BOB MILLER
Acting Governor

STATE OF NEVADA

ROBERT R. LOUX
Executive Director

AGENCY FOR NUCLEAR PROJECTS
NUCLEAR WASTE PROJECT OFFICE
Capitol Complex
Carson City, Nevada 89710
(702) 885-3744

November 27, 1989

Mr. Carl Gertz, Project Manager
Yucca Mountain Project Office
Department of Energy
Nevada Operations Office
P.O. Box 98518
Las Vegas, NV 89193-8518

Dear Mr. Gertz:

As you are aware, this Office and its contractors have been analyzing the ground water level data collected by the U.S. Geological Survey (USGS) for the Yucca Mountain Project. From time to time during this continuing analysis, we have discovered errors or discrepancies in the raw field data provided to us by the Survey, and have identified those errors or discrepancies to the DOE and the Survey. The purpose of this letter is to identify an additional discrepancy found in the field transducer data and to request an explanation of its resolution.

In analyzing the transducer data recorded for well B-1, L. Lehman and Associates, one of our contractors, identified an inconsistency in clock time and calendar date that is not documented in the comments within the USGS B-1 data file, the USGS B-1 log book, or USGS procedure HP-71. This inconsistency was discovered during the testing phase of development of a time series analysis procedure by L. Lehman and Associates (see attached letter). According to our contractor, a new procedure must be developed and "quality assured" to correct the problem.

We are sure your contractor, the U.S. Geological Survey, has already identified this problem with the transducer data, and has taken steps to correct the problem. A corrected set of transducer data, requested by this office on November 14, 1989 (R. Loux to C. Gertz) may already contain a resolution of the problem. If so, we are now requesting some additional information to assure ourselves

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such problems have been identified and that we understand the manner in which they have been corrected. Specifically we request:

1) Documentation as to when and under what circumstances the time problem with the transducer data was discovered;

2) Time period over which the correction was made to the transducer data and identification of the technical procedure and quality assurance procedure used;

3) Documentation that the corrections have been reviewed and approved; and

4) Documentation that other well data have been reviewed and any inconsistencies in timing corrected.

If this inconsistency with the transducer data has <u>not</u> been corrected, we request the DOE inform this office of its plan and schedule for its correction.

Should you have any questions or require further clarification, do not hesitate to contact me or, Carl Johnson of my staff.

Sincerely,

Robert R. Loux
Executive Director

RRL:CAJ/lmg

ATTACHMENT

cc: Linda Lehman, LLA
Larry Hayes, USGS
Robert Browning, NRC
Dade Moeller, NRC-ACNW
Donald Deere, NWTRB

L. LEHMAN & ASSOCIATES, INC.

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November 1, 1989

Carl Johnson
NUCLEAR WASTE PROJECT OFFICE
Capitol Complex, Suite 252
Carson City, NV 89710

RE: Well B-1 Data Recording Inconsistency

Dear Carl:

The transducer data recorded for well B-1 contain an inconsistency that is not documented in the comments within the data file, the B-1 log book, or USGS procedure HP-71.

Transducer data are recorded in many columns. The format of these columns changes many times throughout the history of data collection. Of particular concern are the columns which record julian date and 24 hour time. From October 1983 to June 1984, data were recorded every hour on the hour from 0100 to 2400. It is assumed that in this format, 0100 represents 1:00 a.m. and 2400 represents midnight. From July 1984 to March 1985 data were recorded every hour, but the time (minute of the hour) when the data were recorded changes often. These ranges are listed below:

0100 to 2400,	October 1983 to June 1984
0056 to 2356,	After July 1984
0054 to 2354,	
0001 to 2301,	
0036 to 2336,	
0050 to 2350,	
0015 to 2315,	
0024 to 2324,	
0046 to 2326,	
0025 to 2325,	
0024 to 2324,	
0000 to 2300	March 1985 to January 1987.

A few questions arise when considering time series data like this.

1) All programs which convert days and hours to relative time (noon on January 1, 1983 would be relative day 1.5) need to consider the minutes part of the time column. The formula hours/2400 will not properly convert the hours to fractional days because of the fact that there are only 60 minutes in an hour, not 100. For example, 2359/2400 yields 0.9829 when the real answer is (23+59/60)/(24) = 0.9993. A better formula would be

   h=trunc(hours/100)
   m=frac(hours/100)*100

   r=(h+m/60)/24

2) All records where the hour is equal to 2400 need to be changed to 0000 to make these data consistent with the rest of the data. The day field must also be incremented. This can be done in MATLAB with a two line command:

   for i=1:length(M),if M(i,2)>=2400, M(i,2)=M(i,2)-2400..
   ,M(i,1)=M(i,1)+1,end,end

   Special care should be taken at year boundaries, because day 366 will be generated from day 365 hour 2400. Day 366 should be changed to day 1 of the next year. In leap years, day 367 will be generated which should be changed to day 1 of the next year. Year boundaries should be checked and modified by hand.

3) According to HP-71, a USGS technical procedure, the data logger program directs the data logger to sample data over the hour, average it, and record the average. The hour field represents the time of first input. This is assumed to mean that the value recorded at hour 'n' represents the average of samples taken between hours 'n' and 'n+1'. Is it possible that during the period when the hour field ranged from 0100 to 2400, the data were sampled and averaged and recorded on the time of the last input? This would mean that data recorded at hour 'n' would represent the average of samples taken from hours 'n-1' to 'n'. This issue needs to be resolved with USGS personnel.

4) According to the summary file that describes the column formats of the data files, all times are PST or PDT. Were the data logger clocks updated to reflect daylight savings time? If so, which data loggers were updated and when?

5) There are hints that more two or more data loggers were used to record data at well B-1. The first entry in the B-1 log book (on 3/22/85) contains this statement, "Transferring equipment and hardware from CR21 to 21X with solar panel system." We do not have records prior to 3-22-85 for well B-1. Was a similar change made in the summer of 1984?

6) Are there inconsistencies like these in data files from other wells?

This new problem with the transducer data was discovered during the testing phase of development of our time series analysis procedure. A new procedure must be developed and Quality Assured to correct the records containing 2400 in the hour field. Discovering, researching, and solving this data integrity problem slowed progress of the transducer data time series analysis. Much progress could be made if we were able to acquire a new, clean copy of the transducer data from USGS. Hopefully, our recent request to DOE for new data from USGS will be honored.

If you have any questions, please call. Thank you for your assistance in this request.

Sincerely,

L. LEHMAN & ASSOCIATES, INC.

Linda Lehman

Linda L. Lehman
President

LLL:jj