic commercial nuclear industry QA requirements (such as NQA-1[195]) and NRC QA requirements.[196,197] The DOE QA rule requirements are expressed at a higher level than commercial nuclear industry and NRC QA requirements, and provide for flexibility in the approaches that may be taken to meet the requirements. As a result, a QA program could be developed to meet the requirements of the DOE QA rule without meeting the NRC QA requirements. DOE has prepared an implementation guide for the QA rule[198] that provides additional insights into what DOE considers an acceptable QA program.

The DOE QA rule does contain requirements that go beyond what is normally expected of an NQA-1 or NRC QA program. However, the preamble to the DOE QA rule states, "Just as the NRC has endorsed NQA-1 as an acceptable way (there are others) for their licensees to implement the requirements of (10 CFR Part 50) Appendix B, DOE contractors may use NQA-1 as a way to implement the rule."[199]

In order to determine the impact of transitioning from a QA program that meets the DOE QA rule to a program that meets NRC QA requirements, the NRC QA requirements must be known. At this time, the NRC has defined the QA requirements it would apply to a high level

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194 Item 3 of Section 6.0 of the "Policy for Radiological, Nuclear, and Process Safety Regulation of TWRS Privatization Contractors," (DOE/RL-96-25) states that the contractor's set of standards and requirements "shall contain, as a subset, the nuclear safety requirements in 10 CFR Parts 830, 834, and 835 that are enforceable under 10 CFR Part 820."

195 ANSI/ASME NQA-1, Quality Assurance Requirements for Nuclear Facilities.

196 The NRC QA requirements being referred to are thos in 10 CFR Part 50, Appendix B, Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants; 10 CFR Part 60, Subpart G, Quality Assurance; 10 CFR Part 71, Subpart H, Quality Assurance; and 10 CFR Part 72, Subpart G, Quality Assurance.

197 See Section 3.5 of the DOE/EM's Comparison of NRC and DOE Requiremnts for Independent Spent Nuclear Fuel Storage Facilities dated June 1995 and section 4.1.6 of the DOE/EM's Office of Spent Fuel Management Comparison of Department of Energy TWRS Top-Level Standards and Principles and Nuclear Egulatory Commission Draft Standard Review Plan for Fuel Cycle Facilities.

198 Implementation Guide for US with 10 CFR 830.120, Quality Assurance, DOE G 830.120.

199 Department of Energy (U.S.), Washington, D.C. *Federal Register*. Vol. 59, pp. 15843-15849 (Sec II.C.30). April 5, 1994.

waste (HLW) processing facility. The existing 10 CFR Part 70[200] does not contain specific QA requirements for SNM licensees except for licensees who intend to possess and use SNM in a plutonium processing and fuel fabrication plant. For such a plant, 10 CFR Part 70 indicates that the QA program description should include a discussion of how the criteria in 10 CFR Part 50, Appendix B will be met.[201]

Specific references to 10 CFR Part 50, Appendix B or NQA-1 are not anticipated to be included. In concert with development of the new draft 10 CFR Part 70, NRC has developed two SRPs; some for facilities possessing and using SNM and some specifically for TWRS/WTP facilities. The current SRP for TWRS-P states that the NRC reviewer should review the application to determine whether the applicant, for items relied on to prevent or mitigate accidents of high consequences, has either:

1. Described its (and its principal contractor's) organization, organizational authority, and organizational responsibilities for QA; provided a commitment to implement and maintain the QA program to comply with the applicable elements of NQA-1; or

2. Described its (and its principal contractor's) organization, organizational authority, and organizational responsibilities for QA, and addressed the extensive checklist provided in the appendix to this section of the SRP.

   In either case, the applicant should also (a) describe how the QA program will be graded for items of lesser or no effect on consequences of concern and (b) list the items relied on for safety as determined by the applicant's integrated safety analysis.

In its QA Program and Implementation Plan (QAPIP),[202] which had been approved by the RU,[203] BNFL Inc. had committed to comply with the applicable elements of NQA-1, DOE/RW-0333P,[204] and NUREG-1293.[205] Additionally, the TWRS-P contract required that DOE/RW-0333P be applied.[206] Although the QAPIP appeared to indicate that the basic requirements of NQA-1, Part I (1994a) apply and that the NQA-1 supplementary requirements were to be addressed as

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200 Code of Federal Regulations, *Title 10, Energy*, Part 70, "Domestic Licensing of Special Nuclear Material."

201 Code of Federal Regulations, *Title 10, Energy*, Draft Part 70, "Domestic Licensing of Special Nuclear Material." July 30, 1998.

202 BNFL Inc., BNFL-5193-QAP-01, Revision 4, "Quality Assurance Program and Implementation Plan." BNFL Inc.: Richland, Washington. 1998.

203 Gibbs, D.C., U.S. Department of Energy, letter to M.J. Bullock, BNFL, Inc., "Approval of BNFL-5193-QAP-01, Rev. 4, 'Quality Assurance Program and Implementation Plan,' (QAPIP)," June 2, 1998.

204 Department of Energy (U.S.)(DOE). DOE/RW-0333P, "Quality Assurance Requirements and Description for the Civilian Radioactive Waste Management Program." DOE: Richland, Washington

205 Nuclear Regulatory Commission, (U.S.)(NRC). NUREG-1293, "Quality Assurance Guidance for a Low-Level Radioactive Waste Disposal facility." NRC: Washington, D.C. 1991.

206 Department of Energy (U.S.)(DOE). RL/REG-98-13, Revision 0, Table 3.1.1 and Section 4.1, "DOE Regulatory Unit Evaluation Report of the BNFL Inc. Quality Assurance Program and Implementation Plan." DOE: Richland, Washington. May 1998. indicates that application of DOE/RW-0333P is a contractual requirement.

required by project specific activities, the language in the QAPIP was not sufficiently clear for the NRC to make a definitive judgment on which elements of NQA-1 had been committed to.

However, the QAPIP is clear that DOE/RW-0333P applies. DOW/RW-0333P requirements are derived to a large extent from NRC QA requirements (10 CFR Part 50, Appendix B; 10 CFR Part 60, Subpart G; 10 CFR Part 71, Subpart H; and 10 CFR Part 72, Subpart G) and NQA-1 requirements. DOE/RW-0333P has been approved by the NRC under 10 CFR Part 60 and 10 CFR Part 71 for radioactive material packages.[207] Moreover, DOE is applying DOE/RW-0333P to the TIM-2 Independent Spent Fuel Storage Installation, which is in the process of being licensed by the NRC.[208]

Based on the TWRS-P commitment to apply DOE/RW-0333P, the NRC concluded that the TWRS-P QA program description satisfied the QA requirements of the 1998 draft of 10 CFR Part 70 and the guidance in the corresponding draft of the TWRS SRP regarding a commitment to meet NQA-1 (the Basics and Supplementary Requirements in Part I [from the former NQA-1] and the requirements in Part II [from the former NQA-2] but not the Nonmandatory Appendices Preliminary in Part III).

Preliminary NRC Staff Assessment

The DOE TWRS Quality Assurance (QA) program requirements and the TWRS-P contractor's DOE-approved QA programs may need to be modified in order to facilitate the transition to NRC regulation. The NRC staff believes the differences in QA requirements are small and the adequacy of the QA program really depends upon its implementation. The NRC Staff does not consider this a significant transition issue.

D20. IMPACTS ON OTHER HANFORD SITE FACILITIES

Issue

DOE is concerned that there may be impacts upon non-TWRS/WTP facilities at Hanford after regulatory transition to the NRC.

Discussion

Some NRC requirements are known to be different from DOE standards and practices established for the design and safe operation of facilities at Hanford. Examples include, risk evaluation guidelines including the concept of the co-located worker, design basis seismic and

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207 Travers, W.D., U.S. Nuclear Regulatory Commission, letter to R.A. Milner, U.S. Department of Energy, February 29, 1996.

208 License Application for the Idaho National Engineering Laboratory Three Mile Island Unit Two Independent Spent Fuel Storage Installation, Chapter 6, Revision 0, October 1996.

tornado magnitudes, and natural phenomena hazards evaluation criteria.[209,210] However, the NRC may find such DOE standards and practices acceptable, even if different. As a recent example, NRC has accepted the DOE's approach for determining the design basis earthquake and tornado design requirements for the new dry spent fuel storage facility at the INEEL, which is undergoing a licensing review under 10 CFR Part 72.[211]

Where DOE's approach is not acceptable to the NRC, the NRC will require TWRS/WTP to comply with its different requirements, after transition to regulation of the facility by NRC. Although the NRC would have no authority to impose these requirements on non-TWRS/WTP facilities, the imposition of NRC requirements on TWRS/WTP could impact on other facilities broadly in two ways. First, designing or operating the facility to meet NRC requirements may require design and operational changes at neighboring facilities or from the Hanford site as a whole. Second, in cases where the facility is designed or operated to meet certain NRC requirements that are different than DOE standards and practices, obviously different safety requirements between TWRS/WTP and its neighboring facilities may be questioned by stakeholders, and pressure for upgrading non-TWRS/WTP facilities may result.

