

Appendix A:

Ground Water Monitoring Network Standard Operating Procedure



**Ground Water Monitoring Network
S-001-OWQ-D-GW-10-S-R0
Standard Operating Procedure**

Office: Water Quality
Branch: Drinking Water
Section: Ground Water

Revised: N/A. **Revision Cycle:** 2 years
Effective date: January 27, 2010

Scope of operations

This standard operating procedure (SOP) outlines roles of staff within the Ground Water Section for the collection of ground water samples as it relates to the Ground Water Monitoring Network. This SOP is limited to the roles of Ground Water Staff and does not cover the collection of ground water samples related to the Quality Assurance Project Plan (QAPP).

Scope of applicability

This SOP applies to all staff members of the Indiana Department of Environmental Management (IDEM) Office of Water Quality in the Ground Water Section of the Drinking Water Branch who participates in the Indiana Ambient Ground Water Monitoring Network.

Authorizing Signatures

I approve and authorize this Standard Operating Procedure:

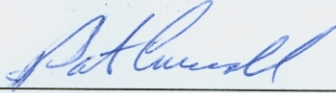
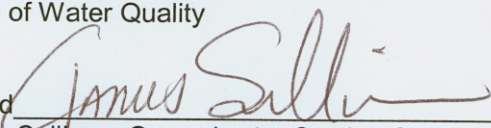
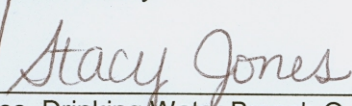
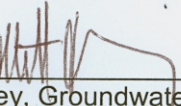
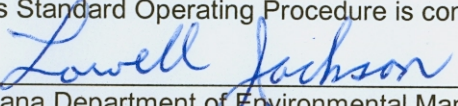
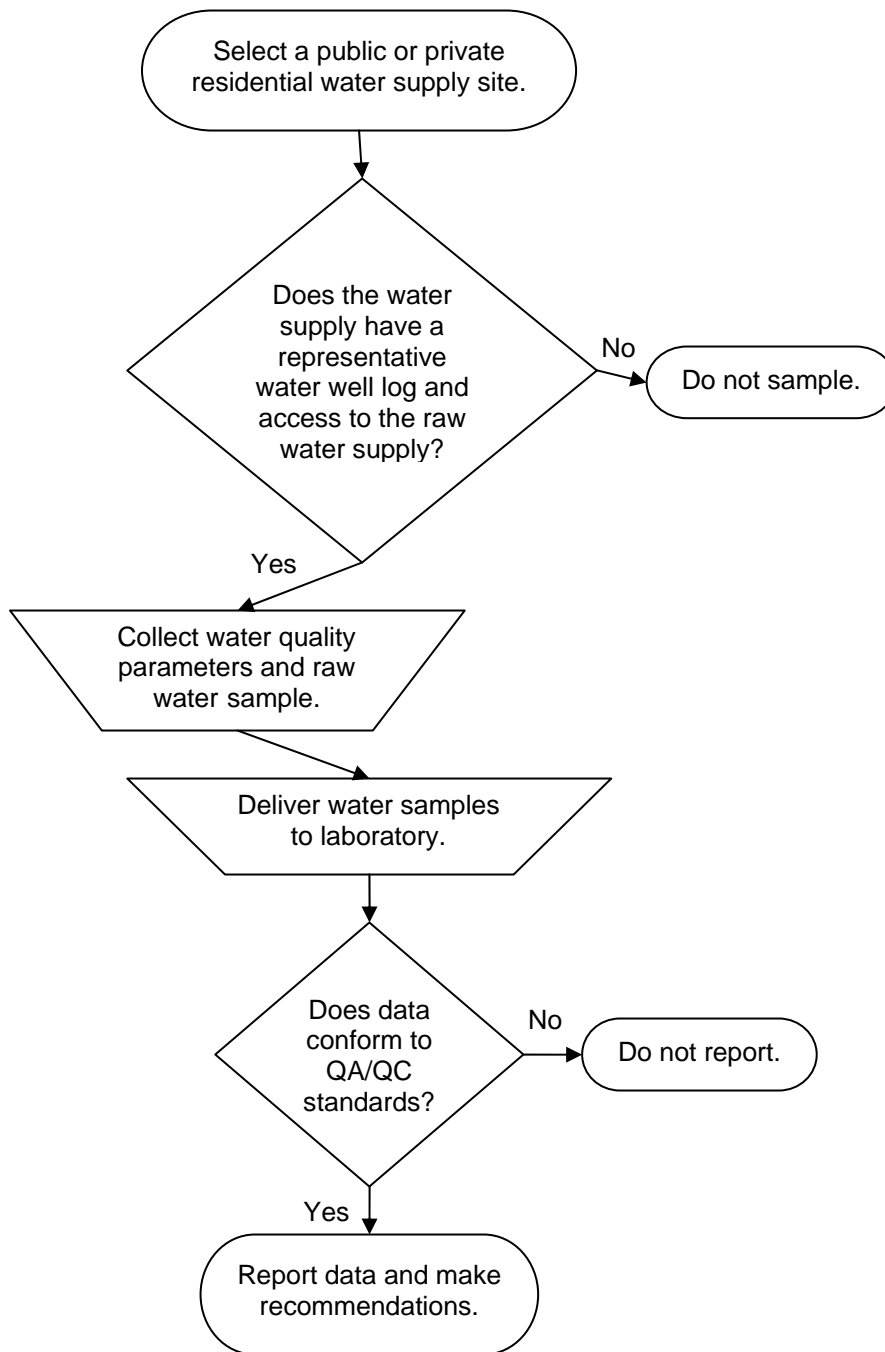
Signed <u></u>	Date <u>5/25/10</u>
Pat Carroll, Drinking Water Branch Chief Office of Water Quality	
Signed <u></u>	Date <u>2/4/2010</u>
James Sullivan, Groundwater Section Chief Office of Water Quality	
Signed <u></u>	Date <u>2/4/10</u>
Stacy Jones, Drinking Water Branch Quality Assurance Coordinator Office of Water Quality	
Signed <u></u>	Date <u>2/17/10</u>
Mitt Denney, Groundwater Section Quality Assurance Contact Office of Water Quality	
This Standard Operating Procedure is consistent with agency requirements.	
<u></u>	<u>6-3-10</u>
Indiana Department of Environmental Management Quality Assurance Program Planning and Assessment	Date

