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DEVELOPMENT OF A DATA MANAGEMENT SYSTEM FOR  
ASSISTANCE IN CONDUCTING AREA OF REVIEWS (AORS) ON  
CLASS II INJECTION WELLS IN OKLAHOMA

Cooperative Agreement Grant No. DE-FG22-95MT95003

Oklahoma Corporation Commission

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**Abstract:** The purpose of this project is provide the resources and capabilities necessary to permit the State of Oklahoma to conduct Area of Review (AOR) variance analysis on a statewide level. The project allows for the analysis and identification of areas which may qualify for AOR variances, the correlation of information from various databases and automated systems to conduct AORs in area which do not qualify for variances, the evaluation of the risk of pollution, during permitting and monitoring, using risk based data analysis, and the ability to conduct spatial analysis of injection well data in conjunction with other geographically referenced information.

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## I. Executive Summary

The Oklahoma Corporation Commission is committed to assisting the oil and gas exploration and production industry in our State. This project, once completed, will save the State and the E&P industry much time, effort and resources in our environmental protection efforts. We are actively combining the various data base resources available at the state level and the private sector. This enables the state to review existing and new permit applications for compliance with existing standards.

The project is running behind schedule currently due to the problems which we have experienced with the State's procurement department. Those problems we believe have finally been addressed by that department and the necessary equipment has been ordered.

Also, BDM Oklahoma, a DOE contractor, is very helpful in our efforts. They are providing the resources needed to acquire the Geographical Information System (GIS), the completed well plugging data, and digitizing the state's ground water protection maps; all are necessary to fully implement this project.

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## II. Introduction

This project has one primary objective. This objective is to provide the resources and capabilities to permit the State of Oklahoma to conduct Area of Review (AOR) variance analysis on a statewide level. This objective includes four primary tasks: 1) the analysis and identification of areas which may qualify for AOR variances; 2) the correlation of information from various databases and automation systems to conduct AORs in areas that do not qualify for variances; 3) the evaluation of the risk of pollution, during permitting and monitoring, using risk based data analysis; and 4) the ability to conduct spatial analysis of injection well data in conjunction with other geographically referenced information.

The Corporation Commission is completely rewriting its oil and gas data management system to meet this objective and perform the tasks stated. This is a long, complicated and often frustrating process. Most of the equipment and software have been purchased and installed except for the production server and servers for the district offices. The production server has now been ordered and we anticipate delivery during the next reporting quarter. The delays experienced in obtaining the equipment is a result of the state's procurement process.

Many data are being made available through the private sector and through a DOE contractor, BDM Oklahoma. These data are required to fully implement the proposed operating system.

### III. Results and Discussion

During this reporting quarter, the Oil and Gas Conservation Division employed two professionals to assist in the reconciliation of the UIC data base with that of the Well Data Maintenance System (WDMS), the division's main data base. The two systems were developed and maintained independently since UIC primacy was granted in 1982 and the well information maintained on the UIC data management system is incomplete. Progress toward achieving the goals of this project hinges on compatible data. This is the most integral portion of this process and is underway. We are using a special software tool to create new screens for the UIC staff, which are similar to their existing screens and functions. This integration will allow the commission to complete this program by having full integration before April 1997. This will allow the staff to perform an area of review using composite and available comprehensive digital data.

The Commission has four systems analysts/programmers currently rewriting WDMS to the new operating platform, bringing the total employed using federal funds to six. In addition to the four systems analysts and the two professionals currently employed using federal money, the commission has assigned the equivalent of four full-time state-funded employees to work toward the completion of this project. Two of the federally-funded programmer/analysts are working on moving the Well Data Maintenance System to a client server environment. This also includes combining information from the existing UIC database in order to have access to all well information from a central point. The other two federally-funded programmers/analysts are working on setting up new equipment, assisting Oil and Gas users with help hot line calls, and training the Oil and Gas staff on the new software. Approximately 4,253 hours were expended toward the DOE project this quarter. Federally-funded staff persons expended 1,757 hours and state-funded staff expended 2,496 hours. The total hours expended in support of this project equals 17,590 hours. The Commission has expended 12,140 of state-funded staff hours and 5,450 in federally-funded hours through December 31, 1996.

