Risk Based Data Management Solutions (RBDMS) Hydrofrac Module

Helping to shape the way agencies, industry, and the public manage water and energy resources

Paul Jehn

GROUNDWATER
PROTECTION COUNCIL

Quick Introduction

RBDMS AS A NATIONAL PHENOMENON

RBDMS was developed to aid regulatory agencies in their oil and gas oversight missions.

- Manage operator and bonding information.
- Track well locations and construction details.
- Assess area of review impacts of UIC wells to protect USDWs.
- Track production and injection activities.
- Manage permitting.
- Inventory surface facilities.
- Schedule hearings.
- Track inspection, compliance, and enforcement programs and complaint and spill investigations.
- Generate reports on demand.

RBDMS partners nationwide number 21 states and the Osage Nation.

- Since its inception in 1992, RBDMS has continuously improved and expanded its form and function as a result of user feedback.

- RBDMS successfully moved from client-server to Web database interfaces, thus easing data exchange between agencies and between agencies and industry operators.

★ RBDMS Partner

RBDMS program history is one of collaborative success.

- Developed under a grant funding from the DOE NETL with matching funding from the benefiting state agencies.

- Directed by a four-state Steering Committee (NY, ND, MT, NE).

- Advised by a rotating Technical Committee of state agency representatives.

- Supported by a state-to-state peer network and a panel of consultants tapped through help desk referrals.

RBDMS user support takes many forms.

- Telephone and remote support (Terminal Services and/or Virtual Private Network)
- Project tracking through SharePoint Services
- Code sharing
- Bi-annual training meetings
- Open-attendance telephone and Web conferencing
- Onsite consulting support when necessary

Capturing Details of Hydraulic Fracturing Events by Stage

RBDMS HF

RBDMS HF data structure tracks…

- The quantities and quality of water used to support extraction and the sentinel indicators of effects on watersheds

- The methods and locations used to dispose of flowback

- The chemical constituents of fracturing fluids (or trade names) where required by states

- Down-hole pressures within wells and formations

- Well mechanical integrity

- Other (operator, location, and injection volumes)

HF tables were modeled explicitly to conform to the data requirements of seven agencies.

- CO, IN, ND, NY, OH, OK, and PA responded to the GWPC's request for data requirements.

- CO and PA are now evaluating disclosure of chemicals used in HF jobs in a queryable state database.

Sample data requirements for HF disclosure:

- Trade name, chemical name, CAS number, MSDS sheet of products and constituents
- Supplier
- Service company
- Percentages of all components by weight
- Type of wells the product is used in
- Primary function of the product (e.g., biocide)
- Product loading information
- Trade secrecy levels and appeals

Other data captured by the HF module tables:

- The date the well was fractured
- The chemicals or trade names of the chemicals that are used in fracturing fluids
- The source of the water used for the well stimulation

- The method of disposal used for hydraulic fracturing fluids
- The results of water well sampling and analysis
- The mechanical integrity of hydraulically fractured wells

HF tables (in red) bridge the RBDMS O&G structure (in green) with RBDMS Env (in blue).


