WATER RESOURCES INFORMATION CLEARINGHOUSE SCIENTIFIC AND ENGINEERING INFORMATION STANDARDS FOR MISSISSIPPI DEPARTMENT OF ENVIRONMENTAL QUALITY OFFICE OF LAND AND WATER

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INTRODUCTION

One of the basic needs identified by the Water Resources Planning Task Force during preparation of the *State Water Management Plan Outline* was the need to develop an effective, integrated, and comprehensive Scientific Information Management System (SIMS) for data collection and information management. State-wide water resources management and planning decisions must have as a foundation a system of reliable, complete, and user accessible information.

A successful water resources information management system should have as a foundation a set of uniform water resources data standards and policies that is critical to the efforts to integrate water resource information from various sources -- internal and external. The need for the development of uniform water resources data standards was identified in the *1992 State Water Management Plan Outline* and the *Scientific Data Management Program Interim Report* dated March 1993.

PROJECT OBJECTIVES

The project is organized into two phases with the first phase consisting of four tasks. The first task inventories existing environmental resources databases utilized by DEQ scientific community and classifies them into the following environmental information clearinghouses: 1) groundwater quality; 2) groundwater quantity; 3) surface water quality; 4) surface water quantity 5) geology; and 6) air quality. The second task defines water resources data collection and data element standards for DEQ. The third task develops GIS related data standards to better manage water resources data which is for the most part geographically based. These standards will assist in conducting spacial analysis of the state's water resources. Task four consists of collecting some locational (UST and water wells) data using GPS equipment and obtaining water resources data subset which is covered by two 1":24,000" scale quadrangle map sheets, Pascagoula North and Pascagoula South, south of I-10.

The second phase consists of two tasks. The first task consists of the utilization of water resources data standard developed in Phase I in a subset of water resources data through the use of GIS and other analysis programs. The second task involves the identification and resolution of any discrepancies in the standards developed in Phase I.

This project represents a continuation of the previous efforts toward addressing the data management issues at DEQ as part of the *State Water Management Plan Outline* development and will be a building block of the development of a comprehensive water resources information management system which is a component of the Department's overall plan for the development of DEQ Scientific Information Management System (SIMS). The objectives of this project are as follows:

Phase I

1. Review and inventory all scientific databases at DEQ.
2. Inventory water resources databases that DEQ access remotely from sources such as EPA, USGS, and FEMA.
3. Classification of DEQ scientific databases into the environmental clearinghouses identified in the conceptual *Scientific Data Management Program Interim Report* dated March 1993.
4. Review and adopt water resources data collection standards which include groundwater flow data, groundwater chemical and physical quality data, surface water (open channel flow) data collection, and surface water and sediment sampling standards.
5. Review and inventory water resources data element standards for groundwater quality, groundwater quantity, surface water quality, and surface water quantity clearinghouses.
6. Development of Geographic Information System (GIS) standards to organize water resources spatial data requirements in an integrated fashion. The GIS standards will focus on mapping consideration, data

structure, data creation procedures, and data quality and quantity verification standards.

7. Collection of field data utilizing GPS equipment to determine horizontal and vertical locations of representative water resource facilities within Jackson County, Mississippi, for use in the development of the standards verification program, Phase II. In addition to field data collection, obtain 1":24,000" base mapping for the demonstration project area.

Phase II

1. Develop a demonstration project for a small geographic area to illustrate how the standards developed in Phase I can be utilized as a tool for better management of the State of Mississippi Water Resources and the integration of surface and groundwater information.
2. Identify any discrepancies in the standards developed in Phase I.
3. Identify root causes of standards discrepancies.

DATABASE INVENTORY AND CATALOG

The DEQ scientific and engineering community utilize databases from numerous internal and external sources that are for the most part incompatible. Additionally, there is a lack of familiarity of what databases exist in different offices and divisions within DEQ. Therefore, it is of extreme value to inventory and catalog all scientific databases utilized by DEQ staff as a first step in the development of water resources related database standards.