An example of the first type of potential impact involves NRC's interpretation that a co-located worker at a DOE site will be considered a member of the public for accident dose evaluations under NRC regulation.[212] If the TWRS/WTP facility is designed so that any individual outside of its controlled area of a few hundred yards meets NRC's public accident dose limits, then there is no effect on neighboring facilities. However, if the facility is not so designed, the NRC could expect the contractor to exercise some control over Hanford worker access to surrounding facilities and to include such workers in the TWRS/WTP facility radiation protection and monitoring program.[213] Also, the NRC could expect the DOE Richland Operations Office and local agencies to redefine the site's established emergency planning zones and evaluation practices, and to revise emergency planning agreements.

Whether the second type of impact occurs is unclear, as evidenced by three recent examples. A new TMI-2 spent fuel storage facility at INEEL will be licensed by the NRC and located within the security fence of the DOE-regulated Idaho Chemical Processing Plant (ICPP). New N reactor spent fuel conditioning and storage facilities at Hanford are being designed to NRC-equivalent requirements while modifications to existing, nearby project facilities are accomplished in accordance with DOE requirements. For both projects, public support for the move to NRC requirements has been positive, and there has been no public concern expressed

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209 "Comparison of DOE and NRC Requirements for Spent Nuclear Fuel Storage Facilities." *SCIENTECH*. 1995.

210 Westinghouse Hanford Company (WHC). WHC/DB-003, Additional NRC Requirements for the K Basins Spent Fuel Project. WHC: Richland, Washington

211 Nuclear Regulatory Commission (U.S.)(NRC). SECY-98-071, "Exemption to 10 CFR 72.102(f)(1) Seismic Design Requirements for Three Mile Island Unit 2 Independent Spent Fuel Storage Installation." NRC: Washington, D.C. April 8, 1998.

212 Nuclear Regulatory Commission (U.S.)(NRC). SECY-98-038, "Hanford Tank Waste Remediation System Privatization Co-Located Worker Standards." NRC: Washington, D.C. March 4, 1998.

213 Nuclear Regulatory Commission (U.S.)(NRC). SECY-98-038, page 3, "Hanford Tank Waste Remediation System PRIVATIZATION Co-Located Worker Standards." NRC: Washington, D.C. March 4, 1998.

over the safety of the neighboring DOE regulated facilities. The DOE project managers attribute these positive results to frequent and open communications with their Stakeholders. On the other hand, at Hanford, at least one Stakeholder representing a public interest group has already expressed an interest in formally participating in any NRC licensing of the vitrification plant.

The technical impacts to non-TWRS/WTP facilities of regulatory transition need to be identified, evaluated, and addressed on an individual basis as such issues arise. Coordinating the transition to external regulation of the tank farm storage and vitrification facilities will likely reduce the impacts to the non-vitrification portion of the tank farms, which is the non-TWRS/WTP facility most susceptible to these impacts.

Preliminary NRC Staff Assessment

The NRC staff does not consider this an issue for regulatory transition.

D21. RESPONSIBILITY FOR OCCUPATIONAL SAFETY

Issue

For its facilities, DOE has regulatory authority for occupational safety. For NRC licensed facilities, the OSHA has such authority. If the TWRS/WTP transitioned to NRC regulatory oversight, OSHA might assume regulatory authority for occupational safety.

Discussion:

The Occupational Safety and Health Act prohibits OSHA from regulating where another Federal agency chooses to exercise its own authority.[214] DOE has authority for regulating worker safety at its facilities under the Atomic Energy Act of 1954.[215] Accordingly, DOE contractors are responsible for worker occupational health and safety;[216] DOE enforces compliance with both OSHA and DOE requirements for worker occupational health and safety.

Traditionally, DOE's authority has extended to all facilities at a site, even new facilities which are typically government-owned, contractor-operated (GOCO) facilities. The original TWRS-P facility would have been company-owned, company-operated (COCO). However, OSHA declined to accept regulatory authority for the facility, and consequently, the RU regulates the occupational safety program. In 1993, the Secretary of Energy committed to replace self-regulation of worker safety with external regulation, and OSHA was undertaking pilot programs

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214 *OSHA Act of 1970*, Section 4(b)(1). 1970.

215 *Atomic Energy Act of 1954*, Section 161.i(3). 1954

216 Department of Energy (U.S.)(DOE). Order 440.1A, "Worker Protection Management for DOE Federal and Cotnractor Employees." DOE: Washington, D.C. March 27, 1998.

at certain DOE facilities,[217] although it is not clear when, or if, OSHA would accept and exercise oversight authority over DOE facilities.

If the TWRS/WTP project were to transition to regulation by NRC, the 1988 MOU between NRC and OSHA[218] could apply. (It would also be possible to develop a specific MOU to address the TWRS/WTP project, like the MOU written for the GDPs.[219]) Under the 1988 MOU, NRC exercises regulatory responsibility for worker radiological health and safety at an NRC-licensed facility. Furthermore, as stated in the 1988 MOU, NRC would have the responsibility for regulating the "...chemical risk produced by radioactive materials" and "...plant conditions that affect the safety of radiological materials and thus present an increased radiation risk to workers." These latter responsibilities include regulating certain aspects of fire and chemical safety at NRC facilities. In addition, under the 1988 MOU, during inspections of radiological and nuclear safety, NRC personnel may identify occupational safety concerns, normally within the scope of OSHA's responsibility, and may receive complaints from an employee about OSHA-covered working conditions. In such instances, NRC would report the matter to the licensee's management. NRC inspectors may elevate OSHA safety concerns to the attention of NRC management who would inform the OSHA Regional Office, when appropriate. On a case-by-case basis, NRC and OSHA conduct joint inspections at NRC-licensed facilities. Conversely, OSHA provides NRC with information that it may obtain concerning worker radiological health and safety.

Preliminary NRC Staff Assessment

The NRC staff anticipates that the enabling legislation for NRC regulation would clearly define the responsibilities. This is not a significant issue for regulatory transition.

D22. TAILORING OF REQUIREMENTS

Issue

The NRC and DOE use different approaches for the tailoring of requirements for safe mission performance.

Discussion

This issue concerns the different approaches used by DOE and NRC for establishing requirements for achieving adequate safety and reconciliation of any differences in the approaches to facilitate seamless transition from DOE to NRC regulation, should transition occur at a future date. As discussed in more detail below, even though the DOE approach to establishing requirements is somewhat different than the NRC approach, the requirements

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217 Voluntary Protection Programs are in place at WIPP, Allied Signal, both Star sites, and Weldon Springs (Merit site). OSHA trials are currently being conducted at ORNL and ANL.

218 Nuclear Regulatory Commission (U.S.), Washington, D.C. "Memorandum of Understanding between the NRC and OSHA; Worker Protection at NRC-Licensed Facilities." *Federal Register*. Vol. 53, p. 43950. October 31, 1988.

219 Nuclear Regulatory Commission (U.S.), Washington, D.C. "MOU between the NRC and OSHA with Respect to the Gaseous Diffusion Plants." *Federal Register*. Vol. 61, p. 40249. August 1, 1996.

resulting from either approach will likely achieve adequate safety, and significant reconciliation may not be necessary.

The DOE approach is a bottom-up process based on the principles of Integrated Safety Management. DOE contractors identify, propose, and justify safety standards and requirements by selecting from appropriate DOE and industry standards and requirements, with full consideration of the work processes and specific hazards associated with a facility. In the case of the TWRS project, the DOE approach for radiological, nuclear, and process safety[220] places on the TWRS Contractor the responsibility to achieve (a) adequate safety of the workers and the public, (b) comply with applicable laws and legal requirements, and (c) conform to DOE stipulated top-level safety standards and principles.[221] Within this framework, the contractor identifies the work needed, evaluates the associated hazards, selects appropriate standards, and justifies the adequacy of the selected standards.[222]

The traditional NRC approach is a top-down process. Adequate protection for the general public, workers, and the environment with regard to matters under the authority of NRC is achieved through compliance with established requirements, in the form of rules, regulations, and orders embodied primarily in 10 CFR Energy. The NRC's requirements have evolved over the years through the formal rulemaking process and are continually subject to modification and change as new information becomes available. Such requirements are established for classes and types of facilities and processes. License applicants are required to demonstrate compliance with all applicable requirements before a license is granted by the NRC. When a license is granted following NRC's detailed reviews of the applicant's information and analyses, the NRC concludes that adequate safety will be achieved because applicable rules, regulations, and orders will be met.[223]

The revised 10 CFR Part 70, which the NRC would likely apply to TWRS/WTP facilities, is more relevant.[224] The revised 10 CFR Part 70 contains top-level performance-based requirements and baseline design criteria, rather than NRC's traditional prescriptive, deterministic

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[220] Department of Energy (U.S.)(DOE). RL/REG-97-10, Rev. 1, "Radiological, Nuclear, and Process Safety Regulation of TWRS Privatization Contractors Regulatory Plan." DOE: Richland, Washington. January 1998.

[221] Department of Energy (U.S.)(DOE). DOE/RL-96-0006, Rev. 0, "Top-Level Radiological, Nuclear, and Process Safety Standards and Principles for the Privatization Contractor." DOE: Richland, Washington. February 1996.

[222] Department of Energy (U.S.)(DOE). DOE/RL-96-0004, Rev. 0, "Process for Establishing a Set of Radiological, Nuclear, and Process Safety Standards and Requirements for TWRS Privatization." DOE: Richland, Washington. February 1996.

[223] For example, see Code of Federal Regulations, *Title 10, Energy,* Sections 70.23(a), 70.31(a) and 70.32(a)(8) on license approval and issuance.