Proposed Generalized Schema to Support Hydraulic Fracturing Operations and Flowback Sample Analysis in a DMZ
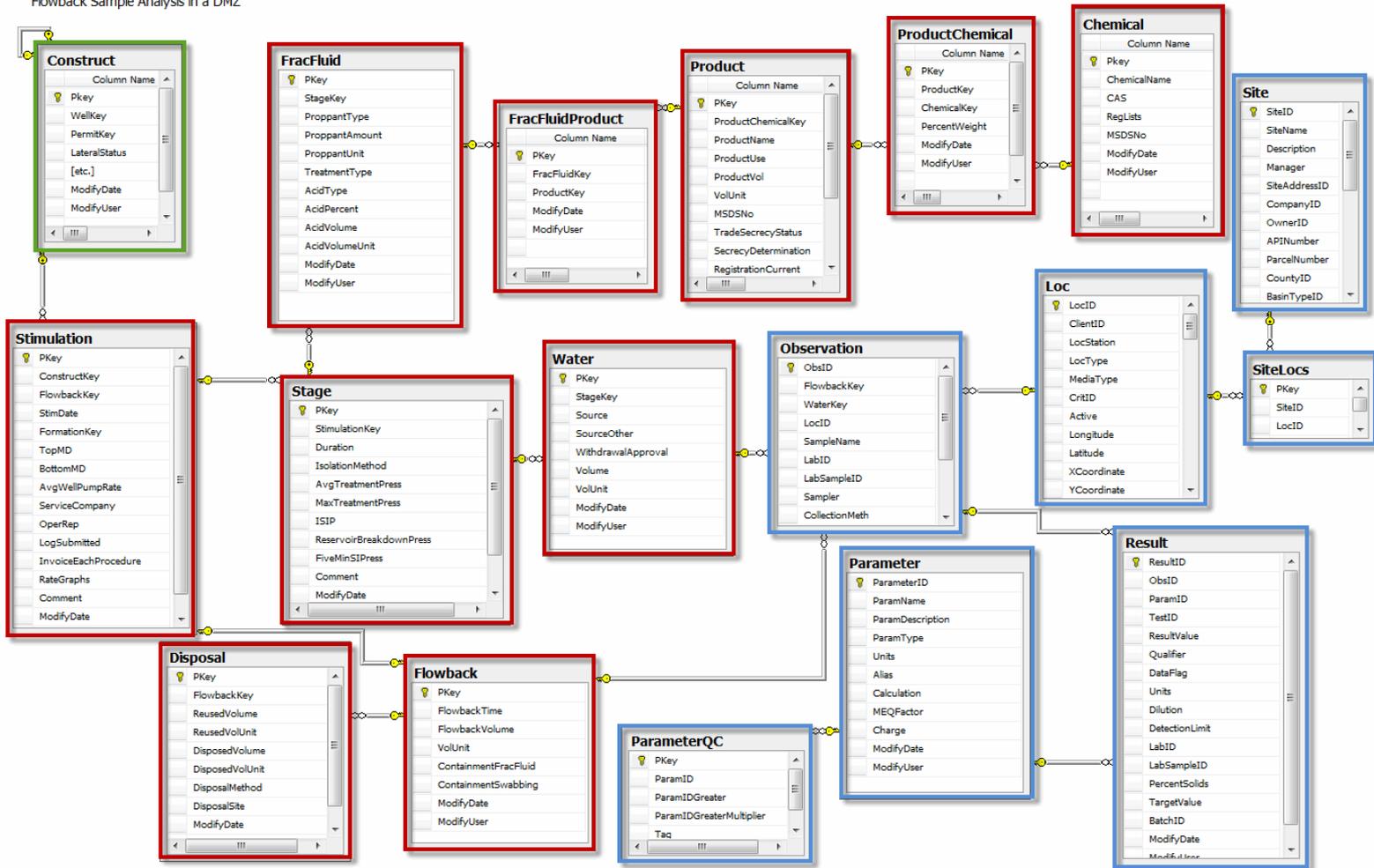
HF tables were modeled explicitly to conform to the data requirements of seven agencies.

- **Stimulation:** Parent table for the HF module, with a many-to-one relationship with the **Construct** table. Tracks summary stimulation data such as the date, formation name, and interval. Since each well treatment is performed in stages, **Stimulation** has a one-to-many relationship with **Stage**.

- **Stage:** Tracks the pressures measured during the stage of treatment, duration of the stage, and the means of isolating the fracturing operation.

