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MESSAGE: Here's some initial material sent to EPA late last week. A real agenda should be available late today.

Preliminary Agenda  
DOE/EPA Technical Exchange Meeting  
August 30-31, 1995  
Albuquerque, New Mexico

La Posada Hotel  
125 2nd St  
Alb. NM  
(505) 242-9090

What follows is a listing of the topics to be discussed at the technical exchange meeting. A detailed agenda is being established by those who will give the presentations; it should be available early next week.

The exact location for the meeting should be finalized by the close of business today. I will contact you immediately once it is confirmed.

Purpose: To discuss the eight experimental programs being pursued as a result of the DOE's recent Systems Prioritization Method analyses, as well as the programs that are being terminated. General overviews of the programs (15-30 minutes each) will be provided. These overviews will include the purpose of the program, its objectives, the parameters being measured and how they fit into DOE's final performance assessment calculations, and the schedule for the generation of final data. A question and answer period will follow each presentation.

Topics:

- Actinide Source Term Program
- Disposal Room- Blowout releases
- Non-Salado: Culebra dolomite- flow and transport
- Non-Salado: Culebra dolomite- hydrological tracer tests
- Non-Salado: Culebra dolomite- chemical retardation
- Non-Salado: Culebra dolomite- colloid concentrations and transport
- Rock Mechanics: Disturbed rock zone formation, creep and healing
- Studies of Short and Long-Term Seals- Shaft sealing system design

Terminated programs:

- Gas Generation Program
- Salado Hydrology Program

The meetings will begin at 9 am each day. The first day will end at 4:30; the second day will end at 11 am. Point of contact: Lamar Moore (RNF) 774-7470

We have reserved a block of rooms at \$60/night.  
Ask for "DOE Technical Exchange".  
- James

**Summary and status of current active and inactive WIPP experimental programs.**

The various experimental programs being conducted by Sandia National Laboratories in their role as Scientific Advisor to DOE, are designed to develop, evaluate and verify conceptual models for the natural and engineered systems at the WIPP, and to provide the data needs for Performance Assessment (PA). Under the Disposal Decision Plan (DDP) schedule, these programs are being designed to provide final data by March 1996. In March 1995 these WIPP Experimental Programs were evaluated through a performance assessment process [System Prioritization Process (SPM) II]. The intent of SPM II was to evaluate the ongoing experimental activities, and to determine:

- o those activities in which the existing parameter values were either sufficiently well defined, or where the parameters did not effect repository performance, and
- o those activities for which additional experimentation was necessary to define parameter values, and support the development of CCDF values which complied with the release limits prescribed by 40 CFR Part 191.

SPM II evaluated the WIPP experimental activities by grouping like activities into "activity sets", and applying known and projected parameter values to determine their relative contribution to a compliant CCDF. The evaluation identified eight activity sets for which continued experimental effort was necessary, and two activity sets for which no additional work was needed. For the purposes of this summary report, these experimental activity sets are identified as active (currently being worked on) and inactive (where experimental work has either been discontinued or is being phased out and will be discontinued by September 1995).

**Active Activity Sets**

The Activity Sets which the SPM II process determined were necessary to be continued consisted of:

Activity Set AST 1.2	Actinide Source Term (actinide solubility);
Activity Set DR 2	Disposal Room (drill hole blow out and disposal room release);
Activity Set NS 8.1	Non-Salado (Culebra dolomite - flow and transport)
Activity Set NS 7	Non-Salado (Culebra dolomite - hydrological tracer tests)

Activity Set NS 4	Non-Salado (Culebra dolomite -chemical retardation)
Activity Set NS 2	Non-Salado (Culebra dolomite - colloid concentrations and transport);
Activity Set RM 1	Rock Mechanics (Disturbed rock zone formation, creep and healing)
Activity Set SL 4	Studies of Short and long term Seals Components (Shaft Sealing System Design)

