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~~DRAFT~~ FINAL TECHNICAL REPORT

Assistance to State Underground Injection Control Programs
and the Oil and Gas Industry
with Class II Injection Well Data Management and Technology Transfer

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ABSTRACT

Submitted by:
The Underground Injection Practices
Research Foundation

**Assistance to State Underground Injection Control Programs
and the Oil and Gas Industry
with Class II Injection Well Data Management and Technology Transfer**

The Assistance to State Underground Injection Control Programs and the Oil and Gas Industry with Class II Injection Well Data Management and Technology Transfer project was made possible through a grant from the U.S. Department of Energy and administered by the Underground Injection Practices Research Foundation and involved the following accomplishments:

- Completed the design and installation of the only comprehensive, fully relational PC-Based Oil & Gas regulatory data management system (the Risk Based Data Management System) in the country. Additionally, training and data conversion was conducted and the RBDMS User's Guide and the RBDMS Administrator's Guide were completed.
- State wide Area-Of-Review (AOR) workshop were held in California and Oklahoma and a national three-day workshop was held in Kansas City, Missouri where 24 state oil & gas agencies were represented.

EXECUTIVE SUMMARY

The Underground Injection Practices Research Foundation (UIPRF) administered a grant project funded by the U.S. Department of Energy relating to Class II injection well operations in various primacy and direct implementation states throughout the country. This effort provided substantial benefits to state regulatory agencies and oil and gas producing companies. It enhanced the protection of the environment through the protection of ground water resources and improved oil and gas production operations within affected states.

This project began to address needs that were identified during the Inventory and Needs Assessment and Implementation Phase of the UIPRF/DOE Risk Based Data Management System (RBDMS) project (1992-93). This project resulted in the following outcomes:

- Four oil & gas state regulatory agencies implementing more formalized environmental risk management practices as it pertains to the production of oil and gas and injection via Class II wells.
- Directly or indirectly enhanced the production of oil and gas by implementing a management system that supports the saving of abandoned or idle wells located in areas with a relatively low environmental risk of endangering underground sources of drinking water (USDWs) in a particular state.
- Verified that protection of USDWs is adequate and additional restrictions or requirements are not necessary in areas with a relatively low environmental risk.
- Standardized the data and information maintained by state regulatory agencies and decreased the administrative cost burden on producers operating in multiple states.
- Demonstrated technical criteria for an Area of Review (AOR) variance methodology
- Indirectly resulted in a system for electronic data transfer among operators and state regulatory agencies and reduced overall operator reporting burdens.

Project Tasks included:

- Task I** Completed Implementation of a Risk Based Data Management System in the States of Alaska, Mississippi, Montana, and Nebraska. RBDMS is the only comprehensive, fully relational PC-Based Oil & Gas regulatory data management system in the country
- Task II** Conducted State wide Area-Of-Review (AOR) workshop were held in California and Oklahoma and a national three-day workshop was held in Kansas City, Missouri where 24 state oil & gas agencies were represented

DRAFT FINAL TECHNICAL REPORT

Assistance to State Underground Injection Control Programs
and the Oil and Gas Industry
with Class II Injection Well Data Management and Technology Transfer

Introduction and Background

The following is a draft final technical report from the Underground Injection Practices Research Foundation (UIPRF) to the U.S. Department of Energy. This project involved Class II injection well operations in various primacy and direct implementation states throughout the country. This project provided substantial benefits to state regulatory agencies and oil and gas producing companies, including the protection of the environment through, and the protection of ground water resources, and improved oil and gas production operations within affected states.

The Underground Injection Practices Research Foundation, Inc., a not for profit corporation, was formed in 1985 with the purpose of providing independent research and review of underground injection control related matters in an effort to improve underground injection control knowledge and programs. UIPRF has been credited with carrying out many successful projects involving all types of injection wells including several projects related to the Class II injection well industry.

This project consisted of two main tasks including:

- Task I** Complete Implementation of a Risk Based Data Management System in the States of Alaska, Mississippi, Montana, and Nebraska.
- Task II** Conduct Area of Review (AOR) Training Seminars.

Task I stems from four previous projects conducted by the American Petroleum Institute (API) and the UIPRF. The first study, completed in February 1988 for the API, was titled "Oil and Gas Industry Water Injection Well Corrosion". It included a methodology for assessing the probability of contaminating underground sources of drinking water (USDWs) via Class II injection well operations. The report also evaluated the potential risk to several oil and gas producing basins throughout the country.

Following the API study, the Research Foundation conducted a pilot study to investigate the feasibility of using a RBDMS in the Williston Basin, incorporating information from North Dakota, South Dakota, and Montana. After that study was completed, a follow-up project was conducted in the Dorr Field waterflood project in Rooks County Kansas, extending the earlier work into an existing UIC regulatory program. The Door field pilot study resulted in a data base which is compatible with the forms, procedures, reports, software, and hardware currently being used in the Kansas UIC program.

