



TERRA THERMA, INC.

WATER CONSULTANTS AND ENGINEERS

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December 31, 1985

Mr. Jeffrey Pohle, Project Officer
Geotechnical Branch
Division of Waste Management
U.S. Nuclear Regulatory Commission
MS 623 - SS
Washington, DC 20555

WM-RES
WM Record File
D1021
NWCI

WM Project 10, 11, 16
Docket No. _____
(PDR) _____
LPDR B, U, S

Distribution:

Pohle

(Return to WM, 623-SS)

RE: "HEDCO: A Program for Converting Observed Water-Levels and Pressure Measurements to Formation Pressure and Standard Hydraulic Head".

Dear Jeff:

An initial review of the HEDCO document was made by Fred Marinelli of Terra Therma prior to the December BWIP meeting in Richland. Since a limited review of this document can not validate the model code, Mr. Marinelli concentrated on the logic and philosophy behind the model. Our preliminary comments are listed below.

1. Generally, the HEDCO program seems to be a reasonable approach for addressing the various affects on the determination of heads and therefore gradients. The program corrects for variations in temperature, salinity, water compressibility, barometric pressure, and gravitation.
2. The primary concern with the logic of the document is that only a single (constant) value of salinity can be assumed for the entire water column within the borehole. If ionic diffusion takes place between the water column and the formation and/or within the water column itself, it is possible that fluid salinity within the borehole may vary with depth. Thus, we would recommend that HEDCO be modified to incorporate a salinity profile (rather than assuming a constant value). This modification can probably be made by DOE with relatively few programming changes to the original computer code.

In order to validate the HEDCO program, one of several approaches can be used. The most straight forward approach would be to obtain a copy of the code, run the program until familiar with it's operation, and run sample problems. However, because of the high cost of such an approach, we propose to create 4-6 problems, using various temperature, salinity, and pressure relationships, and submit them to DOE to be run on HEDCO. The problems would be designed so that relatively simple analytical solutions can be made for each linear relationship, and/or empirical measurements from real case-studies can be used to validate HEDCO's solutions. The test problems submitted to DOE, in many cases, would specify exaggerated relationships in order to evaluate the sensitivity and accuracy of the numerical results to temperature, salinity, pressure, etc. With the expenditure of a minimal amount of time, we feel that

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HEDCO can be tested and validated adequately, keeping in mind that HEDCO is a computing program rather than a predictive model.

Our estimate of time and expenses for performing this task, including development of test cases and solutions, and report preparation, are as follows:

TASK: CREATE AND ANALYZE TEST PROBLEMS FOR HEDCO

PERSONNEL

Michael Galloway..	8	hours	@	\$53.90	\$	431.20
Fred Marinelli....	32	hours	@	\$37.50	\$	1200.00
Clerical/Drafting..	4	hours	@	\$20.00	\$	80.00

Subtotal..... \$ 1711.20

EXPENSES

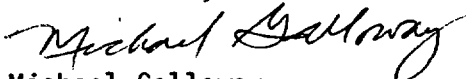
Mileage.....	0	miles	@	\$.00	\$	0.00
Telephone.....	0	calls	@	\$0.00	\$	0.00
Copies.....	100	Copies	@	\$.10	\$	10.00
Computer.....	15	hours	@	\$ 5.00	\$	75.00
Word Processor....	5	hours	@	\$5.00	\$	25.00
Per Diem/lodging..	0	days	@	\$ 0.00	\$	0.00
Misc. Expenses....					\$	0.00

Subtotal..... \$ 110.00

ESTIMATED TOTAL TIME AND EXPENSES \$ 1821.20

If you have any questions or we can provide any additional information, please contact the undersigned.

Sincerely,
TERRA THERMA, INC.



Michael Galloway
Project Manager, BWIP

cc Mark Logsdon
Project Manager, NWC