A questionnaire was developed as an aid in collecting information from DEQ at the division and section levels regarding the scientific databases utilized by DEQ staff. The questionnaire was directed to each section in each office within DEQ that deals with scientific information management. The questionnaire sought to gather information related to each scientific database used by DEQ, i.e., database name, database contact, database source, database coverage, database map scale, database attribute, database application, and geographic descriptions. Follow-up interviews were conducted with key staff members to obtain any additional information needed to develop the DEQ environmental resources database catalog.

The following are the databases reviewed and utilized for the development of the DEQ database catalog and water resources information standards for the groundwater resources, surface water resources, air quality, and geology clearinghouses.

Groundwater Databases

MSDEQ Office of Land and Water

- Permit Files (in-house)
- Water Use (in-house)
- Driller's Logs (in-house)
- Geophysical Logs (in-house, empty)
- Water Quality (in-house, empty)
- Hydrogeologic Info (in-house)
- Well Attributes (in-house)
- Water Level (in-house)
- Pump Test (in-house, empty)
- Well Construction (in-house, empty)

MSDEQ Office of Pollution Control

- RCRA (EPA)
- SuperFund:
  - CERCLA (EPA)
  - Uncontrolled Sites (in-house)
- Emergency Management (in-house)
- UIC (EPA - not operational)
- UST (EPA)
- Solid Waste (in-house)
- Agricultural Chemical (EPA - not operational)

U.S. Environmental Protection Agency (EPA)

- **FRDS** (Federal Reporting Data System - for the Public Water Supply System)
  Source: EPA - Office of Wetlands, Oceans & Watersheds
- **HWIWDB** (Hazardous Waste Injection Well Database)
  Source: EPA - Office of Groundwater and Drinking Water/Groundwater Protection Division
- **STORET-WQS** (STORET - Water Quality System)
  Source: EPA - Office of Wetlands, Oceans and Watersheds
- **RCRIS** (RCRA Information System)
  Source: EPA - Office of Solid Waste
- **CERCLIS** (CERCLA Information System)
  Source: EPA - Office of Emergency and Remedial Response
- **USTDMS** (UST Data Management System)
  Source: EPA - Office of Underground Storage Tanks
- **CERCLIS** - The mainframe system for the ten EPA regions' data and the USACE data
- **WASTELAN** - A PC LAN-based system used for data entry and reporting by the EPA regions
- **CLEANLAN** - A PC LAN-based system used for data entry and reporting by USACE

U.S. Geological Survey (USGS)

- **NWIS/GWSI** (Groundwater Site Inventory)
  Source: USGS - Scientific Information Management
- **NWIS/WUDS** (Water Use Data System)
  Source: USGS - Scientific Information Management
- **NWIS/QW** (Water Quality)
  Source: USGS - Scientific Information Management
- **USGS/RASA** - Geophysical Well-Log Database (The Gulf Coast Aquifer Systems, South-Central United States)
  Source: USGS - Gulf Coast RASA

Surface Water Databases

MSDEQ Office of Land and Water

- Dams Inventory (in-house)
- Stream Discharge (in-house - empty)
- Stream Flow (in-house - empty)
- Permitting Files (in-house)

MSDEQ Office of Pollution Control

- NPDES-GIS Permit Files (in-house)

U.S. Environmental Protection Agency (EPA)

- **DWS** (Drinking Water Supply File)
  Source: EPA - Office of Wetlands, Oceans and Watersheds
- **GD** (Gage and Dam Files)
  Source: EPA - Office Wetlands, Oceans and Watersheds
- **IFD** (Industrial Facilities Discharge File)
  Source: EPA - Office of Wetlands, Oceans and Watersheds
- **PCS** (Permit Compliance System)
  Source: EPA - Office of Wastewater Enforcement and Compliance)
- **RF** (Reach File)
  Source: EPA - Office of Wetlands, Oceans and Watersheds
- **STORET/WQS** (STORET Water Quality System)
  Source: EPA - Office of Wetlands, Oceans and Watersheds
- **STORET/DFS** (STORET Daily Flow System)
  Source: Office of Wetlands, Oceans and Watersheds
- **WBS** (Waterbody System)
  Source: EPA - Office of Wetlands, Oceans and Watersheds

