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OIL & GAS PRODUCTION AND ENSURE THE PROTECTION OF THE ENVIRONMENT

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ABSTRACT*

The Environmental Information Management Suite/Risk Based Data Management System (EIMS/RBDMS) and Cost Effective Regulatory Approach (CERA) programs continue to be successful. All oil and gas state regulatory programs participate in these efforts. Significant accomplishments include: streamline regulatory approaches, enhancing environmental protection, and making oil and gas data available via the Internet. Oil and gas companies worldwide now have access to data on state web sites. This reduces the cost of exploration and enables companies to develop properties in areas that would have been cost prohibited for exploration.

Early in project, GWPC and State Oil and Gas agencies developed the EIMS and CERA strategic plan to prioritize long term development and implementation. The planning process identifies electronic commerce and coal bed methane as high priorities. The group has involved strategic partners in industry and government to develop a common data exchange process.

Technical assistance to Alaska continues to improve their program management capabilities. New initiatives in Alaska include the development of an electronic permit tracking system. This system allows managers to expedite the permitting process.

Nationwide, the RBDMS system is largely completed with 22 states and one Indian Nation now using this nationally accepted data management system. Additional remaining tasks include routine maintenance and the installation of the program upon request for the remaining oil and gas states.

The GWPC is working with the BLM and MMS to develop an XML schema to facilitate electronic permitting and reporting (Appendix A, B, and C). This is a significant effort and, in years to come, will increase access to federal lands by reducing regulatory barriers.

The new initiatives are coal bed methane and e-commerce. The e-commerce program will provide industry and BLM/MMS access to the millions of data points housed in the RBDMS system. E-commerce will streamline regulatory approaches and allow small operators to produce energy from areas that have become sub-economic for the major producers. The GWPC is working with states to develop a coal bed methane program, which will both manage the data and develop a public education program on the benefits of produced water.

The CERA program benefits all oil and gas states by reducing the cost of regulatory compliance, increasing environmental protection, and providing industry and regulatory agencies a discussion forum. Activities included many small and large group forum settings for discussions of technical and policy issues as well as the ongoing State Class II UIC peer review effort.

The accomplishments detailed in this report will be the basis for the next initiative which is RBDMS On-Line. RBDMS On-Line will combine data mining, electronic permitting and electronic reporting with .net technology. Industry, BLM, GWPC and all Oil and Gas states are partnering this effort.

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Introduction:

The Ground Water Protection Research Foundation (GWPRF) has developed the Risk Based Data Management System (RBDMS) for use by regulatory agencies. These agencies use this comprehensive system to manage oil and gas production and injection related activities. This system allows agencies to: improve regulatory decision-making; make oil and gas information more readily available to industry; increase environmental compliance; and reduce the regulatory barriers to oil and gas production. Twenty states and one Indian Nation are now using RBDMS with more states scheduled to install this system in 2003-4. Making the wealth of information contained in these compatible databases available creates an unparalleled opportunity for industry to improve exploration activities and increase production while improving environmental compliance. Attributes of RBDMS include its continued usefulness in assessing and reducing risk to drinking water, its use of nonproprietary software, its capability to address legacy databases, and its adaptation to variations in state oil and gas regulatory and production accounting methods. GWPRF's "Cost Effective Regulatory Approach" (CERA) is an integral part of the RBDMS system. These effective and more efficient policies and environmental program improvements developed through CERA can be implemented by all States. The principal project objectives of this grant are to continue implementing RBDMS Phase II, make these data available to industry, streamline permitting on state and federal lands, reduce the cost of environmental compliance, and develop user-friendly on-line reporting techniques. The historic focus of this project has benefited the state oil and gas agencies by improving their environmental compliance and oversight has been a value to the industry by decreasing permit approval time. One major product has been the development of a translation utility that allows much better access to state held data by the industry. The more readily available well and related geographic data have a direct effect of decreasing exploration and production costs.

Executive Summary

RBDMS (Risk Based Data Management System)

Technical assistance to Alaska continues to improve their program management capabilities. New initiatives in Alaska include the development of an electronic permit tracking system. This system allows managers to expedite the permitting process. The field inspections utility has been developed and installed in the North Slope Office. Data is replicated on a CD and transferred to the main RBDMS system in Anchorage. The field inspection utility is in the final testing phase.

Nationwide, the RBDMS system is largely completed with 20 states and one Indian Nation now using this nationally accepted data management system. RBDMS will be installing the remaining oil and gas states upon request. The Nevada RBDMS install has been completed. RBDMS is now operational at the Nevada DEQ and Nevada Department of Mines and Minerals. Nevada RBDMS also tracks geothermal wells. An RBDMS.net front end is being developed for RBDMS in California.

Electronic commerce continues to be a priority for RBDMS states. Montana, Colorado, Utah, Nebraska, Pennsylvania, and New York are all testing the electronic reporting module. Utah will begin operator testing in December of 2003. GWPC and states are also obtaining industry input for the e-commerce initiative through public meeting and peer review.

CERA (Cost Effective Regulatory Approach)

In 2002, the GWPRF initiated a joint project with the Bureau of Land Management and the Department of Energy's Office of Fossil Energy to assess the feasibility of water management and beneficial use alternatives specific to CBM produced water. The project is being performed using an integrated team approach with participants from states, federal agencies, universities, industry, and researchers. The Coal Bed Methane Beneficial Use handbook has been completed and is available in hard copy and electronic format. Based on the Coal Bed Methane survey, GWPC is developing a work plan for a Coal Bed Methane Module for RBDMS. This module will track CBM wells in addition to produced water quality. Produced water quality will be made available on agency web sites.

The EIMS/RBDMS and CERA programs continue to be successful. All oil and gas state regulatory programs participate in these efforts. Significant accomplishments include: streamline regulatory approaches, enhancing environmental protection, and making oil and gas data available via the Internet. Oil and gas companies world-wide now have access to data on state web sites. This reduces the cost of exploration and enables companies to develop properties in areas that would have been cost prohibitive for exploration.

Experimental*

This research project does not involve the use of experimental methodology.

Results and Discussion*

Task 1: RBDMS On-going Maintenance:

Accomplishments: 10/1/1– 3/31/2

A portion of the Oklahoma Corporations Commissions data has been loaded into the EIMS/RBDMS Core and is available on the Internet. This project was completed to test the compatibility of the EIMS/RBDMS system and to showcase the effort for all members of the OCC. A complete install and customization of EIMS/RBDMS is included in a separate DOE proposal. EIMS/RBDMS has been installed in Missouri and Nevada should be completed by the end of 2002.

Accomplishments 4/1/2 – 11/15/2

Progress is continuing on the Nevada RBDMS install. Scheduled completion date is now set for early 2003. GWPC is meeting with the California Oil, Gas, and Geothermal Resources Division to install the RBDMS Core back-end. This will enable Data generated by the RBDMS e.Permit and eInspect systems to be use more effectively. In addition, GWPC is developing plans to upgrade the RBDMS core to enable states like California, Oklahoma, Colorado, and New Mexico to fully use all RBDMS features. This has been requested by California, Colorado, and New Mexico. The RBDMS user group is exploring options with MMS and BLM to increase interagency data transfer.

Accomplishments 11/16/2 – 4/30/3

The Nevada RBDMS install is nearing completion. A Class V module is being developed so Nevada can more closely track water quality as it relates to fossil energy production. This module will be tested against the RBDMS Core program and will then be available to all RBDMS states.

GWPC is working with BLM and MMS to develop a business case for joint implementation of electronic reporting/permitting schemas. This business case will lay out the procedures for pilot testing of e-reporting and e-permitting programs and for adoption by API as an industry standard.

Accomplishments 4/1/3 - 10/31/3

The Nevada RBDMS install has been completed. RBDMS is now operational at the Nevada DEQ and Nevada Department of Mines and Minerals. Nevada RBDMS also tracks geothermal wells.

An RBDMS.net front end is being developed for RBDMS in California. This will enhance security and provide a faster interface for e-commerce solutions (e-commerce is being developed for California under a separate DOA solicitation).

Planning for a complete install of RBDMS in Oklahoma will begin in November 2003.

Accomplishments 10/1/3 – 3/31/4

The Arkansas RBDMS installation is being upgraded to interface with the generic field inspection utility and to be ready for electronic commerce applications. RBDMS in Alabama is being updated to track hydraulic fracturing data.

Update of Installation of Surface Facilities/EnviroInspection/Compliance package.

Surface facilities:

Updated/fixed: Operator name did not refresh when you choose a different lease. The lease number and lease name refreshed, but the company did not.)

Updated/fixed: QTR QTR location info not in the location subform? The Qtr Qtr is not being written to the location table (tblLocMaster) but is written to tblFieldFacilities.

Compliance:

Updated/fixed: In the compliance table, tblEnfComply, the field API_WellNo is populated with fDEV0000001. The label on the form says Entity ID, but the table still says API_WellNo.

Environmental Inspection:

Updated/fixed: From the Environmental Facility Inspection form, if you hit the “Write Compliance based on this Inspection” button a record is written to tblEnfComply. The record houses the Comply_ID, the Entity ID and the two dates that are defaulted when the form opens.

