SANDIA NATIONAL LABORATORIES
WASTE ISOLATION PILOT PLANT

Analysis Plan for Non-Salado Hydraulic-Test Interpretations

AP-070, Revision 1

Task Number 1.4.2.3

Effective Date: 10/20/04

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1. INTRODUCTION AND OBJECTIVES

This Analysis Plan directs the interpretation of hydraulic tests performed in formations other than the Salado Formation at the Waste Isolation Pilot Plant (WIPP) site. Hydraulic tests are performed in support of WIPP compliance activities to provide data needed for generation and defense of conceptual models, and for numerical modeling of groundwater flow and transport. Interpretations of the hydraulic tests will serve as input to models used for compliance decisions related to the performance of the WIPP disposal system.

The objectives of hydraulic-test interpretations are to obtain estimates of some or all of the following hydraulic properties:

- Permeability-thickness product (transmissivity) (all tests);
- Storativity (only tests with observation wells);
- Fracture-matrix storativity ratio (only tests exhibiting double-porosity responses);
- Interporosity flow coefficient (only tests exhibiting double-porosity responses);
- Anisotropy (only tests with three or more observation wells);
- Flow dimension (all tests); and/or
- Formation pore pressure (all tests).

Error/uncertainty in the estimation of these parameters will be assessed directly by the analysis codes used (see Section 3).

2. APPROACH

The analytical approach to be followed is well established and has been used on the WIPP project for many years (Beauheim, 1989, Appendix B and Roberts et al., 1998, Chapter 6). The computer codes to be used for analysis include Interpret/2 v. 1.8 and nSIGHTS v. 1.0. The input to these codes consists of some or all of the following:

- transient pressure data;
- transient flow-rate data;
- well radius;

- tested thickness;
- fluid density;
- fluid viscosity;
- distance from source well;
- porosity; and/or
- rock compressibility.

3. SOFTWARE LIST

Two computer codes may be used for the analysis of hydraulic-test data:

- Interpret/2 v. 1.8 (off-the-shelf software); and
- nSIGHTS v. 1.0 (qualified under NP 19-1) or later (when qualified).

The use and qualification of utility codes for such things as barometric and earth-tide corrections to test data will be documented in analysis reports prepared and reviewed for those activities in accordance with NP 9-1. Off-the-shelf spreadsheet programs, such as Excel 2000, and graphing programs, such as Grapher 5.0, may also be used for data manipulation and plotting, again in accordance with NP 9-1.

4. TASKS

The tasks to be performed in connection with a hydraulic-test analysis are the following:

- Assemble data on well completion and location;
- Assemble data relevant to the performance of the test;
- Assemble qualified data files to be used in interpretation;
- Perform any corrections that need to be made to the data prior to analysis (e.g., removal of barometric and earth-tidal effects);
- Manipulate data files in a spreadsheet to put in the proper input format for the analysis code(s);
- Plot data to evaluate data quality and develop preliminary model conceptualization;
- Analyze data with selected code(s);

- Produce hardcopy plots of final simulations;
- Make copies of input files and final output files; and
- Prepare analysis package, obtain necessary reviews, and submit to records center.

The principal analysts for non-Salado hydraulic tests are Randall M. Roberts (6822), Richard L. Beauheim (6822), and David A. Chace (6822). Pre- and/or post-analysis data processing may be performed by other individuals. Analysis reports documenting the analysis process and results will be prepared, reviewed, and submitted to the WIPP Records Center by the responsible analyst at the completion of each set of related analyses.

5. SPECIAL CONSIDERATIONS

No special considerations have been identified.

6. APPLICABLE PROCEDURES

All applicable NWMP quality-assurance procedures will be followed for these analyses. Training of personnel will be done in accordance with the requirements of NP 2-1 *Qualification and Training*. Analyses will be performed and documented in accordance with the requirements of NP 9-1 *Analyses*. All software used will meet the requirements of NP 19-1 *Software Requirements*. Data generated using procured and off-the-shelf software will be verified in accordance with the requirements of NP 9-1. The analyses will be reviewed following NP 6-1 *Document Review Process*.

7. REFERENCES

Beauheim, R.L. 1989. *Interpretation of H-11b4 Hydraulic Tests and the H-11 Multipad Pumping Test of the Culebra Dolomite at the Waste Isolation Pilot Plant (WIPP) Site*. SAND89-0536. Albuquerque, NM: Sandia National Laboratories.

Roberts, R.M., R.L. Beauheim, and P.S. Domski. 1999. *Hydraulic Testing of Salado Formation Evaporites at the Waste Isolation Pilot Plant Site: Final Report*. SAND98-2537. Albuquerque, NM: Sandia National Laboratories.