[224] NRC statement during a May 28, 1998 public meeting on the revised Code of Federal Regulations, *Title 10, Energy,* Part 70.

requirements.[225] As noted by NRC, under the revised Part 70, "the contractor must design[226] its facility to meet the baseline design criteria and other requirements that are identified in the NRC's regulations and perform an integrated safety analysis of the facility design to confirm that appropriate controls will be provided.... This approach incorporates both flexibility of a risk-informed, performance-based safety analysis as well as baseline design criteria from which a judgment is reached that there is reasonable assurance of adequate safety." The applicant's license application summarizes the results of the integrated safety analysis, the facility design, compliance with the prescribed standards and requirements, and the ability of the facility to withstand/mitigate the hazards identified in the integrated safety analysis.

Therefore, there is nothing inherent in the TWRS/WTP requirements development process, compared to the draft Part 70 process, that would preclude the selection of a set of standards and requirements for the TWRS/WTP facility that will achieve adequate safety in either an NRC or a DOE regulatory environment. However, this will not guarantee that the NRC would accept the TWRS/WTP standards and requirements as sufficient should the facility transition to NRC regulation. In fact, NRC has already acknowledged that the DOE and NRC approaches are intended to reach the same endpoint but has expressed the following concerns with the approach for TWRS-P:

1. Safety requirements were proposed and conditionally approved during the pre-conceptual design phase of the facility. This attempt to reach judgment on adequate safety was performed prior to the majority of design information being available.

2. For both regulatory processes, the determination of adequate safety is somewhat subject to engineering judgment and, as such, should transition occur, additional requirements and potential backfits could be needed.

3. The situation is exacerbated by (a) DOE's tailoring approach, which allows the TWRS-P Contractor to pick and choose in proposing a set of applicable safety requirements, and (b) the appearance that the RU is increasingly influenced by cost and schedule considerations during its regulatory decision making process (from Chapter 7.0, Main Reference 17).

Preliminary NRC Staff Assessment

The NRC staff believes this issue is not significant if regulatory transition occurs in the near-term because the end result should be comparable.

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[225] Nuclear Regulatory Commission (U.S.)(NRC). SECY-98-185, "Proposed Rulemaking-Revised Requirements for the Domestic Licensing of Special Nuclear Material." NRC: Washington, D.C. July 30, 1998.

[226] Nuclear Regulatory Commission (U.S.)(NRC). SECY-98-185, "Proposed Rulemaking-Revised Requirements for the Domestic Licensing of Special Nuclear Material." NRC: Washington, D.C. July 30, 1998. Note that the wording on pages 23 and 44 of SECY-98-185 indicates that an applicant must consider/address the baseline design criteria, not necessarily meet them.

D23. ACHIEVEMENT OF ADEQUATE SAFETY

Issue

DOE and NRC may reach different conclusions about the achievement of adequate safety and this may require reconciliation during the possible future transition of TWRS/WTP to NRC regulation.

Discussion

This concerns the implementation of measures to avoid or to identify, assess, and disposition differing conclusions between DOE and NRC on the achievement of adequate safety as a result of the different approaches. Such measures are best implemented early in the project's life cycle and continue on an ongoing basis to preclude a backlog of differences that would have to be resolved as part of the transition process to NRC regulation.

The DOE regulatory approach for TWRS-P safety (radiological, nuclear, and process) places on the TWRS/WTP Contractor the responsibility to achieve (a) adequate safety for the workers and the public (b) comply with applicable laws and legal requirements, and (c) conform to DOE stipulated top-level safety standards and principles.[227] Within this regulatory framework, the TWRS-P Contractor identifies the work needed, evaluates the associated hazards, selects appropriate standards, and justifies the adequacy of the selected standards.[228] As discussed in Section D.22, the DOE regulatory approach for TWRS-P is potentially similar to the NRC approach anticipated in the revised 10 CFR Part 70. Nevertheless, the NRC has expressed the following concerns about the process for TWRS-P:

1. Safety requirements were proposed and conditionally approved during the pre-conceptual design phase of the facility. This attempt to reach judgment on adequate safety was performed prior to the majority of design information being available.

2. For both regulatory processes, the determination of adequate safety is somewhat subject to engineering judgment, and as such, should transition occur, additional requirements and potential backfits could be needed.

Preliminary NRC Staff Assessment

The NRC staff believe this is a technical issue that requires additional design effort by the contractors.

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[227] Department of Energy (U.S.)(DOE). RL/REG-97-10, Rev. 1, "Radiological, Nuclear, and Process Safety Regulation of TWRS Privatization Contractors Regulatory Plan." DOE: Richland, Washington. January 1998.

[228] Department of Energy (U.S.)(DOE). DOE/RL-96-0004, Rev. 0, "Process for Establishing a Set of Radiological, Nuclear, and Process Safety Standards and Requirements for TWRS Privatization." DOE: Richland, Washington. February 1996.

D24. EFFECT OF SCHEDULE DELAYS ON THE OVERALL RISK

Issue

DOE is concerned about balancing the risks of the TWRS/WTP facility with the risk of continued storage of the tank wastes.

Discussion

DOE has expressed interest in balancing the risks posed by continued operation of the tanks with the risks posed by operation of the vitrification plant, regardless of the regulatory framework. In particular, DOE is concerned that delays in TWRS/WTP operations due to regulatory matters (DOE and/or the NRC transition) would translate into increased risks because the tank farm system is old and potentially leaking. In theory, the regulatory requirements for a TWRS/WTP facility could be different (and reduced) against a baseline of the existing hazards of tank storage, which could be reduced by the operation of the facility. From the viewpoint of DOE, early startup, high availability, and high capacity operation of the vitrification plant could serve to reduce the risks posed by the tanks and the overall risk of HLW at Hanford, even if requirements on the vitrification plant were relaxed.

NRC requirements have been established to minimize risks of operation of a facility relative to a baseline of non-operation, even though NRC can consider balancing risks within a facility. However, NRC operates to codified regulations (10 CFR Part 70) and, while provision for risk benefits and balancing can be made via the risk-informed, performance based approach, it can be difficult to manage and balance the different risks on a quantitative basis with limited information on the design and safety features of the TWRS/WTP facility. Regulatory requirements could be administered with recognition of the real risks from the degrading tanks as baseline risks.

The risks to continued operation of the tank farm are analyzed in the Basis for Interim Operation (BIO),[229] which temporarily substitutes for a comprehensive Safety Analysis Report (SAR). The tanks also represent immediate concerns. Steel tanks that were built upwards of 55 years ago to a design life of 10 years ultimately will fail. The collapse of tanks due to overburdened loads, perhaps under seismic excitation, while they still contain waste represents both an immediate public concern and a long-term remediation challenge.

Preliminary NRC Staff Assessment

The NRC staff anticipates that the scope of NRC regulation—the TWRS/WTP facilities, tank farms, other Hanford facilities—will be defined in the enabling legislation. A single regulatory entity offers consistency and the potential to consider total risks from tank waste management. However, absent specific design and quantitative analysis, and NRC regulation of the entire Hanford Site operations, it is not possible to assess balancing total risk for the tank waste/HLW

[229] Department of Energy (U.S.)(DOE). HNF-SD-WM-BIO-001, Rev. 0, Executive Summary page ES-13, "The Basis for Interim Opration of the Tank Waste Remediation System Facilities." DOE, Richland, Washington. August 1998.

related systems at Hanford. However, achieving adequate assurances of safety is likely to be based upon individual facility analyses.

D25. RESOURCE ALLOCATION ACROSS TWRS FACILITIES

Issue

DOE has expressed concerns about balancing the resources available for the safety features of the TWRS/WTP (the vitrification facilities in particular) across the entire TWRS complex.

Discussion

The resources that support safety operation of the vitrification plan and the tanks are both drawn from the same source (i.e, public funds) and are, therefore, ultimately in competition with one another. DOE's concern is that the risk of the deteriorating tanks is increasing as the tanks continue to age thereby increasing the likelihood of tank leaks and accidents. Approximately 25 percent of the tank farm equipment fails upon demand. Therefore, this issue is directed toward the DOE observation that regulatory oversight needs to be applied to the vitrification plant and the tanks in such a manner as to minimize the overall risk from both. This could be done by providing a consistent regulatory framework for all parts of the TWRS/WTP program—the tanks and the vitrification plant.

Given the increasing risk of continuing the status quo with the tanks, DOE wants to emphasize the importance that all efforts be made to ensure that the design, licensing, and operation of the vitrification plant occur on schedule. However, while such a conclusion may be logical, DOE does not want to be seen as recommending regulation of the vitrification plant to any lesser standards than are applied to their other nuclear facilities. In management of the Hanford site, DOE ensures the safety of all operations according to the risk of those operations, and allocates funding and resources accordingly. From DOE's perspective of total risk, this might correspond to expedited schedules or safety features different from a facility constructed individually.

Preliminary NRC Staff Assessment

The NRC is concerned with adequate assurances of safety for the workers, the public, and the environment. Once safety and regulatory requirements are met for TWRS/WTP, resource allocation is an internal DOE matter. The NRC staff expects the scope of NRC regulation to be defined in the enabling legislation.

D26. BACKFIT/RETROFIT

Issue

Changes may be required as the TWRS/WTP facility transitions to NRC regulation.