Accomplishments 4/1/4 – 9/30/4

The Arkansas RBDMS update has been completed. The field inspection utility is also operational.

Task 2: Technical Assistance to the Alaska Oil and Gas Conservation Commission.

Accomplishments: 10/1/1– 3/31/2

EIMS/RBDMS has been fully customized and installed in Alaska. Alaska is one of the beta test states for e-permitting and e-reporting.

An integrated base install and migration of legacy data was performed for the Alaska Oil & Gas Conservation Commission (AOGCC) in the past year. This has added the Nation’s largest producing State as an integrated user to the EIMS suite of products. The Montana/Michigan data model was the initial starting point for the customization efforts performed. This project included customization of the RBDMS application to account for the specific needs of the AOGCC. A couple of these customization needs included:

Specific customization for the AOGCC production account needs.

An addition of a Permit-To-Module for the creation of new wells and tracking data submittals by operators.

The data tasks that were performed for the AOGCC included creating a migration schema for taking the existing mainframe data and porting it into the newly revised and update SQL Server 2000 data structure. As part of the data structure modification a full conversion of the AOGCC RBDMS to SQL Server 2000 to take advantage of the new SQL Server 2000 capabilities was performed.

In addition to the legacy data migration and customization of the RBDMS application additional applications were customized or integrated with the RBDMS installation. These included:

Production Data Import (PDI): This application was developed to assist AOGCC production personnel in receiving and verifying electronic submittal data from operators.

Oilfield Manager: To assist in the analysis of production data a SQL Server interface was developed to supply data to the commercial software package Oilfield Manager.

PFEET: Installation of the GWPC PFEET software on AOGCC personnel's PCs was also performed.

As part of the continuing work that is progressing for the AOGCC, a GIS Navigation system is being integrated into the RBDMS front end as well as Multiple Bottom Hole Location capabilities.

Accomplishments 4/1/2 – 11/15/2

Every member of the AOGCC staff has been trained on the use of RBDMS. The GIS Navigation system has also been completed. Work is beginning on the administrative and user help manuals. We continue to customize the RBDMS front-end to make it more user friendly for AOGCC staff. GWPC is developing a project plan for the next phase of RBDMS development in Alaska. Tasks include:

Field inspection utility

Permit tracking feature, which will help AOGCC staff, expedite large and complicated permits.

Injection storage module, which will allow tracking of the new gas storage wells currently being permitted in Alaska.

Additional GIS and mapping features will be added to the system.

Accomplishments 11/16/2 – 3/31/3

The permit tracking feature has been installed for the Alaska RBDMS system. The work plan is under development for the field inspection and reporting utility.

Accomplishments 4/1/3 – 10/31/3

The field inspections utility has been developed and installed in the North Slope Office. Data is replicated on a CD and transferred to the main RBDMS system in Anchorage. The field inspection utility is in the final testing phase.

The data transfer system was installed for the AOGCC. This allows non confidential data to be displayed and used by the public.

The directional survey module was installed for the AOGCC. This allows multilateral wells to be viewed in RBDMS in a GIS format.

Two meetings were held in Anchorage to solicit input from the oil and gas industry on e-commerce needs. Results will be summarized and included in the 2004 RBDMS annual report.

Accomplishments 10/1/3 – 3/31/4

Numerous enhancements were made to the Alaska RBDMS system this period including:

Directional Survey Modification:

This task involved the modification of a SQL Server stored procedure to assure that when calculations are performed within the Directional Survey module they are performed on directional survey point type records.

In addition the modified procedure was scripted, tested against the local production database, and sent to Elaine Johnson for implementation.

Second Login Issue

When the AOGCC was required to change their networking OS to Novell the necessity to login to SQL Server separately from their network login was implemented. This task made the necessary changes to the AOGCC network software to allow for passing of authenticated user's information to MS SQL Server.

Navigation to Related Inspections

Provide navigation ability to easily navigate to related inspections stored in the AOGCC inspection module. This made the re-filtering of the inspection forms to a double clicked related inspection number.

Removal of "PEND" Status

This task adjusted the well record status fields upon the issuance of a permit.

Addition of Related Inspection Number to Reports in Inspection Module

Modifications to inspection reports were relevant were performed to add Related Inspection Number.

Build a Reset Filter Option in Inspection Module

Added a button to inspection module that resets filter options.

Conformation Report for MDB Submittal

Constructed a conformation report for inspectors to provide them with feedback on the inspections that have been included in the MDB created for submittal to the central office. The

report automatically updates upon the initial creation of the submittal and when opening the MDB submittal.

Modification of Excel Import Routines

This task involved the modification of the Excel import routines used to capture operator submitted data. This added additional comment information stored in the Excel spreadsheets to the remarks comment.

Accomplishments 4/1/4/ - 9/31/1

A .net internet interface has been completed for Alaska. This new interface allows for internet users to access data stored in the AOGCC RBDMS system. This interface will be used as a basis for additional e-commerce applications nationwide.

Task 3: E-Commerce

Accomplishments Tasks 3.1,3.2,3.3 10/1/1– 3/31/2

Based on the RBDMS needs survey, the RBDMS Strategic plan and subsequent discussions with states and industry, e-commerce was identified as the number one priority for future development. State regulatory agencies and the oil and gas industry recognize the need to operate more efficiently because of rising costs and increased budget restrictions. State regulatory agencies also recognize the need to decrease the cost to industry of permitting and reporting while maintaining or increasing environmental compliance. E-commerce is defined as:

- . Online data access
- . Online permitting, and;
- . Online reporting of production and injection data.

The RBDMS e-commerce utility is being designed to:

- . Have nationwide applicability (e.g., the “core/generic” approach)
- . Be compatible with BLM and MMS e-commerce initiatives; and
- . Have widespread acceptance from industry.

E-commerce Development Summary

I. XML Schema:

Develop core XML schema for production and injection reporting. This schema will be the basis of all RBDMS e-commerce initiatives.

II. Web-based Reporting Module.

- A. Developed using the core XML schema.
- B. Geared towards small independent operators with generally less than 25 wells.
- C. Feature auto-population and the ability to add or delete wells, allow editing of pools, and allow an operator to save a copy of the report on their computer.
- D. Modules contain a common layout to give it the same “look and feel.”

III. XML Parser.

- A. Geared towards medium-sized independents to majors.

- B. The operator would generate an XML file, which would be transferred into intermediate, tables (mdb), and undergo validation checks prior to being transferred into the database.
- C. Create a utility to translate the XML file into a format that could be downloaded into the state's database whether it is a legacy, Access, or SQL database.
- D. Bulk data transfer process would be as follows:
 - 1. Operator would create and XML file;
 - 2. XML file would be sent electronically to the state;
 - 3. The data would undergo a primary edit for acceptance;
 - 4. The data would be parsed into temporary storage;
 - 5. The state would then process the data for detailed technical acceptance;
 - 6. The data would then be accepted into the state's database and an approval notice would be sent back to the operator. If the data failed any of the edit checks, a notice would likewise be sent to the operator and the operator would need to correct the data.
 - 7. Develop parser in MS SQL version 7 or 2000.
 - 8. Volunteer states: UT, NE, and PA.

IV. mdb XML Creator.

- A. For medium sized independents that maintain a database but may not have the ability to create XML transfer files.
- B. This batch data submittal process would be similar to the process outlined above for medium-sized independents to majors where an XML file would be generated and go through the same process.
- C. Contain a utility to translate XML to legacy, Access, and SQL databases.

V. E-permitting.

- A. CA is nearing completion with their e-permit system. This system should be available for review via the Internet in 2002.
- B. Review and look at making the CA e-permit system a "core system" and develop a common XML schema.

The EIMS/RBDMS states have developed an XML schema to standardize e-reporting (see attached schema). The GWPRF is working with the API to have this included in the PIDD. State oil and gas board managers and technical staff believe that the eXtensible Markup Language (XML) is an ideal format for sharing data with oil and gas industry operators. Two factors contribute strongly to this perception: its low cost in comparison with the cost of traditional electronic data interchange (EDI) and the wide-scale availability of XML development tools. For all XML-enabled EDI applications, a schema, or standard set of syntax and formatting requirements specific to the oil and gas industry, is needed as a means of first-round of data validation.

Over the past 2 years, the Ground Water Protection Council (GWPC) has coordinated the development of such a schema. The extensive development effort has included Technical Advisory Group meetings, workshops, state agency conferences, and pilot studies funded through grants from the Department of Energy (DOE) and the participating states. Agencies

nationwide have embraced the schema as a standard. Electronic reporting initiatives are now being launched in Colorado and New York and are being planned in Montana, Alaska, Utah, Mississippi, and Pennsylvania.

The schema on which all of these applications will be based is called eReport.xsd. Now in version 3, the eReport schema governs production, injection, and locational data. The schema itself is designed to be database-neutral, so users' database table structures can remain unchanged.

Because API has long written the standards for well construction, GWPC believes that API acceptance of any standard associated with the oil and gas exploration and development processes is both desirable and proper. GWPC therefore requests that API review the schema that it has developed through this collaboration of state agencies for production and injection data reporting and back its use as a standard for the oil industry. GWPC and the state agencies would particularly welcome API's inclusion of the eReport XML schema tags developed to date in the PIDD.