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1.0 Overview “work-flow” flowchart



2.0 Definitions

ARCGIS software— A geographic information system software product which allows one to view and query maps created with other ARC products.

Chain of Custody— A form used to document the chronology of events in collecting a water quality sample. The documentation includes each water quality sample and the individual responsible for sample collection, shipment, and receipt.

Conductivity Meters— An electronic device used to quantify the amount of electrolytes in a solution.

Dissolved Oxygen Meter— An electronic device used to quantify the amount of dissolved oxygen in a solution.

Data Base Administrator— The Environmental Manager in the IDEM Ground Water Section responsible for maintaining a data base for the ground water monitoring network.

ERDAS Imagine Software— A remote sensing software capable of manipulating data placement in imagery.

Field Book— A waterproof notebook used to record field notes.

Field Study Considerations— Considerations to be accounted for if water sampling plan deviates from the SOP.

Geographic Information System (GIS) Administrator— The Environmental Manager in the IDEM Ground Water Section responsible for maintaining GIS data and maps for the ground water monitoring network.

Global Positioning Equipment— A United States space-based radio navigation system that provides reliable positioning, navigation, and timing services to civilian users.

Ground Water Monitoring Network— This network will use both public and private water well supplies for obtaining ground water samples. Data derived from this network will be analyzed for the purpose of identifying variations in water chemistry among the State's hydrogeologic settings and developing an understanding of the ambient ground water quality across Indiana. Objectives of the network include:

- Develop a plan to monitor trends in ground water quality over the next 25 years,
- Establish a network of 200 plus monitoring wells(by hydrogeologic setting),
- Develop a baseline for annual and/or quarterly monitoring,
- Determine real variations in regional ground water quality,
- Evaluate impacts from land use, and
- Share data and foster partnerships.

Ground Water Monitoring Network Database— A Microsoft Access Database used to store all of the monitoring sites, laboratory sample numbers and laboratory data. The database is used to check out sites for sampling and to upload laboratory data.

Ground Water Section Warehouse— A storage building for equipment and supplies located east of 2525 North Shadeland Avenue.

Hydrogeologic Setting—(Fleming et al, 1994, p. 1.1)— A basis for classifying and describing the relationships between ground water and the geologic terrains it occurs in.

Indiana Department of Natural Resources (IDNR)- An Agency of Indiana State government that promotes responsible stewardship of Indiana's natural resources.

Monitoring Network Sampling Staff— Member of the IDEM Ground Water Section who participate in sampling the sites of the ground water quality monitoring network.

Oxidation Reduction Potential Meter— An electronic device used to quantify oxidation reduction potential in a solution.

pH Meter— An electronic device used to quantify the pH of a solution.

Pre-field Laboratory Considerations— Considerations to be accounted for in preparation for ground water quality sampling.