Discussion

The TWRS-P facility could be subjected to new or modified requirements imposed by NRC if regulatory transition occurs. These new or modified requirements may require that the TWRS-P facility be modified. Terms such as "backfit" and "retrofit" are commonly used to describe modifications that are made in response to a new or modified requirements. These terms, the regulatory actions and precedents associated with them and the differences between them are discussed further below.

The NRC has backfitting provisions in its regulations for reactors, independent spent fuel storage installations, and GDPs.[230] In these regulations, backfitting is generally defined as the modification of, or addition to, systems, structures, or components of a facility; or to the procedures or organization required to operate a facility, any of which may result from a new or amended provision in the NRC rules or the imposition of a regulatory staff position interpreting the NRC rules that is either new or different from a pervious NRC staff position. Backfitting only applies to facilities that have received a license (including a construction permit) or a certification. For these facilities (except for a few special conditions noted in the regulations[231]), the NRC can require a backfit only when it determines that there is a substantial increase in the overall protection of the public health and safety or the common defense and security to be derived from the backfit and that the direct and indirect costs of implementation for that facility are justified in view of this increased protection.

Backfit provisions are expected to be ultimately included in 10 CFR Part 70.[232] In response to an Nuclear Energy Institute (NEI) Petition for Rulemaking that requested a backfitting provision for 10 CFR Part. 70 similar to the one in 10 CFR 50.109, the NRC staff proposed that "a qualitative backfit mechanism, similar in purpose to a 10 CFR 50.109 provision, be considered after the safety bases, including the results of the ISA, are established and incorporated in the license, and after licensees and staff have gained a few years of experience with implementation of the ISA requirement. This mechanism would not apply to modifications identified as a result of the initial ISAs that are needed to assure protection of public health and safety; these modifications would be required for compliance with the revised 10 CFR Part 70."[233]

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[230] See Code of Federal Regulations, *Title 10, Energy*, Section 50.109, "Backfitting," Section 72.62, "Backfitting," and Section 76.76, "Backfitting."

[231] A backfit analysis is not required if regulatory action is necessary to ensure that a facility provides adequate protection to the health and safety of the public; the modification is necessary to bring a facility into compliance with a license/certification or NRC rules or orders, or into conformance with written commitments by the licensee; or the regulatory action involves defining or redefining what level of protection to the public health and safety should be regarded as adequate.

[232] Code of Federal Regulations, *Title 10, Energy*, Part 70, "Domestic Licensing of Special Nuclear Material." The draft 10 CFR Part 70 issued on July 30, 1998, does not include a backfit provision. However, because of the differences of opinion on whether to include a backfit provision in Part 70, the Commission is requesting public comment on its intent to defer consideration of a qualitative backfit provision in Part 70.

[233] Nuclear Regulatory Commission (U.S.)(NRC). SECY-97-137, Attachment 1, Section 8.0, "Proposed Resolution to Petition for Rulemaking Filed by the Nuclear Energy Institute." NRC: Washington, D.C. June 30, 1997.

Changes that are required to be made when an existing facility applies for an NRC license or certification are termed "retrofits" and do not meet the criteria for being classified as a backfit. Thus, NRC backfit provisions do not apply to retrofits. In fact, the NRC does not have specific retrofit provisions in its regulations. The Portsmouth and Paducah GDPs, which were existing, DOE-regulated operational facilities prior to being transitioned to NRC regulation, had to meet or commit to meet the applicable NRC regulations in order to receive certifications. For these plants a plan for achieving compliance with respect to any areas of noncompliance with the NRC's regulations had to be submitted with the application for an initial certificate of compliance.[234] Although a backfitting rule for the GDPs was issued, the NRC interpreted the rule not to apply until after the initial NRC certification process was completed.[235] It should be noted that the GDPs were transitioned to NRC regulation approximately 50 years after their design and 45 years after construction, while transition of the TWRS/WTP facilities would likely occur within 5 years of the design activities.

Preliminary NRC Staff Assessment

The NRC anticipates that some Backfits/Retrofits may be necessary upon transition of the TWRS/WTP to NRC regulatory authority. However, the NRC staff expects these to be minor because the facilities would represent new design and construction, with complete documentation, and the NRC has participated with DOE and their contractors in Phase IA and Phase IB-1 of the program. Regulatory transition of other TWRS activities might involve older facilities with less documentation and could result in more significant requirements.

D27. SCOPE OF NRC REGULATION

Issue

DOE has discussed the scope of NRC regulation, including facilities beyond the immediate TWRS/WTP facilities.

Discussion

HLW has been stored in large underground storage tanks at the Hanford site since 1944.

The existing tank waste, as well as new waste added to the tanks farms, is regulated by the TPA's RCRA enforcement provisions. The TPA, initially issued in 1989, is an enforceable agreement among DOE, Washington State Department of Ecology, and EPA for achieving environmental compliance at the Hanford site. Under the TPA, the 149 single-shell tanks must be emptied by 2018, and the 28 double-shell tanks must be emptied by 2028. All processing must be completed by 2028.[236] The TPA was modified in 1996 to permit private companies to

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234 Code of Federal Regulations, *Title 10, Energy*, Section 76.35(b), "Certification of Gaseous Diffusion Plants, Contents of Application."

235 Buhl, A.R., T. Murley, G. Edgar, and D. Silverman. "NRC Regulation of Doe Facilties." *Nuclear News*, p. 32. May 1997.

236 Environmental Protection Agency (US)(EPA) and State of Washingtong Department of Ecology. "Hanford Federal Facility Agreement and Consent Order" (Tri-Party Agreement between DOE,EPA, Ecology).

perform remediation of the tank waste in response to a DOE initiative to encourage industry to use innovative approaches to remediate the tank waste.[237]

The DOE TWRS-P program was developed to address the remediation of the tank waste component of the overall TWRS program using a privatized contractor. Within the TWRS-P program, the DOE regulatory program had been structured to facilitate the possible future transition to NRC regulation. An MOU between DOE and NRC also had been prepared to ensure that the DOE regulatory program is consistent with NRC's regulatory approach and to allow NRC to gain sufficient experience and knowledge of the TWRS-P activities to be able to license the TWRS-P facility (i.e., the vitrification facility) in the future.[238]

As initially envisioned by DOE, both vitrification of tank waste and storage of tank waste would be privatized, and the NRC would regulate all TWRS activities of the privatized contractor(s). This was described as Phase II of TWRS-P. At present, the NRC has no direct involvement in overseeing tank-related activities. Although NRC has licensing authority over any facilities expressly authorized for the long-term storage and disposal of defense HLW, previous NRC legal determinations have indicated that the storage of HLW in the tank farms does not constitute long-term storage and is not subject to NRC licensing. Thus, legislation would likely be needed to grant the NRC the authority to regulate the tank farms (legislation is also needed for NRC to regulate the vitrification facility—it could be part of the same legislative package). DOE, using its own rules, Orders, standards and other directives currently regulates the tank farms.

From the perspective of DOE, focusing financial resources and NRC regulatory attention on the vitrification facility alone could result in insufficient consideration of the considerable environmental and public risk posed by continued operation of the tanks with their associated leakage and potential for collapse and explosion. Conversely, having both the tank farms and the vitrification facility regulated by the NRC would ensure that NRC's regulatory approach and principles and a consistent regulatory framework are applied to both facilities. In evaluating regulatory requirements and decisions in the context of the entire TWRS complex, the NRC could balance the risks posed by continued operation of the tank farms against the risks posed by operation of the vitrification facility, thereby selecting the alternative that minimizes the net risk to the environment and to the public. The NRC staff considers the term "consistent regulatory framework" to mean similar baseline requirements, similar risk based performance criteria, and similar regulatory procedures (license and amendment reviews, inspections, and enforcement).

A consideration with respect to having the NRC regulate the tank farms is that regulation would most likely be done using a certification process. (The requirement for using a licensing process or a certification process would likely be specified in the legislation needed to grant the NRC the authority to regulate the tank farms.) To implement certification, a new section (Part) in the NRC regulations would need to be developed to specify the certification process and the

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237 Department of Energy (U.S)(DOE). EIS-0189-SA23, "Supplement Analysis for the Tank Waste Remediation System." DOE: Richland, Washington. May 1998.

238 "Memorandum of Understanding between the U.S. Nuclear Regulatory Commission and U.S. Department of Energy." January 29, 1997.

standards to be applied to the tank farms. The specific requirements in this new Part could be different than the requirements to be applied to the vitrification facility (i.e., 10 CFR Part 70).

The tank farms are currently a government-owned, contractor-operated facility. If the tank farms were to be transitioned to NRC regulation, the licensee/certificate holder could be DOE, the contractor, or both. DOE has previously expressed interest in transitioning operation of the tank farms to a privatized contractor, similar to that originally planned for the vitrification facility. This was described as Phase II of TWRS privatization. The licensees/certificate holders for the tank farms and the vitrification facility might be different, and separate licenses/certifications could be required for NRC regulation of these facilities. Thus, the NRC regulatory focus would tend to center on whether the activities occurring at each individual facility are meeting the commitments in each safety analysis report and the conditions of each license/certificate. Further more, separate NRC licensing project managers would likely be assigned for the tank farms and vitrification facility, and separate docket files would likely be opened in each case. However, to the extent that both facilities were licensed/certified by a single safety regulator, greater consistency of safety decision making can be expected.