The RBDMS effort then continued through a grant from DOE with a multi-task project consisting of an inventory and needs assessment of 25 states Class II UIC programs pertaining to electronic data management, environmental risk assessment and management objectives, resultant benefit of a RBDMS, and various information and data required for the design and development of a RBDMS, in individual states. Additionally included was the assessment of data, hardware, software and personnel needs of the states to determine the potential for adoption of the risk based data management system. The product of this task was a report titled "State Assistance with Risk-Based Data Management: Phase I Inventory and Needs Assessment of 25 State Class II Underground Injection Control Programs" (July 1992). Following the inventory and needs assessment, a state selection and justification process was undertaken for the first group of states (Group-I states) selected for RBDMS implementation. Based on the information obtained during the inventory and needs assessment study, a ranking of states using a point system was developed by the project team.

Group-I states selected included, Alaska, Mississippi, Montana, and Nebraska. An additional outcome of this effort was the preparation of a conceptual implementation plan for the state of Texas and funding provided for the state of North Dakota for the purchase of specific computer hardware components.

Upon the selection of the Group-I states chosen for early implementation, the RBDMS design and implementation effort began. This included the preparation of a detailed conceptual implementation plan which included design and specification of the RBDMS for each of the Group-I states. The project also included the presentation of the technology employed with the RBDMS as part of the project's technology transfer. The product of this project is a report that contains the design specifications and implementation plan for the Group-I states titled "Risk Based Data Management System Design Specifications and Implementation Plan for the Alaska Oil & Gas Conservation Commission; the Mississippi State Oil & Gas Board; the Montana Board of Oil & Gas Conservation; and the Nebraska Oil & Gas Conservation Commission" (September 1993).

Task II of this project also stems from a previous UIPRF project which involved the API. Because the Environmental Protection Agency (EPA) had plans to propose amendments, in 1994, to its UIC program regulations as they pertain to Class II injection wells and that the basis for these revisions is the Final Document developed by the Federal Advisory Committee, the API and the UIPRF took action to assist both the regulator and industry with the proposed changes relating to Area-of-Review (AOR) requirements. These proposed regulations included a significant increase to the number of AOR studies to be required but also includes the provisions for obtaining variances from AOR requirements provided proper justification. In an effort to assist Class II UIC Directors, who must apply for and submit a variance plan to EPA within one year of promulgation of the new regulations, the UIPRF created a committee of State, EPA, and industry representatives to develop a model variance plan. The goal established by the committee was; "to Develop a Model Area-of-Review Variance Process Including Administrative Guidance That Will Be Acceptable To EPA And Utilized By UIC Class II Direct Implementation And State

Directors". This document, completed in late 1993, provided guidance to both the operator and the regulator in ways to work together in the determination of the possible variance areas. This effort was started in June of 1993 and was completed by December of the same year.

The purpose of Task II was to take the guideline document developed by the UIPRF committee and develop it into training workshops to further assist the regulator and industry in establishing AOR variance programs across the country.

SECTION I: Complete Implementation of a Risk Based Data Management System in the States of Alaska, Mississippi, Montana, and Nebraska

Overview of the Implementation of a Risk Based Data Management System in the States of Alaska, Mississippi, Montana and Nebraska

This project was designed to extend the implementation of a Risk Based Data Management System (RBDMS) in four states. In general this project provided assistance the states of Alaska, Mississippi, Montana, and Nebraska with converting data from existing data management systems where applicable; coding and internal testing of the RBDMS; preparing documentation, training, and technology transfer.

Project Management and Technical Assistance

The project was implemented by the UIPRF; with design and technical services provided by CH2M Hill and the Digital Design Group. The successful execution can be credited to the fact that the UIPRF is an organization predominantly composed of state regulatory agency members who are well attuned to the specific and detailed needs of the states who participated in the RBDMS projects. In addition, the UIPRF chose these two highly qualified firms to design, develop, and implement RBDMS in selected states. The combination of these firms provided the UIPRF and states with substantial experience regarding state Class II UIC and oil and gas programs; various risk assessment methodologies; various petroleum, environmental, geological, geochemical, hydrogeological-related issues specific to each of the states; and development of large comprehensive data management systems for state agencies and industry.

Project History

RBDMS Implementation: Multiple tasks and subtasks pertaining to the implementation of a RBDMS in the states of Alaska, Mississippi, Montana, and Nebraska were undertaken. Work included the development of a detailed multi-state implementation plan including system design, and system implementation schedule. The RBDMS contains a relational data base design, its functional capabilities plus details on how it is customized to meet the individual needs of each of the four participating states.