U.S. Geological Survey (USGS)

- **NWIS/ADAPS** (Automated Data Processing System)
- **NWIS/GWIS** (Groundwater Site Inventory)
- **NWIS/QW** (Water Quality)
- **NWIS/WUDS** (Water Use Data System)
- **NWIS/Daily Values File**
- **NWIS/Peak Flow File**
- **NWIS/Basin Characteristics File**
- **NWIS/Header File**

Federal Emergency Management Agency (FEMA)

- National Inventory of Dams

Air Quality Databases

MSDEQ Office of Pollution Control

- Emission Inventory File
- Air Emission Control File
- Polk File
- CDBG Inventory File
- Title IV Inventory File
- Dry Cleaning Base File
- Cotton Gin Inventory File
- EMS Raw Data Inventory File

Geology Databases

MSDEQ Office of Geology

- Core Sample Files
- Geophysical Logs Files

WATER RESOURCES INFORMATION STANDARDS

This study was prompted by the need to make and support water resources management decisions based on standard information and data collection that cuts across the Department's programs.

Effective water resources management requires that adequate information be collected and available for the following water resources management areas:

1. Water resource planning and policy management.
2. Environmental planning and policy management.
3. Economic, agricultural, and industrial development planning and policy management.
4. Permitting and regulatory management.
5. Conservation and demand management.
6. Monitoring network design and modeling.
7. Extreme event management.

The effectiveness of the water resources management efforts in the state will, to a great extent, be dependent on

the accuracy, completeness, and accessibility of the information related to water resources.

During the course of this project, data collection and data standards developed at various federal agencies (especially USGS and USEPA) are examined and related data standards are adopted for DEQ's Water Resources Information Clearinghouses. The purpose was to achieve consistency throughout the state and with the federal databases and reporting systems.

The following sections describe the structure of the water resources data collection and data element standards for DEQ Water Resources Information Clearinghouses.

Data Collection Standards

Existing data critical to water resource management, activities, and decisions are collected by various local, state, and federal agencies, usually as part of the regular permitting or administrative activities of these agencies.

Utilizing uniform data collections procedures as a baseline will yield quality assurance and reliability to the information assimilated at the clearinghouses.

The recommended water resources data collection standards were adopted from the *National Handbook for Recommended Methods for Water-Data Acquisition*. The National Handbook presents the water-data acquisition methods recommended by a large sector of major U.S. water-data collectors and users (both federal agencies and the non-federal community).

For surface water, only open channel flow data collection standards were adopted. Scientists and engineers at DEQ should refer to the National Handbook for over land flow and closed conduit flow data collection methodologies.

For groundwater, only water level and discharge measurement methods were adopted.

Water quality and sediment sampling procedures and management recommendations were standardized for surface water and groundwater quality clearinghouses. For analytical method recommendations the reader should again refer to the National Handbook.

Surface Water Data Collection Standards

1. Daily Mean Data
2. Yield Data
3. Extremes - Instantaneous Values
4. Basins Characteristics Physical Data

Groundwater Flow Data Collection Standards

1. Water Level Measurement
2. Discharge Measurement

Water Quality and Sediment Sampling Standards

1. Sample Collection
2. Sampling Frequency
3. Sampling Devices
4. Sample Handling and Preservation
5. Sample Identification

Data Element Standards

EPA - Data Standards Policy defines "Data Standards" as standards used generally, but not exclusively, for automated systems to ensure that one type of data is defined the same way in all systems. A similar definition means having the same name, the same number of maximum characters, and the same type and content of data in all systems where a specific data item appears.

Consistency in expressing data to define parallel information contained in different data elements is essential for water resources management. Uniform data element formats, precision, and units of measure are needed to express data consistently.

Database developers and water resource managers have an important incentive to ensure such consistency. Consistent data establishes information sharing capabilities which results in the integration of surface and groundwater information.

In order to remain consistent with the federal databases, an exhaustive research was conducted to standardize data elements for DEQ Water Resources Information Clearinghouses.