Cases exist or will exist on DOE sites where NRC regulates one facility and DOE regulates other facilities, although these have much simpler interfaces than at TWRS. The TMI-2 Independent Spent Fuel Storage Installation (at the DOE Idaho Site) is an example of a case where NRC will license and regulate a new facility that will receive waste from an existing facility, specifically the Test Area North (TAN) facility. In this case, DOE regulates current TAN facility spent fuel pool storage operations and will regulate dry storage cask loading operations performed at the TAN facility. NRC regulation will begin when the fuel leaves the TAN facility boundary in an approved transportation cask.[239] In another case, at the Portsmouth and Paducah GDPs, certain operations have been certified by NRC while others remain under DOE control. This shared site arrangement required that regulatory boundaries be established to ensure a clear understanding of responsibilities for regulatory oversight and the rules governing particular portions of the plants.[240]

<u>Preliminary NRC Staff Assessment</u>

The NRC staff anticipates that the scope of NRC regulation—the TWRS/WTP facilities, tank farms, other Hanford facilities—will be defined in the enabling legislation and this will address this issue. A single regulatory entity offers consistency and the potential to consider total risks from tank waste management. However, absent specific design and quantitative analysis, it is not possible to assess balancing total risk for the tank waste/HLW related systems at Hanford and achieving adequate assurances of safety is likely to be based upon individual facility analyses.

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[239] Department of Energy (U.S.)(DOE). Rev. 0. Section 1.2, "License Application for the Idaho National Engineering Laboratory Three Mile Island Unit Two Independent Spent Fuel Storage Installation." DOE: Idaho Operation Office. October 1996.

[240] Buhl, A.R., T. Murley, G. Edgar, and D.Silverman. "NRC Regulation of DOE Facilities." *Nuclear News*. p. 32. May 1997.

D28. LOCATION OF THE REGULATOR

Issue

DOE believes the regulator should be located near the Hanford site.

Discussion

The location of the regulator is a potential issue, especially prior to the start of operations. Ideally, the regulator should be close to the regulated. As a practical matter, since the regulator usually has more than one licensee, this is normally not possible. However, the issue of NRC assumption of regulatory authority for DOE facilities, or facilities on DOE land, is new.

As a regulator, the NRC usually stations a resident inspector locally, has a lead field office, and maintains a technical review staff at the NRC Headquarters. The resident inspector and the field office focus on daily and more immediate issues, including inspections and enforcement, and routine meetings with the facility staff on operations. The Headquarters staff focuses on licensing and evaluation issues, and includes more specific area technical specialists. For regulatory activities associated with the proposed TWRS/WTP facilities, the NRC would probably maintain several FTEs as residents at the Hanford site, have a dedicated team of several FTEs at the Region IV Office, and maintain a staff of around 15 specialists at the NRC Headquarters.

Preliminary NRC Staff Assessment

The NRC staff anticipates that NRC regulation of TWRS/WTP facilities would involve some staff FTEs at the Hanford site, some staff FTEs at the Region IV Office, and some staff FTE's at the NRC Headquarters. The actual staffing levels would be determined by Congress via the enabling legislation and the scope of NRC regulation it requires.

D29. MULTI-STEP LICENSING

Issue

The program for TWRS/WTP is split into several phases, and a multi-step licensing process may be more appropriate .

Discussion

NRC has adopted one-step licensing for 10 CFR Part 70 licenses. TWRS-P had contractually established a two-step process with separate authorization of contraction and operation. Regulatory activity also occurred during preliminary design of TWRS-P, and is likely to occur during the completion of the design under the M&O contractual arrangement. The NRC does not have a well-defined approach for regulating preliminary design work although such activities have occurred in the past and are occurring now.[241]

The RU expects preliminary design to be the basis of the Contractor's PSAR in the Construction Authorization Report (CAR). The NRC would normally expect their 10 CFR Part 70 license applications to be supported by a more advanced design. If the NRC were to assume regulatory authority after the start of construction but before the start of operations, the Contractor may have to upgrade the PSAR to a level consistent with NRC's expectations before this transition. However, the NRC regulatory approach is flexible and can adapt to a two-step approach with a submittal for a construction permit and a subsequent submittal of a license application for operations.

In the revised 10 CFR Part 70,[242] NRC is requiring that a licensee effectively perform a second step in the one-step licensing process by requiring that a preliminary hazards analysis be performed on the preliminary design prior to construction of new facilities. NRC notes that this could be viewed as an additional licensing step if approval was required, but it is not clear whether this step would include public participation. Without public participation it could seem to be an NRC approval of work already done on the preliminary design.[243]

Preliminary NRC Staff Assessment

The revised 10 CFR Part 70 allows multi-step licensing. An amendment process would allow the constructed TWRS/WTP facility to obtain approval for changes, different flow capacities, and different radionuclide inventories. This is not an issue.

D30. DIFFERENCES IN 10 CFR PART 20 AND 10 CFR PART 835

Issue

DOE believes differences in 10 CFR Part 20[244] and 10 CFR Part 835[245] need to be understood and reconciled to the extent necessary.

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241 In the licensing of the US-DOE Clinch River Breeder Reactor Plan in the late 70's when regular meetings on parts of the design basis and safety analysis were presented to the NRC in Germantown at biweekly meetings thus obtaining valuable prelicensing feedback. The MOX facility is anticipated to be a two-step licensing effort with considerable, upfront involvement and interactions between the NRC and the DOE contractors. The NRC Staff have also been involved in the TWRS Program itself from 1997 through 2000.

242 Code of Regulations, Title10, Energy, Revised Part 70, "Licensing of Special Nuclear Material." Issued for public viewing in July 1998.

243 BNFL Inc. "Contractors Initial Safety Analysis Report," BNFL Inc.: Richland, Washington. 1997.

244 Code of Federal Regulations, *Title 10, Energy,* Part 20, "Standards for Protection Against Radiation."

245 Code of Federal Regulations, *Title 10, Energy,* Part 835, "Occupational Radiation Protection."

Discussion

DOE promulgated primary standards for radiation protection in December 1993 when 10 CFR Part 835 was issued as a final rule.[246] The new rule was intended to codify current radiological safety requirements contained in DOE orders and directives; however, for various reasons, not all aspects of radiological safety were included in the rule. For example, respiratory protection was not covered under the rule because another directive, the DOE Radiological Control Manual[247], already contained respiratory protection requirements. At the time 10 CFR Part 835 was issued, all DOE contractors were required to incorporate compliance to the DOE Radiological Control Manual in their contracts. (This requirements has since been modified.)

For the most part, DOE and NRC radiation protection regulations are similar, but a few differences exist. The most notable difference is that requirements found in 10 CFR Part 20 are more comprehensive than the 10 CFR Part 835 requirements, but where differences in dose values exist, the DOE requirements are usually more conservative. Areas found in 10 CFR Part 20 and not covered by 10 CFR Part 835 include:

1. Respiratory protection including respirator protection factors.

2. Sealed radioactive source control.

3. Radioactive waste disposal.

4. Packaging receipt.

The TWRS-P Contractor was required to comply with all requirements in 10 CFR Part 835, and any additional requirements it elected to include in the Safety Requirements Document (SRD). The additional safety criteria[248] address areas covered in 10 CFR Part 20, but not covered by 10 CFR Part 835. The NRC's Special Projects Branch reviewed the applicable sections of the TWRS-P Contractor's SRD and concluded that, in general, the SRD radiation protection standards are equivalent to 10 CFR Part 20, and if properly implemented, the TWRS-P Contractor's Radiation Protection Program (RPP) could be compliant with the NRC regulations. However, the NRC staff did not review the TWRS-P Contractor's SRD for specific compliance to 10 CFR Part 20. The RU agreed with this assessment.

Both agencies also agreed that the key to developing a 10 CFR Part 20 compliant RPP lies in the details of the implementation of the SRD Safety Criteria for radiation protection. The TWRS-P Contractor had not developed the implementation details. It was expected that the level of detail needed to better evaluate compliance with 10 CFR Part 20 would become available at the PSAR stage when the TWRS-P Contractor would have submitted a revised

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[246] Department of Energy (U.S.). *Federal Register*. Vol. 588, No. 238.

[247] Department of Energy (U.S)(DOE). EH-0256T, Rev. 1, "Radiological Control Manual." DOE: Richland, Washington. DATE:________

[248] Safety Criteria are standards that the TWRS-P contractor included in the Safety Requirements Document. These Safety Criteria are generally based on regulations or industry standards, but can be created ad hoc.

RPP for construction. It is expected that a similar approach will be taken by the new contractors working under M&O arrangements.

Preliminary NRC Staff Assessment

The NRC staff does not consider this a transition issue.

D31. COST OF CONTRACTOR DOCUMENTATION

Issue

DOE expects there may be some costs associated with changing documentation to meet NRC expectations after regulatory transition.

Discussion

Regulation by the NRC may require additional documentation, different formats, more specificity, or additional analyses. DOE used the example of the GDPs since the regulatory oversight of the GDPs recently transitioned to the NRC from DOE; DOE evaluated the costs involved in the GDP documentation changes. A source at DOE's Oak Ridge Office put the cost of revised paperwork alone (independent of any physical change at the facilities) at $50 million plus for revision of procedures, the SAR, and other documents for the GDPs. It should be noted, however, these costs were for old plants in which existing documentation was lacking and many of the documents had to be created or required major updates, and training/certification of personnel was necessary. In addition, the GDPs were not in compliance with the DOE regulations and requirements at the time of transition, which contributed to the costs involved. It would be expected that if the TWRS/WTP contractors were in compliance with the DOE regulatory framework at the time of transition to NRC regulation, the costs for revision of new plant documents (all of which would likely be available in electronic formats) would be substantially less. Given the use of M&O contracts, DOE would fund these documentation requirements and changes.