We have completed conversion of the Intent to Drill, Well Inventory, and Gas/Oil Allowables and Production modules. We are in the process of adding new features to these systems pertaining to changing API numbers when errors are found so that all systems stay updated accordingly. We have completed the process to upload the UIC data into the Well Inventory module and have completed changing the Well Inventory module to reflect UIC uploaded wells when conducting on-line research. This will provide the base of composite well information from which to perform an area of review.

Although the micro computers have been installed, we are delaying implementation of the remaining modules. The delay is due to waiting to install and implement new file servers. These file servers will be equipped with state of art backup and recovery hardware and software. We have been attempting to bid and purchase new file servers since February 1996, but have received obstacles dealing with Central Purchasing. The new file servers are being purchased with state funds

under the Data Processing Division. The existing file server could not adequately process such a large volume of transactions under the new high speed communication devices acquired through this grant. It is hoped that we will be able to install the servers and implement the remaining modules in February 1997.

The new switch connecting the workstations to the network via a router has been installed and all workstations and printers are now going to the router at 100 mb/second. We found, however, that the router cards were still at 10 mb/second resulting in no increase in speed. We have ordered new 100BaseT cards for the router to support the Oil and Gas and Data Processing staff increased speed.

The purchase order for the development database server was finally received in late October. The development server was received and installed in December. The technical representative for Oracle was scheduled out in late December to install the Oracle software on the new development server.

We have identified all of the equipment necessary to place servers in each of the four district offices and connect them through our router. The servers will provide for distributed databases with advanced replication of data between the central office and the district offices. The connection through the router will assist in increasing the efficiency of transfer of information. We will be ordering the district office equipment this quarter.

We are adding many new features to the WDMS modules as we move them to the network. We have added the capability to process changing to the year 2000. We also added a much needed audit/logging function to capture a snapshot of any record that has been added, updated, or deleted. This will protect the system in case of hardware failure and allow for recovery up to the last transactions made. The third feature added was to separate out the many alternate keys on the large well master file into a single file used only for browse and query functions. This will increase the speed of using the system for the users and increase the conversion process.

Obtaining all of the API numbers assigned and matching them up to Commission well records continue in both the UIC system and WDMS. We will be meeting with a private company that has agreed to assist the Commission in obtaining these API numbers and also matching the well records to the states tax identification number. The last portion of the interim combined system will be to add missing well records and convert all existing UIC records without API numbers into a composite data system.

An essential piece of the project is the acquisition of an operating Geographical Information System (GIS) with well plugging data. The data is not available from any commercial vendor. BDM Oklahoma is funding the University of Oklahoma to complete its Natural Resources Inventory System (NRIS) GIS called NRIS Maps. NRIS Maps will be imported directly into the Commission's operating system and modified to use digitized ground water information and other essential data to determine AOR viability. During the next reporting quarter, the Commission will release requests for proposals for the purchase of the GIS software (ArcInfo and ArcView). The bid process will take approximately eight weeks before we actually place the order. We will install this software and the necessary data

supplied by BDM Oklahoma on each of the field inspectors' computers and our Oklahoma City network. We will also add our inspection and complaint data bases to this system.

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#### IV. Conclusion

The project is proceeding according to plan except for the problems that have plagued us in our equipment procurement efforts through the Department of Central Services (the State's procurement department). The department is now following its own procedures and has allowed us to purchase the necessary equipment.

Since the project is so dependent on these vital pieces of equipment, we are not proceeding as quickly as needed to complete the project by April 1997. The commission has requested an extension of the project's completion date due to the delays experienced in the procurement process. These delays caused the essential programming to be delayed. We anticipate completion of the project by March 1998. All other processes are running on schedule.

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