July 8, 1998

MEMORANDUM TO: L. Joseph Callan
Executive Director for Operations

THRU: Malcolm R. Knapp, Acting Director
Office of Nuclear Material Safety and Safeguards
Original Signed By
Malcolm R. Knapp

FROM: John T. Greeves, Director
Division of Waste Management
Office of Nuclear Material Safety and Safeguards
Original Signed By
Michael F. Weber for

SUBJECT: BRIEFING FOR OFFICE OF SCIENCE AND TECHNOLOGY POLICY ON DRAFT ENVIRONMENTAL PROTECTION AGENCY YUCCA MOUNTAIN STANDARD (40 CFR PART 197)

On June 29, 1998, U.S. Nuclear Regulatory Commission (NRC) staff attended a briefing of Dr. Arthur Bienenstock, Associate Director for Science of the Office of Science and Technology Policy (OSTP), by U.S. Environmental Protection Agency (EPA) staff on EPA's draft Yucca Mountain Standard. The briefing was the second meeting, on this topic, that NRC staff had attended. The briefing was given by L. Weinstock, Acting Director of EPA's Office of Radiation and Indoor Air. A list of attendees and a copy of the EPA briefing charts are attached.

The discussions again focused on modeling of the groundwater pathway in the saturated zone, and EPA relied heavily on information presented by the U.S. Department of Energy (DOE) to NRC staff, in periodic technical meetings, and to DOE's Nuclear Waste Technical Review Board. There was no discussion of the standard, itself. When topics arose, such as applying maximum concentration limits for radionuclides in groundwater, Dr. Bienenstock said that discussion of such matters was premature.

EPA initially stated that its assessments of the capture zone of a well used by a rural residential family is several million cubic meters, and DOE initially thought a capture zone of this size would be consistent with its ability to model groundwater concentrations. However, as the discussions progressed, it appeared that EPA was considering a much smaller volume of water. Dr. Bienenstock asked the agencies to have their technical staffs meet to try to come to a common understanding of the groundwater flow models and to come back to OSTP with a recommendation by the end of July. EPA committed to provide specific language defining its concept of the capture zone of a well and to provide analyses of groundwater flow to support its view, as a basis for technical discussions, by July 10, 1998. A video conference that would include participation by DOE's technical staff in Las Vegas, NV, is planned for the week of July 13, 1998.

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Attachments: As stated

CONTACT: Michael J. Bell, DWM/NMSS

(301) 415-7286

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BRIEFING FOR OFFICE OF SCIENCE AND TECHNOLOGY POLICY ON
EPA'S YUCCA MOUNTAIN STANDARDS
JUNE 29, 1998

ATTENDEES

OSTP	EPA	DOE	NRC
A. Bienenstock	L. Weinstock	L. Barrett	J. Greeves
B. Hartline	F. Marcinowski	A. Brownstein	M. Bell
M. Offutt	A. Colli	A. Van Luik	T. McCartin
	K. Czyzinski	B. Robinson	

Attachment 1

POTENTIAL GROUND WATER CONTAMINATION AT YUCCA MOUNTAIN

RADIATION PROTECTION DIVISION
OFFICE OF RADIATION AND INDOOR AIR
U. S. ENVIRONMENTAL PROTECTION AGENCY

June 1998

Attachment 2

PURPOSE OF BRIEFING

To provide information on potential ground water contamination at Yucca Mountain.

The briefing will cover:

- **Meaning of grid size in modeling the saturated zone**
- **DOE results at current grid size**
- **Reasonable expectation**

Does the Grid Size Matter?