An oil and gas schema approved by API would have greater value beyond the purposes of only the regulatory agencies. One of the primary benefits that would accrue to industry from improved data access is the ability to leverage oil and gas exploration and resource development efforts. Industry could produce more oil and gas more cost-effectively if operators had access to both the current and historical data warehoused in oversight agencies' databases. Data access in combination with desktop analytical tools also would be highly useful to operators in assessing production trends, risk, and other factors. Meanwhile, the massive efforts the agencies put forth to manage agency information processes can be scaled back to a much more efficient and effective level, with immediate feedback to industry as to data transfer status.

Accomplishments 4/1/2 – 11/15/2

GWPC continues to refine the "core" XML schema. Input is being obtained from MMS, BLM, states, and industry. The XML schema is currently being beta tested in California with the e.Permit system.

GWPC and the RBDMS user group has developed and submitted to API, a business case for formal adoption of the XML schema. In September, the RBDMS user group met via conference call, with the API Regulations Committee to discuss formal adoption procedures. GWPC, the RBDMS user group and the API Regulations Committee will meet in Louisiana on January 20-21 to formalize adoption procedures.

Accomplishments 11/16/2 – 3/31/3

eReport: A summary of progress

The eReport schema has been updated.

- Requests from PA, UT, and the REGs Committee have increased the flexibility of the schema.
- New tags have been added.
- Many of the global data elements are now either repeating or recursive.

eReport version 3.5 now available.

- Schema documentation: http://virtuales.com/xml/schemaVer3_5Doc/ereport3_5.html
- Schema: http://VirtualES.com/xml/eReport3_5.xsd

The eReport XML Web service is now available.

- A .NET XML Web service has been developed for data exchange with operators and is now being tested.
- The eReport Web service handles two-way data exchange with operators without relying on a browser.
- The Web service populates the client application (eReportRemote.NET), tracks agents and the operators they represent, and makes it possible for those agents to download header information from the agency database for local editing.

eReportRemote.NET is now available.

- eReportRemote.NET is a client application for the eReport Web service.
- Operators download the application, login to the agency server to populate it with a requested dataset, and then edit and mine the data locally.
- The agency controls the data made available to industry.
- Operators upload reports to the agency server by clicking a button in eReportRemote.NET.
- To use eReportRemote.NET, operators need only to install the .NET Framework (free from Microsoft) and to have an Internet connection.

Small footprint, simple user interface

GWPC has prepared an implementation guidance document.

- Now in technical review, this implementation plan documents
 - o How eReport components can be configured.
 - o Which eReport components must not be altered without GWPC eCommerce Committee approval.
- The plan also suggests areas of agency commonality that should be explored to cost-leverage new eReport development through greater uniformity of programming between installations (codes, object libraries, base classes).

Generally, each eReport installation should include the following:

- On the server:
 - o Reference to the universal resource indicator (URI) for the eReport schema, version 3.5, for first-round data validation
 - o The .NET Framework
 - o One of two XML parsers (eReportWS.dll for the Web service or the XML2ADO.dll ActiveX control)
 - o A script to create intermediary tables in an ADO data source
 - o Stored procedures for second-round data validation

Generally, each eReport installation should include the following:

- On client workstations:
 - o An up-version browser
 - o The eReportRemote utility in one of two formats (.NET or Access)
 - o Platform support for eReportRemote

Plan gives industry three ways to access each eReport installation. #1:

- Operators can enter reports directly onto the agency's Web site forms.
 - o Benefits: There is no need for programming knowledge, and reports can be printed locally.

- Suitable for: Smaller operators with few wells

Plan gives industry three ways to access each eReport installation. #2:

- Operators can use an agency-provided utility that produces schema-compliant files for upload to the agency server.
 - Benefits: The operator prepares the datasets locally, without agency server load, and can use the utility as a local data repository for both regulatory reporting and internal well tracking.
 - Suitable for: Medium-sized operators with few IS resources
 - Format: Either eReportRemote.NET can be used with the new Web service or Access can be used with the older, more restrictive XML2ADO.dll program.

Plan gives industry three ways to access each eReport installation. #3:

- Operators can download header information from agency-provided datasets and then join this structure to their own in-house databases.
 - Benefits: Schema-compliant files can be created for batch upload to agency Web sites from industry data sources. The upload site can be a Web page or a POP3 e-mail address.
 - Suitable for: Larger operators with many wells and sophisticated IS resources.

State-by-state Progress

Colorado Oil and Gas Conservation Commission

- COGCC installed eReport on its server in 2002.
- COGCC is interested in using the eReport XML Service to provide data sets to operators.
- An industry pilot test group is being sought for the production-by-well data entry Cold Fusion Web application.
- A page on the Cold Fusion Web application accepts batch uploads of XML data to the server.

Utah Division of Oil, Gas, & Mining

- eReport was installed on UDOGM's server in April 2003 and is ready for testing.
- The production-by-well entry Cold Fusion Web application is supplemented with a downloadable .NET application to share datasets with operators.
- The .NET application links directly to UDOGM's server via the eReport XML Web service.
- A page on the Cold Fusion Web application accepts batch uploads of XML data to the server.

Nebraska Oil and Gas Conservation Commission

- NOGCC's eReport installation is in development.
- Testing is planned to begin in June 2003.
- Operators will be able to send and receive data through both a Cold Fusion Web application for production-by-well data entry and through the eReport XML Web service and eReportRemote.NET client application.
- A page on the Cold Fusion Web application will accept batch uploads of XML data to the server.

Montana Board of Oil and Gas Conservation

- MBOGC's eReport application is in development.
- Agency testing is scheduled for later in 2003.

Pennsylvania Department of Environmental Protection

- DEP is working with a sister agency (DCNR) to exchange oil and gas information with industry through two means:
 - An agency-distributed pre-populated Access 2000 utility that creates schema-compliant files.
 - An ASP Web application that accepts file uploads created by the Access 2000 utility.
 - Industry is using the utility for the 2002 reporting period.
 - DEP/DCNR is considering an upgrade to .NET in the next one to two years.
- New York State Department of Environmental Conservation
- NYSDEC exchanges production reporting information with industry through a pre-populated Access 2000 utility that creates schema-compliant files.
 - Operators return the files to NYSDEC staff by e-mail. Staff members then upload the data to their RBDMS database.
 - NYSDEC pioneered the use of XML for production reporting and is now in its third year of program participation.

eReport Next Steps

- MMS/API will review eReport schema based on Department of Interior criteria
- The eReport schema will be updated as necessary
- Goal: Achieve API certification as the industry standard

eReport

- GWPC and States are soliciting industry volunteers to test eReport
- Feedback from industry will be used to update the next version of eReport

ePermit

- ePermit schema is under development and will be tested in California fall 2003
- BLM is developing a business case for ePermitting
- GWPC will review and update ePermit business case
- GWPC – BLM – API will work toward an API certification for the ePermit schema

Accomplishments 4/1/3 – 10/31/3

Electronic reporting is now being tested in Utah and Montana. Nebraska and New York will be included in the second tier of testing for e-report. Results of this testing period will be used to update the generic e-report module before being released for all states to use. Obtaining input from industry is necessary before the electronic reporting module is finalized. The schedule for obtaining comments from industry includes:

1. Meetings with oil and gas operators in Anchorage. These meeting occurred in August and September of 2003. Industry comments are being compiled in an Access database.
2. Industry beta testing of the e-reporting module. This is currently underway in Montana and Utah.
3. A public meeting will be held in Bakersfield, California in late January 2004.

A joint business plan for e-permitting has been developed by GWPC and the U.S.BLM. This business plan describes the interagency approach for implementation of e-permitting. The complete business plan is attached at the end of this report. Representatives of GWPC and

RBDMS states will meet with the BLM in Denver in early November to further discuss the business case. Topics of discussion include the development of the xml schema for e-permitting, the e-permit utility and the associated costs. Electronic permitting is expected to be significantly more complicated and expensive than e-reporting.

Accomplishments 10/1/3 – 3/31/4

GWPC and BLM have finalized and adopted the joint electronic commerce business case (see attached). This document will guide e-commerce development at the national and state levels.

GWPC and BLM have developed a joint MOU which will guide future e-commerce applications at the state and federal levels (Appendix D).

The XML schema for electronic reporting (3.5) has been finalized. This schema has also been reviewed by POSC, BLM, API and industry representatives.

Accomplishments 4/1/4 – 9/30/4

Electronic data mining is functional in Montana, Alaska, Utah, New Mexico, Arkansas, New York, Mississippi, and Ohio. Utah and Nebraska are testing electronic reporting with industry.

These applications will be used as the basis for the next phase of electronic commerce – RBDMS on-line.

Sub-task 3.4: Field Inspection

Accomplishments: 10/1/1– 3/31/2

The field inspection utility previously developed is being updated to include the .net technology.

Accomplishments 4/1/2 – 11/15/2

GIS and GPS technology is being added to the field inspection utility. The field inspection utility is available for laptop (Windows 2000/XP), Palm, and Windows CE operating systems. The .net technology is undergoing beta testing in California. An additional feature of the .net technology will allow a user to download USGS topographic maps and aerial photos from the internet. These data are now available for RBDMS eInspect users at no cost. This results in yet another cost savings benefit to RBDMS states.