Preliminary NRC Staff Assessment

The NRC staff does not consider this a significant transition issue.

D32. THE ROLE OF DOE ORDERS VERSUS NRC RULES

Issue

DOE is concerned that there may be misunderstandings regarding the applicability and enforceability of the DOE Orders and their relationship with DOE rules.

Discussion

In the transition of regulatory oversight from DOE to the NRC for the GDPs, the NRC presumed that the GDPs were required to strictly comply with DOE Orders. However, that was not the case. Thus, the role of DOE Orders in the conduct of DOE business required clarification. The term "Order" or more precisely, "Safety Order" is a misnomer and leads one to a basic misconception in understanding the DOE regulatory process. The terminology problems can be exacerbated because the NRC regulatory structure also includes the term "Order" but it is used in the more conventional sense. NRC Orders have the force of law and are issued to licensees as mandatory requirements. According to DOE and contrary to what the term "Order" implies, DOE Safety Orders are not, on their own, legal requirements and are not necessarily mandatory.

DOE Safety Orders were not promulgated according to the Administrative Procedures Act requirements and are not legally binding. The Administrative Procedures Act requires public noticing and a comment period, among other things, before an Order is promulgated. Absent this process, Orders can be incorporated into a contract to be administratively enforceable under the terms and remedies provided in the contract. Without a statutory or contractual requirement, implementation of a particular Order typically involved an agreement by DOE to compensate the contractor for any additional burden associated with Order compliance. The Price-Anderson Act Amendments of 1988 authorized DOE to impose civil and criminal penalties for violations of enforceable orders. However, in practice, there were no enforceable orders and few civil or criminal penalties were ever imposed.[249]

From the DOE perspective, the need for defining "DOE Orders" during the DOE/NRC transition process became apparent during discussions related to transition of the GDPs to NRC oversight. The GDPs were constructed in the early 1950s and operated through multiple DOE regulatory regimes. During near term (1990) regulation, the plants were subjected to aggressive DOE inspections (Tiger Teams) which identified noncompliance with DOE Safety Orders, recommended privatized operations, and recommended NRC oversight. Even before 1992, when DOE was directed to lease the GDPs to USEC, an upgrade program was initiated and new DOE Safety Orders were issued.[250]

Order-related lessons learned from the GDP transition are not generally applicable to TWRS. DOE Order compliance was specifically excluded from the TWRS-P contract.[251] Both the DOE and NRC have been involved in developing the TWRS-P regulatory (Integrated Safety Management Plan [ISMP] and SRD) and design (Integrated Safety Analysis [ISA] and SAR) bases. The regulatory basis for the new contracts has not been defined yet.

Preliminary NRC Staff Assessment

The NRC staff does not consider this an issue.

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[249] Defense Nuclear Facilties Safety Board. Tech 5.

[250] Department of Energy (U.S)(DOE). ORO-2051, "Regulatory Oversight Program." DOE: Oak Ridge, Tennessee. September 1997.

[251] Department of Energy (U.S.)(DOE) Rev. 1, "Radiological, Nuclear, and Process Safety Regulation of TWRS Privatization Contractors." DOE: Richland, Washington. January 1998.

D33. THE ROLE OF THE NATIONAL ENVIRONMENTAL POLICY ACT IN REGULATORY TRANSITION

Issue

DOE believes the potential effects of the National Environmental Policy Act (NEPA) need to be considered for regulatory transition.

Discussion

Presently, DOE has responsibility for ensuring compliance of the TWRS/WTP activities to NEPA. As part of its compliance activities, DOE has issued an Environmental Impact Statement (EIS) that includes the TWRS/WTP activities. However, when TWRS-P regulatory oversight transitions to the NRC, NRC will also have to comply with NEPA requirements pertinent to its activities.

DOE's implementing regulations for NEPA are found in 10 CFR Part 1021. Similarly, the NRC implementing regulations are found in 10 CFR Part 51 and provide for the adoption of other Federal agencies' NEPA documentation, as well as the participation of the NRC in the NEPA process of other Federal agencies as a lead or cooperating agency.

Both DOE and NRC rules permit the flexibility of being lead agencies or cooperating agencies and to work along with other Federal entities on NEPA documentation. In the past, the NRC has not viewed the task of NEPA coordination and integration as a large challenge, and normally works with other agencies when preparing EISs.

Since the TWRS/WTP project is a major Federal action, DOE had prepared an EIS in the early 1990s for it and related activities. The EIS considers the actual cleanup activities and operations of the TWRS-P facilities and includes construction, operation, and decontamination and decommissioning activities.

Preliminary NRC Staff Assessment

The NRC staff does not consider this an issue because of the existing NEPA coverage and the similarities between the two agencies in their approaches to NEPA. It is possible that an updated or supplemental EIS/Environmental Assessment (EA) may become necessary, based upon the final approaches selected by the TWRS/WTP contractors.

D34. ROLE OF THE ACRS OR ACNW IN REGULATORY OVERSIGHT TRANSITION

Issue

DOE is concerned by the potential effects of the Advisory Committee on Reactor Safeguards (ACRS) and/or the Advisory Committee on Nuclear Waste (ACNW) on the transition of TWRS/WTP regulation from DOE to NRC.

Discussion

The ACRS was established in 1957 by revision of the AEA of 1954 and provides advice to the NRC on potential hazards of proposed or existing nuclear reactor facilities and the adequacy of proposed safety standards. The AEA also requires that the ACRS advise the Commission with respect to the safety of operating reactors and perform such other duties as the Commission may request. Consistent with the Energy Reorganization Act of 1974, the Committee will review any material related to the safety of nuclear facilities and activities of the DOE specifically requested by DOE. Upon request, the ACRS has also provided advice to the DNFSB and the U.S. Navy. In addition, the ACRS, on its own initiative, performs reviews of specific generic matters on nuclear facility safety-related items. Activities of the ACRS are conducted in accordance with the Federal Advisory Committee Act, which provides for public attendance and participation in ACRS meetings.

The NRC established the ACNW in 1988. Until that time, the ACNW was a subcommittee of the ACRS. The ACNW reports to and advises the NRC on nuclear waste disposal facilities as directed by the Commission. This includes 10 CFR Part 60 and 10 CFR Part 61, and other applicable regulations and legislative mandates such as the Nuclear Waste Policy Act, the Low-Level Radioactive Waste Policy Act, and the Uranium Mill Tailings Radiation Control Act, as amended. The primary emphasis of this Committee is waste disposal facilities.

Although neither of the above descriptions of the ACRS/ACNW charters directly encompass TWRS/WTP activities, a DOE discussion with the Executive Director of ACRS/ACNW indicates that one or both of the advisory committees would likely evaluate issues related to licensing of TWRS/WTP. The DOE/RU had concerns that ACRS/ACNW involvement in the regulatory oversight transition may include the potential for delay, and DOE discussed these concerns with the Executive Director and ACNW Nuclear Waste Branch Chief. Both indicated that although the committees may ask for additional information following a presentation of the proposed action, there is little likelihood, in their view, of a substantial delay of the TWRS-P transition process. The committees meet eight times per year and submit their reports within 1 month following the meetings.

An ACNW letter to NRC Chairman Jackson, dated December 23, 1997, forwarded the ACNW 1998 Strategic Plan and Priority Issues and Activities. Listed as a second-tier priority was a commitment to review waste-related activities associated with the NRC's possible regulation of certain DOE facilities if NRC assumes responsibility for those activities as result of privatization or enactment of new legislation. Following their review of the September 16, 1996, NRC Strategic Plan Framework Document, the ACNW endorsed the concept of DOE regulation by NRC and expressed associated recommendations.

Based on the above discussion, the ACNW would likely take an interest in the transition of regulatory responsibility associated with TWRS-P. A review of ACNW reports from July 1996 to the present suggests that a typical ACNW recommendation would be expected within 3 months of an initial presentation of the issue to the Committee. Some issues that were not time sensitive were not concluded for up to a year, while reports on other issues were released within 1 week of the presentation to the Committee. Records of recent meetings suggest that ACNW involvement in the TWRS-P regulatory oversight transition process would not result in any delays. ACNW participation in the process would occur in parallel with other transition/licensing activities.

Preliminary NRC Staff Assessment

The NRC staff does not consider this to be a significant issue because no delays are anticipated.

D35. IMPACT ON FUTURE GENERATIONS

Issue

DOE is interested if there would be any impacts from regulatory transition upon future generations and resources.

Discussion:

The premise for the TWRS-P vitrification plant is that it will take waste, process it, and return a stable vitrified waste form for safe, long-term storage and disposal. By doing so, DOE intends to remediate the Hanford waste tanks and, eventually in the mid-21st Century,[252] return the land to beneficial use as it was prior to 1940. Future generations in the latter half of the 21st Century would benefit by greater land resources than are available now.

As previously noted, external regulation of DOE facilities, including TWRS/WTP facilities, is expected to improve the safety and protection of workers, the public, and the environment. This can only have a positive effect upon the future.

Preliminary NRC Staff Assessment

The NRC Staff does not see this as an issue for regulatory transition. Any schedule impacts from regulatory transition would be minuscule compared to the long time periods involved.