- **FracFluid:** Because each stage may involve the use of multiple fracturing fluids, this table, which tracks the physical makeup of each fluid batch, has a many-to-one relationship with **Stage**.
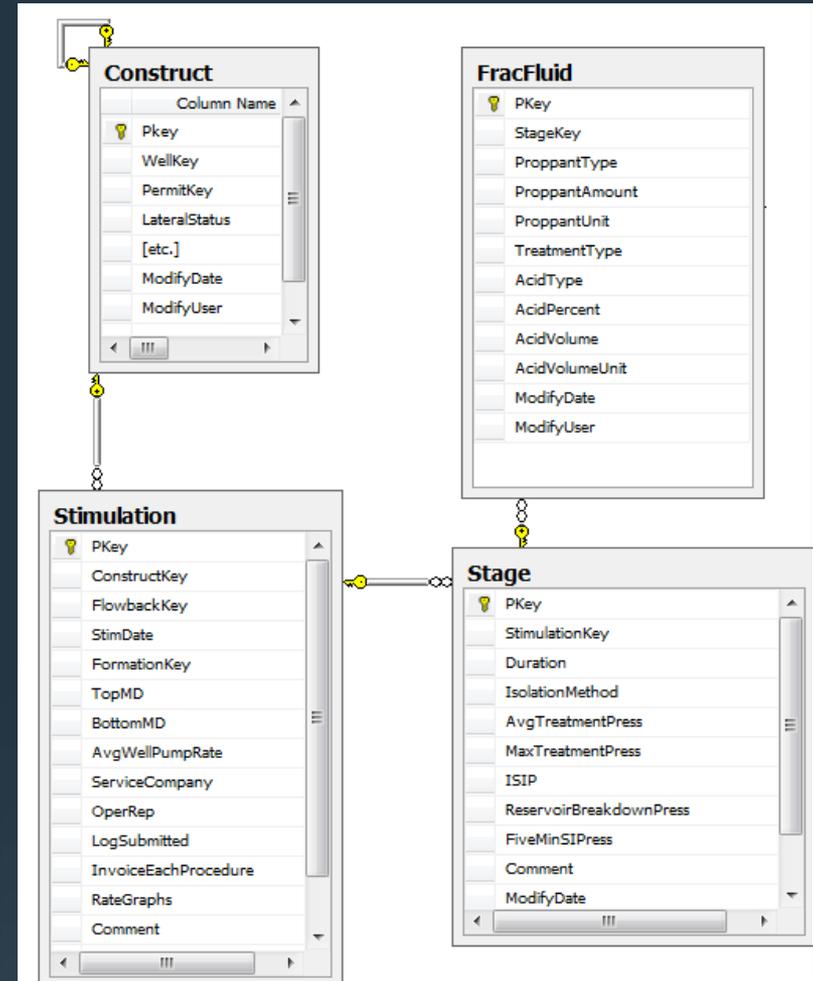
HF tables were modeled explicitly to conform to the data requirements of seven agencies.

- **FracFluidProduct:** Since each fracturing fluid batch can contain multiple products, this table links **FracFluid** and **Product**.

- **Product:** Tracks trade name, product usage, product MSDS number, secrecy determination, current registration, and disclosure.

- **ProductChemical:** Since many chemicals can be in multiple products, this is a linking table for the chemicals in the products along with the percent by weight of the chemicals in the products.

- **Chemical:** Tracks such data as chemical name, CAS number, and MSDS number.
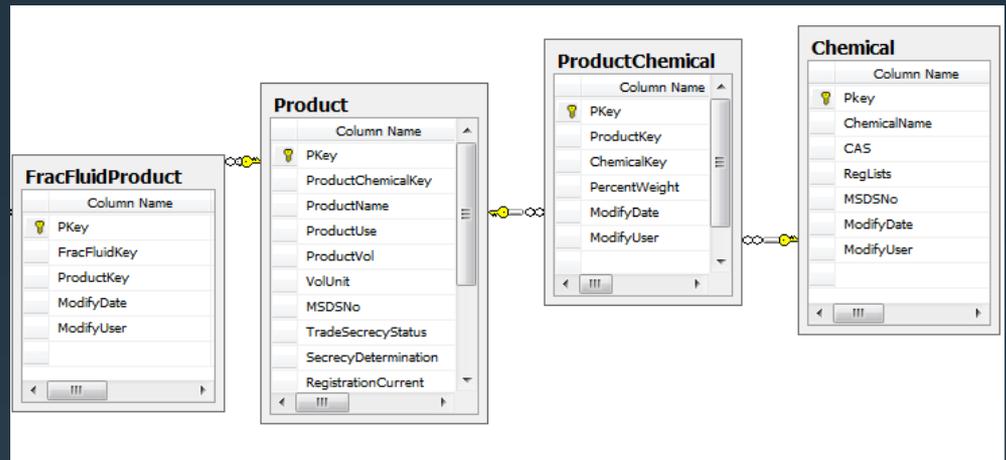
HF tables were modeled explicitly to conform to the data requirements of seven agencies.

- **Water:** Tracks the sources and quantities of water used for each stage of well treatment and has a many-to-one relationship with **Stage**.

- **Flowback:** Tracks the HF fluids collected during the well treatment with respect to duration, volume, and containment methods. Because flowback occurs once after all stages have completed, it has a one-to-one relationship with **Stimulation**.