The following databases and their related data elements were adopted for the clearinghouses:

USGS	EPA	
NWIS I & II:	STORET:	GD
GWSI	WQS	IFD
WUDS	DFS	PCS
QW	RCRIS	RF
ADAPS	CERCLIS	WBS
DVF	USTDMS	
PFF	FRDS	
BCF	DWS	
RASA	HWIWDB	

Federal Emergency Management Agency (FEMA)

National Inventory of Dams

GIS STANDARDS

The standards adopted in the process of data creation determines the quality of the output data. The recommended standards are intended to aid in GIS data development and to justify GIS data creation project. These standards help in assuring the data quality, ensuring the compatibility, and facilitating positional accuracy of water resources information.

The standards are discussed under three headings (sections 3, 4, and 5). The *mapping considerations* section contains information relating to appropriate selection of projections, coordinate systems, geodetic references, and scales for developing statewide water resources database. The *database development* section deals with recommended data structure, tiling systems, and procedures and guidelines for every stage of data creation process. These range from source data verification to data entry and verification. The *data quality standards* section focuses on standards relating to positional accuracy, logical consistency, and quality verification of created data. These standards help the user in determining the usability of created data for an intended application.

As part of developing standards for the DEQ water resources information, contents of data standards adopted or implemented in a few selected states are reviewed and summarized.

Florida: The State's Growth Management Data Network Coordinating Council recommended the adoption of the Digital Cartographic Data Standards Task Force (DCDSTF) standards outlined in the January 1988 issue of *The American Cartographer*. The database creators are required to provide information on lineage, estimate of the positional accuracy, and attribute accuracy.

Minnesota: The Land Management Information Center (LMIC) of the Minnesota State Planning Agency has developed *Data Integration Guidelines* as standards for local, regional, or state level database creation. They adopted standards from different sources including the *USGS Digital Cartographic Data Standards*, the *Minnesota Land Management Information System (MLMIS) Geocoding Procedures*, and the *ARC/INFO User's Manual*. Before the database creation, participating projects are required to submit the MLMIS Data Compatibility Worksheet, that describes in detail the data elements, methods of data collection, data sources, and data resolution, for LMIC staff review.

New Jersey: The New Jersey State Mapping Advisory Committee (SMAC) has prepared and published the *New Jersey GIS Resource Guide* in which an overview of several existing standards reprinted from *THE GUIDE BOOK*, published by the Federal Geodetic Control Committee (FGCC) in 1989, were included to aid the GIS users. The resource guide doesn't recommend or adopt any particular standards, rather it provides a review and reference to different sources to direct users to select their own standards from the pool. It also suggests that there is no need for creating new standards, in most cases, as the existing standards help ensure a quality GIS data.

North Carolina: The North Carolina Land Records Management Program is involved in database creation at the local level. Their established standards and procedures are incorporated in *Technical Specifications for Base, Cadastral, and Digital Mapping*.

Utah: The Automated Geographic Reference (AGR) has implemented standards under a database design called the Target System. Local, regional, and state level data are stored and managed separately and AGR provides a quality assessment and lineage report for each layer added to the database. Evaluation of data suitability for a specific application is left to the agency using the data.

Vermont: The Vermont GIS developed two logically separate, but related, databases at state and local levels. For state-level database, USGS Digital Line Graph (DLG) from 1:100,000 scale maps that meet the specifications of the USGS Digital Cartographic Data Standards were used as the base map. They will be translated to ARC/INFO conforming to the standards inherent to ARC/INFO. These contain relatively low-accurate and small scale map features. The local-level database is developed from already existing orthophoto maps of 1:5,000 and 1:1,250 scale and within the Vermont data standard accuracy of $\pm$ 10 feet.

DEMONSTRATION PROJECT

The demonstration project includes data automation for a 108 square mile area known as the Pascagoula North and South, 7.5 minute quadrangles in Jackson County. One of the advantages of this part of the state was that the USGS digital line graph (DLG) data were readily available at 1:24,000 scale.