D36. PUBLIC INPUT TO REGULATORY DECISIONS

Issue

DOE is concerned that regulatory decisions may not continue to be open to the public and public input after transition of regulation to the NRC.

Discussion

When the Hanford reservation was established, it was under a cloak of secrecy, and decisions were made in wartime conditions where the imperative was the successful conclusion of the war. Decisions were made by the military with little input from anyone else. This unilateral form of decision making extended to DOE's management in the days of the cold war. Even as late as the 1970s, very little input was accepted from Stakeholders other than that which was legislated (as for the Agreement Tribes) or had an impact on Congressional funding (politicians).

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[252] The Tri-Party Agreement specifies complete clean-up of tank wastes by 2028, following which time the tanks themselves and all appurtenances would require decontamination and decommissioning and disposal.

Now, however, the situation is different. The DOE/RU has an Openness Policy[253] that makes it clear that Stakeholder's views are important and will be addressed. The RU satisfies this policy in a number of ways, both in providing information and in listening to the views of others in open meetings and within such groups as the Hanford Advisory Board. Much of the interaction is fairly informal and Stakeholders have a number of ways in which they may submit comments and concerns. DOE has undertaken to disposition all Stakeholders' comments.

The transfer of TWRS/WTP to NRC regulatory oversight would result in the NRC licensing or certifying the TWRS/WTP Contractor's facility. In any licensing action, NRC is required to obtain public participation under 10 CFR Part 2, the Rules of Practice. In this process, the interaction is more formal and judicially governed than in the DOE case. The NRC generally conducts interactions with the licensee in the public domain to the maximum extent possible. The ongoing pre-licensing activities on the MOX project are a good example.

Preliminary NRC Staff Assessment

The NRC staff does not consider this an issue as NRC practices and procedures usually result in more openness with the public than DOE regulatory actions.

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[253] Department of Energy (U.S.)(DOE) RL/REG-97-04, Rev. 2, "Policy for Openness and Openness Plan." DOE: Richland, Washington. June 1998. "The radiological, nuclear, proces safety regulation of TWRS-P contractors provide that the Hanford site shall be transacted publicly and candidly...." "The Tribal Nations and Public should be involved in decisions concerning privatization contractor regulation. Their involvement improves our processes and products and helps (to) ensure safety. We welcome and encourage this involvement."

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APPENDIX E
LISTING OF U.S. NUCLEAR REGULATORY COMMISSION CORRESPONDENCE WITH THE U.S. DEPARTMENT OF ENERGY ON TANK WASTE REMEDIATION SYSTEM-PRIVATIZATION

1. 11/20/96 Lettter to T. Sheridan from NRC RE Preliminary Comments RE Initial Quality Assurance Program, RL/REG-96-01, Rev. 0

2. MOU signed by Hazel O'Leary & Chairman Jackson on 1/15/97, Published in FR 3/13/97 RE MOU: Cooperation & Support of Significant Projects &Activities

3. MOU signed by J. Wagoner, DOE, on 1/15/97 and C.Paperiello, NRC, on 1/29/97, Published in FR 3/18/97 RE MOU: Cooperation & Support for Demonstration Phase (Phase I) of DOE Hanford TWRS Privatization Activities

4. 2/21/97 Letter to J. D. Wagoner from C.J. Paperiello RE Baseline Guidance Documents for Operation of the NRC's TWRS Unit

5. 2/27/97 Letter to T. Sheridan from NRC RE Comments Provided RE Guidance for Employees Concerns Management System

6. 8/17/97 NRC Comments provided to DOE via letter RE LMAES Standards Approval Submission (ISMP, SRD)

7. 10/17/97 and 10/30/97 NRC Comments provided to DOE/RU via letter RE BNFL Standards Approval Submission (ISMP, SRD)

8. 2/6/98 Letter to DOE with NRC Comments RE BNFL Initial Safety Analysis Report (ISAR)

9. 2/13/98 Letter to DOE with NRC RE LMAES Initial Safety Assessment Package (ISAP)

10. 4/3/98 Letter to D.C. Gibbs, DOE, from R.C. Pierson, NRC, RE Comments Provided on BNFL's QA Program and Implementation Plan

11. 5/21/98 Letter to J. Wagoner, DOE, from C. Paperiello, NRC, EDO- 98-00191/NMSS-980078; RE: Co-Located Worker Standards for Accidents (Encl 1 SECY-98-38, Encl 2 4/28/98 SRM)

12. 6/22/98 Letter to D.C. Gibbs, DOE, from R. Pierson, NRC RE Forwarding 2 Draft Documents- -Draft Part 70 and SRP for TWRS

13. 6/29/98 Letter to D.C. Gibbs, DOE from R. Pierson, NRC, RE Issue Paper: Seismic Events for TWRS

14. 7/2/98 Letter to D.C. Gibbs, DOE, from R. Pierson, NRC, RE Providing 2/23/99 Comm Paper "Modifications to MOU"

15. 7/10/98 Letter to D.C. Gibbs, DOE from R. Pierson, NRC, RE Forwarding Comments on Construction Authorization Request Outline

16. 7/23/98 Letter to D.C. Gibbs, DOE, from R. Pierson, NRC, RE NRC Comments on BNFL's Revised SRD & ISMP

17. 10/30/98 Letter to D.C. Gibbs, DOE, from R.C. Pierson, NRC, RE Comments on BNFL's Report "Radiation Protection Program for Design

18. 11/6/98 Letter to D.C. Gibbs, DOE, from R.C. Pierson, NRC, RE Comments on Regulatory Unit Disposition of earlier comments

19. 11/19/98 Letter to G. Wagoner, DOE, from C.J. Paperiello, NRC, RE Co-Located Worker Standards for Accidents

20. 12/1/98 Letter to D.C. Gibbs, DOE, from R.C. Pierson, NRC, RE Comments on BNFL transmittal of Criticality Safety Program PL-W375-NS00001

21. 12/2/98 Letter to D.C. Gibbs, DOE, from R. Pierson, NRC, RE Protocol Proposal for Inspection Assistance to DOE RU Inspections of TWRS-P contractor facilities and activities

22. 12/3/98 Letter to D.C. Gibbs, DOE, from R. Pierson, NRC, RE Issue Paper on Future US NRC Role for the Hanford TWRS

23. 12/03/98 Letter to C. Gbbs, DOE, from R. Pierson, NRC, RE TWRS Comments on "Demonstrations on the DOE-96- 0004 Process," BNFL Rpt-W375-PR00002, Nov 11, 1998.

24. 12/11/98 Letter to D.C. Gibbs, DOE, from R.C. Pierson, NRC, RE Comments on BNFL Submittal of 11/19/98 and 12/98 Seismic Topical Mtg.

25. 12/17/98 Letter to D.C. Gibbs, DOE, from R.C. Pierson, NRC, RE Transmits Inspection Accompaniment Report (98-01): Employee Concerns Program

26. 12/31/98 Letter to D.C. Gibbs, DOE, from R. Pierson, NRC, RE Comments on BNFL's TWRS Safety Criteria for Environmental Radiation Protection Program and for Environmental Radiation Monitoring

27. 1/08/99 Letter to D.C. Gibbs, DOE, from R. Pierson, NRC, RE Revised Protocol for NRC Inspection Assistance.

28. 1/22/99 Letter to D.C. Gibbs, DOE, from R. Pierson, NRC, RE BNFL Criticality Safety Program.

29. 2/11/99 Letter to D.C. Gibbs, DOE, from R. Pierson, NRC, RE Comments on BNFL's TWRS Safety Criteria for Environmental Radiation Protection Program (ERPP) and for Environmental Radiation Monitoring.

30. 2/12/99 Letter to D.C. Gibbs, DOE, from R. Pierson, NRC, RE: Preliminary Comments Provided on 1/28/99 Topical Meeting—Review of Hydrogen & Explosion Info

31. 2/19/99 Letter to D.C.Gibbs, DOE, fm R. Pierson, NRC, RE Draft SRP for the Review of a Licence Applicaiton for TWRS-P Project.

32. 2/19/99 Letter to D.C. Gibbs, DOE, fm R.C. Pierson, NRC, RE Comments Provided on Review of Fire Protection Info Provided by BNFL

33. 2/24/99 Letter to D.C. Gibbs, DOE, fm R.C. Pierson RE Review of Quality Assurance Inspection Plan and Inspection Technical Procedure I-101.

34. 3/1/99 Letter to D.C. Gibbs, DOE, fm R.C. Pierson, NRC, RE Comments Provided on Proposed Approach for Evaluating Compliance with RESW Requirements

35. 3/18/99 Letter to D.C. Gibbs, DOE, from R.C. Pierson, NRC, RE forwarding NRC comments on BNFL's Design Safety Features.

36. 3/19/99 Letter to D.C. Gibbs, DOE, from R.C. Pierson, NRC, RE NRC Inspection Accompaniment Report (99-01): Training & Qualification Program

37. 4/1/99 Letter to D.C. Gibbs, DOE, from R.C. Pierson, NRC RE NRC comments on Draft RL/REG-99-05, "Guidance Review Document for the Construction Authorization Request.

38. 4/21/99 Letter to D.C. Gibbs, DOE, from R.C. Pierson RE Forwards CNWRA Report on Estimate of Hydrogen Generation from Wastes at the Proposed TWRS-P Fac.