- Grid size is a modeling decision to optimize calculational efficiency and reflect site features (hydrology data, physical features)

- Capture zone is used to determine representative volume
  - EPA is in the process of calculating capture zones for projected water consumption rates at various locations

- DOE is using a grid size of 10^6 cubic meters for current modeling
  - Preliminary EPA assessments of the capture zone for a "rural residential" RMEI spans more than one grid element of the size modeled by DOE

Importance of Grid Size

- Grid size associated with degree of dilution in the saturated zone
- Grid size established by data from the flow regime with consideration of site features and calculational efficiency
- DOE has used a dilution factor of 2.5 with a grid size of 10^6 cubic meters
  - -If there was no dilution, doses would increase by 2.5
- DOE has calculated a dose rate of 0.04 mrem/yr at 20 km using the dilution factor of 2.5 in the saturated zone

4

YUCCA MOUNTAIN PROJECT

Total System Performance Assessment - Viability Assessment: Rev. 00 to Rev. 01 Changes in the TSPA-VA Base Case

Presented to:
DOE/NRC Quarterly Technical Meeting

Presented by:
Abe VanLuik
Yucca Mountain Site Characterization Office

June 18, 1998 ← note

U.S. Department of Energy
Office of Civilian Radioactive
Waste Management

TSPA-VA Base Case Rev. 00 to Rev. 01 Changes

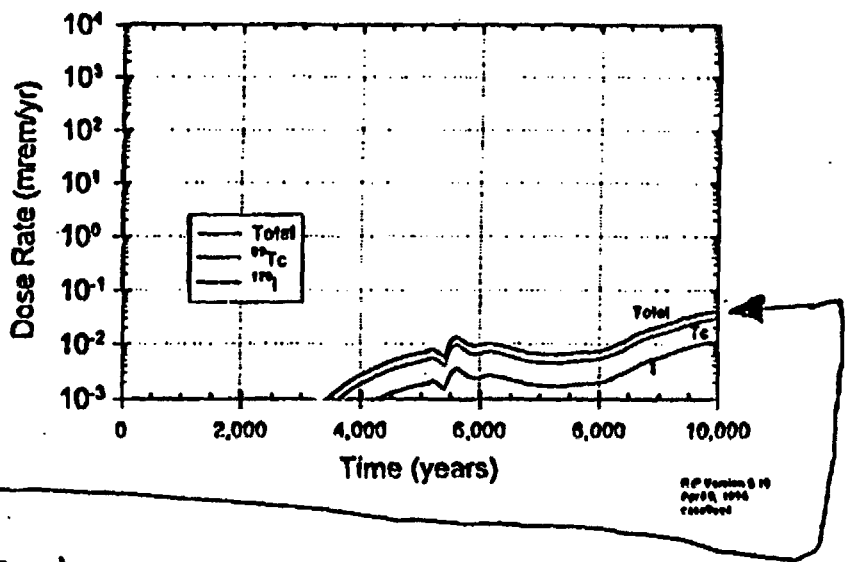
- Saturated zone flow and transport model
  - Rev. 01 includes the following changes:
    - » uses a 3-D flow model to define % of travel path in 4 lithologic units
    - » transport is now based on six 1-D streamtube models (rather than the 3-D transport model in Rev. 00, which had a high degree of numerical dispersion), whose volumetric flux is equal to the volumetric flux discharging into them from the corresponding area of the unsaturated-zone beneath the repository
    - » an expert-elicitation-defined value of 0.6 m/yr for the Darcy velocity in each streamtube in the dry climate
    - » much less dilution than Rev. 00, based on a "dilution factor" range from the SZ Expert Elicitation, which results in a factor of only about 2.5 over 20 km for the Rev. 01 expected-value base case
    - » irreversible sorption of Pu on colloids included
- Biosphere
  - Rev. 01 uses updated values for the biosphere dose conversion factors (generally reduced by a factor of 2 from the Rev. 00 values for the "average" individual)

