United States
Environmental Protection
Agency

Office of
Ground-Water Protection
Washington, D.C. 20460

Office of Information
Resources Management
Washington, D.C. 20460

May 1987

Water

EPA

Appendices: Ground - Water Data Requirements Analysis

GROUND-WATER DATA REQUIREMENTS ANALYSIS

APPENDICES

FOR THE

ENVIRONMENTAL PROTECTION AGENCY

This document was prepared as the result of a joint effort between the Environmental Protection Agency's Office of Ground-Water Protection, Marian Mlay, Director, and the Office of Information Resources Management, Edward J. Hanley, Director. Key contributors to this effort include:

Office of Ground-Water Protection

Norbert Dee
Caryle Miller

Office of Information Resources Management

Thomas E. Kern
Gordon Schisler
Constance Tasker

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LIST OF APPENDICES

The appendices of the Ground-Water Data Requirements Analysis provide the basis of the analysis and foundation for the findings, recommendations, and conclusions of this study. The detail background and source material provided is the result of a thorough document review and the conduct of over 300 structured interviews with EPA Headquarters, Regions, state governments, local governments and other federal organizations. The appendices for the study are listed and described below.

A. **INTERVIEWEES FOR GROUND-WATER REQUIREMENTS ANALYSIS ...** presents a list of study interviewees.

B. **DOCUMENTS REVIEWED FOR GROUND-WATER REQUIREMENTS ANALYSIS ...** provides a bibilography of the documents reviewed for the study.

C. **LIST OF KEY GROUND-WATER DATA ELEMENTS ...** displays the list of key ground-water data elements and includes those elements most frequently mentioned by program managers and field personnel as useful in supporting program decisions.

D. **USE OF GROUND-WATER DATA ELEMENTS BY PROGRAM ...** provides a chart for each major EPA program which details the type of data required and its specific application.

E. **KEY DECISIONS THAT REQUIRE GROUND-WATER DATA ...** identifys the key decisions EPA and states make that require ground-water data. For each program this appendix provides a brief description of the program decision(s), a data flow chart and the associated information management requirements needed in support of the decision.

F. **QUESTIONS AND ANSWERS ABOUT GROUND-WATER DATA MANAGEMENT ISSUES BY PROGRAM ...** describes, in a convenient question and answer format, the need for ground-water data for each major EPA program.

G. **DATA REQUIREMENTS CASE STUDIES ...** provides two detailed case studies which document the use of ground-water data required to make a major program decision.

Appendix A -

Interviewees For Ground-Water Requirements Analysis

APPENDIX A
INTERVIEWEES FOR GROUND-WATER REQUIREMENTS ANALYSIS

EPA Headquarters

Francoise Brasier	Office of Drinking Water
Mike Callahan	Office of Toxic Substances
Stuart Cohen	Office of Pesticide Programs
Sam Conger	Office of Information Resources Management
Tom Dixon	Office of Pesticide Programs
Brendan Doyle	Office of Policy, Planning and Evaluation
Catherine Eiden	Office of Pesticide Programs
James Falco	Office of Environmental Processes and Effects Research
Dave Fege	Office of Waste Programs Enforcement
Mike Flynn	Office of Solid Waste
Duane Geuder	Office of Emergency and Remedial Response
Loren Hall	Office of Toxic Substances
Penny Hansen	Office of Underground Storage Tanks
Bill Hanson	Office of Emergency and Remedial Response
Ron Hoffer	Office of Ground-water Protection
Russ Kinnerson	Office of Toxic Substances
Arnold Kuzmack	Office of Drinking Water
Fred Lindsey	Office of Environmental Engineering and Technology
A.W. Marks	Office of Drinking Water
Vernon Myers	Office of Solid Waste
Annette Nold	Office of Toxic Substances
Robert Raucher	Office of Policy, Planning and Evaluation
Peter Truitt	Office of Management Systems and Evaluation
Burnell Vincent	Office of Solid waste and Emergency Response

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Donn Viviani	Office of Policy, Planning and Evaluation
Karen Wardzinski	Office of General Counsel
Cheryl Wasserman	Office of Enforcement and Compliance Monitoring
Louise Wise	Office of Solid Waste and Emergency Response
Robert Wolcott	Office of Policy, Planning and Evaluation

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INTERVIEWEES FOR GROUND-WATER REQUIREMENTS ANALYSIS

EPA Regions and Labs

Region I (Boston)

Ken Blumberg	Hazardous Waste Management Division
Joel Blumstein	Office of Regional Counsel
Greg Charest	Water Management Division
David Chin	Water Management Division
Steve Harrington	Hazardous Waste Management Division
Doug Heath	Water Management Division
Peter Karalekas	Water Management Division
Harold Kazmaier	Air Management Division
Maggie Leshen	Waste Management Division
Gerry Levy	Air Management Division
Mike MacDougal	Management and Planning Division
Ethan Mascoop	Management and Planning Division
Joe DeCola	Water Management Division
Mike Richardi	Management and Planning Division
Bruce Rosinoff	Water Management Division
Michael Thomas	Office of Regional Counsel

Region III (Philadelphia)

Peter Schual	Hazardous Waste Management Division

Region IV (Atlanta)

Jim Bloom	Water Management Division
Craig Campbell	Office of General Counsel
George Collins	Environmental Services Division
Daylor Connor	Office of Policy and Management

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INTERVIEWEES FOR GROUND-WATER REQUIREMENTS ANALYSIS

Randall Davis	Office of Policy and Management
Jesse Dooley	Office of Policy and Management
Dave Engle	Office of General Counsel
Curt Fehn	NPDES Program
Rita Ford	RCRA Program
Debbie Godfrey	Drinking Water Program
George Harlow	RCRA Program
Will Holsomback	Environmental Services Division
Bob Howard	Environmental Assessment Branch
John Mann	Superfund Program
Ron McCullick	Ground-water Section
Jim Patrick	NPDES Program
Gil Wallace	NPDES Program
Kent Williams	Air, Pesticides and Toxic Management Division

Region V (Chicago)

Dorothy Ademier	Office of Regional Counsel
Gilbert Alvarez	Water Division
Ihsan Eler	Environmental Services Division
Roger Field	Office of Regional Counsel
Bill Franz	Environmental Assessment Group
Steven Goranson	Environmental Services Division
Kathy Guerra	Environmental Assessment Group
Bill Melville	Environmental Services Division
John Peterson	Underground Injection Control Program
Pranas Pranckevicius	Great Lakes National Program Office
Phyllis Reed	Environmental Services Division

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INTERVIEWEES FOR GROUND-WATER REQUIREMENTS ANALYSIS

Stuart Ross	STORET Regional Representitive
Robert Schaeffer	Office of Regional Counsel
Dave Segal	RCRA and Superfund Programs Office
J.P. Singh	Environmental Services Division
Katherine Stone	Environmental Services Division
Hung Tran	RCRA and Superfund Programs Office
Dave Yeskis	RCRA and Superfund Programs Office

Region VII (Kansas City)

Diana Bailey	Waste Management Division
Norm Crisp	Environmental Services Division
Robert Dona	Environmental Services Division
Bob Fenemore	Air and Toxics Division
Gerald Foree	Water Management Division
Kerry Herndon	Waste Management Division
Paul Hirth	Administrative and Information Management Branch
Tom Holloway	Environmental Services Division
Angela Ludwig	Water Management Division
Jacquelyn Schlachter	Water Management Division
Bob Steiert	Water Management Division
Dan Vallero	Program Integration Branch
Jane Werholtz	Office of Regional Counsel
Steve Wilhelm	Waste Management Division
Glenn Yeager	Environmental Review Branch

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Region IX (San Francisco)

Paul Blais	Toxics and Waste Management Division
John Cooper	Office of Regional Counsel
Kent Kitchingman	Office of Program Management
Nate Lau	Waste Management Division
Kathleen Shimmin	Toxics and Waste Management Division
Terry Stumph	Office of Program Management
Bill Thurston	Waste Management Division
Barbara Walsh	Toxics and Waste Management Division
Bill Wilson	Toxics and Waste Management Division
Eric Wilson	Water Management Division
Laura Yoshii	Toxics and Waste Management Division

Region X (Seattle)

David Dabroski	Regional Counsel
Anita Frankel	Toxics and Pesticides
Dave Heineck	Regional Counsel
Barbara Littler	Regional Counsel
Jerry Opatz	Drinking Water and UIC Programs
Jim Peterson	Data Systems
Leslie Sacha	Toxics and Pesticides
Harold Scott	Drinking Water and UIC Programs
Chuck Shenk	Toxics and Pesticides
Clark Smith	EIS and Federal Facilities
Randy Smith	RCRA and Superfund
Dan Steinborn	EIS and Federal Facilities
Fred Wolf	Environmental Services Division

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INTERVIEWEES FOR GROUND-WATER REQUIREMENTS ANALYSIS

Larry Worley	Drinking Water and UIC Programs

Las Vegas Environmental Monitoring Systems Laboratory

Thomas Mace	Lockheed Engineering and Management Services Company
Gene Meier	Office of Research and Development
J. Gareth Pearson	Office of Research and Development
Ann Pitchford	Office of Research and Development
Ross Plumb	Lockheed Engineering and Management Services Company

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INTERVIEWEES FOR GROUND-WATER REQUIREMENTS ANALYSIS

States

Arizona

Charles Graf	Arizona Department of Health Services
Rob Genualdi	Arizona Department of Water Resources
Arthur Hellerud	Arizona Department of Health Services
Edwin Swanson	Arizona Department of Health Services

California

Jeffrey Barnickol	California State Water Resources Control Board
Kit Custis	California State Water Resources Control Board
Marilu Habel	California Department of Conservation
Dawn Lieginger	California Department of Health Services
Susan Nicasia	California Department of Food and Agriculture
Bob Reid	California Department of Conservation
Edwin Ritchie	California Department of Water Resources
David Storm	California Department of Health Services
John Youngerman	California State Water Resources Control Board

Connecticut

Ray Jarema	Connecticut Department of Health services
Jim Murphy	Connecticut Department of Environment Protection
Ed Parker	Connecticut Department of Environment Protection
Elsie Patton	Connecticut Department of Environment Protection
Bob Smith	Connecticut Department of Environment Protection
Hugo Thomas	Connecticut Department of Environment Protection

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INTERVIEWEES FOR GROUND-WATER REQUIREMENTS ANALYSIS

Ronald Waghorn	Connecticut Department of Environment Protection

Georgia

Ken Davis	Georgia Department of Natural Resources
Ted Jackson	Georgia Department of Natural Resources
Bill Mason	Georgia Department of Natural Resources
Jim Setser	Georgia Department of Natural Resources

Florida

Julie Baker	Dade County Division of Environmental Resources Management
Bill Brandt	Dade County Division of Environmental Resources Management
Ed Gancher	Dade County Division of Environmental Resources Management
Jim Labowski	Dade County Division of Environmental Resources Management
Carl Pfaffenberger	Dade County Division of Environmental Resources Management
Joe Stillwell	Dade County Division of Environmental Resources Management
Doug Yoder	Dade County Division of Environmental Resources Management

Illinois

Ross Brower	Illinois State Geologic Survey
Mary Burns	Illinois Environmental Protection Agency
Louallyn Byus	Illinois Environmental Protection Agency
Robert Clarke	Illinois Environmental Protection Agency
Rick Cobb	Illinois Environmental Protection Agency
Rob Crumb	Illinois State Geologic Survey
Wendy Garrision	Illinois State Public Water Survey

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INTERVIEWEES FOR GROUND-WATER REQUIREMENTS ANALYSIS

Mark Haney	Illinois Environmental Protection Agency
Anita Johnson	Illinois State Public Water Survey
Jim Kirk	Illinois State Public Water Survey
Christina Komadina	Illinois State Public Water Survey
Monte Nienkerk	Illinois Environmental Protection Agency
John Schmidt	Illinois Environmental Protection Agency
Susan Schock	Illinois State Public Water Survey
J. Stephen Van Hook	Illinois Environmental Protection Agency

Massachusetts

Boyd Allen	Massachusetts Department of Environmental Quality Engineering
Dodi Brownlee	Massachusetts Department of Environmental Quality Engineering
Lynn Chappel	Massachusetts Department of Environmental Quality Engineering
Jeff Charmann	Massachusetts Department of Environmental Quality Engineering
Roy Crystal	Massachusetts Department of Environmental Quality Engineering
Yvette DePeiza	Massachusetts Department of Environmental Quality Engineering
James Doucette	Massachusetts Department of Environmental Quality Engineering
Ken Hague	Massachusetts Department of Environmental Quality Engineering
Steve Johnson	Massachusetts Department of Environmental Quality Engineering
Jim O'Brien	Massachusetts Department of Environmental Quality Engineering
Steve Roy	Massachusetts Department of Environmental Quality Engineering
Rose Stanley	Massachusetts Department of Environmental Quality Engineering

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Minnesota

Calvin Alexander	University of Minnesota
Patricia Bloomgren	Minnesota Department of Natural Resources
Bruce Blanon	Minnesota Geologic Survey
Paul Book	Minnesota Pollution Control Agency
Linda Bruemmer	Minnesota Pollution Control Agency
Greg Buzicky	Minnesota Department of Agriculture
Dick Clark	Minnesota Department of Health
Tom Clark	Minnesota Pollution Control Agency
Gary Englund	Minnesota Department of Health
Nile Fellows	Minnesota Pollution Control Agency
Joe Gibson	Minnesota Department of Natural Resources
Paul Gondreault	Minnesota Pollution Control Agency
Roman Kanivetsky	Minnesota Geologic Survey
Tom Klasius	Minnesota Department of Health
Patrick Mader	Minnesota Pollution Control Agency
Susanne Maeder	Minnesota State Planning Agency
Jim Nye	Minnesota Department of Health
Gary Oberts	Metro Council
Frank Patco	Minnesota Department of Transportation
Dave Patterson	Minnesota Department of Transportation
Steven Ring	Minnesota Department of Health
Gretchen Sabel	Minnesota Pollution Control Agency
Susan Schreifels	Minnesota Pollution Control Agency
Ron Thompson	Minnesota Department of Health
Tim Wahl	Minnesota Geologic Survey

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Orbbie Webber	Minnesota Pollution Control Agency
Mike Wiltfang	Minnesota Pollution Control Agency

Missouri

Gregory Easson	Missouri Department of Natural Resources
John Howland	Missouri Department of Natural Resources
Stan Jorgenson	Missouri Department of Natural Resources
Cathy Primm	Missouri Department of Natural Resources

Nebraska

Don Hood	Nemaha Natural Resources District

New Jersey

Bob Berg	New Jersey Department of Environmental Protection
Terry Beym	New Jersey Department of Environmental Protection
Gail Carter	New Jersey Department of Environmental Protection
Lisa Diaz	New Jersey Department of Environmental Protection
Paul Galek	New Jersey Department of Environmental Protection
Carol Graff	New Jersey Department of Environmental Protection
Andrew Hildick-Smith	New Jersey Department of Environmental Protection
Dirk Hoffman	New Jersey Department of Environmental Protection
Vincent Manaco	New Jersey Department of Environmental Protection
Georgia Moreno	New Jersey Department of Environmental Protection

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INTERVIEWEES FOR GROUND-WATER REQUIREMENTS ANALYSIS

New York

Ron Green	Suffolk County Department of Health
John (Dave) Wirenius	Suffolk County Department of Health

South Carolina

Jim Ferguson	South Carolina Department of Health and Environmental Control
Barry Langley	South Carolina Department of Health and Environmental Control

Texas

Richard Anderson	Texas Water Commission
Bernard Baker	Texas Water Development Board
Ron Berry	Texas Water Commission
Tom Berkhower	Texas Water Commission
Clyde Bohmfalk	Texas Water Commission
Bruce Fink	Texas Water Commission
Thomas Fox	Edwards Underground Water District
Russ Kimble	Texas Water Commission
Van Kozak	Texas Department of Agriculture
Charles Maddox	Texas Department of Public Health
Sam McCulloch	Texas Natural Resources Information Staff Systems Central
Leonard Mohrmann	Texas Department of Health
Tom Roth	Texas Water Commission
Greg Tripple	Texas Water Commission
Jim Walker	Texas Railroad Commission
John Wilson	Texas Water Commission

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Utah

Robert Barnes	Department of Health
Mack Croft	Department of Health
Loren Morton	Department of Health

Virginia

Elizabeth Campbell	Virginia Department of Mines, Minerals and Energy
Thomas Gray	Virginia Department of Health
Evans Massie	Virginia Department of Health
Jerry Samford	Virginia Department of Health
P.J. Smith	Virginia Water Control Board
Jan Zentmeyer	Virginia Department of Mines, Minerals and Energy

Washington

John Aden	Washington Department of Social and Health Services, Public Water Supply Program
Barbara Carey	Washington Department of Ecology, Water Quality Investigation
Pam Covey	Washington State Department of Ecology, Manchester Laboratory
Mike Gallagher	Washington Department of Ecology, Superfund Program
Jim Griffith	Washington Department of Ecology, UIC Program
Bob James	Washington Department of Ecology, Water Quality Investigation
Peggy Johnson	Washington Department of Social and Health Services, Public Water Supply Program
Jim Knudson	Washington Department of Ecology, Solid Waste Section

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INTERVIEWEES FOR GROUND-WATER REQUIREMENTS ANALYSIS

Dave Peeler	Washington Department of Ecology, Water Resources/Ground-Water Management Areas
Beth Rowan	Washington Department of Ecology, Water Quality Management and Evaluation
Derek Sandison	Tacoma-Pierce County Health Department, Water Resources and Chemical/Physical Hazards
Melanie Saunders	Washington Department of Ecology, Superfund Program
Linton Wildrick	Washington Department of Ecology, Water Resources/Ground-Water Management Areas

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Other

Brookhaven National Laboratory

Ed Kaplan

Ann Meinhold

NASA

Tom Cheng	National Aeronautics Space Technological Laboratories
Billie Edwards	National Aeronautics Space Technological Laboratories
Gary Irish	Lockheed Engineering and Management Services Company
Ronnie Pearson	National Aeronautics Space Technological Laboratories
Bruce Spriering	National Aeronautics Space Technological Laboratories
Dr. Charles Whitehurst	National Aeronautics Space Technological Laboratories

Nuclear Regulatory Commission

Tom Nicholson	Office of Nuclear Regulatory Research
Mike '' ›er	Office of Nuclear Materials Safety and Safeguards

Suffolk County (New York State) Water Authority

Bob Dassler	Suffolk County Water Authority
Pat Dugan	Suffolk County Water Authority
Ronald Green	Department of Health Services
Bill Schickler	Suffolk County Water Authority
John Stonebanks	Suffolk County Water Authority
David Wirenius	Suffolk County Department of Health Services

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INTERVIEWEES FOR GROUND-WATER REQUIREMENTS ANALYSIS

U.S. Air Force Occupational and Environmental Health Laboratory

Richard Anderson

Dr. John Yu

U.S. Army Environmental Hygiene Agency

John Bauer	Ground-water and Solid Waste Branch
Beth Martin	Ground-water Monitoring Program

U.S. Army Toxic and Hazardous Materials Agency

Andrew Anderson

Wayne Bushell

Lloyd Holly

Robert Metzger

Gregory Parker

Ron Roberts

Allen W. Shatto

Warren Wortman

U.S. Geologic Survey

Headquarters (Reston, VA)

Bob Laney

Don Leifeste

Art Putnam

Steve Ragone

Jim Schornich

Owen Williams

Illinois

Cathy Fitzgerald

Barbara Ryan

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INTERVIEWEES FOR GROUND-WATER REQUIREMENTS ANALYSIS

Marvin Cheryl

Dave Voelker

Minnesota

Don Albin

Lee Trotta

U.S. Soil Conservation Service

Dennis Erinakes

Jim Hyland

Appendix B -

Documents Reviewed For Ground-Water Requirements Analysis

DOCUMENTS REVIEWED FOR GROUND-WATER REQUIREMENTS ANALYSIS

1) William F. McTernan, Draft Users Manual Data Sources and Select Applications for Ground-Water Quality Management, AAAS/EPA Environmental Sciences and Engineering Fellow, Summer 1985

2) OGWP, A Ground-Water Monitoring Strategy for the U.S. Environmental Protection Agency, (Draft) November 1985

3) Region 5, Water Division, A Manual for Evaluating Predicted and Actual Impacts of Construction Grants Projects, (Appendix A important), January 1985

4) OGWP, Resource Document for the Ground-Water Strategy Workshop

5) NASA Earth Resources Laboratory, Agricultural Land Cover Mapping in the Context of a Geographically Referenced Digital Information System, March 1982

6) Battelle, Application of Ground-Water Modeling Technology for Evaluation of Remedial Action Altenatives Western Processing Site, Kent, Washington, (Draft) Prepared for ORD, September 1984

7) Memo Ground-Water Data Management, April 1, 1985

8) Brookhaven National Laboratory, Guidebook for the Assembly and Use of Diverse Ground-Water Data, (Draft) Prepared for ORD, April 1985