39. 4/23/99 Letter to D.C. Gibbs, DOE, from R.C. Pierson, NRC, RE Comments forwarded on Methods for Assessing Consequences of Potential Accident Radiological Releases from the TWRS-P Fac (Preliminary).

40. 5/10/99 Letter to D.C. Gibbs, DOE, from R.C. Pierson, NRC, RE Comments Forwared on 3/18/99 BNFL Transmittal of Seismic Documents.

41. 5/28/99 Letter to D.C. Gibbs, DOE, from R.C. Pierson, NRC, RE Transmittal of Point Paper on Process Safety at a TWRS-P Facility.

42. 6/4/99 Letter to D.C. Gibbs, DOE, from R.C. Pierson, NRC, RE Transmits copies of SECY-99-107 & related Secretary Requirements Memorandum

43. 6/11/99 Letter to D.C. Gibbs, DOE, from R.C. Pierson, NRC, RE NRC Inspection Accompaniment Rpt (99-02), "Quality Assurance."

44. 6/14/99 Letter to D.C. Gibbs, DOE, from R.C. Pierson, NRC, RE Comments provided on Chapter 4 of Guidance Document for Construction Authorization Request.

45. 6/22/99 Letter to D.C. Gibbs, DOE, from R.C. Pierson, NRC, RE 5/25/99 RU Activity Report from Jan-April 99 (Triennial Report).

46. 6/22/99 Letter to D.C. Gibbs, DOE, from R.C. Pierson, NRC, RE Comments on BNFL Inc. Quality Assurance Plan and Implementation Program.

47. 6/25/99 Letter to D.C. Gibbs, DOE, from R.C. Pierson, NRC, RE DOE 5/5/99 Ltr on Disposition of the NRC Comments on the BNFL Inc. Design Safety Features Submittal.

48. 7/2/99 Letter to D.C. Gibbs, DOE, from R.C. Pierson, NRC, RE NRC Expenditures on Hanford TWRS Related Work from FY97- 2nd Qtr FY99.

49. 7/2/99 Letter to D.C. Gibbs, DOE, from R. Pierson, NRC, RE Providing 2/23/99 Comm Paper "Modifications to MOU."

50. 7/9/99 Letter to D.C. Gibbs, DOE, from R.C. Pierson, NRC, RE Comments on BNFL Inc. 6/14/99 Submittal "Info for June Topical Meeting.

51. 7/15/99 Letter to D.C. Gibbs, DOE, from R.C. Pierson, DOE, RE NRC Inspection Accompaniment Report (99-03): Self Assessment & Corrective Action Plan.

52. 7/16/99 Letter to D.C. Gibbs, DOE, fromm R.C. Pierson, NRC, RE 5/99 Sellafield Report Sent.

53. 7/27/99 Letter to D.C. Gibbs, DOE, from R.C. Pierson, NRC, RE Review of SW Research Institute Report: "Radiological Binding on the Synthetic Biopolymer Diazoluminomelanin."

54. 7/29/99 Letter to D.C. Gibbs, DOE, from R.C. Pierson, NRC, RE NRC Inspection Accompaniment Report (99-04): Radiation Protection Program.

55. 8/5/99 Letter to D.C. Gibbs, DOE, from R.C. Pierson, NRC, RE Public Concern of Potential Inappropriate Use of 304 Stainless Steel in Tank Farm (Ralph Davison).

56. 8/13/99 Letter to D.C. Gibbs, DOE, from R.C. Pierson, NRC, RE NRC Comments on BNFL Report, "RPP for Design, Rev 2 & Rev 0."

57. 8/17/99 Letter to D.C. Gibbs, DOE, from R.C. Pierson, NRC RE Comments on Inspection Program for the Regulatory Oversight of the RPP-P, Rev 3 (RL/REG-98-05, 7/1/99).

58. 8/19/99 Letter to D.C. Gibbs, DOE, from R.C. Pierson, NRC, RE BNFL Record Storage.

59. 8/25/99 Letter to D.C. Gibbs, DOE, from R.C. Pierson, NRC, RE NRC Inspection Accompaniment Report 99-05, "Configuration Management Program."

60. 8/26/99 Letter to D.C. Gibbs, DOE, from R.C. Pierson, NRC, RE NRC Position on Pipe Damping Relative to the 1998 ASME Boiler & Pressure Vessel Code, Section III, App N, as Rev'sd by '99 Addenda.

61. 11/1/99 Letter to D.C. Gibbs, DOE, from R.C. Pierson, NRC, RE Transmittal of Report by CNWRA "Process Hazards & Safety Issues for TWRS-P" Volumes I & II.

62. 11/2/99 Letter to D.C. Gibbs, DOE from R.C. Pierson, NRC, RE Comments on Rev 4C of BNFL Quality Assurance Program and Implementation Plan.

63. 11/4/99 Letter to D.C. Gibbs, DOE, from R.C. Pierson, NRC, RE NRC and CNWRA Comments on Explosive Hazards Topical Meetings I & II, 8/24/99 & 9/28/99.

64. 11/4/99 Letter to D.C. Gibbs, DOE, from R.C. Pierson, NRc, RE Quality Assurance for Limited Construction Authorization Acts.

65. 11/4/99 Letter to D.C. Gibbs, DOE, from R.C. Pierson, NRC, RE NRC Comments on RL/REG-99-19, Rev. 0, "Analysis of Radiation Materials at Risk Supporting Source Term Development for TWRS-P Facility.

66. 11/12/99 Letter to D.C. Gibbs, DOE, from R.C. Pierson, NRC, RE Point/Status Paper on Quality Assurance.

67. 11/12/99 Letter to D.C. Gibbs, DOE, from R.C. Pierson, NRC, RE Transmittal of Comments on "Proposal to Modify the Current RPP-WTP Position with respect to Process Chemical Hazards for TWRS-P," 9/28/99.

68. 11/15/99 Letter to D.C. Gibbs, DOE, from R.C. Pierson, NRC, RE 10/22/99 RU Response to NRC Point Paper on Process Safety at TWRS-P Facility.

69. 11/23/99 Letter to D.C. Gibbs, DOE, from R.C. Pierson, NRC, RE Response to BNFL Inc.'s Comments on CNWRA Report on Estimates of TWRS-P Hydrogen Generation.

70. 12/14/99 Letter to D.C. Gibbs, DOE, from M. Galloway, NRC, RE NRC Observations on the Topical Meetings with BNFL Info for 11/98-11/99.

71. 12/23/99 Letter to D.C. Gibbs, DOE, from M. Galloway, NRC, RE Information Paper Comparing Radiological Protection Standards in 10 CFR Part 20 & 835.

72. 1/21/00 Letter to D.C. Gibbs, DOE, from M. Leach, NRc, RE Potential Critical Tech Issues for Construction Authorization Resolution.

73. 1/28/00 Letter to D.C. Gibbs, DOE, from M. Leach, NRC, RE NRC Inspection Accompaniment Report (01): Design Process.

74. 2/25/00 Letter to D.C. Gibbs, DOE, from M. Leach, NRC, RE Transmittal of Comments on the Report and Topical Meeting on "Compliance w/Risk Goals and Project Reliability Database."

75. 3/24/00 Letter to D.C. Gibbs, DOE, from M. Leach, NRC, RE NRC Inspection Accompaniment Report (70-3091/002) Training & Qualifications.

76. 4/12/00 Letter to D.C. Gibbs, DOE, from M. Tokar, NRC, RE Additional Comments from March Topical Meeting.

77. 4/27/00 Letter to D.C. Gibbs, DOE, from M. Tokar, NRC, RE NRC Response to 3/23/00 Ltr on Resubmittal of Aug & Sept 99 Topical Mtg Reports on Explosive Hazards.

78. 4/25/00 Letter to D.C. Gibbs, DOE, from M. Tokar, NRC, RE Summary of Discussion of TWRS-P Project RPP - Differences in Regulatory Requirements and Guidance of DOE and NRC.

79. 4/19/00 Letter to D.C. Gibbs, DOE, from M. Tokar, NRC, RE Comments on TWRS-P Project, RU Position on Conformance w/Risk Goals in DOE/RL-96-0006, RL/REG-2000-08, Rev 0 3/28/00.

80. 5/2/00 Letter to D.C. Gibbs, DOE, from M. Tokar, NRC, RE Transmittal of Point Paper on Materials Issues and Safety at TWRS-P Facility.

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11. ABSTRACT *(200 words or less)*

In 1995, the U.S. Department of Energy (DOE) embarked on an effort to privatize the processing through vitrification of 54 million gallons of radioactive waste that has been stored in 177 underground storage tanks at the Hanford Site. The U.S. Nuclear Regulatory Commission (NRC) provided assistance to DOE on the TWRS-P program, with a potential transition to NRC regulatory authority at a future time. In 2000, DOE terminated the privatization approach, and decided to use more traditional contracting methods.

During their reviews, NRC staff analyzed both unmitigated and mitigated consequences from potential accident scenarios at the proposed facility. NRC staff's efforts identified several key areas of uncertainty, such as melter failure modes and frequencies, that would require further study before more refined analyses could be performed. The reviews also identified several open issues, including the need for significantly more detailed design information and safety analyses, and greater defense-in-depth. In particular, the design, at the time of termination of the privatization, was found to be very preliminary and corresponded to perhaps a 15 percent level of design.

This report summarizes NRC's participation in and observations on the TWRS-P program and identifies issues from the NRC's perspective.

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