Data Collection and Preprocessing

All the available DLG data from USGS, hydrologic features in particular, for the two quadrangle areas were obtained to add to the demonstration project GIS database. The following Water Resources Databases were collected for the demonstration area:

Source	Database
MSDEQ/OLW	
Surface Water	Permit File
Groundwater	Permit File
	Water Use File
MBOH/	
Groundwater	PWS Well File

Source	Database
MSDEQ/OPC	
Surface Water	NPDES, GIS Stormwater Permits
Groundwater	UST (Only Addresses)
	RCRA (Only Addresses)
	CERCLA (Only Addresses)
USGS/	
Groundwater	GWSI
EPA/	
Surface Water	STORET

These databases include maps in digital or hard copy form, tabular data in various digital database formats or in hard copy format, photocopies of actual permits, photocopies of locations of permitted facilities marked on quadrangle maps, or field surveyed information.

Some of the maps acquired in digital form (e.g., DLG data) were in different geographic projections and datum. All these maps are transformed to Mississippi Transverse Mercator Projection and to NAD83. Some of the hard copy maps do not contain a valid coordinate system (e.g., ecoregion map) to register the maps to a known reference. These maps were registered using coordinates from other basemaps with common identifiable feature intersections or bordering lines. These identified registration marks are used for digitizing maps.

Different divisions within the state and federal agencies use different database formats or spreadsheet software in creating their tabular data. The tabular data are used both for map creation and for relating attribute information to map features. For instance, the Office of Land and Water Permitted Well dBASE file is used in creating permitted well location map layer by extracting X,Y coordinates from items of the table. One of the items from the table is also added to the map layer for use as a common item while joining or relating map layer with tabular data. Key identifiers such as permit number are used as common items. Some of the tabular data are available in hard copy form only. Addition of attribute information from such sources involve manual entry of selected data items.

In some of the federal databases like RCRIS or CERCLIS permitted facilities, the site locations are not explicitly defined in terms of mappable coordinate values but are referred by their addresses. An attempt has been made to create a map layer using the street address item. ADDRESSMATCH command in ARC/INFO is used to match addresses in street address INFO data file against TIGER address coverage and create a point coverage containing locations of matched addresses. TIGER road maps contain addresses of buildings on both sides of the streets. All the addresses in the INFO file were not selected in creating the point coverage due to the fact that some of the streets in the TIGER road coverage carry neither street name nor the addresses.

Some of the information exists on actual forms for permits and their locations marked on USGS quadrangle maps. Stormwater permitted facilities map layer is created from such pieces of information. Photocopies of each facility marked on quadrangle map are acquired on individual sheets of paper. By displaying roads and section map layers as backdrop, these marked facility locations are digitized on screen. Other attribute information about the facilities are manually added to the map coverage.

Besides acquiring the existing data, some of the well and underground storage tank locations were identified in the field using global positioning system (GPS). This data collection provides high horizontal and vertical accuracy of tested locations and helps determining the degree of relative and absolute positional accuracy of original data acquired through traditional methods.

Field information such as GPS surveyed well locations in hard copy format are used to create point map coverage. Similarly, surveyed underground storage tank locations are also mapped.

Discrepancy Documentation

The locations of features in many map layers are based on coordinate values specified in the database. In most of the cases, these values are based on manual calculations or approximations from the closest lat. long. grid. It is relatively complex to approximate a distance in units of degrees, minutes, and seconds. A difference of one second of latitude or longitude will amount to an actual distance of about 100 feet. Due to the variations involved with human approximation, similar feature locations were given different coordinate values. The variations in the source data could in no way be rectified in map creation to make the locations more accurate than the source data. The only rectification that could be done is confined to a few select locations where the locations were surveyed using global positioning system (GPS).

Locations of same wells defined by different state and federal divisions were compared against GPS surveyed well locations. This comparison helped to evaluate approximations of different divisions and to eliminate the most inaccurate ones. Besides locations, the elevations are also compared. Of the three sources of well locations, the Board of Health locations almost always appear to be farther from their actual location defined by GPS survey. The other two sources of locations are relatively close. Here, the X and Y-shift from the actual locations do not provide the straight distances between points, rather they provide shift in each direction.