9) RCRA Ground-Water Monitoring Technical Enforcement Guidance Document, (Draft)

10) DiNivo and Jaffe, Local Ground-Water Protection

11) Joe Franzmathes, Memo: Summary of January 8 and 9 Data Meeting, January 15, 1986

12) STORET Manual, (Draft)

13) ODW, Analysis of Ground-Water Monitoring Strategies and Programs, December 1984

14) Illinois Department of Energy and Natural Resources, Design of a Statewide Ground-Water Monitoring Network for Illinois, December 1984

15) Proceedings of Data Management Workshop Region V, October 29-30, 1985

16) Lee Braem, Region 5, Memo: Ground Water Data Management: Summary of State Activities, May 10, 1984

17) Bob Hilton, Region 5, Minutes for the Data Base Management Work Group Region 5, Region 5 Ground Water Data Management Survey: General and Program Specific Findings, December 1984
Recommendations for a Region 5 Ground Water Data Management System

18) William Melville, Region 5, Memo: Data Management Activities, May 1, 1985

19) Minnesota Pollution Control Agency, Requirements Analysis and Conceptual Design for the Intergrated Ground Water Information System of the Minnesota Pollution Control Agency, August 30, 1985

20) Brookhaven National Laboratory, Assessing Aquifer Impacts from Diverse Surveillance Data, (GIS Demonstration), December 10, 1984

21) EPA, Ground-Water Data Management, (Flyer on STORET), August 1985

22) Wyoming Water Research Center, WRDS: A User's Guide to the Water Resources Data System, September 1984

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25) USGS, A Land Use and Land Cover Classification System for Use with Remote Sensor Data, 1976

26) ESRI Geographic Information Software Descriptions

27) US Army Corps of Engineers & Soil Conservation Service, An Interactive Soils Information System Users Manual, September 1983

28) New Jersey Department of Environmental Protection, The Integrated Ground-Water Monitoring Strategy Evaluation Document: Existing Ground Water Data Base Systems, January 1983 (2 parts)

29) HWGWTF, Ground-Water Data Management, (2 parts) December 1985

30) STORET On-Line Documentation System PGM=LOC

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32) STORET, Announcing STORET to SAS

33) STORET On-Line Documentation System FILE FORMATS

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35) STORET: EPA's Computerized Water Quality Data Base (Flyer)

36) STORET User Handbook: Part OV Overview

37) STORET User Handbook: Part WQ Water Quality File

38) Manager's Guide to STORET

39) HWDMS: Operations Manual for the December PDP 11/70, November 1985

40) HWDMS, Data Base Specification (Draft)

41) Hazardous Waste Data Management System Functional Requirements Manual Vol 1

42) HWDMS, System Subsystem Manual (Draft)

43) HWDMS, Data Dictionary (Computer Printout)

44) STORET: Water Quality Control Information System

45) STORET On-Line Documentation System REACH RETRIEVAL

46) OGWP, Ground-Water Protection Strategy, August 1984

47) EPA Journal Reprint, Protecting Ground Water: The Hidden Resource, August 1984

48) OGWP, Selected State and Territory Ground-Water Classification Systems, May 1985

49) OPA, Protecting Our Ground Water, (Flyer) September 1985

50) OGWP, A Ground Water Monitoring Strategy for the U.S. Environmental Protection Agency, (draft) September 1985

51) The Conservation Foundation, America's Water: Current Trends and Emerging Issues, 1984

52) HWDMS User's Manual, Version 6.5

53) HWDMS Screen Entry Manual, Version 6.5

54) Environment Reporter, EPA Proposed Standards Under RCRA to Control Tanks for Storage, Treatment of Hazardous Waste, 7/12/85

55) Notheast-Midwest Senate Coalition, Gasoline and Ground-Water Contamination, July 1985

56) Groundwater Technology, Hydrocarbon Contamination of Ground Water: Assessment and Abatement, (Senate Hearings) March 1984

57) Ground-Water Contamination Hearings, (Senate) November 1983

58) HWDMS Training Manual, Version 6.5

59) TSCA Ground-Water Protection Strategy, October 25, 1985

60) RCRA Groundwater Enforcement Strategy, July 22, 1985

61) Safe Drinking Water Act Amendments of 1985 and Other Pending Ground-Water Legislation, (Folder of materials)

62) Pierce County, Washington, Data Management System

63) Region V, Ground-Water Data Management Questionnaire

64) Region III, Criteria Used for Developing a State Ground Water Management System as Developed at the Groung Water Data Management Workshop, February 27-28, 1986

65) OGWP, Guidance for FY 1986 State Ground-Water Grant Work Programs, May 1985

66) OGWP, Guidance for FY 1987 State Ground-Water Grant Work Programs, March 1986

67) NATICH Data Base Users Guide for Data Viewing, September 1985

68) Dames & Moore, WATDAT: Groundwater Data Management System, Version 2.0

69) OGWP, Proceedings of a National Symposium on Institutional Coordination for Ground Water Pollution Control, October 21-22, 1985

70) Richard Johnson, Notes on Conference: Local Goverment Options for Ground Water Pollution Control, January 16-17, 1986

71) Miscellaneous Background Readings on Ground Water, (Folder of Papers from Tom Kern)

72) USGS, Basic Ground-Water Hydrology, 1983

73) USGS, A Primer on Ground Water, 1963

74) USGS, Application of Surface Geophysics to Ground-Water Investigations, 1984

75) USGS, Ground-Water Regions of the United States, 1984

76) USGS, A Data-Magement System for Use in Ground-Water Modeling and Resource Evaluation, March 1984

77) USGS, An Assessment of the Collection and Analysis of Hydologic Data by Private Contractors for the USGS

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80) USGS, A Statistical Summary of Data from the U.S. Geologic Survey's National Water Quality Networks, June 1983

81) USGS, U.S. Geologic Survey Toxic Waste -- Ground-Water Contamination Program -- Fiscal Year 1983, 1984

82) WWJ, Well Logs, May 1986

83) Steven Wassersug, Region 3, Memo: OSWER Information Management Steering Committee Concerns Regarding STORET Water Quality Data System, (Series of Memos) May 1986

84) "State Regulations and Monitoring Activities"

85) Marian Mlay, Memo, Implementation of the Ground-Water Provisions of the SDWA, June 24, 1986 (Includes Fact Sheet and Program Development Plan for the SDWA Admendments of 1986)

86) Office of the Comptroller, SDWA: Program Offices' Requests and OC Recommendations (briefing)

87) Safe Drinking Water Act Amendments of 1986

DOCUMENTS FROM FIELD INTERVIEWS

Arizona

- Ground-Water Forms
- Groundwater STORET Parameters and their Usage
- Status of Arizona's Water Quality: Surface Water and Groundwater, March 26, 1986
- Using the Ground Water Site Inventory File On-Line System, January 23, 1984
- Water Quality Standards for Waters of the State
- Iterim Water Quality Criteria: Carcinogenic Volatile Organic Chemicals and Pesticides
- Pesticides with Groundwater Pollution Potential in Arizona, May 31, 1982
- State of Arizona Five-Year Water Quality Monitoring Stategy Water Year 1984-88
- Oak Creek Water Quality Data Summary and Intensive Survey Design
- State of Arizona Groundwater Quality Protection Permit Program

U.S. Army

- USAEHA System Outputs
- USAEHA Groundwater monitoring program sample chain of custody form
- USAEHA groundwater sampling field data logsheet form
- USAEHA Mission Description
- USAEHA Comments on the Draft Ground-Water Technical Enfocement Guidance Document
- USATHAMA Briefing Installation Restoration Program
- USATHAMA Installation Restoration Data Management User's Guide -- Version 85.6; Section 3, Alphabetical Definition by Field

Brooks AFB

- GAO, Hazardous Waste: Status of Air Force's Installation Restoration Program, December 1985
- Data Fields (Computer Printout)
- Information Management System (IRPIMS), Volume 1. Presurvey Report, March 1985
- Information Management System (IRPIMS), Volume 2. Appendices, March 1985
- Information Management System (IRPIMS), Volume 1. System Requirements, Description, and Specifications, February 27, 1986
- Information Management System (IRPIMS), Volume 4. Standard Operating Procedures, Guidelines, and Data Collection and Reporting Methodologies, February 24, 1986

California

- Department of Water Resources, Water Well Drillers Report (Form)
- Some Specific Potential Uses of the Proposed CALIFORNIA GROUND WATER PROGRAM INFORMATION DIRECTORY as Suggested by Potential Users
- California Underground Storage Tank Regulations, August 1985
- Agriculture Pesticide Residues in California Well Water: Development and Summary of a Well Inventory Data Base for Non-Point Sources, July 1985
- Outputs form the Water Data Information System, Department of Water Resources

Connecticut

- Connecticut Solid and Hazardous Waste Land Disposal Siting Policy October 1981
- Protecting Connecticut's Groundwater: A Guide to Groundwater Protection for Local Officials
- Connecticut Water Quality Monitoring Requirements (Parameters, Sampling Location and Frequency for Drinking Water Contaminants)
- List of Laboratories in Connecticut Certified for Drinking Water Analysis on a Fee for Service Basis (Certification for Pesticides VOC's, EDB and Radiation Included)
- Pamphlet: Protection Our Groundwater, What Every Community can Do

- o Proposed Use of ARC/INFO in Pilot Areas of Connecticut

Florida

- Groundwater Quality Monitoring Program Dade Co. Florida
- Dade County DERM Lab Water Projects List
- Ground and Surface Water Monitoring Programs 1981, Dade County Dept. of Environmental Resources Management
- Water Monitoring Program for the Northwest Wellfield (Wellfield Protection Program)
- Ojective of Dade County Groundwater Monitoring Network Including Parameters Sampled, Well Inventory Data Elements and Sample Protocol Data Elements
- Computer Code Values and Descriptions for Groundwater Monitoring Network

U.S. Geological Survey

Illinois Field Office

- Fact Sheets
  - -- NAWDEX: Key to Finding Water Data
  - -- USGS Groundwater Data Collection Form: Site Schedule
  - -- National Water-Use Information Program
  - -- Toxic Waste Ground-water Contamination
  - -- Regional Aquifer Systems of the United States
  - -- Water-Data Program

Georgia

- A Ground Water Management Plan for Georgia
- Laboratory Analysis Sheet
- Georgia Department of Natural Resources, Rules and Regulations for Groundwater Use

Illinois

- Underground Water in Illinois
- Water Resource Activities in Illinois, 1985
- Fields in Illinois Geologic Survey Basic Well Data File
- Illinois Water Inventory Program File Format

- Overview of the Illinois State Water Survey and Computer Systems
- Description of Aquifer Coding
- Well Location Template
- Well Location Sample Computer Printout
- Overview of Illinois SAFE Computer System
- Ill Division of Public Water Supplies, Facility Inventory and Compliance System Data Collection Form
- IEPA Organization Chart
- IEPA, Div of Land Pollution Control (RCRA): Instructions for Completing Chemical Analysis Forms
- Illinois Water Inventory Program 1985 Questionnaire

Las Vegas Lab

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Nebraska

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- Underground Injection Control Technical Assistance Manual
- Underground Injection Operations in Texas
- UIC Data Types: Example Computer Output from TX UIC System
- Water Well Driller Log Report Data Collection Form
- Overview of TX Ground Water Protection and Data Management
- Groundwater Data Interface File Analysis (Summary of Groundwater Data Files)
- TNRIS Ground-water Data Committee Recommendations for an Automated Ground-Water Data Interface System
- State Agency Responsibilities for Groundwater Protection

Virginia

- Water Well Completion Report (Form)
- Ground-Water Related Programs in Virginia
- Field and Laboratory Data (Form)

- Underground Injection Control Technical Assistance Manual
- Underground Injection Operations in Texas
- UIC Data Types: Example Computer Output from TX UIC System
- Water Well Driller Log Report Data Collection Form
- Overview of TX Ground Water Protection and Data Management
- Groundwater Data Interface File Analysis (Summary of Groundwater Data Files)
- TNRIS Ground-water Data Committee Recommendations for an Automated Ground-Water Data Interface System
- State Agency Responsibilities for Groundwater Protection

Virginia

- Water Well Completion Report (Form)
- Ground-Water Related Programs in Virginia
- Field and Laboratory Data (Form)

Appendix C -
List of Key Ground-Water Data Elements

LIST OF KEY GROUND-WATER DATA ELEMENTS

WELL DESCRIPTORS

- Well location
  - -- lat./long
  - -- FIPS County code
  - -- UTM coordinates
  - -- legal description
  - -- town, range, section, quarter
  - -- state grid system
  - -- site specific numbering system

- Water level data
  - -- depth to water as referenced from a standard well fixture (e.g., top of casing)
  - -- Date of water level sample

- Depth to ground-water

- Aquifer code

- Water quantity
  - -- pump rates
  - -- aquifer yield
  - -- pumping schedule

- Availability of geophysical log

- Availability/content of well drillers log (to collaborate existance of wells in area of review)

- Well characteristics
  - -- date of construction
  - -- name of driller
  - -- well type (e.g., irrigation, drainage, industrial supply, domestic, public production, recharge, monitoring or other)
  - -- well elevation from top of casing or other standard fixture (to aid in determination of gradient)
  - -- well purpose (e.g., RCRA, SF, DW, Injection)
  - -- construction method (e.g., air rotary, bored, augered, cable tool, hydrologic rotary, jetted, air percussion, reversed piston, rotary, submersible, turbine, unknown or other)
  - -- casing material (e.g., PVC, teflon, ABS, brick, concrete, copper, steel, rock or stone, other)
  - -- screen characteristics
    number of screens
    depth to screen
    materials (e.g., ABS, brass, galvanized iron, wrought iron, black iron, TBC, stainless steel, teflon, tile, other)
  - -- screen size (e.g., width(s), slot size)

- Well status
  - -- abandoned
  - -- flowing (active, inactive)
  - -- non-flowing
  - -- plugged (depth of plug, type of plug)

HYDROGEOLOGIC DESCRIPTORS

- Geologic structure (e.g. Karst region)

- Aquifer characterization
  - -- location
  - -- aquifer description (e.g., confined, unconfined; thickness, depth to water table, stratigraphy, lithology, net recharge, hydraulic parameters of aquifers: transmissivity, permeability porosity, conductivity)

- Topography
  - -- location of discharge and recharge areas
  - -- surface water flow pattern(s)

- Soils
  - -- horizon
  - -- depth
  - -- group/type
  - -- physical/chemical attributes (e.g., permeability, transmissivity porosity, other)

WATER QUALITY/SAMPLE DESCRIPTORS

- Sample identifiers
  - -- name of collecting agency
  - -- name of analyzing agency
  - -- name of laboratory
  - -- date sample taken
  - -- submitting agency code

- Sample protocol
  - -- number of well volumes removed prior to sampling
  - -- method of retrieving sample (e.g., air lift pump, submersible pump, bailer)
  - -- Sample procedure (e.g., USGS sample procedure, state sample protocol)

- Sampling type
  - -- grab
  - -- split sample
  - -- 24, 12, 8, or 6 hour composite
  - -- reason for sample

- Analytic method
  - -- USGS standards
  - -- EPA standards (DW, RCRA, SF)
  - -- local agency standards
  - -- instrument calibration
  - -- detection limit (zero not sufficient)
  - -- standard method code
  - -- QA/QC code

- Water quality (e.g., parametric data)
  - -- standard chemical parameter codes for hazardous constituents
  - -- unit of measurement (e.g., parts per million, billion)

RELATED DATA

- Location of other regulated facilities (e.g., RCRA, SF, Small quantity generators, ground water discharge permit holders)

- Other point/non-point sources contamination
  - -- agriculture
  - -- septic tanks
  - -- land applications of waste
  - -- highway network
  - -- oil/gas pipelines
  - -- urban runoff

- Site descriptors
  - -- site location (e.g., address, lat/long)
  - -- wastes found on site
  - -- wastes injected
  - -- name of site owner
  - -- agency responsible for oversight/cleanup
  - -- number of wells on site
  - -- sources of onsite contamination (e.g., surface impoundments, storage tanks)

- Location of other wells

- Land use/land cover classification (e.g. ground cover)

- Demographic information

- Meteorological data
  - -- precipitation
  - -- evapotranspiration
  - -- site temperature

- Health effects
  - -- toxicology
  - -- exposure and risk assessment (e.g., exposure profiles, dietary risk assessment, bioaccumulation)

- Environmental fate
  - -- chemical fate and transport
  - -- chemical persistence

Appendix D -

Use of Ground-Water Data Elements By Program

RCRA Program Actions Which Require Ground-water Data

DATA TYPES	PROGRAM ACTIONS AND RESPONSIBILITIES				COMMENTS
• Well Descriptors • Hydrogeologic Descriptors • Water Quality/Sample Descriptors • Related Data	Facility Permitting Responsibility: State, Region	Ground-Water Monitoring Responsibility: State, Region	Corrective Actions Responsibility: State, Region	Post-closure Monitoring Responsibility: State, Region	Legend: ● Primary Data ○ Nice to Have
Well Descriptors					
Well location, e.g., - latitude/longitude - FIPS county code	●	●	●	●	Needed to geographically/legally identify the source of the sample. Necessary when modelling contaminant plume direction and dispersion.
Depth to ground water	●	○	●	○	Needed to determine from which aquifer the sample was taken.
Availability/content of well log	○		○		Can be important in corrective action where as much hydrogeologic data as possible is sought (e.g., subsurface stratigraphy).
Well characteristics, e.g., - well type - well purpose - construction - elevation - screen size - screen depth	●	○	●	○	Provides enhanced detection/analysis capabilities; well characteristics can influence sample analysis results.
Well status, e.g., - abandoned - flowing	○				Denotes possible source of background water quality data for use in permit process.
Quantity pumped					
Hydrogeologic Descriptors					
Hydrogeologic descriptors, e.g., - geologic structure - aquifer characterization - stratigraphy - topography - soil	●	○	●	○	Needed to evaluate suitability of proposed ground-water monitoring plans and other permit considerations; also used extensively to select appropriate clean-up response and then to evaluate effectiveness of corrective actions.

RCRA Program Actions Which Require Ground-water Data

DATA TYPES	PROGRAM ACTIONS AND RESPONSIBILITIES				COMMENTS
• Well Descriptors • Hydrogeologic Descriptors • Water Quality/Sample Descriptors • Related Data	Facility Permitting Responsibility: State, Region	Ground-Water Monitoring Responsibility: State, Region	Corrective Actions Responsibility: State, Region	Post-closure Monitoring Responsibility: State, Region	Legend: ● Primary Data ○ Nice to Have
Water Quality/Sample Descriptors					
Ground-water quality	●	●	●	●	Needed for all activities.
Sampling type, e.g., - grab - duplicate - split - treated?	●	●	●	●	Needed to correctly interpret ground-water samples taken at a well; helpful in assessing data QA/QC.
Sample identifiers, e.g., - name collecting agency - date and time sample taken	●	●	●	●	Needed to relate a specific sample with prior/future samples; also serves as one indicator for data QA/QC.
Analytic method, e.g., - EPA standards - USGS standards	○	●	○	●	Needed to evaluate a specific sample's effectiveness in identifying contamination; one indicator for data QA/QC.
Related Data					
Location of revelant facilities and wells	●		●		Important for permitting to know if drinking water wells are near facility; in corrective action, needed to identify potential risks to public.
Demographic data	○		●		Used to identify population at risk from spread of contamination.
Other sources of contamination, e.g., - agricultural - septic tanks - highway networks	●		●		Used in permitting to evaluate suitability of location of facility; also, used in permitting to determine impact of facility operation on adjacent population/wells/ etc.; used in corrective action to identify risks to the public and environment.
Site descriptors, e.g., - wastes found on site - wastes injected - site responsibility	●	○	●	○	Important in permitting a TSD facility, reviewing ground-water monitoring plan, and in identifying/implementing corrective actions.
Health Effects data	●		●		Used in permitting and corrective action to determine risk of facility or contamination plume to public and environment.
Environmental fate	●		●		Used in corrective actions to predict extent, flow and behavior of the contaminant plume; also used to evaluate risk to public and environment.

Superfund Program Actions Which Require Ground-Water Data

DATA TYPES	PROGRAM ACTIONS AND RESPONSIBILITIES				COMMENTS
• Well Descriptors • Hydrogeologic Descriptors • Water Quality/Sample Descriptors • Related Data	Emergency Response Actions Responsibility: State, Region	Threat Assessment Actions Responsibility: State, Region	Alternatives Evaluation Responsibility: State, Region	Site Monitoring Actions Responsibility: State, Region	Legend: ● Primary Data ○ Nice to Have
Well Descriptors					
Well location, e.g., - latitude/longitude - FIPS county code	●	●	●	●	Information used in modelling plume direction and dispersion.
Depth to ground water	○	●	●	●	Needed to determine from which aquifer the sample was taken.
Availability/content of well log		○	○	○	Used to verify existence of wells in site review area and help characterize subsurface stratigraphy.
Well characteristics, e.g., - well type - well purpose - construction - elevation - screen size - screen depth			○	●	Descriptors that provide estimates of direction of ground-water flow; location of contaminants; and can influence water quality sample results.
Well status, e.g., - abandoned - flowing					
Quantity pumped					
Hydrogeologic Descriptors					
Hydrogeologic descriptors, e.g., - geologic structure - aquifer characterization - stratigraphy - topography - soil	○	●	●		Data required to conduct site specific hydrogeologic investigations providing information on the rate and direction of ground-water contaminant flow. Identifies recharge and discharge areas.

