



**AGENCY FOR NUCLEAR PROJECTS
NUCLEAR WASTE PROJECT OFFICE**

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December 10, 1991

Dr. John W. Bartlett, Director
Office of Civilian Radioactive
Waste Management, RW-1
U.S. Department of Energy
1000 Independence Avenue S.W.
Washington, DC 20585

Dear Dr. Bartlett:

The State of Nevada has reviewed the DOE Study Plan "Characterization Of Meteorology For Regional Hydrology" (Study Plan 8.3.1.2.1.1) and its cited references and is providing its comments in this letter. The State's comments address the adequacy, completeness, and technical accuracy of the Study Plan to meet the purposes of site characterization.

The Study Plan indicates that meteorological data will be gathered from DOE - Operated meteorological stations, the NTS Weather Service Nuclear Support Office, the National Weather Service, and the World Meteorological Organization, as well as historical data from these and other organizations. Given the large number of organizations which will be providing data (current and historic) to this Study, the Plan is lacking in a discussion of the criteria which will be adopted by the DOE for acceptance of the data. Since the repository will be licensed by the U.S. Nuclear Regulatory Commission (NRC), their criteria for an acceptable meteorological measurement program will have to be satisfied (see NRC Regulatory Guide 1.23 "Onsite Measurement Programs"). The Study Plan is silent on whether the data gathered through this plan will meet NRC requirements.

Section 2.1.1 (page 2.1-1) addresses the role of this Study in assessing surface hydrology. The Section indicates that the precipitation measurement network is operated as part of the streamflow measurement program started in 1983. As stated, the precipitation network is only composed of simple non-recording storage gages at the stream measurement site. How is the

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precipitation network to be used in defining amounts needed to "promote streamflow of varying magnitude?" Such a precipitation "network" will in all probability yield little data which relates to the watershed precipitation and runoff. In the best of conditions, such precipitation data may give a vague idea of some threshold value needed to initiate runoff. However, if such parameters as antecedent moisture and temporal and spatial precipitation distribution are unknown, the gross storm data at a single point in the watershed maybe of little use.

On page 2.1-2 of the same Section (2.2.1) the Plan proposes an upgrade and expansion of the current operating precipitation network. The whole concept and expanding network assumes that "enough" data can be collected during the early characterization period to be used in and be useful to the other studies referenced. Is it realistic to assume that quantity of data needed to derive deterministic relationships will be available when needed given the vagaries of weather in Southern Nevada?

Also on page 2.1-2 The Plan states that preliminary analyses suggest that relatively short-term data can be statistically correlated with regional precipitation data spanning a longer time. A reference to preliminary analyses which correlate short-term data to longer records is not provided in the Plan. A check of the cited SCP section also does not provide any specific reference. The caveats on the quantity, quality, and analysis techniques available given at the end of the second paragraph should be well considered given this data is expected to be used by other parts of the overall site characterization program.

Section 2.1.4 (page 2.1-7) states that the subject Study will contribute to reducing uncertainty in current representations of two hypotheses concerning the upper boundary of the saturated zone at Yucca Mountain and the surrounding region. The first of these hypotheses postulates that the average recharge to the saturated zone through the unsaturated zone at Yucca Mountain is small, because annual precipitation is small. There is no argument that the present precipitation is small (on an annual basis) at the site and that the expected recharge at the site is also small. However, the groundwater flux is estimated to be approximately 0.3 percent of the annual precipitation with a high degree of uncertainty. Given the large uncertainties in estimating flux on a site and region basis, every effort needs to be made to reduce that uncertainty by understanding precipitation distribution through the region and the site in particular. Since collection of precipitation is relatively inexpensive once the instruments are installed and require little manpower if remotely accessed, the networks proposed should not only cover the area of study, but also include redundant gages.

Section 2.2.4 (page 2.2-1) in the section on study constraints states that time is critical in the collection of meteorological

data for the proper characterization of precipitation events. For this reason, the Plan indicates the importance of data collection for this study in a timely manner. Conceptually the State agrees that if any data is to be collected which is of use to other portions of the site characterization program, then data collection should be initiated as soon as possible. However, even if data collection is begun soon, there is no assurance that the data base will be sufficient in both time and range of events to be adequate for many characterization purposes including this study.

In the discussion of precipitation stations (Page 3.1-53), fiscal considerations are indicated as a possible reason which might prevent the development of a precipitation monitoring network of sufficient density and areal coverage to meet site characterization requirements. Since the data gathered from the network contemplated in this Study Plan will be used in numerous other site characterization studies, the ramifications of economic considerations are more far reaching than this Plan. Given the total cost projected for site characterization at Yucca Mountain (\$4 to 5 billion in 1991 dollars), the cost of providing a complete precipitation network, especially in comparison to numerous other characterization activities (i.e. drilling, trenching, tunnel boring) is minuscule. Economic considerations should not be a factor in satisfying site characterization requirements and licensing regulations.

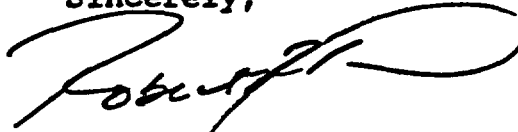
Page 3.1-55 presents a good description of the merits of various gages and data from those gages, however, a key discussion is missing. What is missing is a discussion of the catch of various gages versus actual precipitation for various locations and storm types. It makes little difference if a gage measures what it catches to ± 0.25 mm if the catch only represents 60 to 90 percent of what falls at a particular location and time.

In the section on selecting field sites (page 3.1-59) there is a discussion of the feature - based and statistically - based considerations which must be weighted in the selection of sites. On page 3.1 - 60, The Study Plan states: "Based on a preliminary analysis of both current and historical data, a dense sampling network consisting of 100 to 150 monitoring sites for study areas 1 and 2 will be necessary to meet accuracy requirements of 10-percent error for areal estimations and for the characterization of the spatial variability of meteorologic parameters at the proposed repository site. Unfortunately, economic and practical limitations prevent the installation of a dense sampling network on the scale of the regional study areas." Since these other considerations (economic, practical limitations) prevent the installation of a "dense network" which could yield an estimate of precipitation with an accuracy requirement of 10 percent error. What accuracy is expected with the proposed gage density in this Study Plan?

In the section on analysis of meteorological data (page 3.1-73), the Plan states that historical data will be combined with data collected as described in this Plan. The section fails to discuss how the accuracy and reliability of historic data will be determined and what weight will be placed on historic data in characterizing the regional precipitation.

Should you have any questions about the State's comments, this Office is available to meet with the Department to discuss these comments at any time.

Sincerely,



Robert R. Loux
Executive Director

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cc: Carl Gertz, YMPO
✓ Joe Youngblood, NRC
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Steve Kraft, EEI