pyrophoric and explosive material content, and (4) characteristics affecting the solubilization and mobilization of radionuclides, formation of colloidal suspensions containing radionuclides, production of gas from the waste, nuclear criticality, and generation of heat in the disposal system. The impact of non-radioactive hazardous components of the waste should also be assessed as such components have the capacity to influence radionuclide transport. The results of this study shall be provided to EPA along with documentation of the methodology and information describing the importance of particular characteristics of the waste. These results shall dictate the breadth of characterization to be performed.

Once the waste characteristics that are important to the disposal system's ability to isolate radionuclides have been identified, the waste shall be categorized based on those characteristics that would be expected to make all waste within a particular category behave similarly in the disposal system. For example, if the curie content of a given radionuclide in the waste is determined to be important to the disposal system's ability to contain radionuclides, it might be used as part of a system of categorization. Waste having a high curie content of that nuclide could comprise one category, while waste having a low curie content of that nuclide could comprise another category. Similarly, if a given waste form is found to be important, categories could be made for various waste forms such as sludges and solids. EPA proposes that a detailed description shall be provided which identifies the characteristics of each category of waste established.

A variety of methods for characterizing waste exists including sampling and analysis, radioassay, and examination of waste generation documentation and associated records (often referred to as "process knowledge"). Today's proposal does not specify any particular method for characterizing the waste. Nevertheless, regardless of which method or combination of methods is selected for waste characterization activities, the Agency is proposing to require that each method be identified and described. Moreover, the uncertainty associated with each method shall be identified, and if information about the processes and materials that generated the waste is used as a basis for waste characterization, the DOE shall be required to substantiate such characterization.

The manner in which the Agency proposes that waste characterization

shall be accomplished is explained below. The DOE will examine each important characteristic of the waste and determine a value or range of values for that characteristic. Since DOE must demonstrate that the WIPP complies with the containment, individual, and ground-water protection requirements of 40 CFR part 191 for the whole range of values for each waste characteristic, the larger the range, the greater the uncertainty associated with a claim that WIPP complies. DOE can reduce the range of values for each characteristic through enhanced information gathering until the range is small enough such that DOE is reasonably confident that the resulting probability for compliance will meet the containment, individual, and ground-water protection requirements of 40 CFR part 191. Thus, DOE has a great deal of flexibility in the amount of characterization required. However, whatever value or range of values DOE selects for each characteristic must be considered in compliance assessments of the WIPP. In assessing compliance, DOE shall consider all combinations of waste characteristics and the resulting impact on the disposal system's behavior.

EPA is proposing that waste not be emplaced in the repository unless its characteristics fall within the ranges of values for those characteristics used in compliance assessments. To assure that only waste whose characteristics fall within the given range of values is emplaced, the Agency is proposing that a system of controls be established, including measurements, sampling, and recordkeeping for the waste, such that the actual characteristics of waste will be identified before the waste is emplaced in the WIPP. Compliance applications shall provide an identification and description of these controls along with an analysis of the uncertainty associated with them.

As a final measure to assure proper waste characterization, the Agency is proposing that EPA audits and inspections will be used to verify the waste characterization requirements of this part.

Future State Assumptions

Demonstrating compliance with 40 CFR part 191, subparts B and C, involves the use of computer models based on conceptual models which project, over an extended period of time, the transport of radionuclides from the disposal system to the accessible environment and resulting radiation doses to individual members of the public. Because of the long-term nature of these evaluations, uncertainty of values for many parameters important to the analysis may be very large. Environmental conditions and living habits of future populations and individuals may change in significant and unforeseeable ways over the lengthy timeframes that will be analyzed for compliance.

In light of the difficulty of assigning appropriate values with confidence, the Agency is proposing to specify certain assumptions about the future for use in long-term modeling. The Agency is proposing that, unless otherwise specified, any certification of compliance shall assume that characteristics of the future remain what they are today. EPA believes such an approach will enable compliance assessment to focus on more predictable and more significant features of disposal system performance. For instance, EPA is proposing that such an approach not be used to characterize the long-term geologic, hydrologic, or climatologic conditions of the system and its vicinity.

With regard to consideration of climatic conditions, the Agency is proposing to require predictions about climate, but within a specified framework. Specifically, EPA is proposing to limit the consideration of climate effects to the effects of increased and decreased precipitation on the disposal system. This would include predictions of temperature, which affects evapotranspiration, and other factors.

With respect to human technology and behavior, EPA has tentatively concluded that it would be fruitless to attempt any predictions about the future that would be useful over 10,000 years. The one constant in human history is change-in social organization, economic activity, and technology. Thus, at first glance it seems highly anomalous to assume that future states will be like the present. However, as noted, EPA believes that there is no reasonable way to predict in any definitive way what changes will take place in the future. In effect, then, EPA is proposing to employ present conditions as default values for future states because it has no better choices, and because this approach at least has the advantage of providing readily ascertainable and verifiable values.

The Agency solicits comment on its approach to future states assumptions and the Agency's treatment of geology, hydrology, and climate considerations. Suggestions of alternatives to the proposed approach are also solicited.

Expert Judgment

EPA recognizes that expert judgment may be used to support disposal system

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