System Coding, Internal Testing & Pilot Testing: Once the overall general design of the RBDMS was finalized, program coding and testing of individual modules was initiated. Modules were developed in a phased manner so that states had the opportunity to evaluate and begin utilizing individual, stand-alone modules. States were provided with Beta versions in September and October of 1994 and the draft final Beta was released in December of 1994. Module testing was conducted with fabricated data to verify the system's proper operation.

Conversion Program Assistance: Assistance was given to participating states to prepare conversion programs for transferring existing UIC, oil and gas, and other miscellaneous data to the state's RBDMS. By early January, 1995 consultants were assisting states with conversions. The system was developed to the point that data conversion was possible yet adjustments to the system's final configuration were still possible. All adjustments were made and the development of the system for the first four states were completed in late February.

In late February a letter was sent to all of the Oil and Gas State regulatory agencies and representatives of each of the EPA Regions to announce the completion of the final Beta of the RBDMS. The letter encouraged these individuals to attend the March meeting of the GWPC where the only comprehensive, fully relational PC-Based Oil & Gas regulatory data management system in the country would be demonstrated.

During the GWPC meeting a special session entitled "RBDMS Demonstration and User's Group Meeting" was held. The session was attended by representative of states where RBDMS is being implemented as well as representatives of both state and EPA Regional offices.

Documentation: Throughout the implementation effort, system documentation was performed. Program documentation, user help screens, and the unique details which apply to various states were incorporated into a user's guide. The user's guide was designed as a working document set up in a modular format. States reviewed drafts of the user's guide modules as system modules were developed. User's guide modules also included detailed information on each system module and program; how to operate each individual module; and what reports or other functions can be performed by individual modules. After the input from states was included the user's guide modules were incorporated into a document entitled, "Risk Based Data Management System User's Guide".

Additionally the RBDMS Administrator's Guide was completed. While the User's Guide contains comprehensive information about all the functions of the system the RBDMS Administrator's Guide provides details on hardware and software requirements, installation of RBDMS files, configuration of RBDMS software, RBDMS security setup, and general database information. A copy of the RBDMS Administrator's Guide can be found in the back of the RBDMS User's Guide. A copy of this RBDMS User's Guide which includes the Administrator's Guide can be found in APPENDIX A.

Training: Training was performed throughout the project on each of the individual system models and on the overall system itself. In an effort to minimize training costs, a portion of training efforts were conducted by telephone and in conjunction with other tasks being performed during the implementation effort. Efforts were made to coordinate training events with other tasks to effectively utilize funding and control costs.

Assessment of Future Needs: As the project team worked with the states, there was a

continues attempt to make a determination of future needs required for full implementation of a RBDMS (including data entry) and continued ongoing utilization and expansion of the system. Components of the system that states would like to see added include, production/proration accounting, tracking information on surface facilities; and permitting. Additionally, state representatives expressed an interest in working more closely with other state representatives so that more could be accomplished with the limited resources.

Technology Transfer: One significant part of the RBDMS project was technology transfer. Presentations were made to various groups and organizations including;

- Department of Energy's Contractors Review Conference;
- EPA in Regions IV, V, VIII, and IX;
- Texas Railroad Commission;
- Indiana Department of Natural Resources and Indiana State Geological Survey;
- EPA in Region VII with attendance from the states of Nebraska, Missouri, Kansas, and Iowa;
- Oklahoma Corporation Commission;
- Michigan Department of Natural Resources;
- New Mexico Oil & Gas Conservation Division;
- Kansas Corporation Commission;
- Interstate Oil & Gas Compact Commission Meeting in Colorado;
- Multiple Ground Water Protection Council Meetings;
- Colorado Oil & Gas Commission;
- Alaska Oil & Gas Conservation Commission;
- Mississippi State Oil & Gas Board;
- Montana Board of Oil & Gas Conservation;
- Nebraska Oil & Gas Conservation Commission;
- American Petroleum Institute;
- Various oil & gas producing companies, including Shell Oil; Company/Shell Western E&P, Phillips Petroleum, BP Exploration, Texaco, Exxon, Amoco; and
- Other miscellaneous groups/organizations

Summary

Project team completed the design and installation of the only comprehensive, fully relational PC-Based Oil & Gas regulatory data management system (the Risk Based Data Management System) in the country. The implementation is complete in the states of Alaska, Mississippi, Montana, and Nebraska. States are continuing the process of data conversion. Additionally, the RBDMS User's Guide and the RBDMS Administrator's Guide were completed.

SECTION II: Class II Injection Well Area of Review (AOR) Training

Overview of Class II Injection Well AOR Trainings

In 1993 EPA Headquarters announced that new Class II UIC regulations would appear in the Federal Register in early 1994. The draft proposed regulations were to require that a significant number of previously grandfathered wells have AOR investigations performed. Additionally, the draft proposed regulations were to include provisions that allow the UIC regulatory Director to grant variances from these requirements if sufficient proof is presented that underground sources of drinking water would not be endangered. Given these proposed regulatory changes relating to Class II injection wells, a significant need for training was evident.