Superfund Program Actions Which Require Ground-water Data

DATA TYPES	PROGRAM ACTIONS AND RESPONSIBILITIES				COMMENTS
• Well Descriptors • Hydrogeologic Descriptors • Water Quality/Sample Descriptors • Related Data	Emergency Response Actions Responsibility: State, Region	Threat Assessment Actions Responsibility: State, Region	Alternatives Evaluation Responsibility: State, Region	Site Monitoring Actions Responsibility: State, Region	Legend: ● Primary Data ○ Nice to Have
Water Quality/Sample Descriptors					
Ground-water quality	○	●	●	●	Used to determine ground-water quality, identify presence and extent of contamination.
Sampling type, e.g., - grab - duplicate - split - treated?		○	●	●	Information used to identify sampling procedures, responsible sampling authority and analytic methods that meet quality assurance and "chain of custody" requirements.
Sample identifiers, e.g., - name collecting agency - date and time sample taken		●	●	●	Same as above.
Analytic method, e.g., - EPA standards - USGS standards		●	●	●	Same as above.
Related Data					
Location of relevant facilities and wells	○	○	●		Location of PWS and other drinking water wells needed for site evaluation.
Demographic Data	○	○	●		Determines potential population at risk.
Other sources of contamination, e.g., - agricultural - septic tanks - highway networks	○	●	●		Provides useful site contextual information to help identify possible sources of site contamination.
Site descriptors, e.g., - wastes found on site - wastes injected - site responsibility	○	○	●		Knowledge of wastes on-site necessary for sample planning, contaminant identification, and suitability of remedial actions.
Health Effects data	○	●	●		Needed to assess health risk to population.
Environmental fate	○	●	●		Determine chemical degradation, mobility and accumulation.

Underground Storage Tank Program Actions Which Require Ground-water Data*

DATA TYPES	PROGRAM ACTIONS AND RESPONSIBILITIES		COMMENTS
• Well Descriptors • Hydrogeologic Descriptors • Water Quality/Sample Descriptors • Related Data	Enforcement Actions Responsibility: State, Region, Locality	Corrective Actions Responsibility: State, Region, Locality	Legend: ● Primary Data ○ Nice to Have
Well Descriptors			
Well location, e.g., - latitude/longitude - FIPS county code	○	●	Information used in modelling plume direction and dispersion from tank leak.
Depth to ground water	○	●	Needed to determine from which aquifer the sample was taken.
Availability/content of well log	○	○	Used to verify existence of wells in site review area and help characterize subsurface stratigraphy.
Well characteristics, e.g., - well type - well purpose - construction - elevation - screen size - screen depth	○	○	Descriptors that provide estimates of direction of ground-water flow; location of contaminants; and can influence water quality sample results.
Well status, e.g., - abandoned - flowing			
Quantity pumped			
Hydrogeologic Descriptors			
Hydrogeologic descriptors, e.g., - geologic structure - aquifer characterization - stratigraphy - topography - soil	○	○	Data required to conduct site specific hydrogeologic investigations to support corrective action providing information on the rate, direction and quantity of ground-water contaminant flow.

* Regulations for this program are currently in development. Need for ground-water data not clearly defined at this time.

Underground Storage Tank Program Actions Which Require Ground-water Data*

DATA TYPES	PROGRAM ACTIONS AND RESPONSIBILITIES		COMMENTS
• Well Descriptors • Hydrogeologic Descriptors • Water Quality/Sample Descriptors • Related Data	Enforcement Actions Responsibility: State, Region, Locality	Corrective Actions Responsibility: State, Region, Locality	Legend: ● Primary Data ○ Nice to Have
Water Quality/Sample Descriptors			
Ground-water quality	○	●	There are no ground-water monitoring requirements at Federal level. Should a tank leak, this data used to determine ground-water quality, identify presence and extent of contamination.
Sampling type, e.g., - grab - duplicate - split - treated?	○	○	Information used to identify sampling procedures, responsible sampling authority and analytic methods that meet quality assurance concerns.
Sample identifiers, e.g., - name collecting agency - date and time sample taken	○	○	Same as above.
Analytic method, e.g., - EPA standards - USGS standards	○	○	Same as above.
Related Data			
Location of revelant facilities and wells		○	Location of PWS and other drinking water wells needed for threat assessment.
Demographic data	○	○	Determines potential population at risk.
Other sources of contamination, e.g., - agricultural - septic tanks - highway networks	○	○	Provides useful site contextual information to help identify possible sources of site contamination.
Site descriptors, e.g., - wastes found on site - wastes injected - site responsibility	○		Useful in linking ground-water contaminants with substances stored in specific tanks.
Health Effects data			
Environmental fate			

* Regulations for this program are currently in development. Need for ground-water data not clearly defined at this time.

UIC Program Actions Which Require Ground-Water Data*

DATA TYPES	PROGRAM ACTIONS AND RESPONSIBILITIES		COMMENTS
• Well Descriptors • Hydrogeologic Descriptors • Water Quality/Sample Descriptors • Related Data	Permit Actions Responsibility: State, Region	Enforcement Actions Responsibility: State, Region	Legend: ● Primary Data ○ Nice to Have
Well Descriptors			
Well location, e.g., - latitude/longitude - FIPS county code	●	●	UIC permittees must submit location of all wells in area of review. Ready access to this data would speed review of permit application by the regulatory authorities.
Depth to ground water	●	●	Injection zone must be below lower most USDW, except for class IV wells must be flagged 6 months after program in effect.
Availability/content of well log	○		Confirms existence of wells in the area of review.
Well characteristics, e.g., - well type - well purpose - construction - elevation - screen size - screen depth	○		Poor construction of well in area of review could provide pathway for migration of injection wastes.
Well status, e.g., - abandoned - flowing			
Quantity pumped			
Hydrogeologic Descriptors			
Hydrogeologic descriptors, e.g., - geologic structure - aquifer characterization - stratigraphy - topography - soil	●	○	Used to determine suitability of injection formation including size, porosity and permeability of disposal reservoir. Also required to calculate area of endangerment and injection formation pressure.

* There are 5 different classes of UIC wells. Data requirements vary by well class.

UIC Program Actions Which Require Ground-Water Data*

DATA TYPES	PROGRAM ACTIONS AND RESPONSIBILITIES		COMMENTS
• Well Descriptors • Hydrogeologic Descriptors • Water Quality/Sample Descriptors • Related Data	Permit Actions Responsibility: State, Region	Enforcement Actions Responsibility: State, Region	Legend: ● Primary Data ○ Nice to Have
Water Quality/Sample Descriptors			
Ground-water quality	○	○	Ground-water quality data not routinely collected by UIC program. However, a change in background water quality of near-by wells could indicate a leak in an injection well or zone.
Sampling type, e.g., - grab - duplicate - split - treated?			
Sample identifiers, e.g., - name collecting agency - date and time sample taken			
Analytic method, e.g., - EPA standards - USGS standards			
Related Data			
Location of revelant facilities and wells	○		Used to assess possible impact of potential USDW contamination.
Demographic data	○		Same as above.
Other sources of contamination, e.g., - agricultural - septic tanks - highway networks	○		Same as above.
Site descriptors, e.g., - wastes found on site - wastes injected - site responsibility	●	●	Injected wastes are regulated by permit/rule. Recordkeeping of injected wastes is required. Helps link injected wastes with potential contamination incidents.
Health Effects data			
Environmental fate			

* There are 5 different classes of UIC wells. Data requirements vary by well class.

Drinking Water Program Actions Which Require Ground-Water Data

DATA TYPES	PROGRAM ACTIONS AND RESPONSIBILITIES			COMMENTS
• Well Descriptors • Hydrogeologic Descriptors • Water Quality/Sample Descriptors • Related Data	PWS Approval Actions Responsibility: State	Enforcement Actions Responsibility: State, Region/ HQ	MCL Development Actions Responsibility: EPA HQ	Legend: ● Primary Data ○ Nice to Have
Well Descriptors				
Well location, e.g., - latitude/longitude - FIPS county code	●	○		Physical location of PWS wells important to other programs and needed by facility if contamination discovered.
Depth to ground water	●			Needed to determine from which aquifer the sample was taken.
Availability/content of well log	○			Used to characterize subsurface stratigraphy.
Well characteristics, e.g., - well type - well purpose - construction - elevation - screen size - screen depth	●			Useful in correction of contamination problems.
Well status, e.g., - abandoned - flowing				
Quantity pumped	○	○		Useful for regulation of water withdrawals; a related program in many states, (e.g., MN, AZ, GA, etc.).
Hydrogeologic Descriptors				
Hydrogeologic descriptors, e.g., - geologic structure - aquifer characterization - stratigraphy - topography - soil	○	○		Required to conduct hydrogeologic investigation should corrective action be necessary.

Drinking Water Program Actions Which Require Ground-Water Data

DATA TYPES	PROGRAM ACTIONS AND RESPONSIBILITIES			COMMENTS
• Well Descriptors • Hydrogeologic Descriptors • Water Quality/Sample Descriptors • Related Data	PWS Approval Actions Responsibility: State	Enforcement Actions Responsibility: State, Region/ HQ	MCL Development Actions Responsibility: EPA HQ	Legend: ● Primary Data ○ Nice to Have
Water Quality/Sample Descriptors				
Ground-water quality	●	●	○	SDWA requires water quality monitoring "at the tap" for MCLs. Some state programs monitor at the source and analyze the sample for a broader range of contaminants.
Sampling type, e.g., - grab - duplicate - split - treated?	●	○	○	Information used to identify sampling procedures, responsible sampling authority and analytic methods useful to assess data quality.
Sample identifiers, e.g., - name collecting agency - date and time sample taken	●	○	○	Same as above.
Analytic method, e.g., - EPA standards - USGS standards	●	○	○	Same as above.
Related Data				
Location of revelant facilities and wells	○	○		Location of PWS and other drinking water wells useful in detection of contaminant sources.
Demographic data				
Other sources of contamination, e.g., - agricultural - septic tanks - highway networks	○	○		Provides useful site contextual information to help identify possible sources of site contamination.
Site descriptors, e.g., - wastes found on site - wastes injected - site responsibility				
Health Effects data		○	●	Needed to assess health risk to population.
Environmental fate		○	○	Determine chemical degradation, mobility and accumulation.

Pesticide Program Actions Which Require Ground-Water Data

DATA TYPES	PROGRAM ACTIONS AND RESPONSIBILITIES			COMMENTS
• Well Descriptors • Hydrogeologic Descriptors • Water Quality/Sample Descriptors • Related Data	Pesticide Registration Actions Responsibility: EPA HQ	Pesticide Review Responsibility: EPA HQ	Special Review Responsibility: EPA HQ	Legend: ● Primary Data ○ Nice to Have
Well Descriptors				
Well location, e.g., - latitude/longitude - FIPS county code		●	●	Used to establish proximity of contaminant area.
Depth to ground water		○	●	Needed to determine from which aquifer the sample was taken.
Availability/content of well log		○	○	Used to verify existence of wells of interest to pesticide program.
Well characteristics, e.g., - well type - well purpose - construction - elevation - screen size - screen depth		○	●	Descriptors which provide estimates of direction of ground-water flow; location of contaminants and can influence water quality sample results.
Well status, e.g., - abandoned - flowing				
Quantity pumped				
Hydrogeologic Descriptors				
Hydrogeologic descriptors, e.g., - geologic structure - aquifer characterization - stratigraphy - topography - soil	●	●	●	Data used in model applications to determine pesticide ground-water contamination and vulnerability.

Pesticide Program Actions Which Require Ground-Water Data

DATA TYPES	PROGRAM ACTIONS AND RESPONSIBILITIES			COMMENTS
• Well Descriptors • Hydrogeologic Descriptors • Water Quality/Sample Descriptors • Related Data	Pesticide Registration Actions Responsibility: EPA HQ	Pesticide Review Responsibility: EPA HQ	Special Review Responsibility: EPA HQ	Legend: ● Primary Data ○ Nice to Have
Water Quality/Sample Descriptors				
Ground-water quality	●	●	●	Used to determine ground-water quality, identify presence and extent of contamination. Provides data for trend analysis. Assist in setting priorities for pesticides that are candidates for review.
Sampling type, e.g., - grab - duplicate - split - treated?	○	○	●	Information used to identify sampling procedures, responsible sampling authority and analytic methods are useful indicators of data quality. Absent these indicators, data still of value.
Sample identifiers, e.g., - name collecting agency - date and time sample taken	○	○	●	Same as above.
Analytic method, e.g., - EPA standards - USGS standards	○	○	●	Same as above.
Related Data				
Location of revelant facilities and wells				
Demographic data	●	●	●	Determines potential population at risk.
Other sources of contamination, e.g., - agricultural - septic tanks - highway networks		○	○	Provides useful site contextual information to help identify possible sources of site contamination.
Site descriptors, e.g., - wastes found on site - wastes injected - site responsibility				
Health Effects data	●	●	●	Needed to assess health risk to population.
Environmental fate	●	●	●	Determine fate of pesticide and pesticide by-products in the contaminant.

* Data for Special Reviews is applicable to state agencies conducting special pesticide surveys on studies (e.g., MN, IL, UT).

Office of Toxic Substances Program Actions Which Require Ground-Water Data

DATA TYPES	PROGRAM ACTIONS AND RESPONSIBILITIES		COMMENTS
• Well Descriptors • Hydrogeologic Descriptors • Water Quality/Sample Descriptors • Related Data	Control New/Existing Toxics Responsibility: EPA HQ	Assess Health & Environmental Effects of Toxics Responsibility: EPA HQ	Legend: ● Primary Data ○ Nice to Have
Well Descriptors			
Well location, e.g., - latitude/longitude - FIPS county code	○	●	Used to identify problem areas or "hot spots."
Depth to ground water	○	○	Needed to determine from which aquifer the sample was taken and to identify vulnerable ground-water.
Availability/content of well log			
Well characteristics, e.g., - well type - well purpose - construction - elevation - screen size - screen depth	○		Descriptors that influence water quality sample results, possibly needed for future field studies.
Well status, e.g., - abandoned - flowing			
Quantity pumped			
Hydrogeologic Descriptors			
Hydrogeologic descriptors, e.g., - geologic structure - aquifer characterization - stratigraphy - topography - soil	○	○	Data to characterize problem areas, assess aquifer vulnerability and for use with GEMS model runs.

Office of Toxic Substances Program Actions Which Require Ground-Water Data

DATA TYPES	PROGRAM ACTIONS AND RESPONSIBILITIES: Control New/Existing Toxics Responsibility: EPA HQ	PROGRAM ACTIONS AND RESPONSIBILITIES: Assess Health & Environmental Effects of Toxics Responsibility: EPA HQ	COMMENTS
• Well Descriptors • Hydrogeologic Descriptors • Water Quality/Sample Descriptors • Related Data			Legend: ● Primary Data ○ Nice to Have
Water Quality/Sample Descriptors			
Ground-water quality	○	●	Used to determine ground-water quality, identify presence and extent of toxic contamination. Often result of special studies (e.g., VOCs, TCE). Assist in setting priorities for toxics that are candidates for review.
Sampling types, e.g., - grab - duplicate - split - treated?	○	○	Information used to identify sampling procedures, responsible sampling authority and analytic methods that effect quality assurance.
Sample identifiers, e.g., - name collecting agency - date and time sample taken	○		Same as above.
Analytic method, e.g., - EPA standards - USGS standards	○		Same as above.
Related Data			
Location of revelant facilities and wells	○		Location of PWS and other drinking water wells needed for exposure assessment.
Demographic data	○		Determines potential population at risk.
Other sources of contamination, e.g., - agricultural - septic tanks - highway networks	○		Provides useful information to help identify possible sources of contamination, such as hazardous waste sites and practices resulting in contamination (e.g., animal feed lots and irrigation).
Site descriptors, e.g., - wastes found on site - wastes injected - site responsibility			
Health effects data (e.g., risk assessment or exposure data)	●	●	Needed to assess health risk to population.
Environmental fate	●	●	Determine fate, mobility and accumulation of toxic.

Appendix E -

Key Decisions That Require Ground-Water Data

Summary Decision Charts

DECISION	DECISION-MAKER				
	EPA HQ	EPA Region	State	Locality	Other
1. RCRA					
• Should a permit be issued to a RCRA facility based upon the submitted ground-water monitoring plan? -- Has the site been characterized properly? -- Is a facility's proposed/actual ground-water monitoring strategy adequate to detect migration of the hazardous constituents from the facility to the uppermost aquifer? -- Should a facility be granted an Alternate Concentration Limit (ACL) for a specific contaminant? Does that contaminant pose a substantial present or potential hazard to human health and the environment?		✓	✓		
• Should an enforcement action be taken against a RCRA facility? -- Are background levels or MCLs being exceeded? -- What is the nature and extent of the contamination? -- Is a facility following the monitoring plan which will adequately detect contamination?		✓	✓		
• What remedial steps should be taken when discharge is detected at a RCRA facility? -- Should the facility be modified or is removal of the contaminants from the groundwater sufficient? -- Is the corrective action program for a facility effective? If not, should the program be modified with more extensive requirements?		✓	✓		
• Should a RCRA Interim Status facility implement an Assessment Program?		✓	✓		

DECISION	DECISION-MAKER				
	EPA HQ	EPA Region	State	Locality	Other
1. RCRA (Continued)					
• What actions should be taken as a result of an Assessment Monitoring Program at an Interim Status Facility?		✓	✓		
-- Should the facility be closed?					
-- Should the facility have its permit application expedited?					
-- Should the facility be returned to Normal Monitoring Status?					
• What actions should be initiated against a Subtitle D Solid Waste facility identified as causing ground-water contamination?		✓	✓		

DECISION	DECISION-MAKER				
	EPA HQ	EPA Region	State	Locality	Other
2. Superfund					
• Is an emergency response necessary to protect ground water at the site of a spill?		✓	✓		✓ (e.g. DOD)
• Is the threat to ground water or existing ground-water contamination sufficient to place a site on the Superfund National Priority List? -- What existing or potential ground-water contamination must be considered in assigning a Hazard Ranking Score for the site?		✓	✓		
• What removal or remedial action alternatives are likely to be most effective in controlling ground-water contamination?	✓	✓			✓ (e.g. DOD)
• Have the selected remedial actions taken to rectify ground-water contamination been effective in attaining or exceeding applicable requirements?		✓	✓		
3. Underground Storage Tanks					
• Should an enforcement action be taken against a tank owner?		✓	✓	✓ (e.g. Fl.)	
• What corrective action should be taken to clean up a spill from an underground storage tank?		✓	✓	✓ (e.g. Fl.)	