Accomplishments 11/16/2 – 3/31/3

Using .net technology, GWPC will be developing a “Core” field inspection utility. This feature is currently being asked for by Alaska, California, Arkansas, Mississippi, Nebraska, and Colorado. GWPC will use the technology developed to data in field inspection to make this a generic utility and tested against the RBDMS core.

Accomplishments 4/1/3- 10/31/3

Arkansas has volunteered to the pilot state for the national core field inspection utility. Testing should begin in early 2004.

Accomplishments 10/1/3 – 3/31/4

Testing is under way in Arkansas on the RBDMS generic field inspection utility with GPS capability.

Accomplishments 4/1/4/ - 9/30/4

The Core .net field inspection utility is functional in Arkansas. New York is also installing this application and is updating some of the features. A detailed administration and help manual is available electronically.

Task 4: Cost Effective Regulatory Approach (CERA):

Accomplishments 10/1/1 – 11/15/2

Members of the Ground Water Protection Council and the Ground Water Protection Research Foundation have worked diligently to stay abreast of the issues that have recently been discussed nationally regarding the environmental impact of hydraulic fracturing of coal seams for the production of coal gas. Some time and travel of GWPC/GWPRF staff have been covered under this task for members and staff to participate in national forums. The efforts of the GWPC/GWPRF to ensure that cost effective regulatory approaches are always considered whenever regulatory schemes are discussed.

Accomplishments 11/16/2 – 4/30/3

UIC MEETING: The 2003 Annual UIC Meeting summary written by Bill Bryson has been submitted in an earlier report. This meeting entitled: An Industry Forum on Ground Water Protection and Conservation Addressing Legislation, Regulation, Operations, Policy, and Technical Issues Regarding Waste Stream Management and Other Water Issues Facing Industry was held in January 21-23, 2003, held in New Orleans, Louisiana.

Accomplishments 5/1/3 - 9/30/03

CLASS II STATE PEER REVIEW: The GWPC State UIC Peer Review effort is an opportunity for states to share experiences with their peers who administer the same (or similar) regulatory programs. States who have gone through the process feel strongly about the benefits of the effort. States serving as reviewers as well as those reading the reports benefit from the knowledge of how other agencies are dealing with specific issues. However, the agency that gains the most from the process is the state being reviewed. The completed review document provides the state with a detailed report on the strengths and weaknesses of the agency which can be used to advance the program and enhance the protection of ground water. GWPC conducted two Class II UIC State Peer Reviews in 2003 including agencies in Montana and Arkansas.

The review team of the Montana Board of Oil and Gas consisted of Mark Bohrer of the North Dakota Industrial Commission and Gill Hunt of the Utah Division of Oil, Gas and Mining. Additionally, Dan Jackson of the UIC Division of USEPA Region 8 was an observer and Bill Bryson and Ben Grunewald of GWPC facilitated the three day review on August 11-13 in Billings Montana. Our special thanks to George Hudak, Jim Halvorson and Tom Richmond of the Montana Board of Oil and Gas for all their efforts in furnishing the needed information to complete the review, and to the review team for their voluntary participation. The Montana peer review document is being edited and will soon be posted at the GWPC project web site at <http://www.gwpc.org/classii.htm>.

Accomplishment 10/1/03 – 9/30/04

CLASS II STATE PEER REVIEW: The review team of the Arkansas Oil and Gas Commission consisted of Rick Bender of the Kentucky Division of Oil & Gas and Scott Kell of the Ohio Department of Natural Resources-Division of Oil & Gas. Bill Bryson and Ben Grunewald of GWPC facilitated the three day review on November 2-4 in El Dorado Arkansas. Our special thanks to Gary Looney and Grant Black of the Arkansas Oil and Gas Commission and, Robert Allen and Laura Stuart of the Arkansas Department of Environmental Quality for all their efforts to furnish the needed information to complete the review, and to the review team for their voluntary participation. The Arkansas peer review document is being edited and will soon be posted at the GWPC project web site at <http://www.gwpc.org/classii.htm>.

UIC MEETING: GWPC held the '04 Annual UIC Meeting in Houston, TX, January 20-22. There were just under 100 present. The final agenda and summary report of the event can be viewed www.gwpc.org/MeetingsY.htm. The 2004 UIC Conference included sessions for those interested in injection well practices. Participants included representatives of the industries using injection wells for waste disposal, state and federal regulators, and members of the environmental community. The purpose of this important meeting is to analyze current and pending rules, policies, and national legislation pertaining to Class I, II, and III injection and solicit input from participants to develop GWPC UIC policy positions. Discussion topics will center on water and waste water issues and how GWPC can better respond to the interests of the regulated community. Input provided at this meeting was used to develop strategies for more effective application and oversight for underground injection practices and will identify issues for consideration at GWPC's Annual Policy Meeting in March, 2004.

Task 5: Coal-Bed Methane Wells

Accomplishments 10/1/1 – 3/31/2

The GWPRF is conducting an on-line Coal Bed Methane Survey to determine state and industry data management needs. Results of this survey will be presented at the GWPC fall meeting in San Francisco (September 2002). The EIMS/RBDMS Coal Bed Methane Module will then be designed with additional input from states and industry.

The GWPC hosted a Coal Bed Methane workshop at the annual UIC meeting, January 2002. This workshop was developed and presented for the GWPC by ALL Consulting. CBM is the most important new petroleum target in the U.S. More new CBM wells are being drilled every month in established oil and gas basins as well as in new basins. CBM holds the promise to supply new gas reserves to the nation, but it also has the potential to impact other environmental resources.

The workshop began with short synopsis of coal deposition and maturation with an emphasis on the formation of CBM. It continued with an overview of CBM production around the country with an emphasis on those aspects that could represent threats to environmental resources. For instance, produced water volumes and quality vary from the Eastern U.S. to the Western U.S. - CBM production in West Virginia includes small volumes of heavy brine while CBM production

in Wyoming results in large volumes of high to medium quality water that can have important beneficial uses.

The workshop continued by surveying completion and production technologies used around the country as well as methods of managing co-produced water. The workshop concluded by looking at Best Management Practices in the CBM industry and the range of regulatory hurdles that must be surmounted by operators throughout the country. The workshop was aimed at the wide variety of attendees that included regulators, operators, and interested individuals.

Accomplishments: 4/1/2 – 11/15/2

October 16-17, 2002, the GWPC held it's first produced water management conference in Colorado Springs Colorado. The conference, entitled "Making Water Produced During Oil and Gas Operations a Managed Resource for Beneficial Uses," included a broad variety of topics, including topics on CBM and conventional oil & gas production. The purpose of the meeting was to explore innovative approaches to handling oil and gas produced water. The conference was attended by industry representatives, many state and federal regulatory representatives, and an impressive group of researchers and scientists. All that attended were able to discuss many issues that are among the most important with respect to progressing development of natural resources in an environmentally sensitive society. There were 120 in attendance. We have placed all of the papers and abstracts and most of the power point presentations on the GWPC web site at www.gwpc.org.

Meeting Structure:

The 2002 Ground Water Protection Council (GWPC) Produced Water conference was functionally organized around five areas that together provide a framework for produced water treatment and handling.

Setting the Stage for Produced Water Handling and Beneficial Use

Produced Water Quality, Chemistry, and Treatment Regional Review

Produced Water Handling and Treatment

Produced Water Beneficial Use

CBM Operations and Produced Water Handling

Infusing the spirit of the conference is six overall themes that play a critical role in our ability to meet the challenges of produced water treatment and beneficial use.

Traditional Treatment Methods and Use

State and Federal Regulations dealing with Produced Water Handling and Disposal

Beneficial Use of Produced Water

The Special Case of CBM Operations and Produced Water Treatment and Handling

Changing Expectations with Regard to Produced Water Handling

Sharing Results and Successes

The meeting summary was provided in previous reports.

Accomplishments 11/16/2 – 4/30/3

Based on the Coal Bed Methane survey, GWPC is developing a work plan for a Coal Bed Methane Module for RBDMS. This module will track CBM wells in addition to produced water quality. Produced water quality will be made available on agency web sites.

In 2002, the GWPRF initiated a joint project with the Bureau of Land Management and the Department of Energy's Office of Fossil Energy to assess the feasibility of water management and beneficial use alternatives specific to CBM produced water. The project is being performed using an integrated team approach with participants from states, federal agencies, universities, industry, and researchers. The project is being managed jointly by BLM (Matt Janowiak) and the GWPRF. The GWPRF selected ALL Consulting and Ft. Lewis College to perform the project and conduct necessary research and technical work. The project team has held multiple meetings, including a kick-off meeting at the BLM's Fluid Minerals Conference in Salt Lake City, the BLM's Buffalo Field Office, and its last meeting in Colorado Springs in conjunction with the GWPC's Produced Water Conference. Field reconnaissance trips have also been conducted in Ranchester, Wyoming; Decker, Montana; Durango, Colorado; Southeastern Kansas, and Ft. Smith, Arkansas to discuss technical details with industry. Through the end of 2002 and through the first quarter of 2003, various sections of the document underwent a national technical review process by project cooperators. More than 50 individuals from federal and state government, industry, environmental groups, native American Indian tribes, Universities (Ft. Lewis College, Texas A&M), and researchers participated in the initial review process. Following the initial review process, the various components of the handbook were compiled in preparation for a fully compiled and final document review. The review process is expected to be conducted in April and May. Comments will be compiled and used to prepare a final document by mid-2003.