#### Inactive Activity Sets

A number of activity sets were found to be non-critical in the SPM-2 analysis. These included several specific activity sets within the Actinide Source Term, Disposal Room and Non-Salado programs. In addition it was determined that two programs were non-critical. These were:

Activity Set GG1	Gas Generation Program
Activity Set SAL SAL2, SAL3, SAL 4.1-4.3	Salado Hydrology Program

#### DESCRIPTION OF THE ABOVE ACTIVATION CODE

The following is a brief description of each of the SPM II critical activity sets:

#### Activity Set SST 1.2. Actinide Source Term (actinide solubility):

This activity set is comprised of the R&D activities needed to determine the solubility of actinides in the high ionic strength brines from the Salado and Castile formations. Activities involved in this set include:

- o development of thermodynamic models which represent the maximum dissolved concentrations of the five actinides (americium, plutonium, thorium, uranium, neptunium) present in the TRU waste to be received for disposal at the WIPP. These models are being developed for each potential oxidation state (up to four) of the various actinides.
- o Development of a predictive model of actinide solubility, using the oxidation state thermodynamic models.
- o Development of a "look-up" table using the predictive model. This table will include the data on actinide concentrations for various brines compositions, CO<sub>2</sub> concentrations, brine pH concentrations, and presence (or absence) of chelators, and will be used as a fundamental data base for PA.

- o Additional R&D activities associated with this activity set include speciation studies to determine actinide oxidation state distribution, and experimental activities to challenge the Pitzer model used in developing the thermodynamic models.

The majority of the R&D activities have been ongoing over the past six years and the final data (in the form of "look-up tables) will be available to performance assessment (PA) on March 1996. Additional confirmatory R&D, as well as the development of back-up documentation, is currently scheduled to continue through at least September of 1997.

**Activity Set DR 2: Disposal Room (drill hole blow out and disposal room release):**

This activity set includes the R&D activities associated with predicting the potential for radioactive release from the repository disposal room through a drill hole which was inadvertently intersected the repository. These activities include:

- o development of release models which predict cuttings release from the drill hole, and spall induced release of TRU waste from the disposal room;
- o laboratory studies to evaluate gas induced spall releases of degraded TRU waste. These laboratory data will be used to confirm the conceptual and numerical models, and to provide basic data on the parameters controlling spallation.

R&D work associated with this activity set has been ongoing since 1990. The "Cuttings" model and cuttings database have been completed. The spallation laboratory database is scheduled for completion by September, 1995 and is scheduled to be used to validate against the model by November of 1995.

**Activity Set NS 8.1: Non-Salado (Culebra dolomite - flow and transport), and**  
**Activity Set NS 7: Non-Salado (Culebra dolomite - hydrological tracer tests)**

These activity sets are comprised of those R&D activities necessary to establish the flow and transport characteristics of the Culebra dolomite. Activities involved in this activity set include:

- running scoping calculation to determine the conceptual model which best defines the flow and transport characteristics of the Culebra;
- drilling (and coring the Culebra member) a set of seven holes in which to conduct flow and transport studies. These studies will include:
  - a single well "slug injection" test to qualitatively determine matrix diffusion in the Culebra;

- preliminary tracer studies to determine the flow characteristics of the Culebra;
- hydraulic tests in the new seven drill hole configuration to determine relative flow of the sub-members of the Culebra;
- detailed non-sorbing tracer tests to determine anisotropy (or heterogeneity) and quantify the extent of matrix diffusion in the Culebra;
- conducting hydraulic tests in the newly drilled WIPP environmental monitoring wells to determine relative flow of the sub-members of the Culebra and provide additional data to validate the zone of high transmissibility, and;
- reducing and analyzing data to evaluate specifically those Culebra sub-member(s) which dominate flow, and to provide a quantification (in terms of "specific area") of matrix diffusion.