Project Chemist— The chemist in the IDEM Ground Water Section responsible for assigning sample identification numbers, and reviewing and interpreting laboratory data for accuracy through quality control/quality assurance.

Project Manager— The Senior Environmental Manager in the Ground Water Section responsible for ensuring the ground water quality monitoring network is implemented properly.

Public Water Supply System— A public water system for the provision to the public of water for human consumption through pipes or other constructed conveyances, if such system has at least 15 service connections or regularly serves an average of at least 25 individuals daily at least 60 days out of the year.

Quality Assurance/Quality Control (QA/QC)- An integrated system of management activities involving planning, implementation, documentation, assessment, reporting, and quality improvement to ensure that a process, item, or service is of the type and quality needed and expected by the client and the overall system of technical activities that measures the attributes and performance of a process, item, or service against defined standards to verify that they meet the stated requirements established by the customer; operational techniques and activities that are used to fulfill requirements for quality. In other words, QC involves measuring the "thing produced" against a standard to ensure it is a quality product that meets the identified need.

Raw Water— Ground water that has not been filtered or treated.

Section Chief— The section chief of the IDEM Ground Water Section.

Sample Identification Number— A unique number assigned by the Project Chemist that is used by the laboratory to identify a water sample.

Site Identification Number— A unique number that is assigned by the Project Manager to identify each water supply sample location.

Task List— A form that is prepared by the section chemist. It is submitted to the laboratory with the chain of custody. The form indicates the parameters to be sampled along with their appropriate identification numbers.

Temperature Meter— An electronic device used to quantify the temperature of a solution.

YSI Model 650 Water Quality Monitoring System— An electronic, handheld, portable data logger. The YSI logs temperature, conductivity, dissolved oxygen, pH, and oxidation reduction potential.

3.0 Roles

3.1. Responsibilities:

Section Chief— Final approval of monitoring network. Acquire funding. Work with PCN 10029490 to ensure monitoring network is implemented properly.

Project Manager— Ensure monitoring network is implemented properly. Training staff members. Maintain data base for monitoring network. Writing quarterly and final reports. Work with staff to review and update SOP.

Project Chemist— Assign sample identification numbers. Maintain data base for monitoring network. Review and interpret laboratory data for accuracy through quality control/quality assurance. Writing quarterly and final reports. Training staff members. Provides data to the Project Manager.

GIS Administrator— Maintain data base for monitoring network. Provides GIS products to Project Manager.

Monitoring Network Sampling Staff— Report to Project Manager for assignments. Collect water samples and deliver to laboratory. Assist in writing quarterly and final reports.

3.2. Training and Experience requirements:

Microsoft Access— Project Manager, Project Chemist, GIS Administrator

ARCGIS— Section Chief, Project Manager, Project Chemist, GIS Administrator, Monitoring Network Staff

Global Positioning Equipment— Section Chief, Project Manager, Project Chemist, GIS Administrator, Monitoring Network Staff

YSI Model 650 Water Quality Monitoring System— Section Chief, Project Manager, Project Chemist, GIS Administrator, Monitoring Network Staff

Field Sampling— Section Chief, Project Manager, Project Chemist, GIS Administrator, Monitoring Network Staff

4.0 Description of equipment, forms, and/or software to be used

- Global Positioning Equipment
- YSI Model 650 Water Quality Monitoring System, which includes the following:
 - pH Meter
 - Conductivity Meters
 - Dissolved Oxygen Meter
 - Oxidation Reduction Potential Meter
 - Temperature Meter

The equipment listed above can be found in the Ground Water Section warehouse, and can be checked out through the Section Chemist.

- Task List
- Chain of Custody

The forms listed above can be acquired from the Ground Water Section share drive.

- ARCGIS software
- ERDAS Imagine software

This software can be utilized through the GIS/Database Administrator.

- Microsoft Access software

This database software will be used to store the ground water quality data collected for this network. Accessed through the Project Manager or the Database Administrator.