Consultants have completed updating the BU Handbook and have it in PDF format ready to write to CDs for distribution to reviewers.
Strategic Plan

Accomplishments 5/1/03 – 10/31-03

The project has been completed with the final product being the document entitled "Feasibility Study of Coal Bed Methane Produced Water for Beneficial Use". This document is on the web at, www.all-llc.com/CBM/BU/index.htm.

ADDITIONAL Accomplishments 5/1/03 – 9/30/4

The GWPC states have identified the following priorities for RBDMS and CERA projects.

1. E-commerce: Continue the development and implementation of the national e-commerce solutions for oil and gas regulatory agencies and industry
 - a. E-permitting: Reduces rig downtime
 - b. E-reporting: allows regulatory agencies and oil and gas operators to function more efficiently
 - c. Web access to databases: allows industry access to state data warehouses. Encourages exploration by small operators.

- d. Electronic transfer of data with BLM/MMS: Reduces or eliminates duplicate permitting and reporting.
2. Coal Bed Methane Resource Management Module: using the results of the GWPC Coal Bed Methane survey, develop a CBM management tracking system using the RBDMS model. These data will be Web enabled and displayed under the e-commerce initiative.
3. Water Quality: add water quality databases to RBDMS, and the proposed Coal Bed Methane Resource Management Module. These databases would relate water quality data to fossil energy activities.
4. Produced water beneficial uses: Promote the use of produced water as a resource
5. Public education and outreach: initiate a public education and outreach program to demonstrate the sound environmental practices of oil and gas production, coal bed methane, and UIC. Data from the states RBDMS systems will be used for verification. Initiate an education program, which combines water quality and quantity data with the production and use of fossil energy. Use education and outreach to support domestic production of oil and gas.
6. Continue working on the hydraulic fracturing issue
7. Class II research, development, and education.
8. Install RBDMS in additional state oil and gas agencies
9. GIS: incorporate GIS into all projects.
10. Develop a .net front end for the existing RBDMS SQL backend. This enhances security and enables large states like Oklahoma and California to use RBDMS.
11. National Oil and Gas inspection field Core program. This project enables agencies to incorporate inspection data into RBDMS thereby making it available to industry faster.
12. Install RBDMS in additional states when requested.
13. RBDMS maintenance: future work on the RBDMS Core will be limited to routine maintenance and periodic Access and SQL upgrades.

Conclusion*

The EIMS/RBDMS and CERA programs continue to be successful. All oil and gas state regulatory programs participate in these efforts. Significant accomplishments include: streamline regulatory approaches, enhancing environmental protection, and making oil and gas data available via the Internet. Oil and gas companies world-wide now have access to data on state web sites. This reduces the cost of exploration and enables companies to develop properties in areas that would have been cost prohibited for exploration.

The GWPC is working with the BLM and MMS to develop an XML schema to facilitate electronic permitting and reporting (Appendix A, B, and C). This is a significant effort and, in years to come, will increase access to federal lands by reducing regulatory barriers.

The RBDMS program is largely completed. Remaining tasks include routine maintenance and the installation of the program upon request for the remaining oil and gas states.

The new initiatives are coal bed methane and e-commerce. The e-commerce program will provide industry and BLM/MMS access to the millions of data points housed in the RBDMS system. E-commerce will streamline regulatory approaches and allow small operators to produce energy from areas that have become sub-economic for the major producers. The GWPC is working with states to develop a coal bed methane program, which will both manage the data and develop a public education program on the benefits of produced water.

The CERA program benefits all oil and gas states by reducing the cost of regulatory compliance, increasing environmental protection, and providing industry and regulatory agencies a discussion forum.

The accomplishments detailed in this report will be the basis for the next initiative which is RBDMS On-Line. RBDMS On-Line will combine data mining, electronic permitting and electronic reporting with .net technology. Industry, BLM, GWPC and all Oil and Gas states are partnering this effort.

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Business Case for Collaborative Development of Shared Processes and Procedures by Participating US Federal and State Regulatory Agencies to Support Well Permits & Activity Reports

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Appendix A: Business Case for Collaborative Development of Shared Processes and Procedures by Participating US Federal and State Regulatory Agencies to Support Oil and Gas Well Permits & Activity Reports

Executive Summary

This business case describes the proposed development of shared processes and procedures for oil and gas regulatory well permits and activity reports by and for participating U.S. federal and state agencies. The development of shared processes and procedures specifically includes the definition, development and delivery of a working Extensible Mark-up Language (XML) ePermit schema that will be proposed as an oil and gas industry regulatory electronic well permitting/reporting standard [i.e., as a potential American Petroleum Institute (API) Recommended Practice (RP)].

Such development would substantially benefit all concerned parties by virtue of the increased clarity and consistency of these processes. The intended scope of this effort is to address the following business processes:

- Industry well permit/activity report submissions to state/federal regulatory agencies.
- Well permit approval -- activity status inquiries from industry or amongst regulatory agencies.
- Transmission of state/federal regulatory permit approval information back to the industry.
- Sharing of well permit/report data between regulatory agencies.

The business process transaction scope to be addressed includes the following current types of interactions:

- Applications for permit to drill (APDs).
- Miscellaneous well activity reports (e.g., spud notices, completion reports, etc.).
- Well sundry activity permits/reports (e.g., notice of intent to plug and abandonment, etc.)

Work to be accomplished by this business case proposal may encompass:

- Mapping of currently used regulatory permit/report data elements and their definitions to existing, relevant and current permitting and reporting transaction definitions, e.g. XML schemas/sub-schemas, using prior and ongoing mappings to the Petroleum Industry Data Dictionary (PIDDD).
- Development of new permitting and reporting transaction definitions, e.g. XML schema components, when determined necessary.

- Pilot testing of the resulting permitting and reporting transaction definitions between industry and regulatory agencies as well as amongst regulatory agencies (e.g., States and BLM).
- Development of implementation and use guidelines that address agency specific permitting and reporting data submission requirements and respective code and translation domains.
- Submission of resulting permitting and reporting transaction definitions, once demonstrated to be valid and useful, to formal standardization and future support / enhancement process(es).

The authors of this business case believe that the eXtensible Markup Language (XML) Schema (.xsd) technology is the appropriate transaction definition context for sharing and transmitting data between and amongst oil and gas industry operators and regulatory agencies using current Internet-based communication technologies. Two factors contribute strongly to this perception: its low cost in comparison with the cost of traditional electronic data interchange (EDI) and the wide-scale availability of XML development tools. For all XML-enabled EDI transaction definitions, a *schema*, or standard set of syntax and formatting requirements is needed. To account for the high degree of commonality among transaction definitions, schemas often share common aspects including actual shared components (also known as modules), stylistic guidelines, and communication / transmission protocols. Every effort will be made to re-use already defined schemas and components. This applies within and beyond the scope of U.S. regulatory permits and reporting.

Key benefits that would accrue to the industry and State/Federal regulatory agencies include:

- Reduced cycle times for permit submission and regulatory approvals. Administrative delays would be minimized because data validation would be automated. Operators would receive immediate feedback as to data transfer status.
- Operator submit once concept. Alleviate redundant submission requirements when more than one regulatory agency must be notified (e.g., both State and Federal). Industry that operates across state boundaries could report to multiple state regulatory agencies in one standard format, reducing the need to customize permit/reports submissions to conform to agency-specific formatting particularities or to be keyboard transcribed into differing regulatory form-based websites now being developed by each agency. Industry business and service company partners could readily exchange well activity data.
- Easily facilitate the electronic submission of multi-well “batch” permit submissions to the regulatory agency as performed by well permit agents or operators as a result of increased oil and gas activity.
- More efficient permit approval status tracking and quicker problem resolution turnaround.
- Reduction in agency effort and associated costs with permit/report data transcription, validation and most importantly, beginning to end full process automation of the well permit regulatory review, analysis and approval process. In the case of Federal

onshore well permit operations, the use of a common reporting process minimizes the need and cost to develop specific data sharing technology with each respective State agency where there is both federal and state mineral estate responsibilities.

- Utilization of web-based industry driven “self permitting technology” where such approvals are considered necessary but require minimal action on the part of the regulatory agency. Provide browsing environments whereby an operator can leverage an array of existing well-related data provided by the regulatory agency in the area of interest that can be leveraged to start a permit application, thereby minimizing the need to develop such permit data from scratch.
- Utilization of simple word processing file – permit content templates, which can be use by small “low tech” or “mom and pop” operators. The content templates (or existing permit forms) developed by the agencies can be enabled to feed the Internet-based transaction solution including use of agency code validation (enumeration), thereby allowing the operator to email or batch uploaded the permit content templates directly to the agency’s regulatory well permit databases. The use of such content templates could easily encompass new or emerging business processes such as Master APD or Plan of Development filing submissions.
- Improved oil and gas resource development and recovery as a result of more timely, accurate and a wider array of data that is readily available to the industry and regulatory agencies.
- Software developers could write data-driven applications or apply commercial-off-the-shelf technology using the common reporting solution to support existing or emerging well operator, service company industry and regulatory agency business requirements.