One of the map layers, STORET Water Quality Monitoring Stations, is created from the locations defined by the EPA. These locations are also referenced by river reach miles. There is also a map coverage that contains river reaches and associated reach miles. Of the 11-digit reach code, the first eight digits represent the hydrologic unit code (HUC), whereas the last three digits represent the segments of that hydrologic unit. Some of the latitude and longitude locations with a specific reach code are displayed in different adjacent reach code. This indicates that the locations are not accurate. Also, all the segments mentioned in the database are not present in the reach file map. Either the locations or the reach file map or both are to be corrected to make this data more accurate for use.

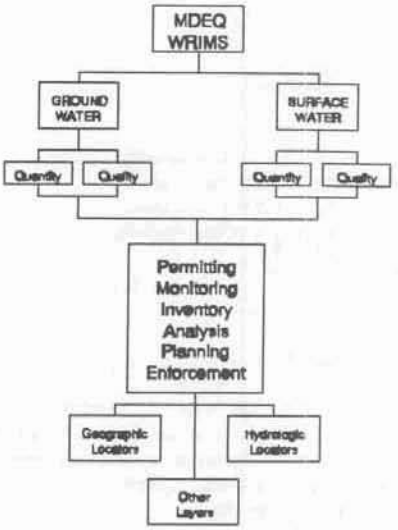
Rectification of these problems involves a variety of solutions based on required accuracy and availability of funds. Extracting the exact locations of features using GPS surveys is the best and least laborious process of rectification. Another less accurate method of locating features is by address matching. In some parts of the state, this may involve updating the missing street names and addresses in TIGER road files.

Conceptual Design and Implementation

WRIMS demonstration project conceptual design and implementation provides the means for integrating all groundwater and surface water, quantity, and quality clearinghouse databases. The WRIMS demonstration project utilizes an integrated, automated data network which relies on distributed processing, geographic information systems, and relational database technologies.

WRIMS Demonstration Project

Conceptual Design Flowchart



The following geographic locations are utilized for the demonstration project:

1. Latitude/Longitude
2. PLSS (Section/Town/Range)
3. County
4. Quad Sheet
5. USGS Well Grid

The following hydrologic locations are utilized for the demonstration project:

1. USGS Hydrologic Unit
2. USGS Aquifer Codes
3. EPA Eco Region
4. EPA Reach File

The following layers are incorporated into the demonstration project and could be utilized for specific needs:

1. Hydrogeophy:
   - Mississippi River
   - Major Rivers
   - Perennial Streams
   - Waterbodies
   - Watersheds
2. Roads
3. Railroads
4. Airports
5. Utilities
6. Elevations
7. Land Use
8. Surface Geology
9. Population
10. Institutional Boundaries, etc.

The clearinghouses are populated with the following databases:

Groundwater Quantity

Permitting - Wells - Industrial and Public
Monitoring - Water Level and Water Use
Inventory - USGS/GWSI and Hydrography Layers
Analysis - Empty
Planning - Empty
Enforcement - Empty

Surface Water Quantity

Permitting - NPDES and Intakes
Monitoring - Discharge
Inventory - Empty
Analysis - Empty
Planning - Empty
Enforcement - Empty

Groundwater Quality

Permitting - RCRA/CERCLA (Only Locational Data)
Monitoring - BOH/PWS
Inventory - UST (Only Locational Data)
Analysis - Empty
Planning - Empty
Enforcement - Empty

Surface Water Quality

Permitting - NPDES and Stormwater
Monitoring - Water Quality Monitoring Stations (Only Locational Data)
Inventory - RCRA/CERCLA (Only Locational Data)
UST (Only Locational Data)
Analysis - Empty
Planning - Empty
Enforcement - Empty

During the demonstration project development and implementation, coding of inventory items for cross-referencing schemes were established and menus serving as data exchange centers for the clearinghouses were developed. The demonstration project was developed in PC environment using ESRI's **ArcView** software with **Avenue** for customization and application development. The database was created in sun-unix workstation environment.

RECOMMENDATIONS

The recommendations identified do not represent the overall water resources information gaps but are limited to the data collection and data standards development.