DECISION	DECISION-MAKER				
	EPA HQ	EPA Region	State	Locality	Other
4. Underground Injection Control					
• Should an EPA Region or delegated state issue a permit or rule for an underground injection well?		✓	✓		
• Should an enforcement action be taken because an underground injection well has violated program requirements, exceeded permit limits or contaminated an USDW? -- Where are the USDWs? Is the underground injection well affecting them? -- Should a permit be revoked from an underground injection well owner/operator? -- What remedial actions should be taken?		✓	✓		
5. Drinking Water					
• Should a purveyor receive approval for the operation of a public water supply system? -- What are the sources of water? -- Will the supply satisfy existing MCL standards?			✓		
• Should enforcement action be taken against a public water system? -- Has the Public Water System exceeded an MCL? -- What is the contaminant? What is the extent of the contamination?	✓	✓	✓		
• Should an MCL be designated for a contaminant found in drinking water? -- What is the health effect of the contaminant? -- What is the efficacy of treatment? -- What is the economic impact of the standard?	✓				

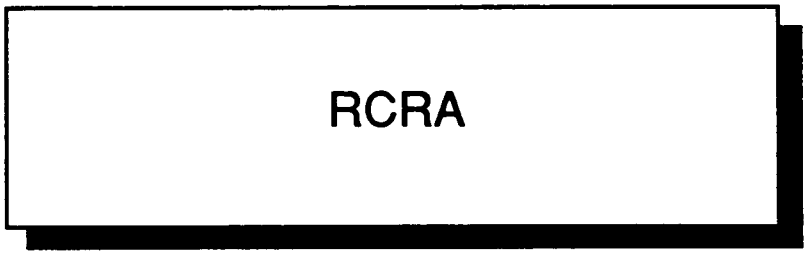
DECISION	DECISION-MAKER				
	EPA HQ	EPA Region	State	Locality	Other
6. Pesticides					
• Should a pesticide be approved/renewed for general or restricted use, or be banned? -- Does a pesticide cause an unreasonable adverse effect on the environment (including ground water)? -- What are the characteristics of the pesticide (e.g., leachability, absorption/desorption, resistance to degredation, solubility and volatility)? -- How should the pesticide be used?	✓		✓		
• Should the registration for an approved pesticide be suspended or cancelled because of contamination of the ground water? -- What is the extent of the actual/projected contamination problem caused by a pesticide? -- What would be the economic impact of the restriction?	✓		✓		
7. Toxic Substances					
• Should the manufacture, processing, distribution, use, or disposal of a toxic substance be regulated; shoould testing (Sec. 4) or additional existing information be requested of the manufacturer (Sec. 8)?	✓				

DECISION	DECISION-MAKER				
	EPA HQ	EPA Region	State	Locality	Other
8. State/Local Programs					
• Water Allocation (AZ, GA, MA, MN, NJ, SC, UT, VA, WA)					
-- How much water should a facility be allowed to withdraw? From which aquifers?			✓		
-- What are the future ground-water needs in the area?			✓		
• Landfill Permitting (CA, IL, SC, TX, VA, MA)					
-- Should a solid-waste landfill receive a permit?			✓		
-- What is the ground-water monitoring plan?			✓		
• Zoning and Planning (MN, CT, UT, MA, AZ)					
-- Should land use restrictions be developed and implemented to protect the ground water in selected areas?			✓	✓	✓
-- What should be the land use policy developed for either the protection or industrial use of ground water resources?			✓		
-- Should population density be limited by land use zoning?				✓	
-- Should a septic system be authorized or permitted?				✓	

DECISION	DECISION-MAKER				
	EPA HQ	EPA Region	State	Locality	Other
8. State/Local Programs (Continued)					
• Chemigation Permitting (NE)					
-- Does the chemigation system provide an actual or imminent threat to ground-water supplies?			✓		✓
• Highway Construction (MN, AZ)					
-- How and where should a highway be constructed so that it will not affect the ground water?			✓		
-- Where should rest areas be located to ensure access to drinking water quality ground water?			✓		
-- Should the transportation authority purchase land for highway construction? Is the ground water beneath the parcel under construction already contaminated?			✓		
• Ground-Water Discharge Permitting (AZ, CT, NJ, TX, WY, MT, VA)					
-- Should a facility or activity receive a discharge permit?			✓	✓	
-- What measures is the facility taking to protect the ground water?			✓		

DECISION	DECISION-MAKER				
	EPA HQ	EPA Region	State	Locality	Other
8. State/Local Programs (Continued)					
• Mine Permitting (VA)					
-- Should a mining activity receive a permit? How will the ground water be affected?			✓		
-- Where should the ground-water monitoring wells be located? What will the reporting requirements be? What is the back-ground water quality?			✓		
• Well-Field Protection (Dade Co., FL, AZ, VT, MA)					
-- Should protection measures be implemented to protect a drinking water well production field from migrating sources of ground-water contaminants and surface discharges?				✓	
-- Should off-site recharge areas be protected?			✓		
• Ground-Water Protection Areas (NE, NJ, WA, UT, CT, NY, IL, FL)					
-- Should discharges be limited in an area because of aquifer contamination problems? Should an aquifer be given a special protection status?			✓		
-- Should recharge areas be protected?					
• Ground-Water Use Classification (CT, NJ, SC, MT, WY)					
-- What should be the designated uses of aquifers throughout the state?			✓		
-- What is the current or potential use of the ground water based upon its quality?					

DECISION	DECISION-MAKER				
	EPA HQ	EPA Region	State	Locality	Other
8. State/Local Programs (Continued) • Well Permit Program (AZ) -- Should a permit be issued to an applicant for the drilling and construction of a well?			✓		
• Land Transfer Program (MA, MO) -- Should the state approve the sale or transfer of corporate and commercial land in Massachusetts or hazardous waste disposal sites in Missouri between an authorized seller and buyer?			✓		


RCRA

PROGRAM: RCRA

DECISION: Should a permit be issued to a RCRA facility based upon the submitted ground-water monitoring plan?

LEGISLATIVE AND REGULATORY AUTHORITY:

Resource Conservation and Recovery Act 1976, Subtitle C, Section 3005(a)
Hazardous Solid Waste Amendments of 1984
40 CFR 264 (Standards for Permitted TSD Facilities) and 270 (Permit Program)

RESPONSIBILITIES: EPA and delegated states are charged with the regulation of hazardous waste treatment, storage and disposal (TSD) facilities. This includes the prevention of contamination to ground-water surrounding such a facility. In order to begin or continue operations, a TSD facility must be permitted by EPA or the state. (One exception to this is the "interim status" facilities which may continue operations while their permit is pending).

There are two parts to the permit application, A and B. Part A contains general information on the facility and its operator. Part B contains extremely detailed and technical information on the facility. There is no standard format for this part of the application. It is up to the facility operator to determine, based upon the regulations, which data to include in Part B. Generally, Part B includes an analysis of the wastes to be treated, the hydrogeologic structure of the area surrounding and beneath the facility and specific information related to the type of proposed facility (e.g., landfills, incinerators).

In addition, Part B also contains the proposed ground-water sampling program for the facility. The minimum number of wells required by the regulations is four (one up-gradient and three down-gradient). Also, the operator may submit with the application sampling results from test wells drilled in the area surrounding the facility.

There are five broad phases in the permitting process. The operator of a facility first submits a permit application. Next, an internal agency (EPA or state) review of the permit is conducted. As part of this phase, the ground-water monitoring plan is analyzed and evaluated. If the plan is deemed insufficient, a notice of deficiency is issued. Third, a draft permit is developed. In the fourth step, EPA or the delegated state issue the permit for comment and may hold public hearings. Finally, based upon the internal review and public comment, the permit is

either issued as is, modified and then issued, or permit denial procedures are instituted.

It is not unusual for circumstances at a permitted facility to change over time. Some examples include the facility wishing to alter its treatment processes, treat new wastes, or change its ground-water monitoring plan. In these cases, the facility must petition to have its permit modified. This process is similar to the public hearings and internal agency review of the original permit. EPA or the delegated states also has the authority to revoke/reissue a permit or terminate outright the permit. These two actions also entail public hearings and an internal agency review.

CURRENT AND FUTURE WORKLOAD:

The majority of the current workload associated with permitting is related to the review of the Part B portion of the permit submitted by the facilities in interim status. While there are permit requests for new TSD facilities, this number is small when compared to the number of interim status facilities. Over time, however, the number of interim status facilities will decline as they are either permitted or closed. In general, the workload associated with the permit process will also decline rather than increase.

RESOURCE REQUIREMENTS:

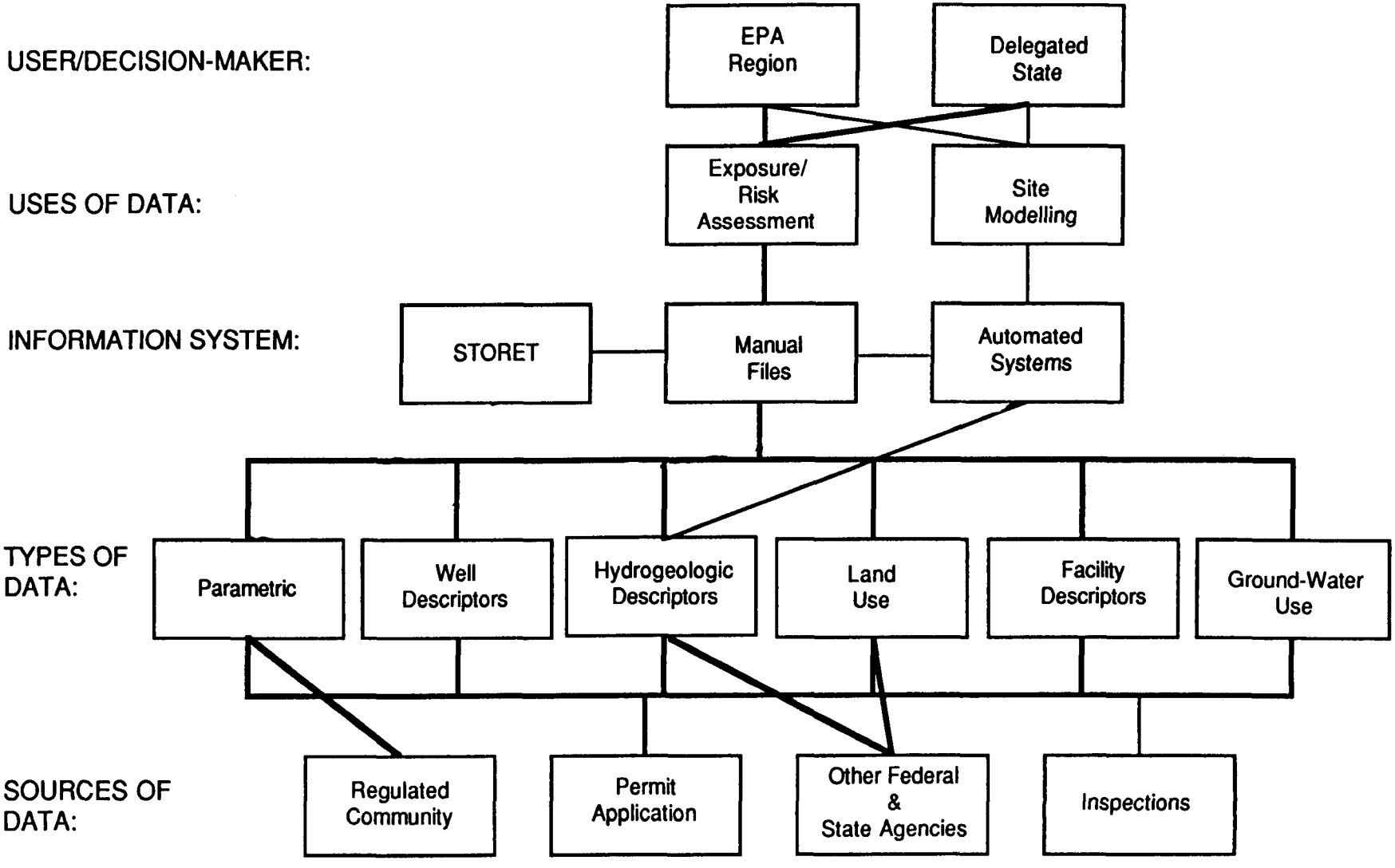
The permit process normally averages from one to three years. As a result of the Admendments, facilities which have submitted complete permit applications by November 8, 1984, must receive a decision (approval or rejection) from EPA between November 1988 and November 1992, depending upon the type of facility. For permit applications submitted after November 1984, the Amendments do not establish a time limit for the review of the permit application by EPA or a delegated state.

ORGANIZATIONAL STRUCTURE:

This decision is made by the EPA Regional RCRA program Office or by a delegated state's environmental protection agency.

PROGRAM: RCRA

DECISION: Should a permit be issued to a RCRA facility based upon the submitted ground-water monitoring plan?



PROGRAM: RCRA

DECISION: Should a permit be issued to a RCRA facility based upon the submitted ground-water monitoring plan?

Current Decision-Making Process	Information Management Requirements	Comments
• EPA Region or delegated state receives a RCRA facility permit application which includes a ground-water monitoring plan. • The facility may have already been monitoring the ground water as required by the interim status regulations. The monitoring data collected during the interim status is integrated into the application. • The facility submits any other data to support its monitoring plan. Such information includes: well descriptors, hydrogeologic data, land use information, facility description and area ground-water use. • The permit approval decision is based primarily on whether the the ground-water monitoring plan will adequately detect contamination which poses a risk to human health and the environment.	• Hydrogeologic data (e.g. location of aquifers and confining units, well elevation). • Adjacent ground-water quality data (2-3 mile area around each site). • Aquifer classification and the state designation for the aquifer. • Land use and potential uses of land in the area. • Soil characteristics, especially attenuation and soil profiles. • Mapping capabilities so as to provide detailed hydrogeologic, land use or contaminant plume maps for each site on demand. • Statistical analysis and modelling capabilities for each facility.	• EPA HQs provides assistance to Regions and delegated states when requested in assessing submitted site monitoring plans. • Some states (e.g., South Carolina) keep RCRA facility parametric data on STORET. • The permitting process can be slowed by the need to contact a number of different EPA, Federal or state program offices to obtain data used to review and evaluate applications. • The information required for permitting a TSD facility can be very site and facility-type (e.g., landfill) specific.

PROGRAM: RCRA

DECISION: Should an enforcement action be taken against a RCRA facility?

LEGISLATIVE AND REGULATORY AUTHORITY: Resource Conservation and Recovery Act 1976, Subtitle C, Section 3008
Hazardous Solid Waste Amendments of 1984

RESPONSIBILITIES: There are two main components to enforcement activities under the RCRA legislation, compliance monitoring and enforcement actions. Compliance monitoring primarily consists of scheduled and unscheduled inspections of a TSD facility. Enforcement actions include administrative orders, civil and criminal penalties, and injunctive relief. The EPA Region or delegated state is responsible for bringing an enforcement action against a facility which does not comply with Subtitle C of RCRA. The decision to initiate an enforcement action is based upon an evaluation of the quarterly ground-water sampling required for each RCRA facility, the failure of the facility to submit results of ground-water analysis or a deficient ground-water monitoring program. Enforcement actions may also be brought for the failure of the facility to obtain the necessary insurance, implement other provisions of the Act or respond to EPA or delegated state directives.

CURRENT AND FUTURE WORKLOAD: A sizeable portion of the workload associated with enforcement actions is in the review and analysis of the data submitted by the operator as part of the facility's ground-water monitoring program. This data is provided at least quarterly. Some delegated states, on a site by site basis, require more frequent reporting. The reporting requirements (e.g., number of contaminants sampled for; number of wells) for permitted facilities normally exceed those for facilities in interim status. As the number of interim status facilities declines through permitting or closure, the workload associated with the review of the operator supplied data may increase.

Also, under the 1984 Amendments, all federal and state operated TSD facilities must be inspected annually. The Amendments also direct the Administrator to initiate a program to inspect all other TSD facilities at least once every two years. Before passage of the Amendments, the regular inspection of TSD facilities was not required. The new inspection requirements may add significantly to future

workload.

RESOURCE REQUIREMENTS:

Enforcement actions generally require assistance from offices other than the RCRA program office at the EPA Region or delegated state level. Usually, the other offices which are involved are the EPA Regional Counsel or the state Attorney General. These other offices take the lead in executing civil and criminal actions. The EPA Region and the delegated state have the authority to issue administrative orders and fine facilities for non-compliance with the regulations.

In the future, the resources necessary to support and initiate enforcement actions will most likely increase to reflect the now mandatory RCRA facility inspections and the growth in the number of permitted facilities.

ORGANIZATIONAL STRUCTURE:

This decision is made by the EPA Regional Waste Management Division or by a delegated state's environmental protection agency.

PROGRAM: RCRA

DECISION: Should an enforcement action be taken against a RCRA facility?

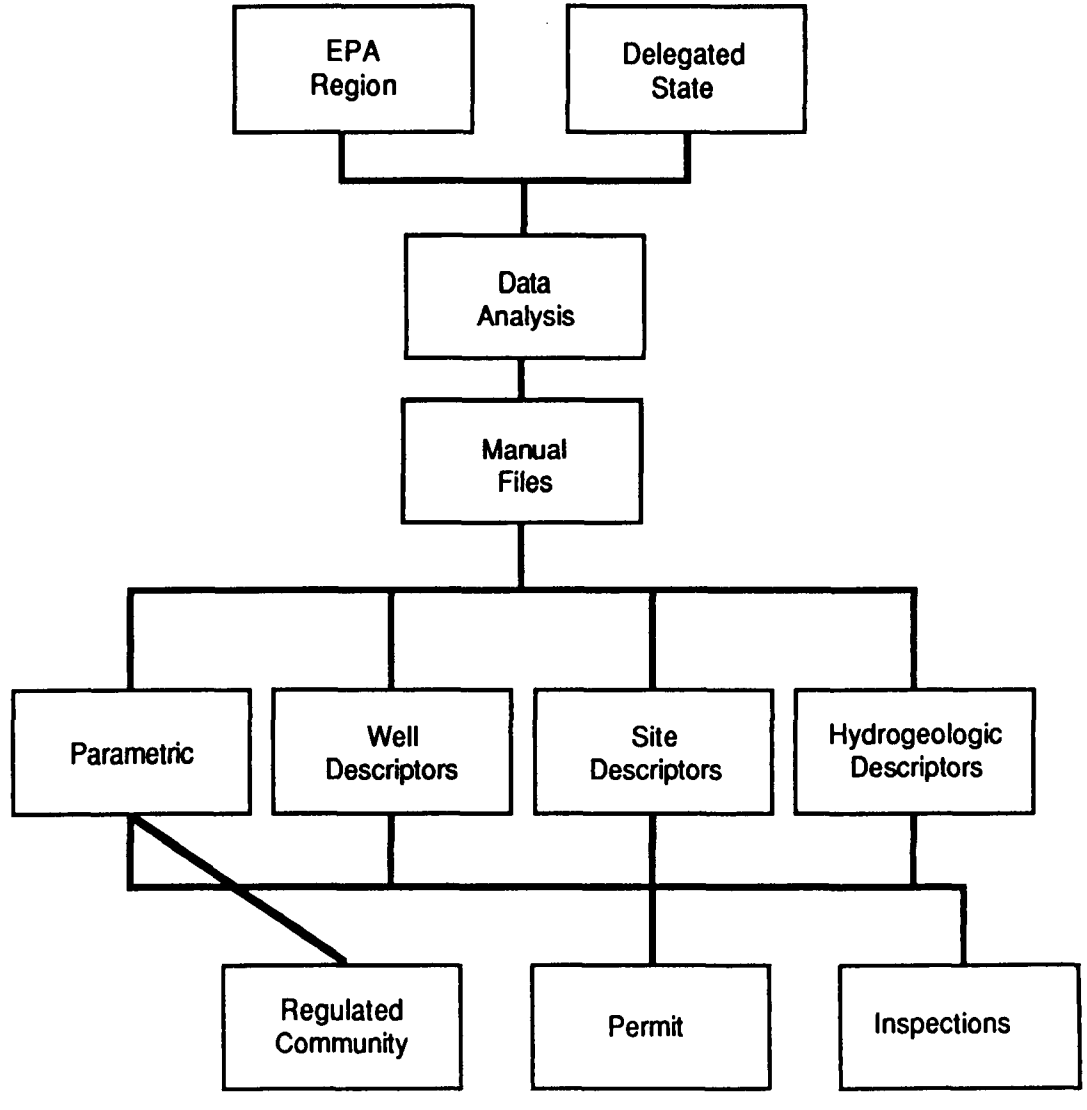
USER/DECISION-MAKER:

USES OF DATA:

INFORMATION SYSTEM:

TYPES OF DATA:

SOURCES OF DATA:



PROGRAM: RCRA

DECISION: Should an enforcement action be taken against a RCRA facility?

Current Decision-Making Process	Information Management Requirements	Comments
• The EPA Region or state RCRA program office decides whether an enforcement action is required and the nature of the enforcement action. • A comparison of current ground-water sampling data with the background levels for a facility is used to identify contamination spreading from a facility into the environment. • The detection of such contamination can trigger enforcement actions by an EPA Region or state against a facility. • The Office of the EPA Regional Counsel or the state's Attorney General uses data and analysis provided by the RCRA program office to initiate enforcement actions. • The EPA Region or the state monitors the performance of the facility in response to the enforcement action. • The EPA region or state determines that the facility has returned to compliance with the permit requirements.	• Hydrogeologic data for each facility. • Facility background and operating ground-water quality data. • Facility ground-water monitoring plan data. • Facility inspection and analysis data. • Mapping capabilities so as to provide detailed hydrogeologic, land use or contaminant plume maps for each site on demand. • Statistical analysis and modelling capabilities for each facility.	• Enforcement actions can be triggered by inspection of the facility, failure of the facility to submit required ground-water data, refusal of the facility to implement corrective actions as well as by many other events. • EPA can bring enforcement actions against a facility if a delegated state declines to pursue actions.

PROGRAM: RCRA

DECISION: What remedial steps should be taken when discharge is detected at a RCRA facility?

LEGISLATIVE AND REGULATORY AUTHORITY: Resource Conservation and Recovery Act 1976, Subtitle C, Section 3008
Hazardous Solid Waste Amendments of 1984

RESPONSIBILITIES: The responsibility for initially detecting and evaluating the concentration of contamination spreading from a facility into the ground-water lies with the facility operator. This is true for both permitted and interim status facilities. However, for permitted facilities, the ground-water monitoring requirements are far more specific. In addition, permitted facilities are also required to clean-up any ground-water contamination above acceptable limits resulting from their operations.