A common permitting and reporting transaction solution in use by a number of federal and state agencies and a candidate for approval in formal industry standards processes would have greater value beyond the purposes of only the regulatory agencies. Industry could produce additional oil and gas more cost-effectively if operators had access to both the current and historical data warehoused in oversight agencies’ databases. Data access in combination with desktop analytical and geographic information system (GIS) tools are useful to operators in performing well and reservoir asset and infrastructure planning and management, analyzing production trends, determining regulatory and environmental constraints, minimizing project risks and other similar activities.

The organizations and groups that have participated in the preparation of this business case description believe that there is a unprecedented opportunity for broadly based collaboration in the development, deployment, and evolution of contemporary standards for use across the U.S. by operators and both state and federal agencies. At the same time, we take a realistic view of the need to proceed in an iterative way in terms of scope of regulatory functionality, scope of operator and agency use, etc. This is largely influenced by the continued strong incentives for cost reduction and cost control on the one hand and the need to respect the current positioning of various regulatory interactions in current policies and implementation forms and the current developments of improved solutions by various agency/operator groups.

While we do not expect to attract all U.S. state and federal agencies and operators to join this effort, we do ask all parties to be aware and to offer advice to those of us who are engaged in collaborative standards development. Where feasible, we invite additional organizations and groups to seriously consider joining the collaboration. All participants in the collaboration are asked to (a) stay informed, (b) provide feedback and advice, (c) provide resources in the form of participants and/or funding, and (d) participate and support deployment activities.

The collaboration will endeavor to maintain and enhance our relationship with the U.S. federal departments (Interior and Energy) and with the formal standards organizations, API and POSC. The Department of the Interior oversees the effort of federal agencies, BLM and MMS. The Department of Energy encourages and funds relevant work by state agencies. The API and POSC host standards development, publication, and support activities: the API leveraging its PIDX eCommerce focus addressing standards development for non-technical, often lease oriented regulatory activities, while POSC leverages is petrotechnical standards development to address standards development for physical well, reservoir, and facilities oriented regulatory activities. PIDX and POSC cooperate in many aspects of oil and gas industry standards including and beyond the regulatory area. In addition, this collaboration also must include the involvement of the oil and gas industry: operators who permit activities with federal and state agencies, both onshore and offshore, as well as oil and industry service companies, who provide data deliverables to the industry and regulatory agencies.

The vision for this business case is a series of iterative and valuable collaborative efforts involving groups of operators and agencies and supported by the standards organizations, which over time result in increased consistency and decreased costs of overall regulatory activity and reporting. The standards organizations, in this case API/PIDX and the REGS group as well as POSC and the eRegulatory Special Interest Group, play an important role throughout this process. In early stages, they encourage and support early iterations by smaller groups of operators and agencies. They provide expertise in open, collaborative facilitation and decision making, in the development of effective, technology based specifications. They provide publication and active marketing of the specifications en route to become standards, making them easily available to all. They also provide knowledge of existing standards and specifications that can be re-used, avoiding divergent duplicate work efforts. As the scope of collaboration and use grows to cover large segments if not all of the operators and regulatory agencies, the now industry proven and widely accepted specifications will earn full status as formally approved API, POSC, or even ANSI/ISO standards.

This document specifies the next step in this series, which is a permitting capability solution focused on some of the Ground Water Protection Council's producing states and the U.S. DOI Bureau of Land Management (BLM). Future documents will describe subsequent specific projects in the series. All parties are invited to address the authors of this document with suggestions for worthwhile future work efforts.

Oil and Gas Industry Perspective

For every oil and gas well drilled, produced, serviced or abandoned either onshore or offshore within the United States, well permits and activity reports are submitted by the

Oil & Gas Industry to Regulatory Agencies. Quantifying this permitting and reporting activity from an operational perspective -- over 3.5 million oil and gas wells are monitored by the oversight of 29 state and three federal regulatory agencies (onshore and offshore) which are operated by 250 major and over 8000 smaller oil and gas companies. There are tens of thousands of well permits and reports forwarded between these entities on a yearly basis. These well permits and reports are very similar in nature when compared for each agency data requirements, but unfortunately are not standardized as a whole. Operators find themselves submitting the same data to different regulatory entities but having to do so using a variety of manual formats.

While manual form submission is still the norm, many oil and gas companies have developed or procured information technology (IT) to more efficiently manage business data about their well operations. In leveraging their IT to save time and money, these companies generate hard copies of well permits or reports and then manually submit them to appropriate regulatory agencies. Regulatory agencies that have a substantial IT infrastructure transcribe the basic well permit or report attributes (via keyboard entry) into their systems or are now providing Internet-based web-form data entry capabilities for the industry -- extending further, the labor associated with this one way submittal process. The web-based forms environment, like the manual data collection systems still in use, are fraught with inefficiency and prone to errors because of the inability to validate data easily, leading to excessive iterations for corrections and manual data checks on the part of both the industry and agencies. To conclude the business cycle, the agency processing and final approval of the permit or report is usually performed by manual mailing of the approved permit to the submitting company.

In areas of where there is high drilling and field development activity, the Industry, State and Federal regulatory agencies have taken action to streamline well permit processing to include:

- Master APD/SOP submissions. Use of field or basin-wide master APD or standard operating procedures (SOPs). The industry submits a permit that only describes operational departures to a referential or master APD/SOP, thereby greatly reducing subsequent or individual well permit content requirements.
- Plan of Development (POD) submissions. Use of a project level POD where a number of wells, roads, pipelines and related infrastructure are described within the permit. An example of this submission approach is for the Powder River Basin of Wyoming and Montana where rapid and extensive coalbed natural gas development is occurring. Up to 45 wells are permitted using a single POD submission.

The permit streamlining approaches described above represent high workload volumes where commonly developed electronic submission capabilities are critically needed by permit agents, industry and the regulatory agencies.

From the industry viewpoint, with millions of oil and gas wells nationwide, providing this information through iterative, manual methods is a financial and administrative burden. Particularly for small- to mid-sized and independent operators, preparing well permits and

reports often involves several format changes as data from one system is re-keyed or converted into another. In addition, the data reported—data that may be a part of the public record—remains difficult to access in agency data repositories.

The Proposed Solution

The recently defined and standardized data encoding technology known as XML has been demonstrated, in combination with Internet-based transmission technologies, to make EDI tools available to the small- and medium-sized companies where previously only the largest companies could meet the capital investment needed to effectively use EDI. Many tools are now available to generate, validate, and accept XML-formatted data into receiving databases. Because of this combination of factors—the significantly reduced cost of operating an XML “EDI” solution and the large number of available XML development tools and related products—the format is ideal for regulatory agencies with severely restricted budgets. XML is an ideal method for sharing information between loosely coupled systems. Therefore, the development of one or more *schemas* to express the syntax and formatting requirements specific to the oil and gas regulatory well permitting and reporting, is needed.

Over the past few years, an emerging body of XML schemas and similar bodies of work focused on specific business application areas have been developed by the oil and gas industry and active regulatory agencies in the U.S., Canada and internationally. These XML schemas with their respective sub-components have generally been developed in cooperation with the API-PIDX, POSC and PPDM standard bodies. These existing standards provide an important opportunity to leverage existing best practice XML components for re-use, thereby saving considerable development time and effort.

Specific examples of relevant XML schemas/components applicable to regulatory permitting and reporting domain include:

- Groundwater Protection Council’s (GWPC) eReport XML Schema. The GWPC, which represents 20 State oil and gas regulatory agencies, has developed the eReport XML Schema for the purpose of supporting well production/injection and well legal/land description reporting requirements. This schemas’ subcomponents include:
 - ☑ *Customer (Operator)*
 - ☑ Two levels of *Facility*, which is defined as a single well, a lease, a unit, a tank farm, or any other method of grouping oil, gas, and UIC structures and entities.
 - ☑ *Location*
 - ☑ *Produced/Injected/Disposition Volume*
 - ☑ *Denotes an XML schema or sub-component which has undergone testing or actual use*
- Groundwater Protection Council’s (GWPC) ePermit XML Schema. In 1999, long before the eReport schema was developed and when XML was first emerging as an Internet protocol, the GWPC sponsored the development of the ePermit Web application to support well permitting/reporting requirements. Since the W3C was only beginning to evaluate the use of schemas, and DTDs were very cumbersome, GWPC based its ePermit application on well-formed XML combined with multiple

tiers of immediate client-side and automatic server-side data integrity checks. The XML elements for each of the five permit notices (See Appendix B) in ePermit were named to match the field names in the SQL Server data source. The application tracks the following subcomponents:

- ☒ *Customer (Operator)*
- ☒ *Well construction information*
- ☒ *Location*
- ☒ *Produced Fluids*
- ☒ *Permit review status*

- POSC WITSML. Major oil and gas operators in conjunction with large service companies have developed a large family of XML schemas that supports real-time and contextual well-site data transfer. POSC manages the support and future enhancement and expansion of WITSML. WITSML includes schemas addressing the following subjects:

