Project Phase I.

This was the portion of the project that was funded under the Department of Energy's Advance Computational Technology Initiative, started in 1995. Funding was received for FY 1995, none for FY 1996, partial funding for FY 1997.

This phase of the project consisted of nine semi-independent sub-projects (tasks), each of which had it's own participants and goals. Los Alamos National Laboratory was the overall leader for this project. The nine project components were in two general topic areas: modeling and imaging.

The nine project tasks:

A. Modeling Tasks

1. Elastic Modeling of the SEG/EAEG Structures for Comparison With the Acoustic Results. Project Leaders: Walter Kessinger, Houston Advanced Research Center (HARC), email: s40wake@gtri.harc.edu and Shawn Larsen, Lawrence Livermore National Laboratory (LLNL), email: shawn@s109.es.llnl.gov. This component will calculate the elastic response of SEG/EAEG structures, migrate the elastic data, and compare that image with acoustic results.Details of first year effort - HARC/GTRI Page

2. Time Parallel Algorithms. Project Leaders: Jacob Barhen, Oak Ridge National Laboratory (ORNL), email: barhenj@ornl.gov, and Amir Fijany, Jet Propulsion Laboratory (JPL), email: fijany@nips.jpl.nasa.gov. An implicit approach to modeling will be implemented to allow calculating synthetic model data faster, and more effectively exploit massively parallel computing.Details of first year effort

3. Physical Model. Project Leaders: K.K. Sekharan, University of Houston, email: kksekharan@uh.edu, and Mike Fehler, Los Alamos National Laboratory (LANL), email: fehler@lanl.gov. A scaled physical model of the SEG/EAEG sub-salt numerical model will be constructed and model seismic data collected from it.Details of first year effort - Allied Geophysical Laboratories Page

B. Imaging and Inversion Tasks

4. Imaging the SEG/EAEG Dataset Using Approximate Imaging Methods (this project task has been delayed in starting).

5. Evaluation of New Cost-Effective Prestack Imaging Methods. Project Leaders: Biondo Biondi, Stanford, email: biondo@sep.stanford.edu, and Mike Fehler, LANL, email: fehler@lanl.gov. This task will investigate the use of faster methods for 3-D prestack migration and evaluate their usefulness and reliability.Details of first year effort - Stanford Exploration Project Page

6. Seismic Imaging and Inversion via Multi-Level Distributed Computing. Project Leaders: John Scales, Colorado School of Mines (CSM), email: jscales@dix.mines.edu, and Leigh House, LANL, email: house@lanl.gov. Existing and new processing codes will be implemented to exploit parallel computing, and to provide a processing standard for the other components of the project. Information about the distributed parallel processing work at CSM/CWP is available on the CSM web server. Details of first year effort - CWP Distributed Parallelization Page

7. Event Picking and Tracking for Velocity Estimation Using Neural Networks. Project Leaders: Benny Toomarian, JPL, email: beni@nips.jpl.nasa.gov, Jacob Barhen, ORNL, email: barhenj@ornl.gov, and Mike Glinsky, LLNL, email: mglinsky@llnl.gov. Neural networks promise to allow greater automation of processing and analysis of seismic data, such as event tracking and estimation of lithology from well and seismic data. Details of first year effort

8. Fast Global Optimization. Project Leaders: Jacob Barhen, ORNL, email: barhenj@ornl; John Scales, Colorado School of Mines, email: jscales@dix.mines.edu. This task aims to implement a new, faster approach to reliably determining the global minimum for non-linear inversions.Details of first year effort

9. Seismic Holographic Data Storage and Visualization for Oil and Gas Exploration. Project Leaders: H.K. Liu, University of South Alabama, email: Liuhk@aol.com, and Jacob Barhen, ORNL, email: barhenj@ornl. Optical holography may be useful not only to display 3-D seismic data, but also to provide quick optical migration of it. Details of first year effort

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Comments, suggestions to house@lanl.gov