The recommendations are:

1. DEQ Office of Land and Water to continue with GIS Quality GPS Surveys for all public water supply and monitoring network wells/intakes.
2. DEQ Office of Land and Water to develop a GIS based water use/permit database comprised of standard data elements adopted from USGS - WUDS, EPA - FRDS, and EPA - NPDES.
3. DEQ to integrate reservoir/lake physical characteristics data elements with USACE data for reservoir/lake capacity and safe yields.
4. DEQ to adopt EPA's Reach File for the purpose of performing hydrologic routing for modeling, identifying upstream and downstream elements, and providing reach numbers that uniquely identify any particular point associated with the surface waters.
5. DEQ to verify geographic coordinates for USGS - Site ID and EPA - Facility ID throughout the state.
6. DEQ to adopt USGS - NWIS for water quantity and EPA - STORET codes for water quality clearinghouses.
7. DEQ to adopt registration of monitoring well installation, plug and abandonment especially for OPC - groundwater division program activities. This information is available in hardcopy (consultant's reports) format. For a nominal fee (to cover data entry costs), the registration system will enable DEQ to convert this information into a digital form.

8. DEQ to develop a GIS based groundwater quality database in accordance with EPA's *Minimum Set of Data Elements for Groundwater Quality*.
9. DEQ to delineate reaches of losing or gaining streams and identify the optimum sites for collecting groundwater (piezometry) and surface water data.
10. DEQ to delineate areas where the water table is near the land surface.
11. DEQ to adopt water - physical or chemical - quality parameters to define surface water/groundwater relationships.
12. DEQ to purchase EPA's *Environmental Monitoring Methods Index (EMMI)* database available from NTIS. This database contains regulatory lists, EPA regulated substances, analytical methods, detection, and regulatory limits, etc.
13. DEQ to include the following data elements in every program database:

    Facility/Site Located in WHPA? (Y/N)

14. DEQ to develop field observations data forms to collect statewide waterbody quantity and quality information.
15. DEQ Office of Land and Water to adopt a Mississippi unique well numbering system as follows:

    A. Existing Well Identifiers

    A1. USGS - Site Identification Number (15 Digits)

    XXXXXX = Latitude
    XXXXXXX = Longitude
    XX = Sequence Number

    X X X X X X X X X X X X X X X

    A2. EPA - Facility Identification Number

    • Old Facility ID:

    XXXXXXXXX = Duns Number (Dunn and Bradstreet Data Universl Numbering System for Corporations)

    X X X X X X X X X

    • New Facility ID (EPA Facility Identification Data Standard, April, 1990):

    XX = State Abbreviation
    XXXXXXXXXX = Arbitrary Number Assigned by EPA's Facilities Index System (FINDS)

    M S X X X X X X X X X X

    A3. USGS - Local Number

    X = County Grid Letter
    XXX = Sequential Number

    A4. MSDEQ/OLW - Permit Number

    XX = State Abbreviation
    XX = Water Media (GW or SW)
    XXXXX = Sequential Number

    M S G W X X X X X

    A5. MSBOH/PWS - Public Water Supply Number

    XX = County Code (Not FIPS)
    XXXX = Sequential Number
    - = Separator
    XX = Local Well Number

    X X X X X X - X X

    B. Examples of Other State Unique Well Numbers

    B1. State of Michigan

    XX = County Code
    XX = Township
    XX = Range
    XX = Section
    XXX = Sequential Number

    X X X X X X X X X X X

    B2. State of Minnesota

    XX = County Code
    X = Prefix Signifying a Well
    XXXXX = Sequential Number

    X X X X X X X X

    B3. State of Washington

    XXX = Township
    XXX = Range
    - = Separator
    XX = Section
    X = Subsection
    XXXX = Sequential Number

    X X X X X X - X X X X X X X

C. Recommended Mississippi Unique Well Number (Seven Digits)

XX = County Code
X = County Grid Letter
XXXX = Sequential Number

XX X XXXX

16. DEQ Office of Land and Water to modify their existing withdrawal permit numbering system to incorporate BOH numbering as follows:

A. Option (Nine or 12 Digits)

XX = Water Media (GW or SW)
X = Water Use Code*
XX = County Code (Not FIPS)
XXXX = Sequential Number
- = Separator
XX = Local Number