R&D activities in the Culebra dolomite have been ongoing since the mid 1980s. The current activities are a direct result of ambiguous results of the previous tracer testing program. Confirmation of the previous results may permit the use of this data further confirming the existence of matrix diffusion and the potential for physical retardation in the Culebra dolomite. The current activities associated with these "activity sets" will result in data on matrix diffusion which will be available to performance assessment (PA) on March 1996. Additional confirmatory R&D as well as the development of back-up documentation is currently scheduled to continue through at least September of 1997.

Activity Set NS 4: Non-Salado (Culebra dolomite -chemical retardation)

This activity set includes the R&D activities needed to determine, and quantify, the mechanisms for sorption of actinides in the Culebra dolomite. These include the determination of retardation factors ( $K_d$ s) of the various actinide species on minerals in the Culebra dolomite, in particular on clay (corrensite) minerals, as well as mechanistic studies aimed at understanding the important sorption mechanisms. Data from these studies will then be used to develop a chemical retardation model for prediction of the retardation of the relevant actinides (americium, plutonium, thorium, uranium, neptunium) in the Culebra. Chemical retardation (core column) tests on Culebra core will be used to confirm the predictive capability of the model.

These R&D activities have been ongoing over the past four to six years, and the final data (in the form of  $K_d$ s for each of the actinides in their various oxidation states) will be available to performance assessment (PA) in March 1996. Additional confirmatory R&D, as well as the development of back-up documentation, is currently scheduled to continue through at least September of 1997.

Activity Set NS 2: Non-Salado (Culebra dolomite - colloid concentrations and transport);

This activity set is comprised of the R&D activities associated with the determination of the formation and stability of actinide carrier colloids in the Culebra environment. If it is determined that intrinsic and carrier species of colloids are stable in the high ionic strength WIPP brines, the concentration and transport of these colloids in the Culebra will be determined through scoping studies and confirming data from the literature. Activities involved in this set include:

- o a determination of the formation of intrinsic colloids (i.e. actinide polymers) and their stability in the WIPP brines, and
- o a characterization of carrier colloids (mineral chips, humic materials, and microbiological organisms), and their ability to carry actinide and stability in WIPP brines.

R&D activities associated with the formation, stability, transport and retardation of colloids have been ongoing over the past three years. The final data (in the form of colloid concentrations and physical retardation factor in the Culebra) will be available to performance assessment (PA) in March 1996. Additional confirmatory R&D as well as the development of back-up documentation is currently scheduled to continue through at least September of 1997.

Activity Set RM 1: Rock Mechanics (Disturbed rock zone formation, creep and healing), and  
Activity Set SL 4: Studies of Short and long term Seals Components (Shaft Sealing System Design).

These activity sets include the R&D and engineering design activities necessary to demonstrate that the WIPP shafts can be effectively sealed using current technology. Effectiveness is defined in terms of the permeability values needed to prevent the Salado overburden (Rustler and Dewey Lake Red Beds) ground water from entering the Salado shaft seal components ( $10^{-16} \text{m}^2$ ), and to prevent gas and brine from migrating from the repository ( $10^{-18} \text{m}^2$ ).

Activities involved in "Activity Set RM 1" include:

- o development of a model for the prediction of a disturbed rock zone (DRZ) around the shaft wall, the permeability of the DRZ, and the closure of the DRZ (healing) caused by creep closure against rigid seal components.
- o determination of the parameters for predictive model [Multimechanism Deformation Coupled Fracture (MDCF) model] through the development of a laboratory based database, and validation of the model against field measurements.
- o use of the predictive model in the development of the design

for the shaft seals.

Activities involved in "Activity Set SL 4" include;

- the development of "Shaft Sealing System" conceptual models, and identification of shaft seal components which will meet (or exceed) the system performance requirements;
- identification (or development) of appropriate construction methodologies; and
- identification of uncertainties associated with the natural and engineered systems and construction methodologies and evaluation of how these uncertainties will be mitigated in the shaft seal engineered design.