- ☒ *Well*
- ☒ *Wellbore*
- ✓ *Wellbore Geometry*
- ☒ *Trajectory*
- ✓ *Target*
- ✓ *Rig*
- ✓ *Bottom-hole Assembly Run*
- ✓ *Mud*
- ✓ *Fluids*
- ✓ *Tubular*
- ✓ *Cement Job*
- ✓ *Formation Marker*
- ✓ *Survey Program*
- ☒ *Log*
- ✓ *Coring, Sidewall Core*
- ✓ *Message*
- ✓ *Real-time*
- ✓ *Operations Report*

- POSC WellHeaderML. POSC has developed a basic well information schema. The U.K. oil industry and regulatory agency in conjunction with POSC have adapted the base schema to form a U.K. profile that supports the transmission of basic U.K. well information used in conjunction with a national well information repository and elsewhere. POSC anticipates the developments of other profiles of WellHeaderML in other regulatory areas / countries, for compatibility with given data models (e.g., PPDM), and for other special uses. This schema's subcomponents include:

- ☒ *Document*
- ☒ *Security*
- ☒ *Business Associate*
- ☒ *Well*
- ☒ *Location*
- ☒ *Formation Tops*

- ☑ *Units of Measure*
- ☑ *Geodetics*

- EDI ASC X12 Transaction Set 625 – Well Information. During 1997 and 1998, a working group from within API-PIDX REGS comprised of BLM, MMS Offshore Minerals Management, State oil and gas commissions and industry developed and obtained ANSI approval for an electronic data interchange (EDI) for regulatory well permitting/reporting. Transaction Set 625 – Well Information constitutes a considerable body of work associated with well life cycle permit-related activities, code domains and Petroleum Industry Data Dictionary mappings. Approximately 61 well life cycle objects have been defined around a seven-level hierarchical structure for Transaction Set 625. This transaction sets major hierarchical components include:

- ☑ *Permit/Report*
- ☑ *Fields/Pools*
- ☑ *Contract Designation*
- ☑ *Facility*
- ☑ *Well*
- ☑ *Wellbore*
- ☑ *Well Completion*

The overall intent of this proposal is to utilize the above XML schema body of knowledge and best practices in a manner that will allow rapid development and component re-use to construct the solution schemas that will result from the proposed work effort.

The following organizations have been or will be invited to sponsor and participate in the proposed work effort:

- Agencies in the U.S. Department of the Interior:
 - ◆ U.S. Bureau of Land Management [BLM] (Federal onshore)
 - ◆ U.S. Minerals Management, Offshore Minerals Management [MMS-OMM] (Federal offshore)
 - ◆ U.S. Minerals Management, Minerals Revenue Management [MMS-RMP]
- Groundwater Protection Council [GWPC] sponsored by the U.S. Dept. of Energy with participation of the following State governments:
 - ◆ Alabama Oil & Gas Board
 - ◆ Alaska Oil & Gas Conservation Commission
 - ◆ Arkansas Oil & Gas Commission
 - ◆ California Division of Oil, Gas & Geothermal Resources
 - ◆ Colorado Division of Oil and Gas Resources
 - ◆ Kansas Corporation Commission
 - ◆ Kentucky Division of Oil & Gas
 - ◆ Michigan Department of Environmental Quality/Geological Survey Division
 - ◆ Mississippi Oil & Gas Board
 - ◆ Missouri Department of Natural Resources
 - ◆ Montana Board of Oil & Gas Conservation

- ◆ Nebraska Oil and Gas Conservation Commission
- ◆ Nevada Department of Environmental Quality and Department of Mines and Minerals
- ◆ New Mexico Energy Minerals and Natural Resources Department
- ◆ New York Division of Mineral Resources
- ◆ North Dakota Industrial Commission
- ◆ Oklahoma Corporation Commission Oil & Gas Conservation Division
- ◆ Osage Indian Nation
- ◆ Pennsylvania Department of Environmental Protection
- ◆ Utah Division of Oil, Gas, and Mining
- Additional state oil and gas Regulatory Agencies:
 - ◆ Wyoming Oil and Gas Conservation Commission
 - ◆ Texas Railroad Commission
 - ◆ Louisiana Department of Natural Resources
- Industry including:
 - ◆ Majors
 - ◆ Independents
 - ◆ Permit Agents
- Service companies including:
 - ◆ Well service companies
 - ◆ Software companies
- Oil and gas standard bodies including:
 - ◆ API-PIDX REGS
 - ◆ POSC
 - ◆ PPDM

During the early formative stage of this business case, an initial business requirements survey was developed, forwarded and compiled for insight amongst key international, Federal, state and industry participants that have come to sponsor this XML schema development initiative. The business requirements survey helped to focus the scope and relative prioritization of the work done.

Work to be accomplished as proposed by this business case encompasses:

- Mapping of currently used regulatory permit/report data elements and their definitions to existing, relevant and current permitting and reporting transaction definitions, e.g. XML schemas/sub-schemas, using prior and ongoing mappings to the Petroleum Industry Data Dictionary (PIDD).
- Development of new permitting and reporting transaction definitions, e.g. XML schema components, when determined necessary.

- Pilot testing of the resulting permitting and reporting transaction definitions between industry and regulatory agencies as well as amongst regulatory agencies (e.g., States and BLM).
- Development of implementation and use guidelines that address agency specific permitting and reporting data submission requirements and respective code and translation domains.
- Submission of resulting permitting and reporting transaction definitions, once demonstrated to be valid and useful, to formal standardization and future support / enhancement process(es).

Initial Scope of the Business Case First Deliverable: BLM and GWPC ePermit Collaboration

During the development of this Business Case, considerable discussion has taken place amongst the sponsoring members of this effort. There is a consensus that GWPC and BLM have constituted a relatively mature set of U.S. Onshore well permit/report business process improvement requirements which are or can be supported by electronic commerce technology.

The success of this work effort is defined by the operational deployment of solutions based on the standards specifications developed here for the specified interactions between the BLM and at least the following GWPC states to include California and Colorado.

Collaboration to leverage such existing or ongoing GWPC and BLM business requirements would substantially benefit all concerned parties by virtue of the increased clarity and consistency of these processes. The intended scope of this effort is to address the following business processes (also see Appendix B):

- Industry well permit/activity report submissions to state/federal regulatory agencies.
- Well permit approval -- activity status inquiries from industry or amongst regulatory agencies.
- Transmission of state/federal regulatory permit approval information back to the industry.
- Sharing of well permit/report data between regulatory agencies.

The business process transaction scope to be addressed by a BLM and GWPC ePermit collaboration includes the following current types of interactions:

- Applications for permit to drill (APDs).
- Miscellaneous well activity reports (e.g., spud notices, completion reports, etc.).
- Well sundry activity permits/reports (e.g., notice of intent to plug and abandonment, etc.)

GWPC/BLM ePermit Collaboration Effort: Project Phases

GWPC and BLM have agreed on the use of an 11-12 month ePermit XML Schema development “Fast Track Team” which will be utilized to support the following four Project Phases:

- **Phase I: Data Content Mapping** (2-3 months to complete)
 - ✓ Obtain GWPC’s ePermit Schema with list of existing use cases (permits/reports to be supported). Consider the GWPC ePermit specification as a starting point for this work effort.
 - ✓ Obtain GWPC eReport Schema Mapping with the PIDD Dictionary, noting schema structure, tag names, and corresponding dictionary terms and definitions.
 - ✓ Transaction Set 625, Well Lifecycle Objects, was defined in the late 1990’s as a data definition set intended to address a wide range of onshore and offshore well permitting activities. Map TS 625 with GWPC’s ePermit XML Schema. Prior GWPC eReport PIDD Dictionary mapping work will be of value since TS 625 was fully mapped with the PIDD Dictionary when it was defined. Resulting effort will help establish PIDD Dictionary term and definition associations and tentative data element XML tag names. Candidate XML structures will be noted by association with other mapped data definition sets.
 - ✓ Determine the deltas associated with GWPC’s ePermit ability to support TS 625 content requirements. Determine what is supported and what is not supported. Consider content not supported as possible indications of unrecognized requirements. Determine from the requirements for this current work effort what should be included in this work effort’s ePermit specifications.
 - ✓ Complete the content mapping of the work-in-process ePermit specification’s elements with the PIDD Dictionary.
- **Phase II: Develop ePermit XML Schemas** (2-3 months to complete). Phase I content mapping work should largely help support the requirements for the Phase II ePermit XML Schemas. Do Phase I with a month or two of “massage” time.
 - ✓ Develop and deliver the target ePermit XML Schemas driven primarily by the business requirements and intended operational context for the regulatory process flows that are in the scope of this work effort..
 - ✓ Specify the needed XML re-used components or new XML component development, building from the work-in-process specifications.
 - ✓ Define reference value (code enumeration) domains and preliminary implementation requirements
 - ✓ Validate or exercise industry to government and govt-to-govt process data flows, which will include the use of appropriate security constraints.
- **Phase III: Initiate Pilot Test Planning and Coordination** (6 months to complete).

