

MEMORANDUM



TO: Dr. A.B. Ibrahim
Division of Waste Management
NUCLEAR REGULATORY COMMISSION
Washington, DC 20555

FROM: Glyn M. Jones/Vincent J. Murphy
WESTON GEOPHYSICAL CORPORATION
PO Box 550
Westboro, MA 01581

DATE: December 13, 1985

SUBJECT: Revised Trip Report

Dear Dr. Ibrahim:

This trip report covers our recent attendance [by Vincent Murphy and Glyn Jones] at the Palo Duro Basin Workshop sessions held in Columbus, Ohio.

It is noteworthy that a relatively extensive geophysical data base exists for the Deaf Smith and Swisher County areas, for which we have previously reviewed the E.R. reports.

These data consist of seismic reflection profiles and geophysical suites of well logs.

It is noteworthy that in a general sense the geophysical data clearly indicate a continuity of strata over extensive distances; a general uniformity of geologic layering is thereby inferred for the stratigraphic zone extending from Permian age to the top of the Pre-Cambrian. Information on younger formations, however, is rather sparse and will probably be the subject of future investigations and similar presentations.

A commendable aspect of this workshop session is the interchange of ideas and interpretations by the various professionals from TBEG and SWEC. All questions were answered and expanded upon as requested. Most of the graphics used for the presentations were of high quality and the numerous handouts were especially useful for the best dissemination of materials and understanding of the technical content and details of each presentation. The overall coordination was of high quality and allowed a satisfactory intensity of effort.

In addition to the foregoing general comments, we have prepared specific comments and discussions that are relevant to Weston's geophysical participation.

B601160514 851213
PDR WMRES EECWGC
D-1003 PDR

WORKSHOP & DISCUSSION SETTING

John Trapp [NRC] made an opening statement describing the purpose of the meeting. The basic objectives were:

1. to look at the different data bases that were used in the different interpretations and
2. to discuss the limitations/resolution of the current data base.

SPECIFIC COMMENTS

1. The emphasis, so far, has been on using well-log and seismic data. TBEG have performed some field analyses [lineament trends]. There has been little use so far of aerial photography, also gravity and magnetic data have not been utilized for interpretations.

The well data base is sparse for the Dockum-Alibates interval. The reason is that this interval is above the depth at which logging usually commences. Budnick of TBEG described data from water wells available for the Ogallala Formation.

2. The SWEC seismic data is not optimum for investigation of either very shallow [less than 300 ms] or very deep [greater than 2 seconds] horizons. Target depth was 2,000 to 6,000 feet. Long [GJL] described the use of a 165-foot group length. This appears to be too large. A 55-foot group length would give better resolution of shallow features. A 165-foot group length could then be simulated in processing to bring out the deeper features.

Also, the maximum offsets used appear to be too short for imaging of very deep [basement and sub-basement] features. Butnick showed a table giving the different maximum offsets for various lines shot by SWEC. Line J, which has a maximum offset of 11,220 feet, shows better definition of the deeper horizons than the other lines which used a maximum offset of 2,860 feet. GJ Long made the statement that he thinks there are no major structures shallower than 2,000 feet which they did not see. There appears to be no basis for this statement. Turner [ONWI] described reprocessing of parts of Lines A/O/R by Dawson Geophysical. The reprocessing included using refraction statics. Some better definition of the shallow section was apparent but the improvement was not dramatic. We saw the proprietary seismic data, including Lines STP 9, 10, and 11, which have a maximum offset of 8,250 feet. We also saw Line W-95 [offset 7,150 feet] with much better continuity on the basement. The general comments about processing of the SWEC lines is that the processing did not appear to be optimum. In the future, the processing may require closer monitoring. ONWI personnel also have experience in processing and could be involved with such monitoring.

3. There was a disagreement between Budnick and Long in the identification of certain reflecting horizons. On Line D-North, for example, Budnick interprets the top of the San Andres section at

approximately 450 milliseconds, whereas Long interprets the Upper San Andres at 350 milliseconds. Similarly, Budnick places the top of basement on this line at approximately 1.4 seconds whereas the Pre-Cambrian is interpreted by Long at 1.3 seconds.

Some of the differences can possibly be attributed to differences in the processing. Budnick explained that they had reprocessed some of these lines using different stacking velocities. This has resulted in a difference in the appearance of some of the horizons on the sections. For example, the horizon interpreted by Budnick as top of San Andres at 450 milliseconds is not apparent on the Long section at this time. The horizon identified by Long as Upper San Andres at approximately 350 milliseconds is a fairly discontinuous reflector on the Long section, but is much less well-imaged on the Budnick section. Similarly, the top of basement is a fairly clear reflector on the Budnick section, but at the corresponding time on the Long section, no clear horizon is apparent.

These results demonstrate the sensitivity of the final sections to the stacking velocities used in the processing.

4. There is a basic difference in interpretation philosophy between SWEC and TBEG. Budnick explains TBEG's philosophy as follows:

"Interpretation is an interactive process, in which you collect data, construct the model, predict from the model a new set of data, check this with existing measurements, modify model, etc."

Stone & Webster's philosophy as explained by Washer and Peck is - "accumulate all data, then model".

These differences in interpretation philosophy may explain some of the differences in interpretation between the two groups. For example, Budnick describes carbonate accumulation on the Arney Block. As a result of this accumulation, he expects to find NW/NE faults bounding the block. He looked at the seismic data and found evidence for faults on Line W-95. This fault was then projected to the northeast on the basis of the model. Since SWEC do not apparently have a model in mind, they instead project their faults northwest, which is in the direction of the previous interpretations of faulting in this area.

5. SWEC showed Fault 7 offsetting the upper San Andres Formation. Budnick does not, but proposes influence of the basement structure on shallower formations [through Miocene?], which he explains as draping. Possible fracturing at hinges resulting from the draping could be important in consideration of ground water pathways.

SWEC [Stone & Webster]
GJL [G.J. Long & Associates]
ONWI [Office of Nuclear Waste Isolation]
TBEG [Texas Bureau of Economic Geology]
DOE [Department of Energy]
NRC [Nuclear Regulatory Commission]

0218J2