TECHNICAL MEMORANDUM

TO MR. KARL-HEINZ FROHNE
FROM U.S. DEPARTMENT OF ENERGY
DATE R.H. CALDWELL, THE SCOTIA GROUP
8 January 1993

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RE DE-AC21-91MC28130, Reserves in Western Basins, 5th Quarterly Progress Report

The following is the 5th quarterly progress report for the above referenced project which was approved and commenced on September 30, 1991. A project management plan was prepared and submitted on October 15, 1991. These documents should be referred to for details of overall project philosophy and approach as well as a detailed description of the project plan itself.

Work is continuing on the Greater Green River Basin area. Of the five plays identified by the USGS, we chose to firstly address the Lewis. Technical work on the Lewis is now completed, including relevant geological work, rock property determination and rationalization of test and performance data. This has resulted in the generation of a recovery factor model for the Lewis and initial results have been summarized and were presented at a DOE/GRI workshop in Denver during November, 1992.

The Lewis play was chosen as a starting point since it is one of the smaller plays, was distributed in one geographic area, hence allowing concentration of effort and appeared to have a fairly comprehensive dataset associated with it. Following completion of the Lewis technical work, we have chosen to move on to the Mesaverde which represents the largest play in terms of potential volume, number of wells, thickness and complexity. As of this date, work on the Mesaverde is well underway with initial dataset and base map construction completed and work commenced on calculation of thickness and rock property information, concentrating firstly on the eastern side of the Greater Green River Basin.

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The following items highlight accomplishments to date:

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1. **Log Analysis:** We have been working with EG&G Morgantown to obtain digitized well logs to avoid having to go through the process of digitizing material unnecessarily. We are still in the process of sorting our data formats and ensuring that we have obtained the full suite of information from EG&G. In addition, certain key wells are being digitized to ensure an optimal geographic coverage of data points and also to take advantage of comparison of log and core data in wells which have been cored.
2. **Test Data and Effectiveness of Frac Treatment:** Through the work on the Lewis, an investigation was completed on attempting to correlate well performance with frac treatment. While all wells are frac'd, we were unable to obtain a definite relationship between frac size or effectiveness of frac and well performance. Through discussions with participants at the DOE/GRI conference on the Green River Basin, it is apparent that this frustration was shared by others. In consideration that the ability to evaluate the effectiveness of frac treatments is of prime importance, we have commenced a detailed investigation of the availability of pre and post frac well test data and are attempting to collect detailed information on these via the testing contractors (specifically Halliburton) with the approval of the operators in question. While this is a prolonged process, we feel it is necessary due to the importance of this particular aspect with respect to recovery factor variation.
3. **Mapping and Analysis:** The Mesaverde base maps have been constructed and the relevant well information identified. This includes penetration maps, maps indicating availability of core and test information, as well as position of producers and relative well performance in the form of bubble maps. With the Mesaverde being a much thicker and more diverse lithostratigraphic unit in comparison to the Lewis, we are considering requirements for subdivisions and will make such subdivisions if considered necessary. At least in a preliminary sense the porosity distribution noted in the Lewis appears to also be a feature of the Mesaverde and we are hopeful that the Mesaverde will provide completion attempts and

production in the lower quality reservoir so that we will be able to assess drainage areas and recoveries and then by analogy apply similar models to the lower porosity groups within the Lewis.

This quarterly report summarizes significant progress on this project. We are please with this progress and consider the project to be on schedule and under budget.

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