R&D activities associated with the development of the predictive model and design of the shaft seal system have been ongoing for the past ten - twelve years. The final data and documentation of the shaft seals program will be in the form of:

1. A WIPP Disposal Decision Plan (DDP) publication milestone "Sealing Systems Design Report " in October, 1995;
2. Permeability data delivered to PA in March, 1996; and
3. The Final "Sealing Systems Regulatory Compliance Design Report" supporting the Compliance Certification Package, to be published in October 1996.

Additional confirmatory R&D as well as the development of back-up documentation is currently scheduled to continue through at least September of 1997.

#### Confirmatory Activities

Certain additional activities are being conducted in order to provide confidence in the data being developed by the SPM II identified critical activity sets.

#### **Actinide Source Term Test Program (STTP)**

This activity is part of the WIPP Enhanced Laboratory Program, which was developed to provide data on actinide solubility under conditions which approximate actual repository conditions. The contract to conduct this experiment was awarded to Los Alamos National Laboratory (LANL) and work was commenced in February, 1995 with the first sampling conducted in March 1995. The laboratory experiments consist of 39 three liter vessels and 15-210 liter (drum scale) vessels which are loaded with a prescribed mix of TRU mixed waste and WIPP brines (Salado and Castile). The objective of the experiments is to determine the point at which the dissolution of actinides in the vessel reach "steady state" under varying chemical conditions and to determine the actinide concentrations at steady state. In addition to periodic brine sampling, gases are sampled to determine the concentrations and species of gas



generated, and possible effects on actinide solubility. The contaminated brines are also analyzed to determine actinide speciation.

The purpose of the experiment is to empirically determine the effectiveness of the actinide thermodynamic solubility model, developed under Activity Set AST 1.2, in predicting actinide solubility concentrations under repository conditions. Insofar as the determination of "steady state" actinide concentrations can only be determined empirically (therefore the duration of tests on each vessel is unknown) and that the results of STTP are to verify that the actinide concentrations predicted by the thermodynamic actinide solubility model are conservative (i.e., a greater actinide concentration than that anticipated in the repository) the relationship between this activity and Activity Set AST 1.2 is for

Activities associated with the STTP are current envisioned to be conducted for 3-5 additional years depending on the time it takes to reach steady state.

#### DESCRIPTION OF THE INACTIVE ACTIVITY SETS

The following is a brief description of the major activity sets, associated with complete programs, for which it was determined that existing parameter values were either sufficiently well defined, or did not effect repository performance, i.e. defined parameter the release limits prescribed by 40 CFR Part 191.

#### Gas Generation Program:

Activities associated with the gas generation program have been ongoing for the past 10-12 years. These activities have resulted in the development of two gas generation predictive models (the Average Stoichiometry and the Reaction Path gas generation models) and supporting databases. Work being conducted during FY95 consisted of providing additional data base information. The Average Stoichiometry model is a basic predictive model and does not have the mitigating, more conservative, characteristics of the Reaction Path model. Both models have been incorporated (either directly or indirectly) into the primary performance assessment model (DRAGONLO).

It was found in the analysis of the SPM2 results that this program was sufficiently well developed, and that any additional activity would not influence the ability of the WIPP to meet compliance. As a result, all activities associated with contributing to the gas generation database have been or will be discontinued by the end of FY95. Funding will be continued during FY96 & 97 to provide modeling support to PA, the final GDF calculations in September

1996 and to document activities associated with the gas generation program.

**Salado Hydrology Program:**

Activities associated with the Salado hydrology program have been ongoing for the past 12-14 years. These activities have included studies associated with determining the origin and quantities of ground water flow into the repository, near and far field permeability of the salt and anhydrite associated with the "marker beds", porosity, and potential for two phase (brine and gas) out of the repository.

The recent SPM II realizations considered various iterations involving brine inflow, single and two phase flow as well as other scenarios involving Salado hydrology and determined that they were not significant to release from the repository. As a result, all experimental activities associated with Salado Hydrology have or will be discontinued by the end of FY95. Funding will be continued during FY96 & 97 to provide modeling support to PA, the final CCDF calculations in September 1996 and to document activities associated with this program.

TRANSACTION REPORT

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