In 1993, a UIPRF committee developed a manual that included model variance plan guidelines for the use in decisions related to AORs for Class II injection wells. The committee consisted of five members representing state programs; as well as a representative for each industry, the American Petroleum Institute, the UIPRF, an EPA Region and EPA headquarters. The committee agreed to use the final document in these AOR workshops.

It was originally proposed that four regional workshops be held related to AOR investigations and environmental compliance. However, the proposed regulations were never released. As a result of the scheduling change of the expected release of the new regulation, the scope of this project changed from the original proposal.

In late 1994 members of UIPRF staff, API, project consultant, as well as, industry representatives met to discuss the details of proceeding with the effort and how it could be coordinated with an API effort with similarities. At that time, four workshops were tentatively scheduled including, California in early January-1995, Oklahoma in March-1995, Kansas in May-1995, and Texas, date to be determined. The benefits of the workshops were to be as follows:

- Assist both direct implementation and primacy state Class II UIC Directors in establishing workable AOR variance programs.
- Assist operators of both small and large oil and gas producing companies with Class II injection well AOR background and investigative methodologies for conducting AOR's and providing justification for seeking a variance from AOR requirements where applicable.

The California and Oklahoma workshop were conducted as planned. Attendees included representatives of the oil and gas and other state agencies that would be involved in developing the state's AOR Variance Plan. In addition, industry was represented as state oil and gas associations sent association staff or invited industry representatives.

The AOR variance methodology was presented to state agency and industry personnel concerning application of variance methods to injection fields in their state was heard. Each workshop attendee received a copy of the document developed by the UIPRF entitled "Technical Criteria for an AOR Variance Methodology." This document includes the background information on UIC program requirements for AOR investigations; general methodologies for performing AOR investigations; data acquisition; alternative methods for evaluating a Class II injection well's AOR; criteria for obtaining exemptions from AOR requirements; and additional, more specific technical and regulatory material. APPENDIX B of this report contains a copy of this manual. Additional materials specific to each state where the workshops are held were added accordingly. The workshops also included a detailed presentation of the UIPRF's Risk Based Data Management System (RBDMS) which is a tool for conducting AORs and for making a determination to grant variances from AOR requirements.

The California Area-of-Review Workshop was held on January 11, in Bakersfield. The workshop was attended by 33 people including; at least one representative from each of the six California oil and gas state agency district offices and the main office along with representation from the California Bureau of Land Management. The oil & gas industry was also well represented. The California Independent Petroleum Association, the Conservation Committee of California Oil & Gas Producers, the Western States Petroleum Association, and the Independent Oil Producers' Agency were represented along with several companies including; Mobil, Chevron, Exxon, Shell, Texaco, AMOCO and Cal Resources.

The Oklahoma AOR Workshop was held on March 22, in Oklahoma City. This workshop was similarly attended both by number and type of participants as the California workshop. The Oklahoma workshop attendees were asked to fill out evaluation forms. The response was favorable.

The workshops that were scheduled for Kansas and Texas were canceled because of a re-organization of the oil and gas agencies in both states. In September of 1995, members of the project team decided that the remaining resources allocated for these two workshops would be successfully utilized if directed toward a national three-day workshop for state oil and gas agencies dealing. This workshop dealing with data management, including AOR issues met the needs of the Texas and Kansas accordingly, as well as, provided information to 22 additional state agencies who were at the workshop.

The workshop entitled "State Oil & Gas Agency Data Management User Group Workshop & Risk Based Data Management System Demonstration" on October 9 - 11 in Kansas City, Missouri in conjunction with the Annual Underground Injection Control and Ground Water Protection Forum. In addition to the exchange of information among states on data management issues, the UIPRF's RBDMS was demonstrated in detail which includes the AOR module. The RBDMS is an asset to states who use it to make proper determinations regarding environmental decision making including AOR variance decisions.

There were 44 individuals including 24 state oil & gas agencies represented at the workshop. The gathering resulted in the group making the decision to form a committee of state agency personnel interested in data management. Additional 1995 DOE grant funds were also utilized to plan and conduct this workshop.

Summary

State wide Area-Of-Review (AOR) workshops were held in California and Oklahoma and a national three-day workshop was held in Kansas City, Missouri where 24 state oil & gas agencies were represented.

ACKNOWLEDGMENTS

Throughout the project many oil & gas state oil and gas agency representatives, as well as, representatives of the oil & gas industry were instrumental in the development of the current RBDMS and in the development of the AOR workshops and accompanying AOR manual. Individuals who provided the most substantial input and support to the project are as follows:

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