- Indiana Department of Natural Resources water well logs

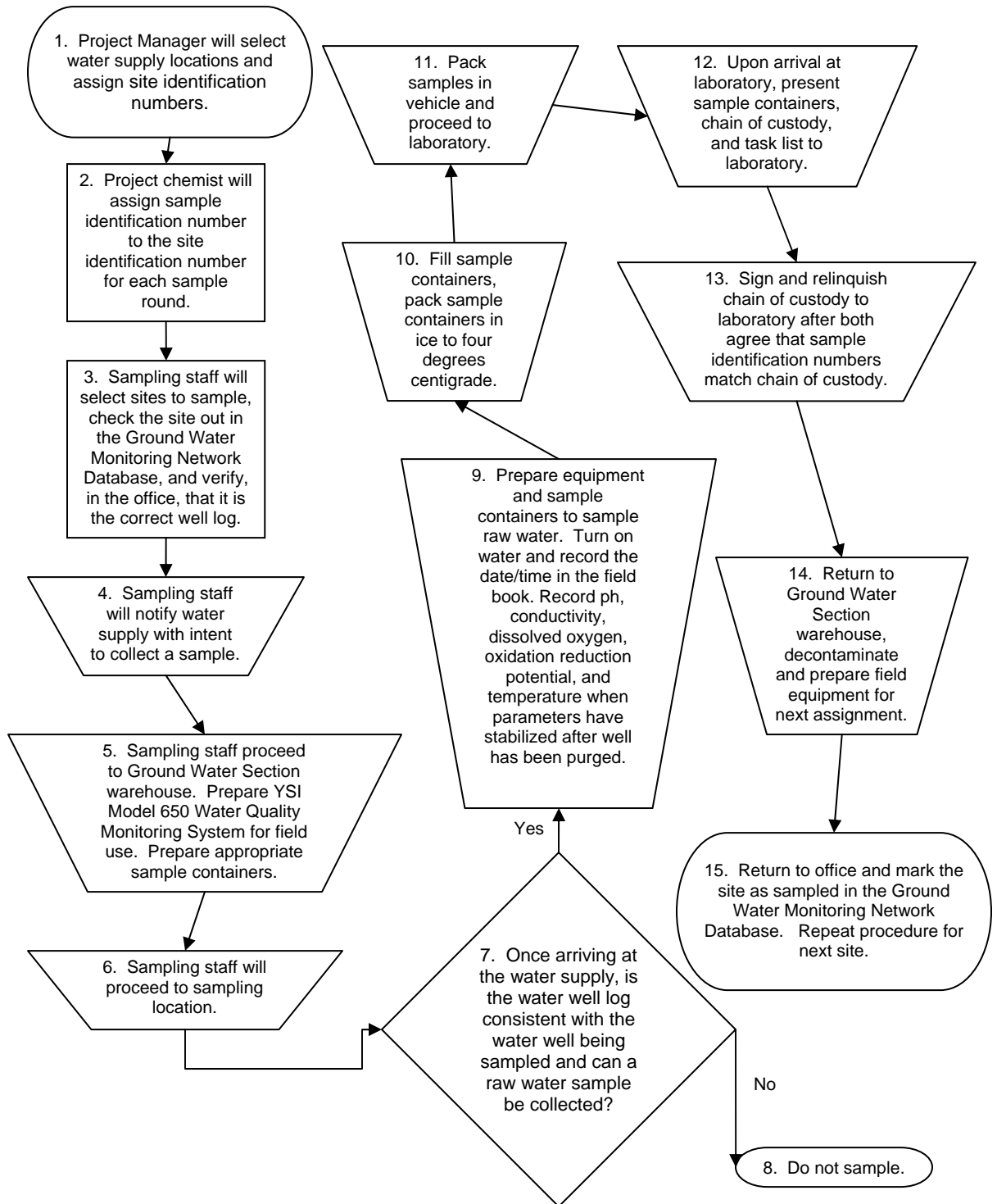
The well logs will be provided by GIS Administrator or the IDNR website.

- Field book

This book is used to record field notes, field parameters, names and addresses. Supplied by Section Chemist.

5.0 Procedure

5.1. Procedural Flowchart



5.2. Procedure

Procedure 1. Project Manager will select water supply locations and assign site identification numbers.

Procedure 2. Staff Chemist will assign sample identification number to the site identification number for each sample round.

Procedure 3. Sampling staff will select sites to sample, check the site out in the Ground Water Monitoring Network Database, and verify, in the office, that it is the correct well log.

Procedure 4. Sampling staff will notify water supply with intent to collect sample.

Procedure 5. Sampling staff will proceed to Ground Water Section warehouse. Prepare YSI Model 650 Water Quality Monitoring System for field use. Prepare appropriate sample containers.

Procedure 6. Sampling staff will proceed to sampling location.

Procedure 7. Once arriving at the water supply, is the water well log consistent with the water well being sampled and can a raw water sample be collected?

Procedure 8. If raw water sample can't be collected or water well log is not consistent with water well being sampled, do not sample.

Procedure 9. Prepare equipment and sample containers to sample raw water. Turn on water and record the date/time in the field book. Record ph, conductivity, dissolved oxygen, oxidation reduction potential, and temperature when parameters have stabilized after well has been purged.

Procedure 10. Fill sample containers, pack sample containers in ice to four degrees centigrade.