- ✓ Look closely at State Agency's position to support testing, industry well activity (e.g., CA, NM, CO and WY) and availability of interested or existing industry trading partners.
- ✓ Identify administrative, funding and coordination road blocks as early as possible.
- ✓ Coordinate on industry one-stop ePermit submission opportunities or potential.
- ✓ Confirm Pilot Test use cases and implementation requirements and documentation.
- **Phase IV: Conduct Pilot Test** (1 year from now or upon completion/approval of Business Case).
 - ✓ Pilot Testing with version change control protocols.
 - ✓ Establish a lesson's learned or being learned, new process insights, etc.
 - ✓ Migration or Cutover from Pilot Testing to actual Implementation

ePermit Project Funding Requirements

The major players of this work effort, BLM and certain GWPC states, will be primarily responsible for the funding, resource provisions, and leadership of the work effort. The wider set of collaborating organizations and groups, including the standards organizations will participate in overall planning, review, and feedback activities. Industry at-large will be invited to participate in reviews and deployment activities.

The following tables characterize the current view of the resource requirements, including types of resources, quantity of resources, and opportunities for industry reviews and deployment participation.

Table 1: ePermit Project Resource Requirements				
Project Phases	BLM	GWPC	Industry	Other
Phase I: Data Content Mapping	2 People 3 Months	2 People 3 Months		
Phase II: Develop ePermit XML Schema	2 People 3 Months	2 People 3 Months		
Phase III: Initiate Pilot Test Planning & Coordination	3 People 6 Months	3 People 6 Months	3 People 6 Months	
Phase IV: Conduct Pilot Test	3 People 9 Months	3 People 9 Months	3 People 9 Months	
Total Resource Requirements	4.75 Man	4.75 Man	3.75 Man	

	Years	Years	Years	
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Appendix B: List of Relevant XML Schemas & Related Bodies of Work

- Groundwater Protection Council's (GWPC) ePermit XML Schema
- GWPC eReport XML Schema
- POSC XML Guidelines
- POSC WellHeaderML and other technical XML schemas/modules for well logs, well path, well schematics, production reporting, etc.
- POSC WITSML Standards, including well, wellbore, trajectory (path), real-time (MWD), well logs (LWD), etc.
- POSC Units of Measure, coordinate systems, and other reference data standards
- NIST EDI ASC X12 Transaction Set 625 – Well Information
- Petroleum Industry Data Dictionary (PIDD)
- API/PIDX Recommended Practices 3901
- UNCE Standards for Units of Measurement

Appendix C: List of Business Processes to be Supported by ePermit

Business Process	Sub-Process	Use Cases
Well Permit Processing	<i>Process Applications-for-Permit-to-Drill (APD)</i>	<ul style="list-style-type: none"> • <i>Notice of Staking (NOS)</i> • <i>APD</i> • <i>Project Plan of Development (POD)</i> • <i>Master APD/SOP</i>
	<i>Process Miscellaneous Well Reports</i>	<ul style="list-style-type: none"> • <i>Well Pad Construction Notice</i> • <i>Notice of Rig Move</i> • <i>Well Spud Notice</i> • <i>Well Completion Report</i> • <i>Well First Production Report</i> • <i>Lease/Agreement Last Production Report</i>
	<i>Process Sundry Notices (Notice of Intent or Subsequent Report)</i>	<i>Notice of Intent or Subsequent Report</i> <ul style="list-style-type: none"> • <i>Recomplete and/or Plugback</i> • <i>Convert to Injection/Disposal</i> • <i>Annular Disposal</i> • <i>Well Completion Mechanical Repair</i> • <i>Casing Repair / Alternation</i> • <i>Frac or Acidizing</i> • <i>Water Shut-off</i> • <i>Water Well Assumption</i> • <i>Well Plugging & Abandonment</i> • <i>Temporary Abandonment</i> • <i>Sub-surface Commingling</i> • <i>Surface Commingling</i> • <i>Off-Lease Measurement</i> • <i>Disposal of Produced Water</i> • <i>Surface Disturbance</i> • <i>Flaring or Venting</i> • <i>Suspension of Operations and/or Production</i> • <i>Regulatory Guideline Variance</i> • <i>Wash Sand</i> • <i>Jet-in Well</i> • <i>Artificial Lift</i> • <i>Perforate</i> • <i>Other Sundry Type</i> • <i>Deepen Well</i> • <i>Sidetrack Well</i> • <i>Change of Plans</i>

	<i>Operator Check of Permit Status</i>	• <i>Web-based Capability</i>
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[Placeholder for benefits statement.]

[Integrate GWPC's list of five types of permits.]

Appendix D: GWPC/BLM MOU

MEMORANDUM OF UNDERSTANDING AND COOPERATION ON THE DEVELOPMENT AND DEPLOYMENT OF PROCESSES AND STANDARDS FOR U.S. FEDERAL AND STATE REGULATORY PERMITTING AND REPORTING (MOUAC on US RPR)

BACKGROUND

State oil and gas regulatory agencies, represented by the Ground Water Protection Council (GWPC), industry, U.S. Department of Energy (DOE), U.S. Bureau of Land Management (BLM), and the U. S. Minerals Management Service (MMS) recognize the need to develop national electronic commerce standards to promote data transfer, electronic reporting, and electronic permitting. Representatives of these organizations, along with representatives of industry standards bodies, have collaborated in the development of an ePermit Business Case and have agreed to continue to work together to coordinate further activities for the common benefit of the oil and gas industry and regulatory community.

PURPOSE

The parties represented by this Memorandum of Common Understanding and Co-operation (MOUAC) are as listed in Attachment 1. Energy industry organizations with an interest in the stated objectives are invited to participate by signing this MOUAC. The purpose of this MOUAC is to coordinate the development and use of beneficial processes and standards in support of regulatory permitting and reporting activities, including the follow near-term benefits:

- Electronic transfer of data between state agencies and the U.S. BLM. This will reduce or eliminate duplicate permitting and reporting, as is now the case for oil and gas operations on federal land.
- Electronic permitting allows oil and gas operators to apply for permits via the Internet. In some cases, this will dramatically decrease the time it takes to issue permits. Many states would like to achieve electronic approval of "routine" permits. Combined with the electronic transfer of data between states and the BLM, this will decrease rig down time and increase access to federal lands.

DISCUSSION

Before an oil and gas operator can drill a well on virtually any land within the continental US including navigable waters and contiguous three-mile offshore areas, permission must be obtained from the appropriate state oil and gas regulatory agency. State permission is required

on private, state, and federal lands and, except for tribally operated wells on Indian lands and the Osage Mineral Reserve in Oklahoma, state permission is also required for wells drilled on Indian lands.

On federal and Indian land, there is overlapping state/federal jurisdiction, as federal permission is also required in addition to state approval.

In most states, when drilling on federal and Indian lands, operators must submit separate applications to both the US Bureau of Land Management and to the state oil and gas regulatory agency. While the application and supporting materials submitted by the operator to the state is similar to the application package submitted to the BLM, there are differences, and these differences vary from state to state, as each state has its own regulations and set of application forms.

With the advent of the Internet and electronic commerce, both the BLM and states realize the benefits of allowing operators to submit drilling permit applications and subsequent reports of drilling and completion operations electronically, and the BLM and several states have already commenced the development and implementation of such e-permitting systems.

To further the acceptance of and to reduce both governmental and private costs of electronic permitting, both the BLM and the states recognize the need to develop uniform data transfer standards.

A common data transfer schema will greatly simplify electronic filing for operators who must submit permit applications to both the BLM and states, and for operators who apply for well permits in multiple states. A common data transfer schema will also facilitate sharing of well data between state and federal agencies, and enable the states and the federal government to more easily share software designed to process and report on well application and completion data.

The task at hand is to define and reach agreement on a comprehensive common set of data elements to be used for the electronic transfer of application, drilling, and completion data. The comprehensive set of data elements will include all data elements used in common and most unique data elements used by individual agencies. The plan will also allow for the transfer of additional data elements on an exception basis.

In its initial stages, this cooperative agreement will achieve the development and deployment of common processes and standards between the GWPC (representing state oil and gas regulatory agencies) and the U.S. BLM. In doing so, regulatory barriers will be reduced and environmental compliance will be ensured.

INTENTION

It is the intention of the parties to cooperate in the development and deployment of regulatory processes and standards, and in related activities, for the benefit of the oil and gas industry and regulators. This MOUAC is not a contractual obligation between the parties and in no way shall conflict with, modify or negate clauses of any contracts negotiated between the parties.

LIST OF ACRONYMS AND ABBREVIATIONS

GWPC- Ground Water Protection Council
GWPRF – Ground Water Protection Research Foundation
EIMS – Environmental Information Management Suite
RBDMS – Risk Based Data Management System
DOE – Department of Energy
EPA – Environmental Protection Agency
BLM – Bureau of Land Management
MMS – Minerals Management Service
XML – Extensible Markup Language
CERA – Cost Effective Regulatory Approach.
AOGCC – Alaska Oil and Gas Conservation Commission
UDOGM – Utah Department of Oil and Gas and Minerals
MBOGC – Montana Board of Oil and Gas Conservation
NOGCC – Nebraska Oil and Gas Conservation Commission
PPM – parts per million