Once permitted, a facility must routinely perform detection monitoring to identify any leaks from the facility into the ground-water. If leakage is detected, then the facility must implement a compliance monitoring program. The objective of compliance monitoring is to determine the concentration of the contamination in the ground-water. The permit details the specific constituents and their concentration levels which must be monitored. If the results from the compliance monitoring program confirm that ground-water contamination is exceeding the allowable limits, as specified in the permit, the facility must then initiate corrective actions.

The intent of a corrective program is to control the contamination and return, over time, the groundwater to its condition prior to the operation of the facility. The corrective action procedures are specified in the permit. Some examples of corrective action procedures include the physical removal of the contaminated earth or treating the groundwater in place. If the corrective actions specified in the permit are not appropriate for the contamination, the facility may institute other actions to address the clean-up of the ground-water.

The role of the EPA Region or delegated state is to review and evaluate the detection and compliance monitoring programs and to ensure that contamination is detected and reported. The Region and state also have responsibility for ensuring that the facility promptly implements a corrective action program when contamination is detected. If the

facility fails in its duty, the Region and state have the authority, and responsibility, to initiate enforcement activities to force the facility to comply with the terms of the permit and the Subtitle C regulations.

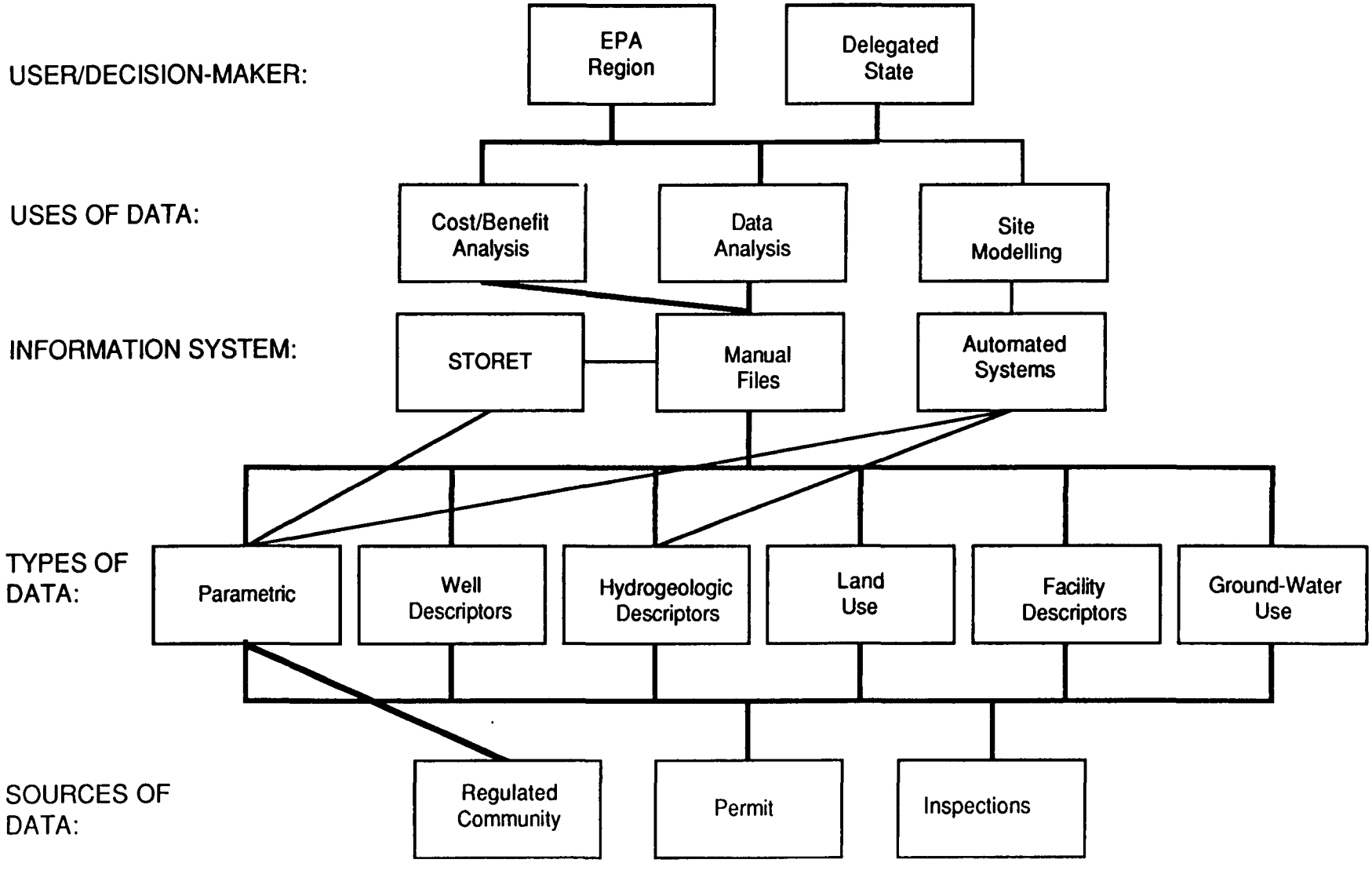
CURRENT AND FUTURE WORKLOAD: Several states have reported one to four new facilities per year which have required the implementation of corrective actions. As the number of permitted facilities increase (primarily from the permitting of interim status facilities), the workload for corrective action monitoring and enforcement activities by the Regions and states will most likely increase.

RESOURCE REQUIREMENTS: The resource requirements vary by site depending upon the level and extent of the ground-water contamination. Again, most resources involved in a corrective action program are those of the facility operator, or a contractor hired by the facility. However, as the number of permitted facilities increase, it can be expected that Region and state resource requirements will also increase.

ORGANIZATIONAL STRUCTURE: This decision is made by the EPA Regional RCRA Program Office or by a delegated state's environmental protection agency.

PROGRAM: RCRA

DECISION: What remedial steps should be taken when discharge is detected at a RCRA facility?



PROGRAM: RCRA

DECISION: What remedial steps should be taken when discharge is detected at a RCRA facility?

Current Decision-Making Process	Information Management Requirements	Comments
• When detection monitoring identifies, and compliance monitoring confirms, ground-water contamination above the allowable limits, the EPA Region or state must determine if the facility is promptly implementing an effective corrective action program. • If the contingency plan is not adequate, EPA Region or state may require the development and implementation of additional procedures. • EPA Region or state determines if modifications to the facility permit are required. • EPA Region or state monitors facility compliance with corrective actions procedures. • The facility determines, and EPA Region or state verifies, that contamination has been corrected and the facility may return to compliance monitoring.	• Hydrogeologic data for each facility. • Facility background and operating ground-water quality data. • Facility ground-water monitoring plan data. • Facility contingency action plan data. • Technical and scientific decontamination procedures and methodologies data. • Mapping capabilities so as to provide detailed hydrogeologic data, land use or contaminant plume maps for each site on demand. • Statistical analysis and modelling capabilities for each facility.	• Corrective action may include the pumping out of the plume, repairing facility liners, removal of contaminated earth and other actions. • EPA or state has a variety of powers to compel a facility to institute corrective actions.

PROGRAM: RCRA Interim Status Facilities

DECISIONS: Should a RCRA Interim Status facility implement an assessment program?

What actions should be taken as a result of an assessment monitoring program at an interim status facility?

LEGISLATIVE AND REGULATORY AUTHORITY: Resource Conservation and Recovery Act 1976, Subtitle C, Section 3005(e)
40 CFR 265 (Standards for Interim Status TSD Facilities)

RESPONSIBILITIES: All RCRA TSD facilities in operation as of November 19, 1980 were allowed to continue operations as "interim status" facilities until issued a permit or ordered closed. There were also several requirements that facilities desiring interim status had to meet. First, the facility must submit the Part A portion of the RCRA permit application. In addition, depending upon the nature of the facility (e.g., land fill, incinerator), the facility must complete and submit the Part B portion of the permit in the time period November 1985 to November 1988. Those facilities which fail to complete the Part B portion will lose their interim status and must close between November 1985 and November 1992.

An EPA Region or delegated state is responsible for monitoring TSD facilities while they are in interim status. Only certain types of interim status facilities are required to perform ground-water monitoring. This includes surface impoundments, landfills, land treatment facilities and certain waste piles. Aside from the in-process permitting activities (which has already been discussed in a prior section), the key decisions for interim status facilities revolve around the results of the facility's ground-water monitoring program.

The operator of an interim status facility must initially sample for one year to establish background levels for ground-water. In the following, and all subsequent, years the facility must, until it is permitted or closed, perform routine monitoring of the ground-water. The results of the routine monitoring are then compared to the background levels. If there is a difference, the EPA Region or delegated state must be notified. An assessment program is then instituted by the facility operator to determine if contamination is in fact entering the ground-water. If there is no contamination, the facility resumes normal routine monitoring. If contamination is found, however,

then the operator must continue the assessment program and continue to sample quarterly until the facility is permitted, ordered to expand the sampling program as part of the permitting process or closed.

The responsibility for identifying that ground-water contamination is occurring belongs to the facility operator. The EPA Region or a delegated state normally conducts a review of the operator's findings and conclusions and may overrule the operator. However, the Region or the delegated state are primarily responsible only for determining the appropriate action(s) after an assessment program has confirmed the existence of ground-water contamination.

It is important to note that as time passes, the number of interim status facilities will decline to zero, as facilities are either permitted or closed.

CURRENT AND FUTURE WORKLOAD:

The majority of the workload associated with interim status facilities is associated with the parallel permitting decisions for the facilities. Resources are required to review the quarterly submission of ground-water monitoring data from a facility and to determine the appropriate response to the detection of ground-water contamination. However, as the number of RCRA interim status facilities declines, the workload associated with these functions will gradually cease.

RESOURCE REQUIREMENTS:

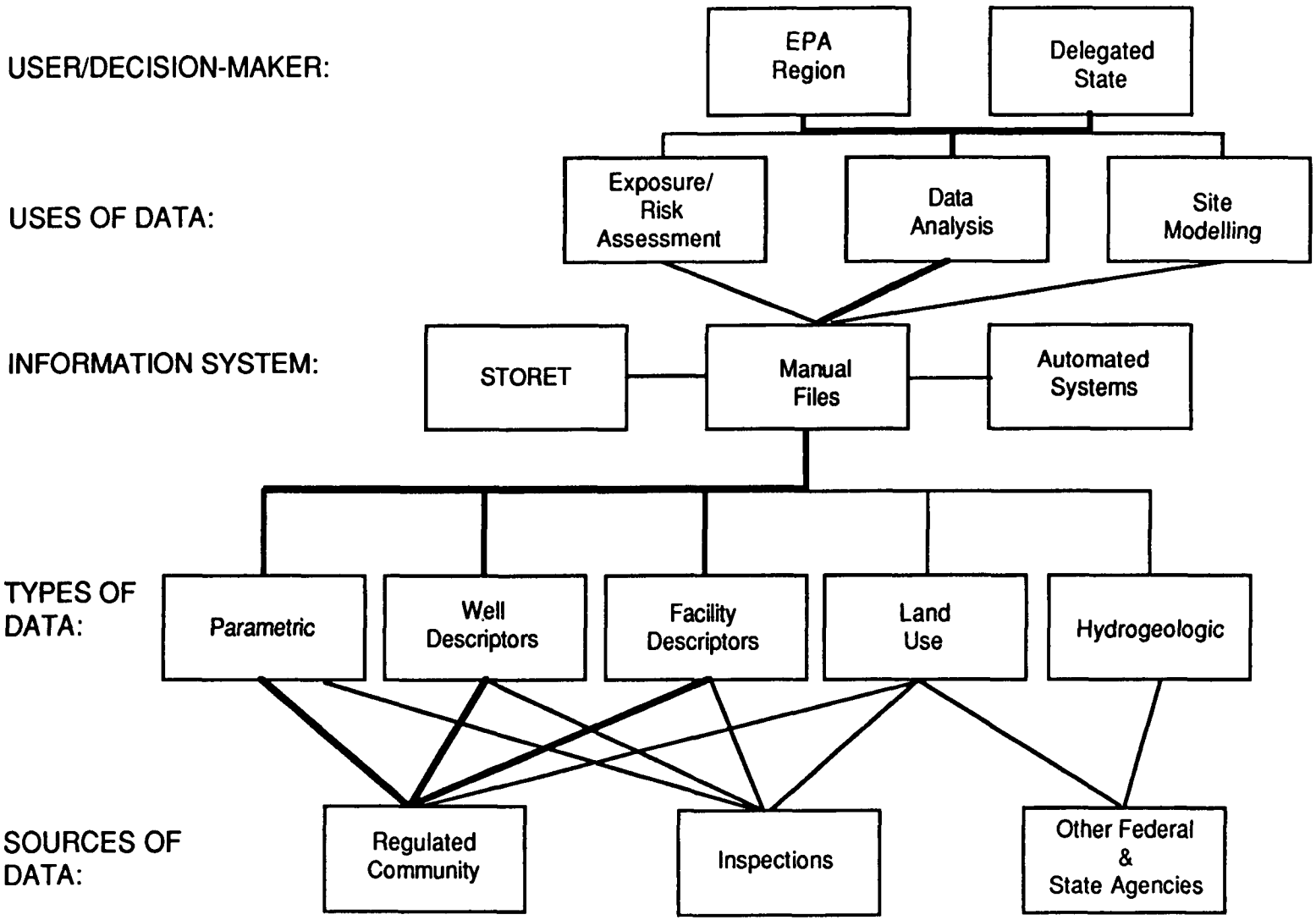
The resource requirements for these decisions are similar to the RCRA detection monitoring activities associated with permitted facilities. In general, however, the ground-water sampling review and analysis requirements are less for interim status facilities than for permitted facilities.

ORGANIZATIONAL STRUCTURE:

These decisions are made by the EPA Region RCRA Program Office or by a delegated state's environmental protection agency.

PROGRAM: RCRA

DECISION: What actions should be taken as a result of an Assessment Monitoring Program at an Interim Status Facility?



PROGRAM: RCRA

DECISION: What actions should be taken as a result of an Assessment Monitoring Program at an Interim Status Facility?

Current Decision-Making Process	Information Management Requirements	Comments
• The interim status facility is primarily responsible for monitoring ground-water quality surrounding the facility and comparing current samples with background levels to identify contamination problems. • EPA Region or delegated state receives notice from a facility when the background levels have been exceeded. • The facility then institutes an assessment monitoring program and informs EPA Region or state of the results and its conclusions. • EPA Region or state reviews the conclusions and accepts or rejects them. • If contamination is not confirmed, the facility resumes normal operation. • Otherwise, the facility continues assessment monitoring. EPA Region or state can order additional ground-water monitoring and protection activities or close the facility.	◗ Facility background and operations ground-water quality data. ◗ Facility descriptors data. ◗ Well location and descriptors data. ◗ Hydrogeologic data (e.g., location of aquifers and confining units, well elevation). ◗ Land use in the area. ◗ Mapping capabilities so as to provide detailed hydrogeologic, land use or contaminant plume maps for each site on demand. ◗ Statistical analysis and modelling capabilities for each facility.	• In general, the regulations for interim facilities are less specific and extensive than those for permitted facilities. • The number of interim status facilities will decline over time as they are either permitted or closed. • There are statutory requirements mandating specific dates by which an interim status facility must submit the Part B portion of the permit application. If a facility does not meet this deadline, it must begin closure procedures.

PROGRAM: RCRA Subtitle D -- Non-Hazardous Solid Waste

DECISIONS: What actions should be initiated against a Subtitle D solid waste facility identified as causing ground-water contamination?

LEGISLATIVE AND REGULATORY AUTHORITY: Resource Conservation and Recovery Act 1976, Subtitle D, Sections 1008(a) and 4004(a)
40 CFR 257 (Ground Water)

RESPONSIBILITIES: The primary goals of the RCRA Subtitle D program is to protect the environment from pollution caused by the disposal of solid waste. As with hazardous waste, Subtitle D facilities are prohibited from contaminating the ground water (as well as other aspects of the environment) around their location.

EPA has promulgated technical standards (Subtitle D criteria) and provided funding for states to develop their own solid waste management program. All solid waste disposal facilities must meet the Subtitle D criteria (or more restrictive local state standards/regulations) or close. States, however, are not required to develop a solid waste plan. Participation is voluntary.

EPA has few responsibilities under Subtitle D. Most management and enforcement actions are at the state level and executed by the states. EPA, however, does develop, and update as necessary, the regulations and criteria for the Subtitle D program. In addition, EPA administers the state plan funding program and must approve the content of the state plans. At present, EPA is engaged in drafting new Subtitle D regulations. It is possible that these new regulations may expand EPA's responsibilities and role in this program.

CURRENT AND FUTURE WORKLOAD: The number of Subtitle D facilities is many times the number of hazardous waste (Subtitle C) facilities. The workload associated with the program is primarily at the state level and varies from state to state depending upon the provisions of the state program and the number of facilities within a state. The workload associated with the state program may increase after the issuance of the new regulations. The workload at the EPA Region and Headquarters levels may also increase as a result of the new regulations.

RESOURCE REQUIREMENTS:

Resource requirements vary from state to state. Also, since the new regulations have not yet been announced, it is not possible to accurately forecast the additional resources that may be needed to meet the new requirements for Subtitle D facilities.

ORGANIZATIONAL STRUCTURE:

It is expected that the setting of the technical criteria and the approval of state plans will continue to be an EPA Region and Headquarters function. The actual monitoring and enforcement of the technical criteria and other aspects of the state solid waste management plans will most likely be the responsibility of the individual states.

Since the role of EPA is limited in Subtitle D activities, no data flow chart nor requirements matrix has been included for this decision.

Superfund

PROGRAM: Superfund

DECISION: Is an emergency response necessary to protect ground water at the site of the spill?

LEGISLATIVE AND REGULATORY AUTHORITY: Comprehensive Environmental Response, Compensation and Liability Act of 1980

40 CFR 300.65, Subpart F

RESPONSIBILITIES: A removal action is appropriate when the lead agency determines that the initiation of such action is necessary to prevent or mitigate immediate and significant risk of harm to human life, health or the environment. In the context of ground water protection, removal actions are an appropriate response to contamination of a drinking water supply (40 CFR 300.65(b)(2)(ii).

CURRENT AND FUTURE WORKLOAD: Emergency response activities, by their nature, occur on a case by case basis, however EPA estimates that there are approximately 170 emergency response actions each year. From December 1980 - May 1986 there were about 726 emergency responses.

RESOURCE REQUIREMENTS: A removal action must be terminated after obligation of $1 million, or after 6 months has elapsed from the date of the initial response, unless it is found that circumstances warrant continued action. Pending legislation would increase the time and dollars available for emergency response actions to one year and $2 million dollars. Waivers beyond these conditions may be granted if the removal is consistent with the remedial action taken at the site.

ORGANIZATIONAL STRUCTURE: The Department of Defense is responsible for releases from its vessels and defense facilities. Evacuation and relocation is handled by the Federal Emergency Management Agency. All other response action is vested in EPA. Within EPA emergency response decisions are the responsibility of the appropriate regional office.

PROGRAM: Superfund

DECISION: Is an emergency response necessary to protect ground water at the site of a spill?