Procedure 11. Pack samples in vehicle and proceed to laboratory.

Procedure 12. Upon arrival at laboratory, present sample containers, chain of custody, and task list to laboratory.

Procedure 13. Sign and relinquish chain of custody to laboratory after both agree that sample identification numbers match chain of custody.

Procedure 14. Return to Ground Water Section warehouse, decontaminate and prepare field equipment for next assignment.

Procedure 15. Return to office and mark the site as sampled in the Ground Water Monitoring Network Database. Repeat procedure for next site.

6.0 Records Management

Records management involves the reporting of ground water quality data from the laboratory. This is accomplished through a rigorous quality assurance quality control program initiated by the project chemist. Quality assurance quality control measures are those activities used to demonstrate the accuracy and precision of the data reported back from the laboratory analyzing the ground water quality samples.

7.0 Quality Assurance / Quality Control

The SOP will be reviewed biennially by the Drinking Water Branch and Ground Water Section QA contacts.

Project manager will monitor sampling staff weekly to determine and verify the SOP was followed correctly.

Quality assurance quality control consists of five categories:

- Pre-field laboratory considerations.
- Field study considerations.
- Laboratory analysis of collected samples.
- Good laboratory practices
- Data reporting

8.0 References

- Fleming, A.H., Benot, P., Brown, S.E., Grove, G., Herring, W., Lewis, E.S., Moeller, A.J., Rupp, R.F., and Steen, W.J., 1994,
- Atlas of Hydrogeologic Terrains and Settings of Indiana: Indiana Geological Survey Open-File Report 94-17, 198pp.

9.0 History of Revisions

Not applicable, this is the first version of this SOP.

10.0 Appendices

Appendix A....Chain of Custody
Appendix B....Task List

Appendix A....Chain of Custody

Appendix B....Task List



**INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
OFFICE OF WATER/GROUND WATER SECTION
SAMPLE TASK SHEET**

Project:		Project Range: DK	To DK	Project Date:	
Sampler:	Section	Assigned Lab: UL	HES		
Sample Numbers Submitted:		Cooler _____ of _____ Coolers			

TASK 1 - METALS					
Antimony		Barium		Aluminum	
Arsenic		Calcium		Cobalt	
Beryllium		Iron		Manganese	
Cadmium		Magnesium		Selenium	
Chromium		Potassium		Silver	
Copper		Sodium		Titanium	
Lead		Strontium		Thallium	
Mercury		Boron, 200.8		Zinc	
Nickle					

TASK 2 – GENERAL INORGANICS, MICROBIOLOGIC, NUTRIENTS & ORGANICS					
Alkalinity		Total Coliforms,		Phosphorous (Applicable to All Forms)	
BOD5		Cyanide, Total		Solids, Filterable Residue (TDS)	
BOD, Ultimate		Cyanide, Amenable		Solids, Non-Filterable Residue (TSS)	
Bromide		Fluoride		Solids, % (Solid Waste Matrices)	
Chemical Oxygen Demand		Hardness as CaCO3		Solids, Settleable Residue	
Chloride		Nitrogen, Kjeldahl (TKN)		Specific Conductanc	
Chlorine, Free & Total		Nitrogen, Nitrate		Sulfate	
Chlorine, Free		Nitrogen, Nitrite		Total Organic carbon (TOC)	
Chromium, Hexavalent		Nitrogen, Nitrate-Nitrite		Turbidity	
Coliforms, E.coli		pH (Lab)			
Coliforms, Fecal		Phosphorous, ortho			

TASK 3 – ORGANICS			
524.2 – Volatile Organics		504.1 - EDB & DBCP	513 -TCDD (2,3,7,8-TCDD)
524.2E – Volatile Organics Extended		505 - Organohalides & PCB's	515.1 - Chlorinated Acids - ECD
525.2 – Semivolatile Organics		507 - Nitrogen/Phosphorous NPD	515.3 - Chlorinated Acids - ECD
525.2E – Semivolatile Organics Extended		508.1 - Chlorinated Acids- ECD	531.1 - Carbamates

SAS						
Worst Case Approximation	<10ppb	1-10ppm	10-100ppm	100-1000ppm	>1000ppm	
REPORTING TIME (Days)	30	14	2			

COMMENTS

Mailed Reports	Hand Delivered Reports	Contact Information
Mitt Denney IDEM Ground Water Section, 66-33 100 N Senate Ave Indianapolis, IN 46204	Mitt Denney IDEM Ground Water Section, 66-33 2525 N Shadeland Ave Indianapolis, IN 46219	(317) 308-3324 (317) 308-3339, fax mldenny@dem.state.in.us