- **Disposal:** Tracks volumes disposed and methods of disposal for HF fluids from each stage. Since some portion of the fluid also may be reused, **Disposal** is in a many-to-one relationship with **Stage.**
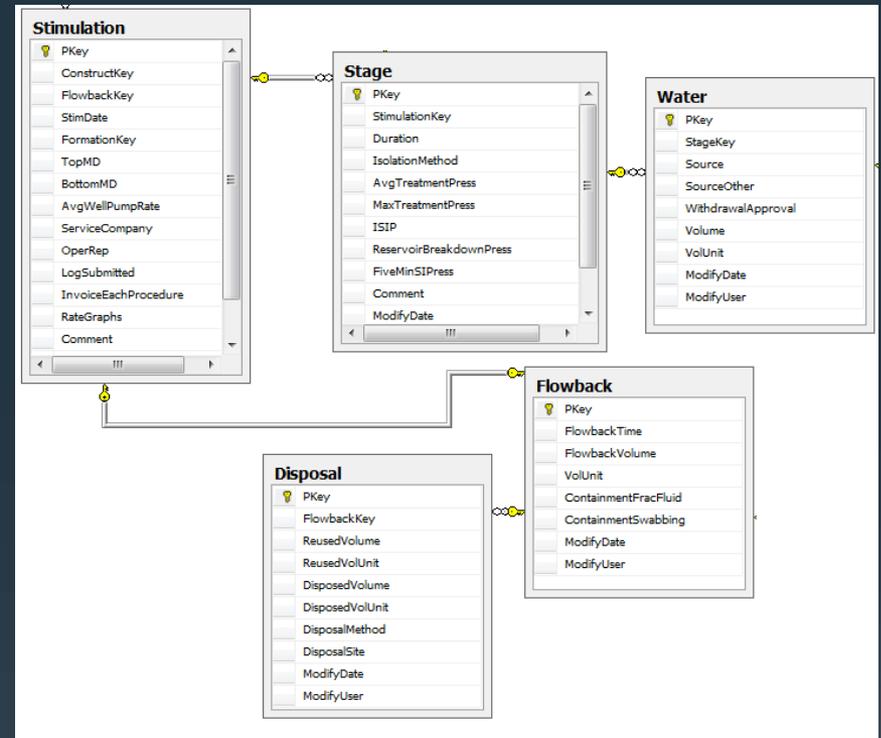
RBDMS-powered Data Access

NATIONAL DATA PORTAL

A joint GWPC-IOGCC project:

- The GWPC and the IOGCC are planning to develop and to host a Web site of national oil and gas well information for public access.

- The Portal will feature live data feeds of oil, gas, and injection information across contiguous state boundaries in a clickable map application.

- The project is expected to be a multiple-year effort of data mapping, harvesting, and sharing.

Bi-directional data transfer between states and the Portal is planned.

- The RBDMS National Oil and Gas Portal will be programmed to accept data feeds from the GWPC's and IOGCC's partnering agencies, who will be asked to host a small web service.

- These web services will feed a data set to the National Oil and Gas Data Portal in addition to providing an internal system key for the state database to enable a link to additional information as the state agency makes it available.

- The state agencies will control the selection of the RBDMS data set sent to the Portal via the web service.

- The GWPC will offer a choice of development formats for the hosted web service, e.g., WCF, ColdFusion, etc.

Suggested data set contents:

- Oil, gas, and injection well locations
- Well type and status
- American Petroleum Institute (API) well number
- Operator-assigned well name and number
- Details of well construction
- Locations and areal extents of oil and gas basins and shale gas formations
- Production and injection data (including fracturing)
- Permit data
- Inspection records
- Latitude and longitude

Portal will include hydraulic fracturing information.

- Data harvesting will be targeted in areas where HF operations are now raising concerns, such as the Susquehanna and Delaware river basins.

- HF well data will be made available within the statutory restrictions of each state.

- The GWPC has developed an intuitive interface for querying the RBDMS database online, which will be used for Portal navigation.