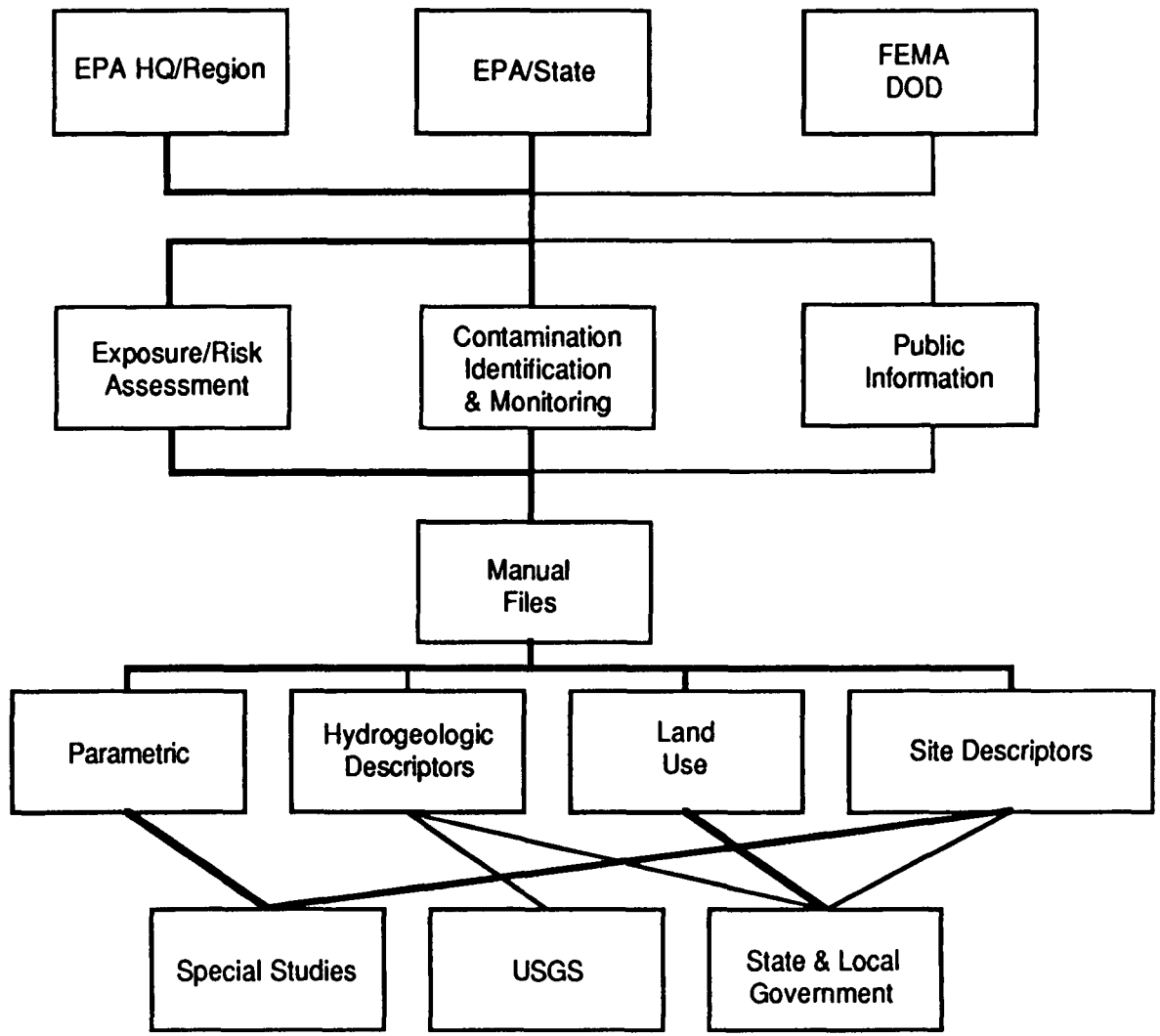
USER/DECISION-MAKER:

USES OF DATA:

INFORMATION SYSTEM:

TYPES OF DATA:

SOURCES OF DATA:



PROGRAM: Superfund

DECISION: Is an emergency response necessary to protect ground water at the site of a spill?

Current Decision-Making Process	Information Management Requirements	Comments
• The lead agency performs the spill site evaluation and determines extent of the threat to ground water. • The lead agency undergoes three phases in an emergency response: -- Phase I: discovery and notification -- Phase II: preliminary assessment of the hazard (including identification of the source and the nature of the release) -- Phase III: immediate removal action when such action is necessary to mitigate significant risk of harm to human life, health or the environment. • Actions may include: -- removal of the substance -- providing alternate water supplies -- sampling and analysis -- containment actions.	• To determine the extent of ground water contamination requires the following basic supporting information: -- Nearby sources of public/ private drinking water wells -- Nearby sources of underground supply of drinking water (USDW) -- Toxicity/mobility of contaminants -- Geologic sensitivity* -- Soil permeability* -- Soil chemical analyses*. * Used less frequently • Information needs are very site specific.	• This decision, or threat determination, is made by a EPA Regional Office, or other responsible federal organization (e.g. Dept. of Defense). • Emergency responses for large spills are, in practice, the responsibility of EPA Regions/On Scene Coordinator. • Since emergency response decisions must be made quickly, data must current and very easily accessible.

PROGRAM: Superfund

DECISION: Is the threat to ground water or existing ground-water contamination sufficient to place a site on the Superfund National Priority List?

LEGISLATIVE AND REGULATORY AUTHORITY: Comprehensive Environmental Response, Compensation and Liability Act of 1980, Section 105(8)

40 CFR 300, Appendix A
40 CFR 300.66(b)(2)

RESPONSIBILITIES: Superfund legislation required EPA to establish a National Priorities List (NPL) consisting of at least 400 sites to be given top priority consideration for possible removal and remedial action. To implement this requirement EPA developed the Hazard Ranking System to score potential sites. Principal parameters which are considered are an observed release or a threatened release to ground water, an observed o a threatened release to surface water, and an observed or threatened release to air.

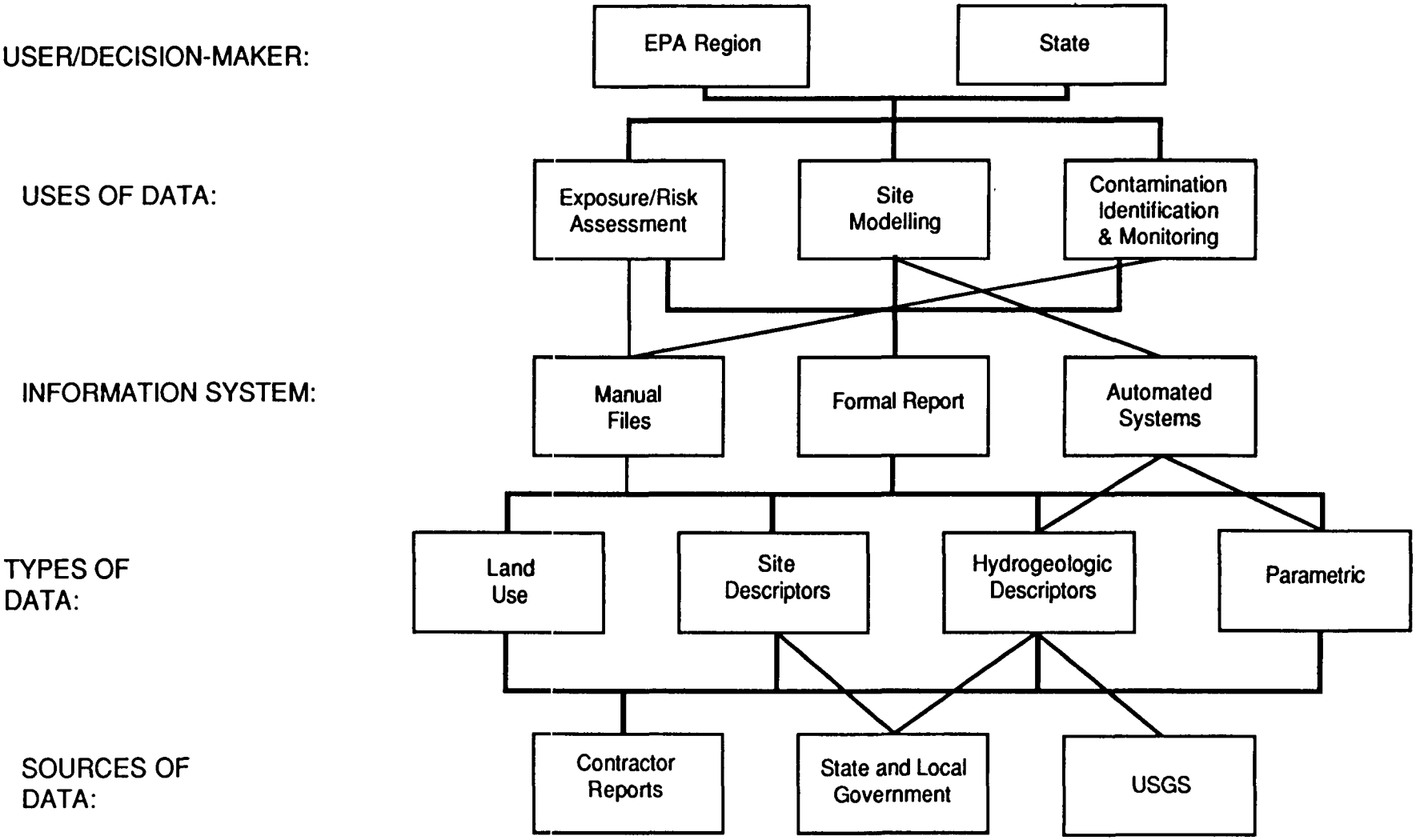
CURRENT AND FUTURE WORKLOAD: There are now approximately 800 sites on the National Priority List. In addition many states have developed state-level Superfund programs and have identified many sites that, with some additional analysis to more fully develop the HRS score, will be candidates for the federal Superfund program. EPA Headquarters estimates that with new legislation the NPL list will expand to between 1400 and 1500 sites.

RESOURCE REQUIREMENTS: Current resource requirements for the EPA Headquarter and Regional Response programs are 170 and 605 Full-time Employees (FTEs) respectively.

ORGANIZATIONAL STRUCTURE: States evaluate sites and submit lists of candidate sites which are then reviewed by the EPA regional office. EPA Headquarters, Hazardous Response Support Division, provides a QA/QC function, reviewing the HRS for each site.

PROGRAM: Superfund

DECISION: Is the threat to ground water or existing ground-water contamination sufficient to place a site on the Superfund National Priority List?



PROGRAM: Superfund

DECISION: Is the threat to ground water or existing ground-water contamination sufficient to place a site on the Superfund National Priority List?

Current Decision-Making Process	Information Management Requirements	Comments
• Perform a Preliminary Site Investigation: -- Assess contamination of nearby drinking water wells to provide preliminary assessment of ground-water contamination -- Action requires analyses of ground-water samples for organic and inorganic contaminants. • Perform Site Investigation: -- EPA/contractor takes ground water samples to determine nature and extent of contamination -- EPA/contractor determines the use of ground water (e.g, irrigation, drinking water, etc.) within a three mile radius of the site -- CLP analyzes the ground water samples -- If contamination is present, ground-water threat is included in calculation of hazardous ranking score -- A score of 28.5 is needed before a site is placed on the NPL list.	• Action requires the following supporting data: -- Water quality analysis from nearby public/private drinking water wells -- Water level information -- Well descriptors (e.g., construction, depth to ground-water) -- Location of nearby public/private drinking water wells -- Soil samples -- Land use information, (e.g., immediate threat to nearby schools, businesses and the community; wastes on site) -- Aquifer hydraulic parameters. • Other information requirements and capabilities include information on local geology/hydrology and use of contaminant fate and transport models.	• Note that ground-water contamination alone is not sufficient to place a site on the NPL list, however, ground-water contamination is a critical element of the hazardous ranking score (HRS). All current NPL sites have a ground-water component to the HRS.

PROGRAM: Superfund

DECISION: What removal or remedial action alternatives are likely to be most effective in controlling ground-water contamination?

LEGISLATIVE AND REGULATORY AUTHORITY: Comprehensive Environmental Response, Compensation and Liability Act of 1980

40 CFR 300.68(g)

RESPONSIBILITIES: The determination of an effective removal or remedial action is Phase VI of a Superfund response action. The purpose of this phase is to determine the appropriate action when the preliminary assessment (Phase II) and the site's NPL ranking indicate that further response is necessary. If the HRS places the site on the NPL a Remedial Investigation and a Feasibility Study (RI/FS) are performed. The RI/FS process starts with a thorough site investigation and sets forth a number of feasible clean-up alternatives based upon cost, the effectiveness of the alternative and acceptable engineering practices.

CURRENT AND FUTURE WORKLOAD: There are currently about 135 RI/FSs performed each year. The number of RI/FSs may increase slightly as a result of Superfund re-authorization.

RESOURCE REQUIREMENTS: Contractors are generally employed to develop the RI/FS for a Superfund site, whether it is funded by EPA or the potentially responsible parties. However, resource requirements to manage these contractors (fund-lead) and provide oversight of their activities (enforcement-lead) are considerable.

ORGANIZATIONAL STRUCTURE: This decision is based upon a review of the RI/FS and made by the EPA Region or state.

PROGRAM: Superfund

DECISION: What removal or remedial action alternatives are likely to be most effective in controlling ground-water contamination?

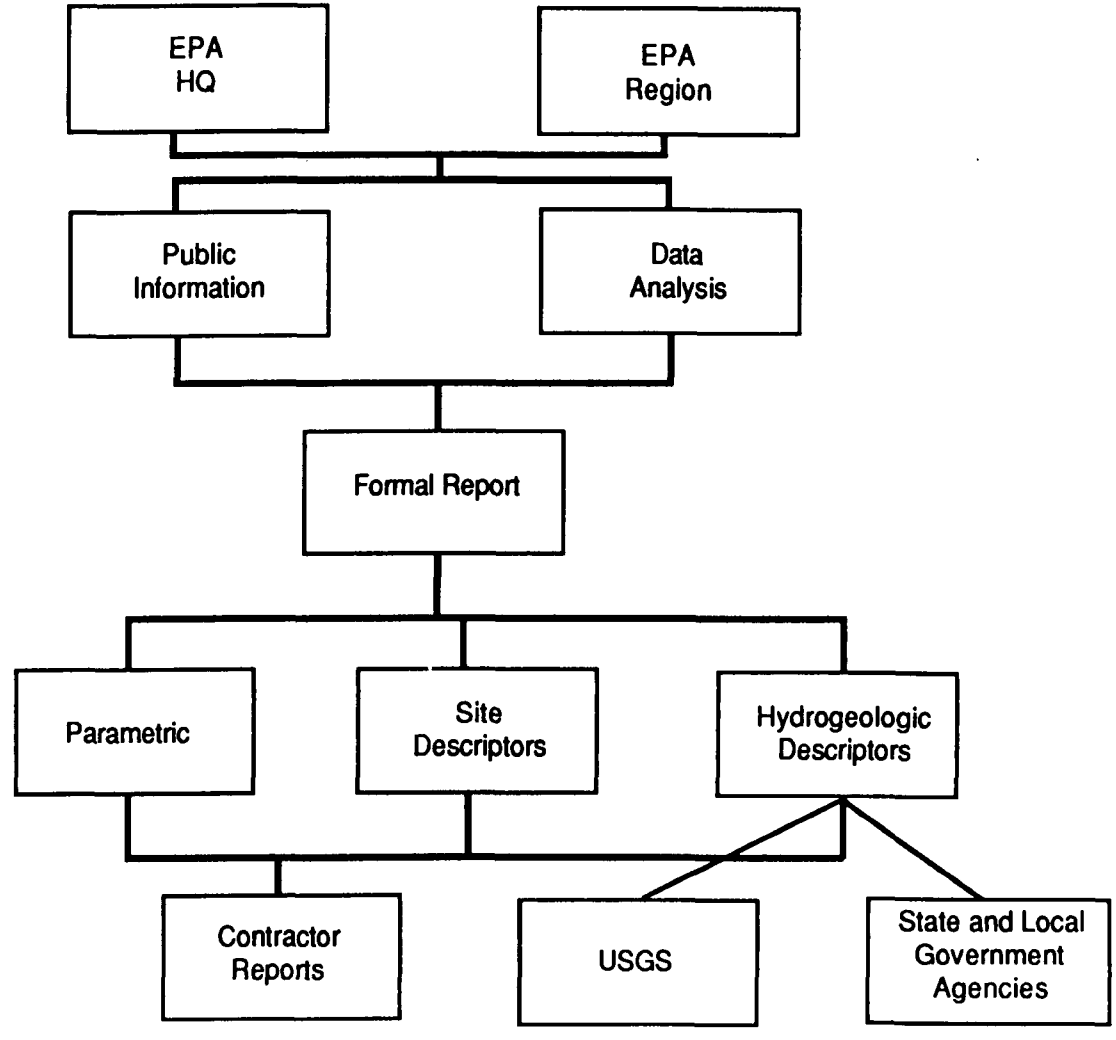
USER/DECISION-MAKER:

USES OF DATA:

INFORMATION SYSTEM:

TYPES OF DATA:

SOURCES OF DATA:



PROGRAM: Superfund

DECISION: What removal or remedial action alternatives are likely to be most effective in controlling ground-water contamination?

Current Decision-Making Process	Information Management Requirements	Comments
• RI/FS: Remedial Response Plan -- Once a site is actually on the NPL, the initial site investigation is followed by a more formal and rigorous Remedial Investigation and Feasibility Study (RI/FS). -- A Remedial Investigation is conducted to collect the information required to develop remedial action alternatives. -- A feasibility study is performed to evaluate the clean-up alternatives. It must consider cost, the effectiveness of the proposed alternative and the use of acceptable engineering practices. -- Selection of the remedial response is based upon a review of alternatives developed in the RI/FS and made by the lead responsible agency.	• Information needs which address ground-water contamination include: -- Soil permeability -- Depth to saturated zone -- Hydrologic gradients -- Proximity to drinking water aquifers -- Hydrogeological data (e.g., general aquifer boundaries and possible interconnections) -- Chemical fate, transport and health effects information. • RI/FS investigations often use ground-water models to estimate direction and magnitude of the contaminant plume.	• RI/FS's are performed by contractors and not EPA personnel.

PROGRAM: Superfund

DECISION: Have the selected remedial actions taken to rectify ground-water contamination been effective in attaining or exceeding applicable requirements?

LEGISLATIVE AND REGULATORY AUTHORITY: Comprehensive Environmental Response, Compensation and Liability Act of 1980

40 CFR 300.68(j)

RESPONSIBILITIES: The appropriate extent of the remedy is determined by the responsible authority's selection of the cost-effective remedial alternative (i.e., the alternative that is technologically feasible, reliable, cost-effective and which effectively mitigates and minimizes damage to and provides adequate protection of public health, welfare or the environment). Responsible authorities (e.g., responsible parties, state or EPA region) must monitor the ground-water quality after remedial action is complete to ensure the remedial alternative selected was appropriate.

CURRENT AND FUTURE WORKLOAD: There are not many sites where remedial action is complete with post-remedial action ground-water monitoring in effect at this time. Such ground-water monitoring will increase as additional site clean-ups are complete.

RESOURCE REQUIREMENTS: Resource requirements are site specific, dependent upon the remedial action taken.

ORGANIZATIONAL STRUCTURE: The responsible EPA Region or state determines if the remedial action taken is effective.

PROGRAM: Superfund

DECISION: Have the selected remedial actions taken to rectify ground-water contamination been effective in attaining or exceeding applicable requirements?

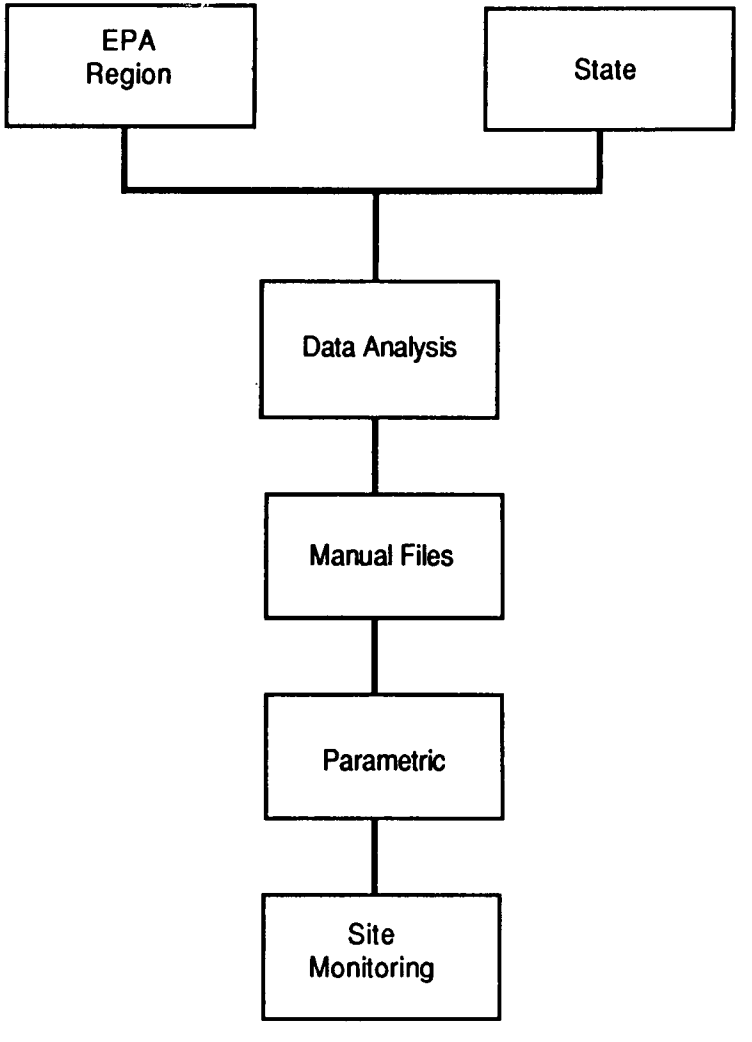
USER/DECISION-MAKER:

USES OF DATA:

INFORMATION SYSTEM:

TYPES OF DATA:

SOURCES OF DATA:



PROGRAM: Superfund

DECISION: Have the selected remedial actions taken to rectify ground-water contamination been effective in attaining or exceeding applicable requirements?