XX X XX XXXX - XX

* (USGS) Water Use Codes:

A: Air Conditioning
B: Bottling
C: Commercial
D: Dewater
E: Power
F: Fire
H: Domestic
I: Irrigation
J: Industrial (Cooling)
K: Mining
M: Medicinal
N: Industrial
P: Public Supply
Q: Aquaculture
R: Recreation
S: Stock
T: Institutional
Y: Desalination

B. Option (Eight or 11 Digits)

X = Water Media (G or S)
X = Water Use
XX = County Code
XXXX = Sequential Number
- = Separator
XX = Local Well Number

X X XX XXXX - XX

EXAMPLE:

GP01009-02

(Groundwater/Public Supply/Adams County/Well Permit #9/Local Well #2)

17. DEQ Office of Pollution Control to modify/adopt existing UIC well numbering system as follows:

For Class I Injection Well Number Modify MSDEQ-UIC Permit Number: (Class I Injection Wells: Hazardous, Nonhazardous, and Municipal Wastewater Disposal Wells Located Below USDWs)

XX = County Code (Not FIPS)
X = Injection Well Designation
XXXX = 1000 Series Sequential Number

XX I 1000

For Class II Injection Well Number Utilize API (American Petroleum Institute) Number: (Class II - Injection Wells: Saltwater Disposal Wells, Enhanced Oil Recovery Wells and Hydrocarbon Storage Wells)

XX = State Code (FIPS)
XXX = County Code (FIPS)
XXXXX = Sequential Number

XX XXX XXXXX

For Class V Injection Well Number Utilize MSDEQ-UIC Permit Number With 5000 Series Sequential Number: (Class V Injection Wells: Injection Wells Not Covered Under the First Four Classes of Injection Wells)

XX = County Code
X = Injection Well Designation
XXXX = 5000 Series Sequential Number

XX I 5000

18. DEQ Groundwater Quality Clearinghouse to adopt sample control number as recommeded by EPA - MSDE as follows:

A. Water Quality Sample Identification by Laboratories

A1. DEQ - Lab Utilizes a Seven Digit Sample ID Number

XX = Year
XXXXX = Sequential Number

XX XXXXX

A2.1. BOH - Lab Utilizes a Ten Digit Sample ID Number For Chemistry Samples

XX = Year
XX = Month
XX = Day
XXX = Sequential Number
X = Analysis (STORET Code)

XX XX XX XXX X

A2.2. BOH - Lab Utilizes a Six Digit Sample ID Number For Microbiological Samples

XXXXXX = Sequential Number

XXXXXX

A3. MSU - Lab Utilizes a Six Digit Sample ID Number

XXXXXX = Sequential Number

XXXXXX

A4. USGS - Lab Utilizes an Eight Digit Sample ID Number

X = Century
XX = Year
XXXXX = Sequential Number

X XX XXXXX

B. Recommended MSDEQ Sample Control Number

XX = Sampled Media (SW, GW, SL, SD)
XX = County Code
XXXX = Sequential Number

XX XX XXXX

19. The following are the recommendations for GIS standards:

A. ARC/INFO is the recommended software for GIS operations.

B. Mississippi Transverse Mercator (MSTM) projection is chosen and all the data are to be converted and archived in this coordinate system.
C. All data are to be converted to NAD 83.
D. For land and aerial surveys MS HARN (High Accuracy Reference Network), a local geodetic reference framework, stations should be preferred to attain high accuracy.
E. All maps smaller than 1:20,000 scale should meet the U.S. National Map Accuracy Standards.
F. Map scales of 1:20,000 and larger should follow ASPRS Interim Accuracy Standards.
G. Source data should meet the verification criteria to attain the set standards.
H. The *rms* (root-mean-square) error should not exceed 0.005.
I. Fuzzy tolerance should be below 0.015 inches (the actual tolerance in other units vary with map scale).
J. Not more than one percent of the features and attributes, per map, shall be missing from the output coverage.
K. Not more than one percent of the features and attributes in any map shall be incorrectly represented.
L. There should be **no** missing or duplicate data fields in the database structure, and all records must be correctly built.

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