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MEMORANDUM FOR: Joseph O. Bunting, Chief
Policy and Program Control Branch, DWM

Malcolm R. Knapp, Chief
Geotechnical Branch, DWM

John T. Greeves, Chief
Engineering Branch, DWM

FROM: John J. Linehan, Acting Chief
Repository Projects Branch, DWM

SUBJECT: HLW GLOSSARY

The Division of Waste Management in cooperation with the Office of Research has compiled a glossary to facilitate consistent usage of common HLW terminology. Most definitions are taken from 10CFR60.2 and various other NRC staff documents. In all cases, the definitions should reflect previous usage. Please have each project manager send the enclosed letter and HLW glossary to their respective technical assistance contractors. This activity will assure consistent usage of HLW terminology as we proceed towards licensing.

Original Signed By:

John J. Linehan, Acting Chief
Repository Projects Branch
Division of Waste Management

Enclosure:
1. Letter to Contractor
2. HLW Glossary

WM Record File 109
WM Project 1
Docket No.
PDR ✓
LPDR

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Enclosure 1

Dear Mr. _____:

Members of the NRC staff and NRC contractors are often incorrect in their use of terminology related to the disposal of high-level radioactive waste (HLW) in geologic repositories. In some instances, the use of common HLW terminology is actually inconsistent with the definitions set forth in NRC's HLW regulation, Title 10 of the Code of Federal Regulations (10CFR60). The lack of consistent usage of common terminology can introduce confusion and even error into research and licensing activities.

To alleviate this situation, I have enclosed a list of terms and their definitions commonly used in the field of deep geologic disposal of HLW. Where noted, these definitions are taken from 10CFR60.2. The other definitions are based on usage in various NRC staff documents. Please use these terms as defined in any correspondence with NRC's staff or other NRC HLW research or technical assistance contractors and in any of your HLW publications reporting on work supported by NRC.

The enclosed HLW glossary definitions should be substantively the same as HLW definitions used previously by the Division of Waste Management in other documents. If any significant differences are noted please contact me. These definitions may be modified occasionally. When such modifications occur, I shall notify you and send you a new list.

The action taken by this letter is considered to be within the scope of the current contract _____. No changes to cost or delivery of contracted products are authorized. Please notify me immediately if you believe this letter would result in changes to cost or delivery of contract products.

Sincerely,

Appropriate Project Manager

Enclosure:
HLW Glossary

HIGH LEVEL
RADIOACTIVE WASTE MANAGEMENT GLOSSARY

Accessible environment: (1) The atmosphere, (2) land surfaces, (3) surface water, (4) oceans, and (5) the portion of the lithosphere that is outside the controlled area. The overall system performance for the geologic repository is calculated at this boundary. (10 CFR 60.2)

Backfill: Material used to fill access tunnels, shafts, and other openings, excluding waste emplacement holes, and forming part of the underground facility. (An example is bentonite clay mixed with crushed rock and secondary minerals used to fill repository drifts.)

Canister: This term has been used by DOE in site specific designs and its use has not been consistent from project to project. NRC staff and contractors should use this term only in reviewing a particular site specific design and then only as it is used by DOE in that site specific design.

Conceptual model: A pictorial and/or narrative description of a repository system or subsystem which represents all relevant components and structures contained within the system or subsystem, the interactions between the components and structures, and any internal or external processes which affect the overall performance of the subsystem.

Consequence analysis: A method by which the consequences of an event are calculated and expressed in some quantitative way, e.g., money loss, deaths, or quantities of radionuclides released to the accessible environment. (NUREG-0960)

Container: This term has been used by DOE in site specific designs and its use has not been consistent from project to project. NRC staff and contractors should use this term only in reviewing a particular site specific design and then only as it is used by DOE in that site specific design.

Controlled area: A surface location, to be marked by suitable monuments, extending horizontally no more than 10 km in any direction from the outer boundary of the underground facility, and the underlying subsurface, which area has been committed to use as a geologic repository and from which incompatible activities would be restricted following permanent closure. (10 CFR 60.2).

Deterministic model: A mathematical or physical model that is based solely on physical relationships or phenomena and that requires point values, but does not involve a consideration of ranges and distributions, or parameters which need to be specified a priori in the model. For a given set of values of such parameters, the model will always produce the same result.

Disturbed zone: That portion of the controlled area the physical or chemical properties of which have changed as a result of underground facility construction or as a result of heat generated by the emplaced radioactive wastes such that the resultant change of properties may have a significant effect on the performance of the geologic repository. (10 CFR 60.2) The

minimum groundwater travel time is calculated between this boundary and the accessible environment. [10 CFR 60.113(a)(2)]

Engineered barrier system: The waste packages and the underground facility. (10 CFR 60.2) The maximum radionuclide release rate is measured at this boundary. [10 CFR 60.113(a)(1)(ii)(B)]

Far field: Past efforts by NRC to define this term have shown that it is exceedingly difficult to reach a consensus on a definition and there is no regulatory need to do so. Please refrain from using this term.

Flow path: The trajectory of a hypothetical groundwater particle. This general term can be applied to laminar or turbulent, steady-state or transient groundwater flow.