Current Decision-Making Process	Information Management Requirements	Comments
• Ground-water quality data are collected and analyzed to determine if: -- Ground-water contamination from the site has increased (i.e., remedy ineffective) -- Ground-water contamination is stable or decreasing (i.e., remedy effective).	• Information required includes: -- Ground-water quality samples analyzed for key organics/ inorganics -- Comparison of new samples with baseline samples.	• Responsible parties and states are most likely to be responsible for long-term site monitoring.

Underground Storage Tanks

PROGRAM: Underground Storage Tanks

DECISIONS: To be decided. May include the following:

- Should an enforcement action be taken against a tank owner?
- What corrective action should be taken to clean up a spill from an underground storage tank?

LEGISLATIVE AND REGULATORY AUTHORITY: The Hazardous and Solid Waste Admendments of 1984,Subtitle I

RESPONSIBILITIES: EPA is currently developing the regulations for the UST program. The statuatory deadline for the regulations regarding corrective action for tanks containing hazardous substances is November 1987.

The UST program will be largely delegated to the states. For the states which do not receive authorization, the EPA region will implement the program. Many states have already implemented their own UST program. The Federal regulations will attempt not to interfere with established state programs. They will focus on leak prevention measures (e.g., tank construction), corrective action, and financial responsibility.

The need for ground-water data will depended on each individual state program. Some states will take a very active role in detecting tank leaks and may require ground-water monitoring for each tanks. Other states may take a more passive role, deal with contamination problems only as they become a contamination problem, and require simple leak detection methods (e.g., inventory monitoring).

The states are now processing the notification forms which were required from all underground tank owners. Some states are using computer systems to store the information.

CURRENT AND FUTURE WORKLOAD: There are over 1 million underground storage tanks which contain petroleum and hazardous substances. The workload will be a factor of Federal and state regulations. Some states require all tank owners to obtain a permit for each tank (in addition to notifying the state for Federal Notification program). Aboveground tanks are also regulated in many states.

RESOURCE REQUIREMENTS: Resource requirements cannot be estimated until the Federal regulations are promulgated and the program is implemented at the state level. Most states are just beginning to develop their own programs.

(A flow chart is not included for this program because, except for the Notification program, the Federal program has not been implemented.)

Underground Injection Control

PROGRAM: Underground Injection Control

DECISION: Should an EPA Region or delegated state issue a permit or rule for an underground injection well?

LEGISLATIVE AND REGULATORY AUTHORITY: Safe Drinking Water Act, Part C

40 CFR Part 144, Subpart D and E. (Authorization by Permit)
40 CFR Part 144, Subpart C (Authorization by Rule)

RESPONSIBILITIES: The delegated state can only authorize -- by permit or rule -- underground injection if it will not endanger an underground source of drinking water. The permitting authority is responsible for five different classes of underground injection wells; only Classes I-III are permitted.

CURRENT AND FUTURE WORKLOAD: Workload varies by state but the total number of Class II wells requiring permit application reviews and permit compliance reviews in the program far exceed the number of all other well classes combined. Region V reviews 220 Class II permits each year.

RESOURCE REQUIREMENTS: Vary by state and EPA region and are dependent upon the scope of the UIC program in the area.

ORGANIZATIONAL STRUCTURE: The UIC program is, for the most part, a delegated program. Therefore program administrative activities rest with the delegated state or territory. Often different classes of wells can be regulated by different agencies in the state. EPA regional offices assume responsibilities for states that have not accepted delegation.

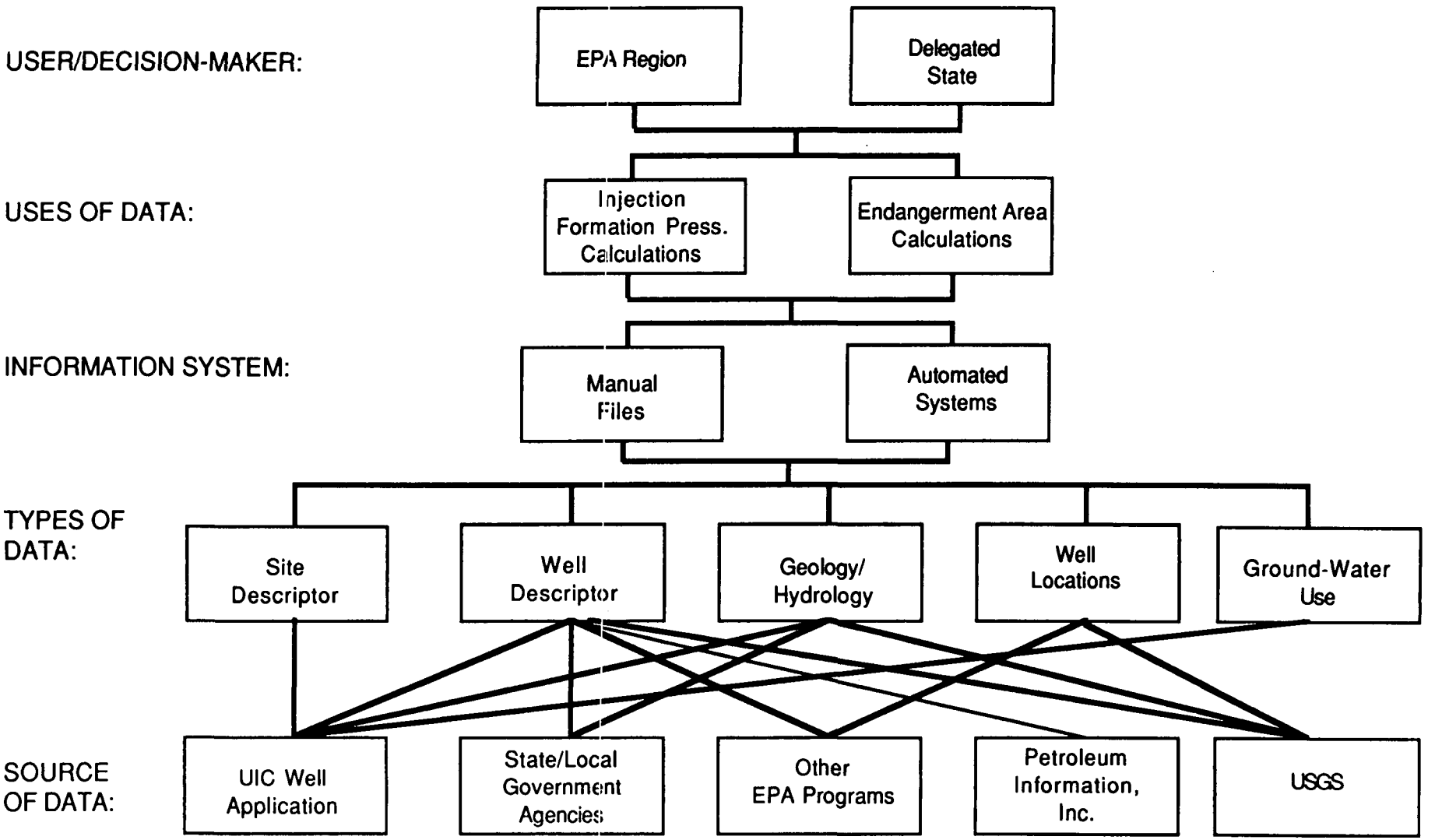
PROGRAM: Underground Injection Control

DECISION: Should an EPA Region or delegated state issue a permit or rule for an underground injection well?

Current Decision-Making Process	Information Management Requirements	Comments
• An EPA region or delegated state receives a UIC well permit application. Typically UIC wells are oil or gas wells that the applicant wishes to convert to a new use. • The application contains: administrative information, drilling logs, well descriptor data, a listing of other nearby wells (usually within a three mile radius). • Permit authorities must review permits and determine: -- Is the integrity of the injection well sound? -- Is the injection formation appropriate? -- Is the injection pressure appropriate for the formation? -- What are the characteristics of the injection zone? -- Is the post-closure plug and abandonment plan (Class I wells) adequate (i.e., ground water monitoring for 30 years)? • The permit approval decision is based on the risk that injected wastes could contaminate an USDW. Two primary calculations are made to assess risk: -- Endangerment area calculations -- Injection formation pressure calculations.	• Ground-water parametric data is not a primary data requirement for this program. However, the background quality of water in UDSW's in the area of review would be useful information. • List of wells in area of review, location and depth of nearby USDWs, together with data on well construction, age, depth, casing, packing, elevation, bottom pressure and administrative data (e.g. owner/operator, facility name, SIC code, permit type, well type) are required. • Comprehensive data on local geology and hydrology to support the use of more sophisticated ground-water transport models is used. Other data includes suitability of the injection zone, reservoir porosity and permeability, proposed injection pressure, injection volume, electric well log, and amount, composition and timing of waste injections. • Data on general regional land uses (e.g., nearby sources of drinking water, RCRA/CERCLA sites, population, etc.) is needed. • Mapping capabilities to display well, land use data, geology and aquifer data on an integrated basis is desired.	• Sophisticated ground-water transport models for UIC application evaluation require significantly more detailed hydrologic and geologic data than is commonly available. Sophisticated models are worthwhile only under special circumstances. • There is a large amount of administrative information associated with permitted UIC wells. Several states currently use micro-computers to store and retrieve information such as well owner, permit limits, and facility operator waste stream injection reports. • It is uncommon to require ground-water monitoring in an injection well. However, Region 5 now requires RCRA-like post-closure ground-water monitoring requirements for its Class I wells. Over the long term this requirement could generate a large amount of data.

PROGRAM: Underground Injection Control

DECISION: Should an EPA Region or delegated state issue a permit or rule for an underground injection well?



PROGRAM: Underground Injection Control

DECISION: Should an enforcement action be taken because an underground injection well has violated program requirements, exceeded permit limits or contaminated an underground source of drinking water?

LEGISLATIVE AND REGULATORY AUTHORITY: Safe Drinking Water Act, Part C

40 CFR Part 144, Subparts B-E.

RESPONSIBILITIES: The permit authority must review injection permits (usually on a three year schedule) and may terminate, permit or deny a permit renewal application for noncompliance.

Permit authorities must review permit compliance data submitted by facility operators to determine compliance with permit injection limits and pressure.

Permit authorities must review monitoring data and records from surrounding wells, monitor well pressure, and evaluate the mechanical integrity of the well to identify facilities as candidates for inspection.

CURRENT AND FUTURE WORKLOAD: Few permit termination actions have been made to date. While permits are reviewed periodically, all UIC wells require inspection. Class I wells are inspected at least once per year while Class II wells are inspected at five year intervals.

RESOURCE REQUIREMENTS: Vary by state and are dependent upon the scope of the UIC program in the state.

ORGANIZATIONAL STRUCTURE: The UIC program is, for the most part, a delegated program. Therefore, program administrative activities rest with the delegated state or territory. Often different classes of wells can be regulated by different agencies in the state. EPA regional offices assume responsibilities for states that have not accepted delegation.

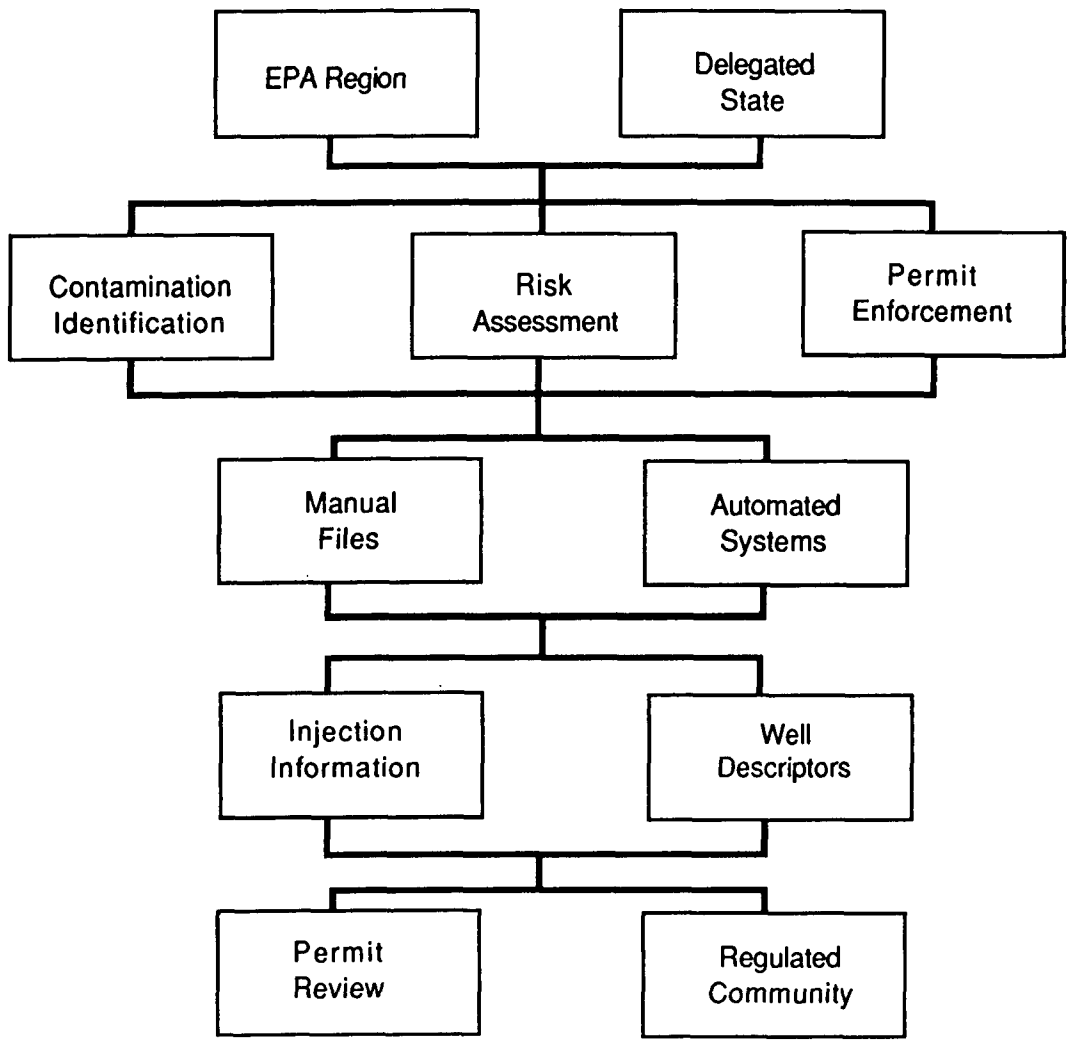
PROGRAM: Underground Injection Control

DECISION: Should an enforcement action be taken because an underground injection well has violated program requirements, exceeded permit limts or contaminated an underground source of drinking water?

Current Decision-Making Process	Information Management Requirements	Comments
• Permits may be terminated when: -- The permit authority makes a determination that the permitted activity endangers human health or the environment (e.g. contaminates an USDW). -- The permittee misrepresents any relevant facts at any time or fails to disclose pertinent information (e.g., willfully fails to disclose all wells in area of review). -- Permittee is in non-compliance with a permit condition.	• Data required to terminate permit may include but is not limited to information from the mechanical integrity test (e.g., does the well leak?) and injection pressure data (e.g., condition of injection formation). • A review of administrative records is necessary to determine if permittee exceeded injection volumes and timing. • Post-closure requirements for Class I wells include a 30 year period of ground-water quality monitoring.	• Many UIC programs do not require that monitoring wells be placed near UIC wells. EPA HQ believe over use of monitoring wells might be harmful to the ground water injection zone. • Ground-water quality data, except TDS, are not routinely collected by the UIC program. It does require the collection of a considerable amount of geologic information not traditionally associated with a ground-water monitoring samples (e.g., location of USDW, identification of confining geology zones, interconnectivity). • Post-closure requirements for Class I wells could generate a significant amount of ground-water quality data.

PROGRAM: Underground Injection Control

DECISION: Should an enforcement action be taken because an underground injection well has exceeded permit limits or contaminated an underground source of drinking water?



Drinking Water

PROGRAM: Drinking Water

DECISION: Should a purveyor receive approval for the operation of a public water system?

LEGISLATIVE AND REGULATORY AUTHORITY: Safe Drinking Water Act 1974, Part B
40 CFR 141-142

RESPONSIBILITIES: EPA may delegate the program to the states which in turn can implement the program at the local or district level. Delegated states must have drinking water standards and enforcement, variance and exemption procedures "no less stringent" than Federal standards. Delegated programs may approve a public water system purveyor if the water meets maximum contaminant level (MCL) standards or has an effective water treatment program. A public water system is one which regularly supplies water to 15 or more service connectors or to 25 or more individuals at least 60 days a year.

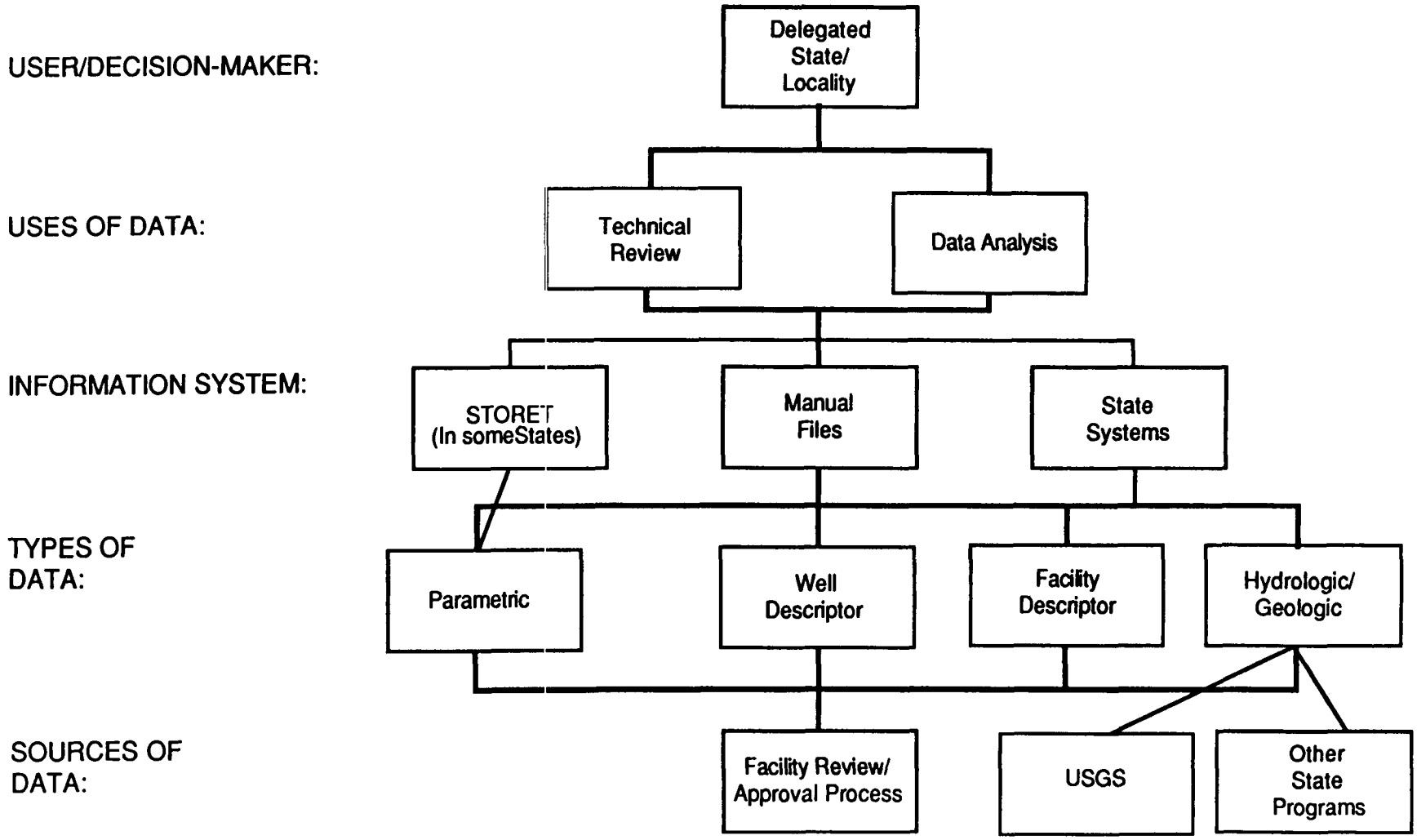
CURRENT AND FUTURE WORKLOAD: Dependent upon the maintenance and development of drinking water supplies necessary to meet demand for public water supplies.

RESOURCE REQUIREMENTS: The technical review of a permit application can take from 8 to 36 person hours.

ORGANIZATIONAL STRUCTURE: All states except Indiana, Wyoming and water supplies on Indian lands have assumed primacy. Many states and localities regulate public water systems from their Health departments.

PROGRAM: Drinking Water

DECISION: Should a purveyor receive approval for the operation of a public water supply system?



PROGRAM: Drinking Water

DECISION: Should a purveyor receive approval for the operation of a public water supply system?