TSPA-VA Base Case Rev. 00 to Rev. 01 Changes 10,000-year doses

Rev. 00

No releases at 20 km because of no package failures

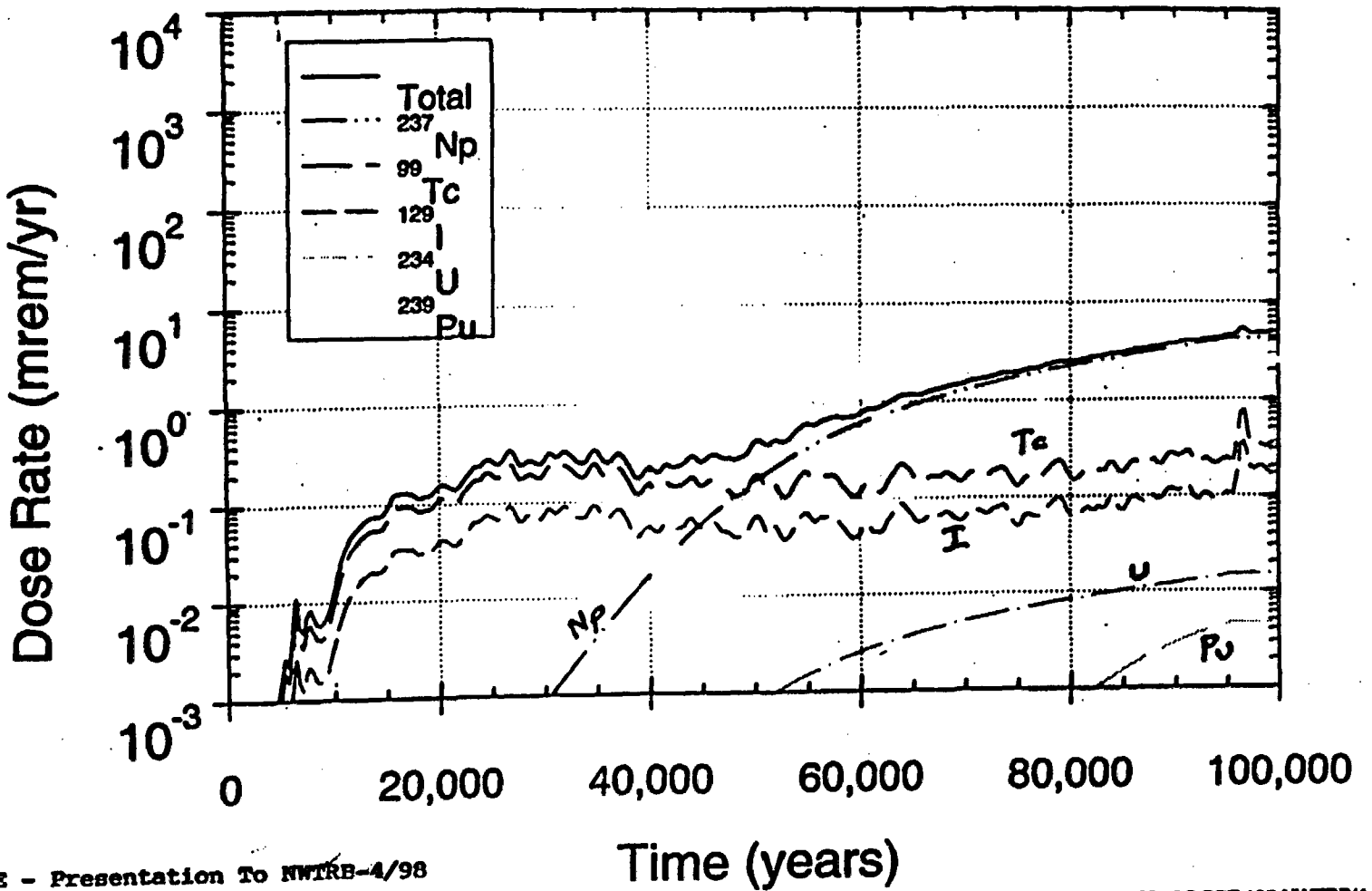
Rev. 01



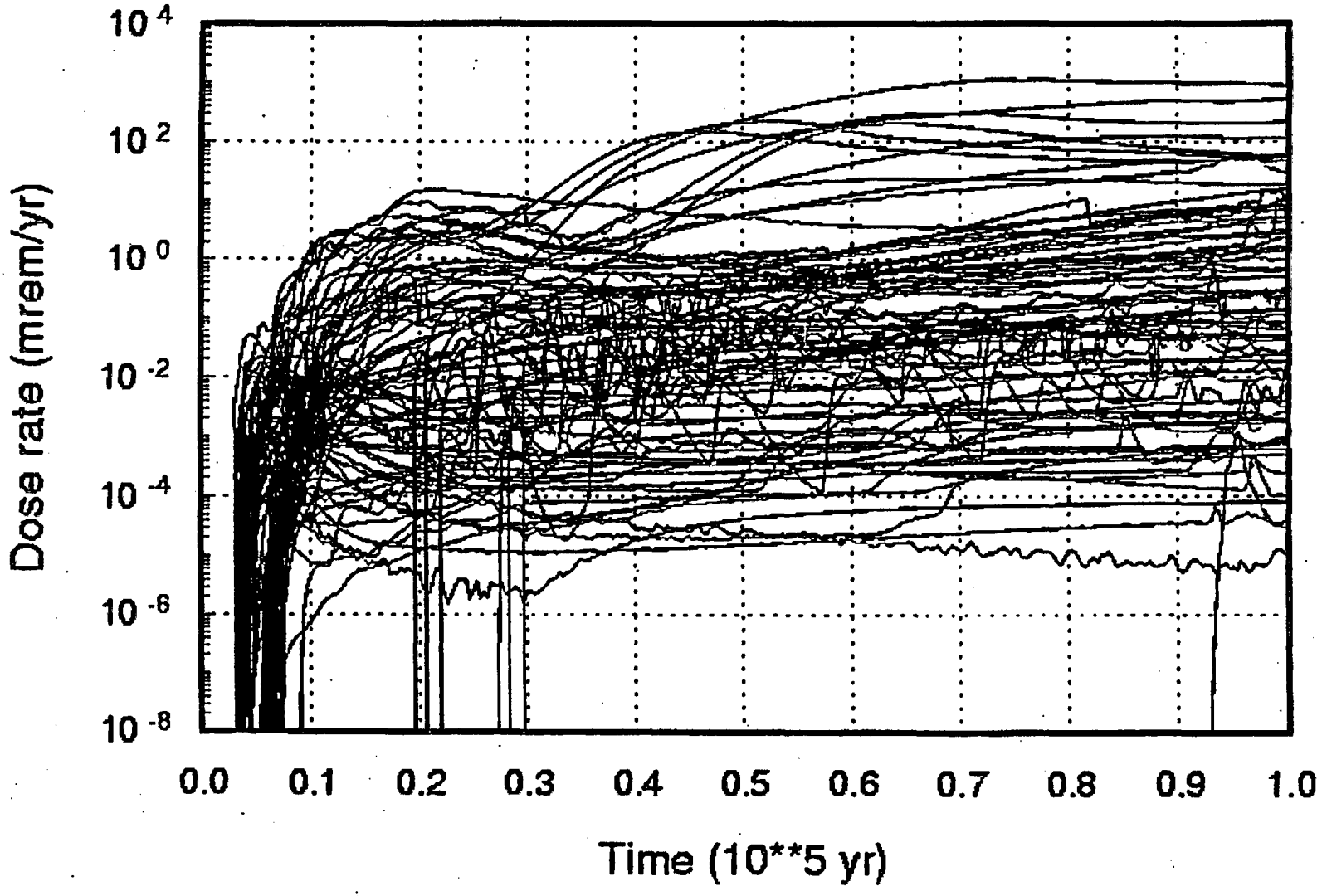
This is the dose rate at 20 km, 10,000 years (0.04 mrem/yr) using the dilution factor of 2.5 in the saturated zone and the other Rev. 01 assumptions. These are the results that will be in the Viability Assessment TSPA