Shale Gas
Basins
Plays
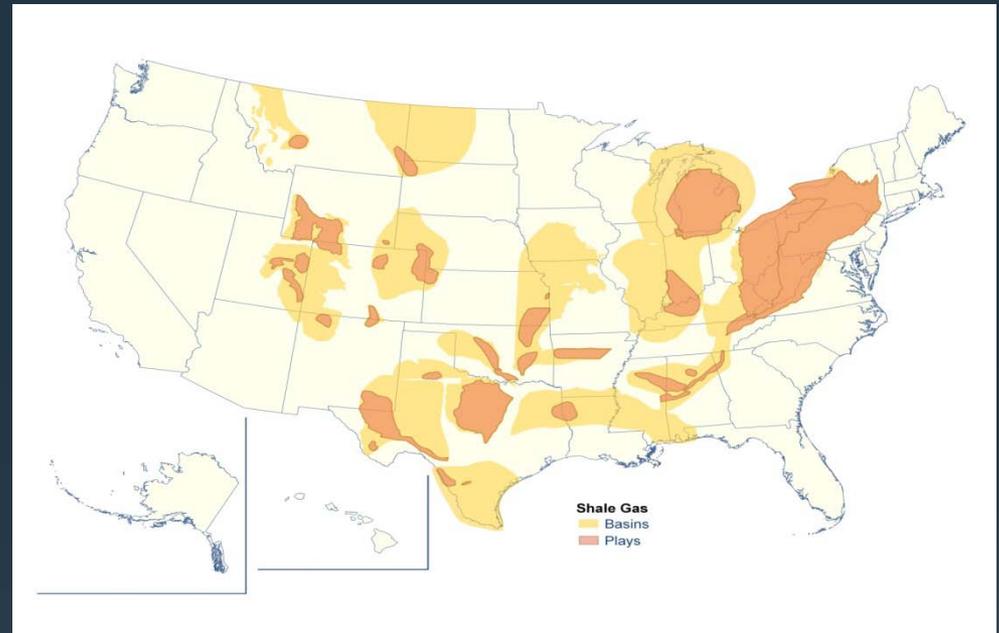
Even casual computer users will be able to run sophisticated queries:

- "Show me the wells permitted for (month, year)."
- "Show me the production of oil and gas from (this field) (this well) (this formation."
- "Show me the wells that were hydraulically fractured within (distance) of (this well)."

Okay, We Want It.

HOW DO WE GET RBDMS?

RBDMS modules and Web applications available for placement in your agency:

- RBDMS O&G (Desktop Modules)
  - Entity-Bond
  - Well-Construction-HF
  - Permit
  - Surface Facilities
  - Inspection
  - Dockets and Hearings

- Web Applications
  - Data Mining
  - eForm
    - Online Permitting
    - Online Well Completion Reports and Sundry Notices
    - Online Production and Injection Reporting
    - Field Inspection
  - Wellbore Schematic Utility
  - RBDMS Environmental
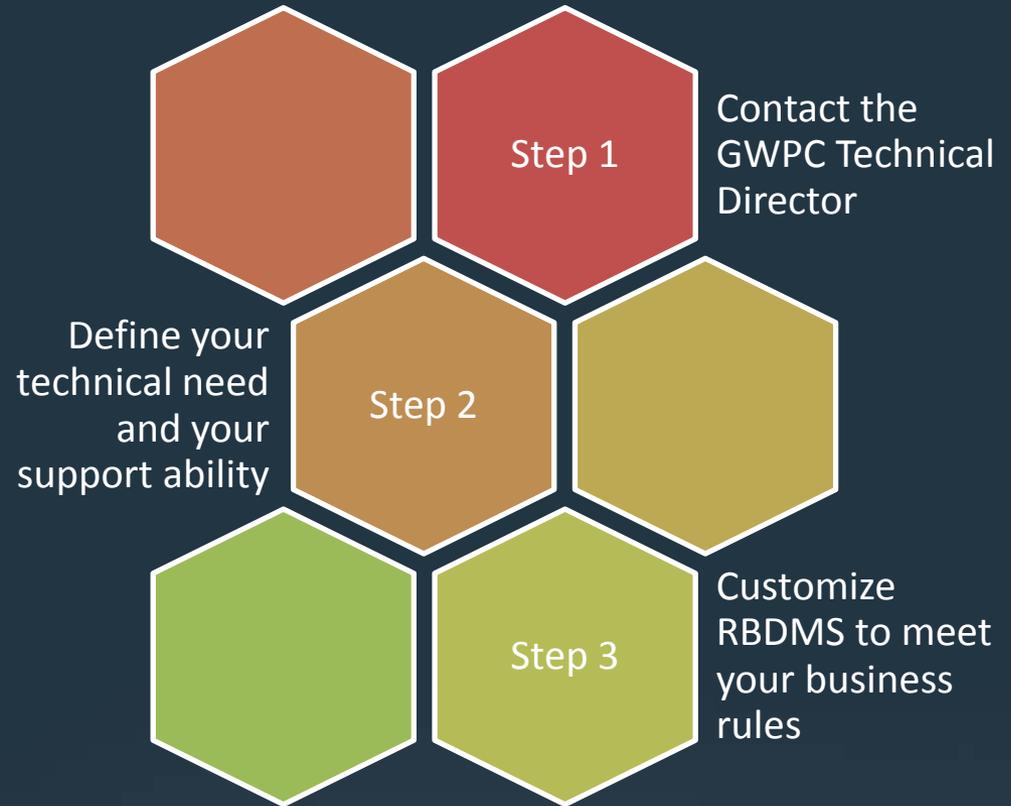
Agencies can choose one or more modules.