Geologic repository: A system which is intended to be used for, or may be used for, the disposal of radioactive wastes in excavated geologic media. A geologic repository includes: (1) the geologic repository operations area, (2) the portion of the geologic setting that provides isolation of the radioactive waste. (10 CFR 60.2)

Geologic repository operations area: A high level radioactive waste facility that is part of a geologic repository, including both surface and subsurface areas, where waste handling activities are conducted. (10 CFR 60.2)

Geologic setting: The geologic, hydrologic, and geochemical systems of the region in which a geologic repository operations area is or may be located. (10 CFR 60.2)

Groundwater: Means all water which occurs below the land surface. (10 CFR 60.2)

High-level radioactive waste (HLW): (1) Irradiated reactor fuel, (2) liquid wastes resulting from the operation of the first cycle solvent extraction system, or equivalent, and the concentrated wastes from subsequent extraction cycles, or equivalent, in a facility for reprocessing irradiated reactor fuel, and (3) solids into which such liquid wastes have been converted. (10 CFR 60.2)

Host rock: The geologic medium in which the waste is emplaced. (10 CFR 60.2)

Mathematical model: A mathematical representation of a process, component, or system. (NUREG 0960)

Model: A representation of a process, component, or system. (NUREG 0960)

Near-field: Past efforts by NRC to define this term have shown that it is exceedingly difficult to reach a consensus on a definition and there is no regulatory need to do so. Please refrain from using this term.

Numerical method: A procedure for solving a problem primarily by a sequence of arithmetic operations. (NUREG 0960)

Overpack: This term has been used by DOE in site specific designs and its use has not been consistent from project to project. NRC staff and contractors should use this term only in reviewing a particular site specific design and then only as it is used by DOE in that site specific design.

Packing: The material that is placed in the waste emplacement hole in the annular space between a canister or overpack (if one is present) and the host rock. The packing is a component of the waste package which serves to control the release of radionuclides from the waste package by sealing against water, modifying the water chemistry, sorbing or retarding the transport of radionuclides or by establishing other improvements in environmental parameters. (An example is a mixture of bentonite clay and crushed rock placed in the anulus between the overpack and host rock.)

Performance assessment: The process of quantitatively evaluating component and system behavior, relative to containment and isolation of radioactive waste, to support development of a high-level waste repository and to determine compliance with the numerical criteria associated with the regulation 10 CFR 60. (NUREG 0960)

Performance confirmation: The program of tests, experiments, and analysis which is conducted to evaluate the accuracy and the adequacy of the information used to determine with reasonable assurance that the performance objectives for the period after permanent closure will be met. (10 CFR 60.2)

Physical model: A scale or analogous model of a process, component, or system.

Quality assurance: Those planned and systematic actions necessary to provide adequate confidence that a structure, system, or component will perform satisfactorily in service, or that a product such as a mathematical analysis or a data measurement will be sufficiently free from error to serve its intended purpose. (NUREG 0960)

Reliability: The probability that a system or component, when operating under stated environmental conditions, will perform its intended function adequately for a specified interval of time. (NUREG 0960)

Reliability analysis: An analysis that estimates the reliability of a system or component. (NUREG 0960)

Risk: A measure of the probability and severity of adverse effects (consequences); the expected detriment per unit time to a person or population from a given cause. (NUREG 0960)

Risk analysis: An analysis that combines estimates of the probabilities of scenarios with estimates of the consequences of those scenarios, while considering the uncertainties associated with both. (NUREG 0960)

Saturated zone: That part of the earth's crust beneath the regional water table in which all voids, large and small, are ideally filled with water under pressure greater than atmospheric. (10 CFR 60.2)

Scenario: An account or sequence of a projected course of action or events. (NUREG 0960)

Scenario analysis: The process of identifying scenarios and estimating the probability of their occurrence. (NUREG 0960)

Sensitivity analysis: An analysis in which one or more parameters are varied to observe the effects of the variation(s) on the performance of a system or some part of it. Such an analysis requires definition of a system, the ranges of parameters over which the system is to be investigated, and the characteristics of the system which is to be observed.

Site: The location of the controlled area. (10 CFR 60.2)

Site characterization: The program of exploration and research, both in the laboratory and in the field, undertaken to establish the geologic conditions and the ranges of those parameters of a particular site relevant to the procedures in 10 CFR 60. Site characterization includes borings, surface excavations, excavation of exploratory shafts, limited subsurface lateral excavations and borings, and in situ testing at depth needed to determine the suitability of the site for a geologic repository, but does not include preliminary borings and geophysical testing needed to decide whether site characterization should be undertaken (10 CFR 60.2)

Streamline: A curve that is everywhere parallel to the direction of flow. Thus, streamlines indicate the direction of flow at every point in a flow domain.

Uncertainty analysis: An analysis that estimates the uncertainty in a system's performance resulting from the uncertainty of one or more factors associated with the system. Such an analysis requires definition of a system, description of the uncertainties in the factors that are to be investigated, and the characteristics of the system that is to be observed. (NUREG 0960)

Underground facility: The underground structure, including openings and backfill materials, but excluding shafts, boreholes, and their seals. (10 CFR 60.2)

Unsaturated zone: The zone between the land surface and the regional water table. Generally, fluid pressure in this zone is less than atmospheric pressure, and some of the voids may contain air or other gases at atmospheric

pressure. Beneath flooded areas or in perched water bodies the fluid pressure locally may be greater than atmospheric. (10 CFR 60.2)

Validation: The process of obtaining assurance that a model as embodied in a computer program is a correct representation of the process or system for which it is intended. Ideally, validation is a comparison of predictions derived from the model with empirical observation. However, as this is frequently impractical or impossible owing to the large physical and time scales involved in HLW disposal, short term testing supported by other avenues such as peer review are used to obtain this assurance.

Verification: The process of obtaining assurance that a computer program correctly implements the numerical model.

Waste form: The radioactive waste materials and any encapsulating or stabilizing matrix. (10 CFR 60.2)

Waste package: The waste form and any containers, shielding, packing and other absorbant materials immediately surrounding an individual waste container (10 CFR 60). The minimum waste package containment time is calculated at this boundary. [10 CFR 60.113(a)(1)(II)(A)]

Water table: That surface in a groundwater body at which the water pressure is atmospheric. (10 CFR 60.2)