100,000-yr Dose to "Average" Individual at 20 km

Base Case
100,000-yr Expected-Value Dose-Rate History
All Pathways, 20 km

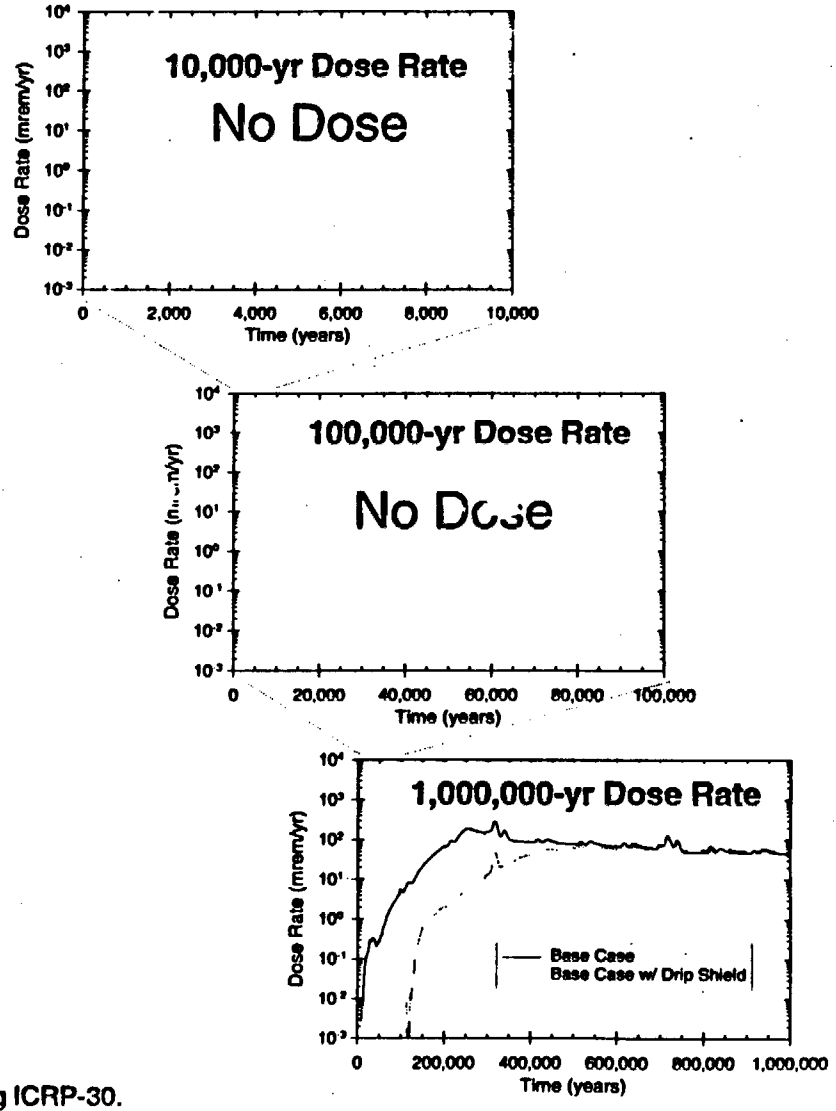


80 Dose Time Histories For the Base Case
20 Realizations Have Zero Dose



TSPA-VA Design Option Analyses - C-22 Drip Shield

- 2-cm C-22 drip shield degrades analogously to C-22 inner waste package
- Mild steel degrades under drip shield by humid air corrosion
- C-22 drip shield must develop holes before seepage can encounter waste package
- C-22 waste package will "fail" at same location as C-22 drip shield
- No waste package failures for ~100,000 years



These analyses represent an all pathways individual dose rate at 20 kilometers using ICRP-30.
These results are model-specific and may be insufficient for future adjudicatory licensing proceedings.

What is Reasonable Expectation?

- Level of proof is less than "reasonable assurance" which is required by NRC to license a nuclear power reactor
- "Reasonable expectation" does not force licensing assessments to use bounding case analyses of very conservative scenarios and low probability parameter values
- Expert elicitation could be used to support analysis where data is unavailable and could not be easily obtained
- Assumption of no dilution along the travel path is unreasonable