Selecting an RBDMS configuration for your agency…

Typically, the GWPC will assist your agency in conducting a needs assessment.

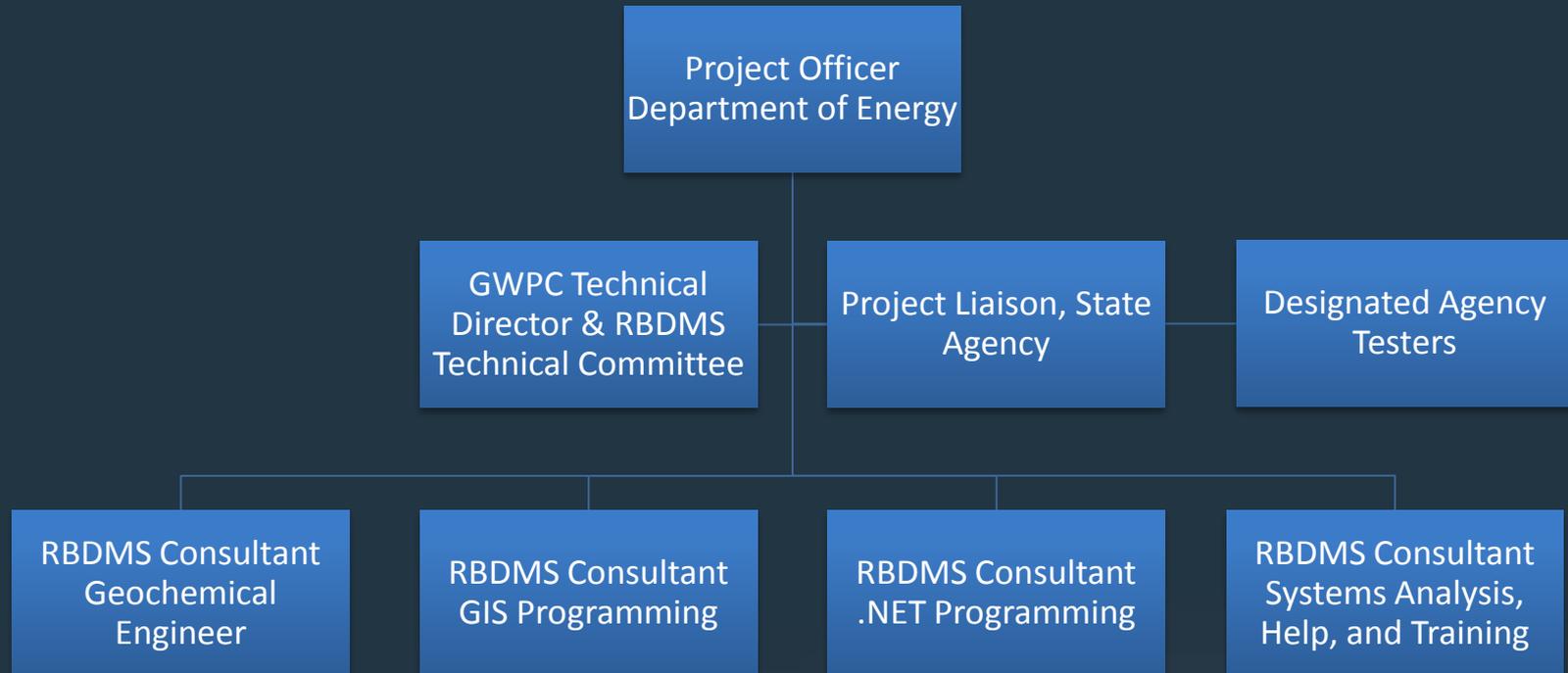The study will include business process review and, if necessary, an IT capability survey.

If desired, the GWPC will then assist you in customizing the selected RBDMS modules to the extent agreed.

RBDMS code base is freely available to governmental and non-profit agencies.

Step 1 — Contact the GWPC Technical Director

Step 2 — Define your technical need and your support ability

Step 3 — Customize RBDMS to meet your business rules

Generalized RBDMS project organization

RBDMS:

Open the door to excellence.