Current Decision-Making Process	Information Management Requirements	Comments
• Under SDWA, EPA can delegate the public water system (PWS) program to the states. As part of their regulatory program, some states and localities permit PWS facilities. Most states perform a plan and specification review of new public water supply facilities. New facilities are often required to submit raw ground-water samples taken from the well heads as well as other information on the supplying aquifer and wells. The states and localities use this data to assess the suitability of the PWS as a safe source of drinking water. States and localities also require a plan and specification review and approval if there are any changes to a PWS facility (e.g., a new well is added to the system).	• States receive most of their information through the PWS approval process. Other information requirements include: -- Background quality data on the supplying aquifer(s) -- Geologic and hydrologic data for the supplying aquifer(s) -- Land use in the area to identify potential sources of contamination.	• State programs often regulate the quantity as well as the quality of the ground water extracted. • The ground-water samples taken at the well head often are not representative of the general water quality found in the supplying aquifer. Larger systems have wells with multiple screens which draw water from several aquifers A well head sample, then, many not represent a single aquifer but a blend of several. • STORET is sometimes used by the delegated programs to store ground-water quality (parametric) data.

PROGRAM: Drinking Water

DECISION: Should enforcement action be taken against a public water system?

LEGISLATIVE AND REGULATORY AUTHORITY: Safe Drinking Water Act 1974, Part B
40 CFR 141-142

RESPONSIBILITIES: Delegated states are responsible for adopting, monitoring, reporting, public notification and implementing procedures for the enforcement of MCL's. State regulatory requirements can be "no less stringent" than the Federal requirements in 40 CFR 141.

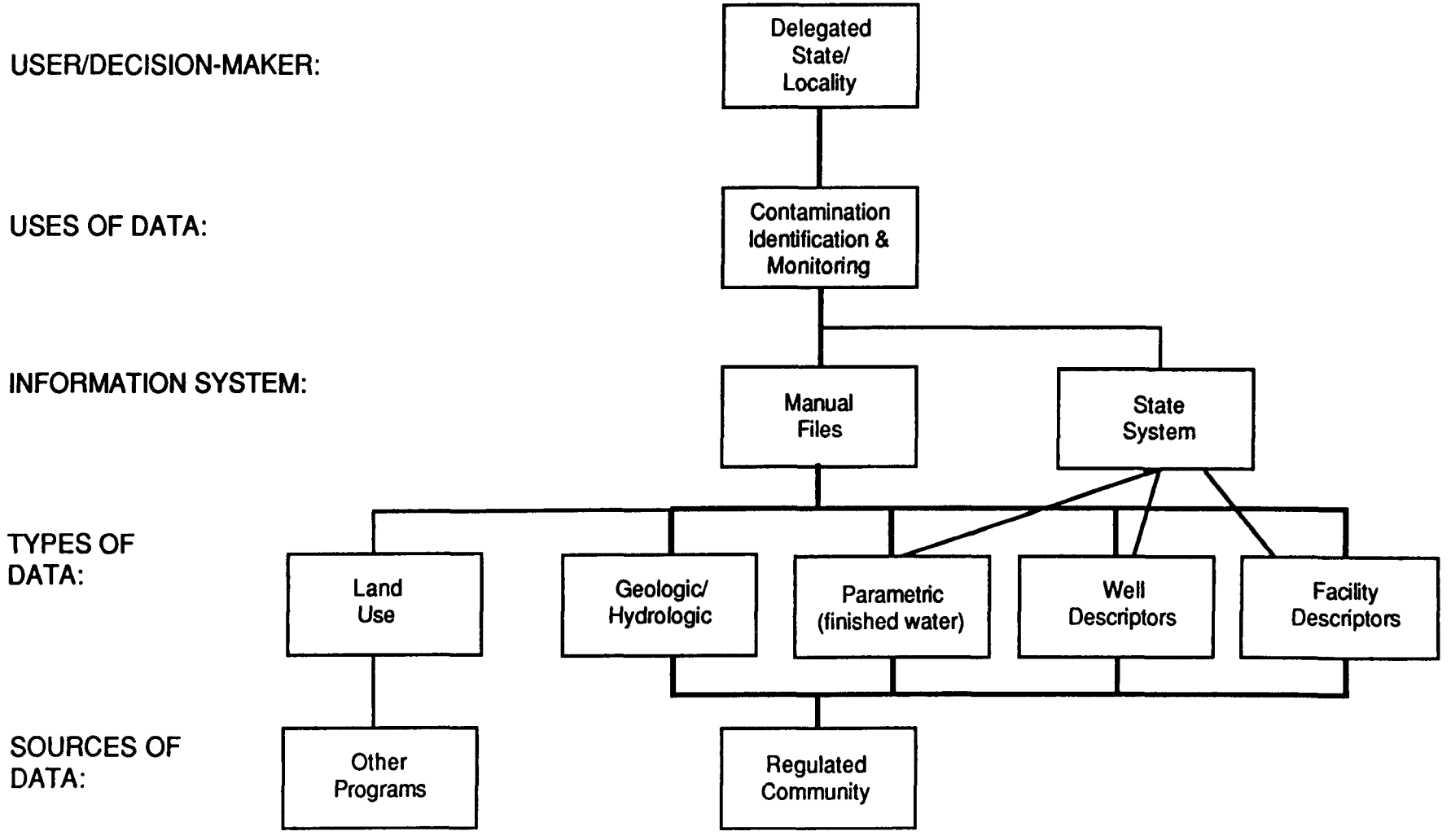
CURRENT AND FUTURE WORKLOAD:

RESOURCE REQUIREMENTS:

ORGANIZATIONAL STRUCTURE: All states except Indiana, Wyoming and water supplies on Indian lands have assumed primacy. Many states regulate Public Water Systems from their Health department.

PROGRAM: Drinking Water

DECISION: Should enforcement action be taken against a public water system?



PROGRAM: Drinking Water

DECISION: Should an enforcement action be taken against a PWS?

Current Decision-Making Process	Information Management Requirements	Comments
• Public water system (PWS) purveyors submit monitoring reports on finished water to the state on a regular basis. When MCL's are exceeded, additional monitoring is performed. This can include monitoring at the well head to detect the source of contamination. Samples may also be taken from wells in the area surrounding the PWS facility. • Sanitary surveys are also performed by the state to help identify contamination problems. • At the state level enforcement actions can result in closure of the PWS unless the facility can correct the problem. • Federal enforcement actions include notification of non-compliance, an order to the state requiring compliance, an EPA issued Administrative Order, or a civil action against the PWS.	• Most of the data required is supplied by the regulated PWS's (this data includes parametric data on finished water, well descriptors, facility descriptors, and geologic/hydrologic data). • Some states find it useful to detect the source of ground-water contamination. The following information is needed in this effort: -- Land use -- Geologic/hydrologic data for an extended area. • Some states indicated that mapping and modelling capabilities would be useful. These tools would assist in the identification of contaminant sources and help predict if a spill or leak would affect a PWS.	• Some states have not used STORET to store parametric data because the data is often for "finished" water. Data on "raw" water is usually available only when the PWS constructs a new well, from special studies, or if the PWS does not treat its water. • The Federal government (EPA) must enforce the PWS program on Indian Lands.

PROGRAM: Drinking Water

DECISION: Should an MCL be designated for a contaminant found in drinking water?

LEGISLATIVE AND REGULATORY AUTHORITY: Safe Drinking Water Act 1974, Section 1401(1), 1412(b)
Safe Drinking Water Act Amendments of 1986, Section 101

RESPONSIBILITIES: The Office of Drinking Water at EPA Headquarters is responsible for establishing maximum contaminant levels for each contaminant which, in its judgement, may have adverse human health effects.

CURRENT AND FUTURE WORKLOAD: According to the SDWA Amendments of 1986, EPA must promulgate national primary drinking water regulations for 83 contaminants by June 1989.

RESOURCE REQUIREMENTS: The resources required to develop an MCL vary widely depending on the type of contaminant.

ORGANIZATIONAL STRUCTURE: The Office of Drinking Water at EPA Headquarters establishes primary drinking water standards in conjunction with the National Academy of Sciences. Interim standards are promulgated by EPA.

PROGRAM: Drinking Water

DECISION: Should an MCL be designated for a contaminant found in drinking water?

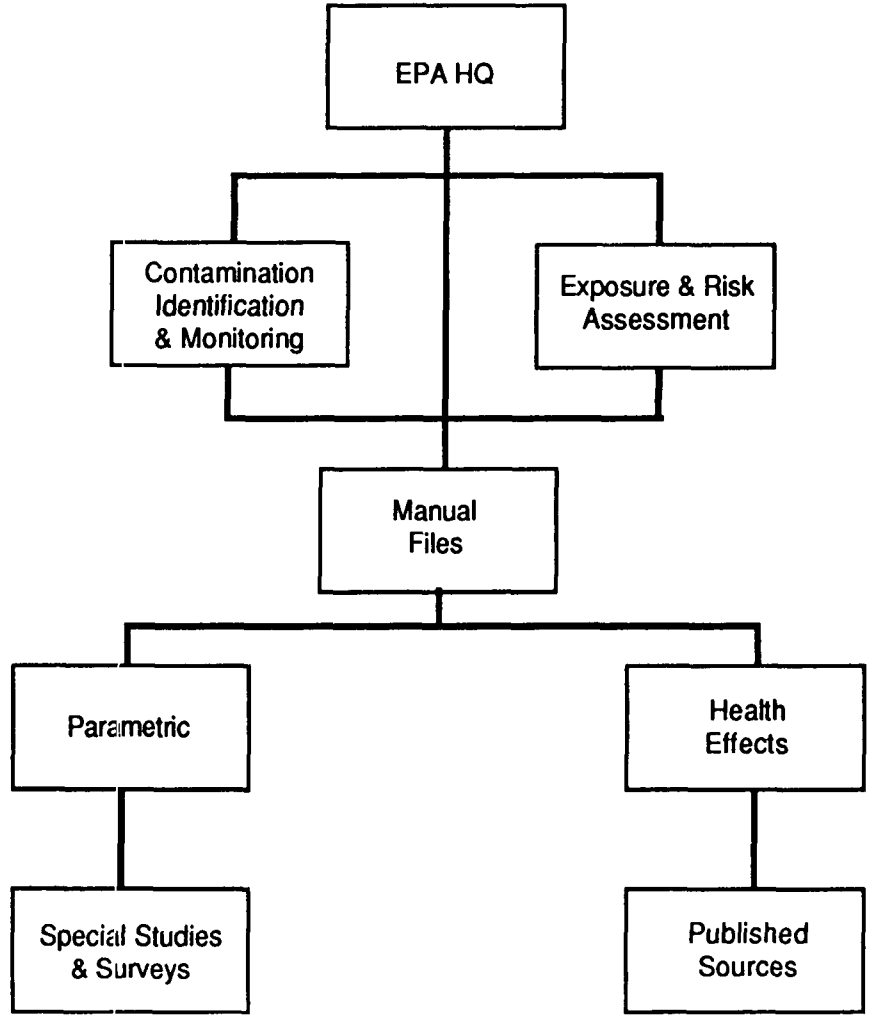
USER/DECISION-MAKER:

USES OF DATA:

INFORMATION SYSTEM:

TYPES OF DATA:

SOURCES OF DATA:



PROGRAM: Drinking Water

DECISION: Should an MCL be designated for a contaminant found in the drinking water?

Current Decision-Making Process	Information Management Requirements	Comments
• The Office of Drinking Water assesses the magnitude of the problem from data provided by the EPA Regions, states and special studies and surveys. It analyzes the health effects associated with the contaminant and determines the necessity of a new maximum contaminant level (MCL). In the interim, ODW may issue a health advisory regarding the contaminant.	• Information requirements include: -- Incidents of contamination or new health effects data on known contaminants -- Health effects information -- ODW may commission a special study to collect surface and/or ground-water quality data.	• Note that the Office of Drinking Water, unlike the pesticides program, is not required to perform a cost/benefit analysis except as required under Executive Order 12291.

Pesticides

PROGRAM: Pesticide Program

DECISION: Should a pesticide registration/reregistration be approved?

LEGISLATIVE AND REGULATORY AUTHORITY: Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) Section 3
40 CFR 162

RESPONSIBILITIES: The Office of Pesticide Programs (OPP) at EPA Headquarters reviews pesticide data submitted by the manufacturer to ensure that the pesticide does not pose an unreasonable adverse effect on the environment (defined as "any unreasonable risk to man or the environment, taking into account the economic, social and environmental costs and benefits of any use of the pesticide") and so meets the statuatory standard for registration or reregistration. A state may provide registration for additional uses of Federally registered pesticides to meet special local needs (if such use has not previously been prohibited by EPA).

CURRENT AND FUTURE WORKLOAD: There are 40,000 pesticides containing some 1,400 active ingredients in 600 generic categories now registered by EPA. All these existing pesticides are being reregistered through OPP's development of Registration Standards. All Registration Standard reviews involve a consideration of ground-water protection. As part of the reregistration process, a special Ground Water Data Call-In was conducted for about 90 potential leachers in 1984, and has elicited 250-270 data submissions so far.

In addition, all requests for new and amended pesticide product registration involving outdoor uses are evaluated from the standpoint of ground-water protection. Most of the 900-1000 scientific environmental fate data reviews completed by OPP during each of the last two years have involved ground-water.

Pesticides raising human health or environmental concerns during registration or reregistration are subjected to more intensive risk/benefit review through the Special Review process. About 6 Special Reviews involving ground-water concerns are ongoing or have been completed by OPP in recent years.

OPP staff anticipate that the number of registration and reregistration review actions involving ground-water concerns will increase during the next several years.

RESOURCE REQUIREMENTS:

OPP's Hazard Evaluation Division includes a Ground-Water Team of three scientists and four part time writer/editor and hydrogeologist consusultants working primarily on ground-water related registration, reregistration and other technical reviews, collaborative projects with the States and USGS, and numerous requests for environmental fate data and technical assistance. Staff of OPP's Registration Division and Benefits and Use Division also play a role in handling registration and reregistration decisions, so that a total of 7 person-years per year are dedicated to ground-water related reviews in OPP.

ORGANIZATIONAL STRUCTURE:

The Office of Pesticide Programs makes the registration or reregistration decision. At the state level, pesticide regulatory and enforcement programs are often implemented by state agencies such as the Department of Agriculture.

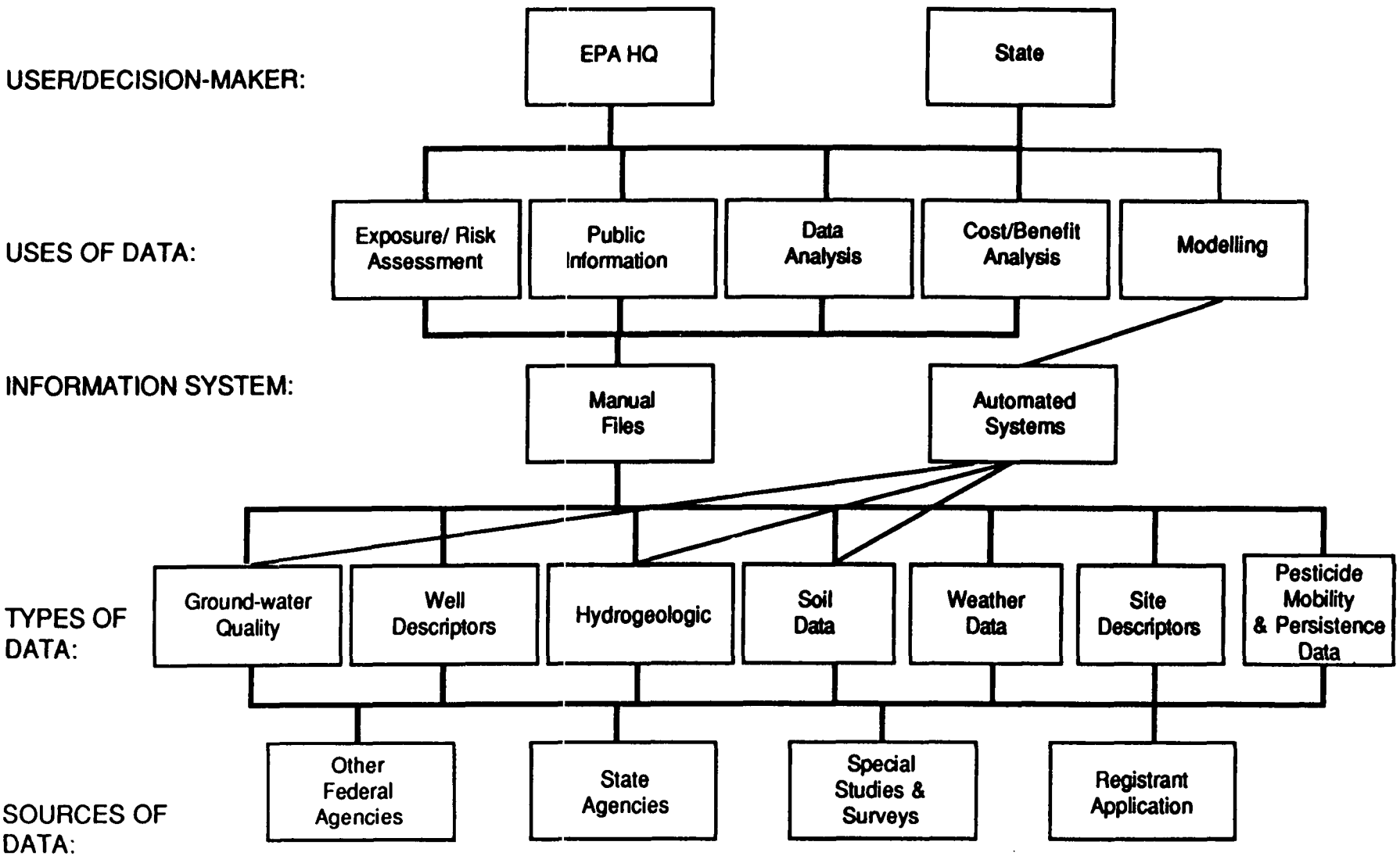
PROGRAM: Pesticides

DECISION: Should a pesticide registration/reregistration be approved?

Current Decision-Making Process	Information Management Requirements	Comments
• Data requirements to support decision include: -- Tests for acute toxicity in humans, test animals or endangered species, or population reductions in non-target organisms -- Tests for chronic toxicity in humans, test animals, etc. -- Reviews of emergency treatment procedures for ameliorating the toxic effects of a pesticide in people -- Cost/benefit analysis of pesticide use e.g., economic modelling -- Effect of pesticide use on ground water (e.g. model chemical, fate and transport in all soils of unstaturated zone. Examine leachability, adsorption/desorption characteristics, resistance to degradation, solubility and volatility.)	• Information requirements include: -- Ground water quality -- Site descriptors -- Geologic/hydrologic data -- Soil data -- Weather data. • QA/QC indicators (e.g., analytical technique used, who performed the study, sampling and analysis) are very important. • Mapping capabilities are needed in the analysis of pesticide contamination. • Security measures are required for any data submitted by an applicant. • Mobility and persistence data of the pesticide.	• OPP is now conducting the National Pesticides Survey. Data will be stored on an IBM AT. • OPP would like better access to the Ground Water Site Inventory Data (GWSI) • The Soil Conservation Service is a source of soil data. • Registrant-submitted data are used for most pesticide actions.

PROGRAM: Pesticides

DECISION: Should a pesticide registration/reregistration be approved?



PROGRAM: Pesticide Program

DECISION: Should the registration for an approved pesticide be suspended, cancelled, or restricted because of ground-water contamination ?

LEGISLATIVE AND REGULATORY AUTHORITY: Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) Section 6 and Section 3.

RESPONSIBILITIES: Sections 6 and 3 authorize EPA to suspend, cancel or restrict pesticides that pose varying degrees of risk to humans or the environment. Under Section 6, EPA may cancel the registration of a pesticide that causes unreasonable adverse effects on the environment. A suspension order may be issued by EPA if it is determined necessary for preventing an imminent hazard. A finding of unreasonable risk under FIFRA involves a process that weighs health risks including applicator, dietary and ground-water contamination, against the benefits of continued use of the pesticide. EPA may also restrict hazardous pesticide uses to certified applicators under Section 3. A ground-water restricted use rule is also being developed by EPA.

CURRENT AND FUTURE WORKLOAD: FIFRA Section 6(c) suspensions occur infrequently, at a rate of only one every several years. However, ground-water related restrictions are likely to occur much more often in the near future.

RESOURCE REQUIREMENTS: These types of suspensions are usually very resource intensive because they require numerous offices to provide thorough legal, economic, and scientific evaluations.

ORGANIZATIONAL STRUCTURE: The Office of Pesticide Programs at EPA Headquarters suspends or cancels a pesticide registration and acts in cooperation with the Office of General Council, the Assistant Administrator for Pesticides and Toxic Substances, and the Administrator.

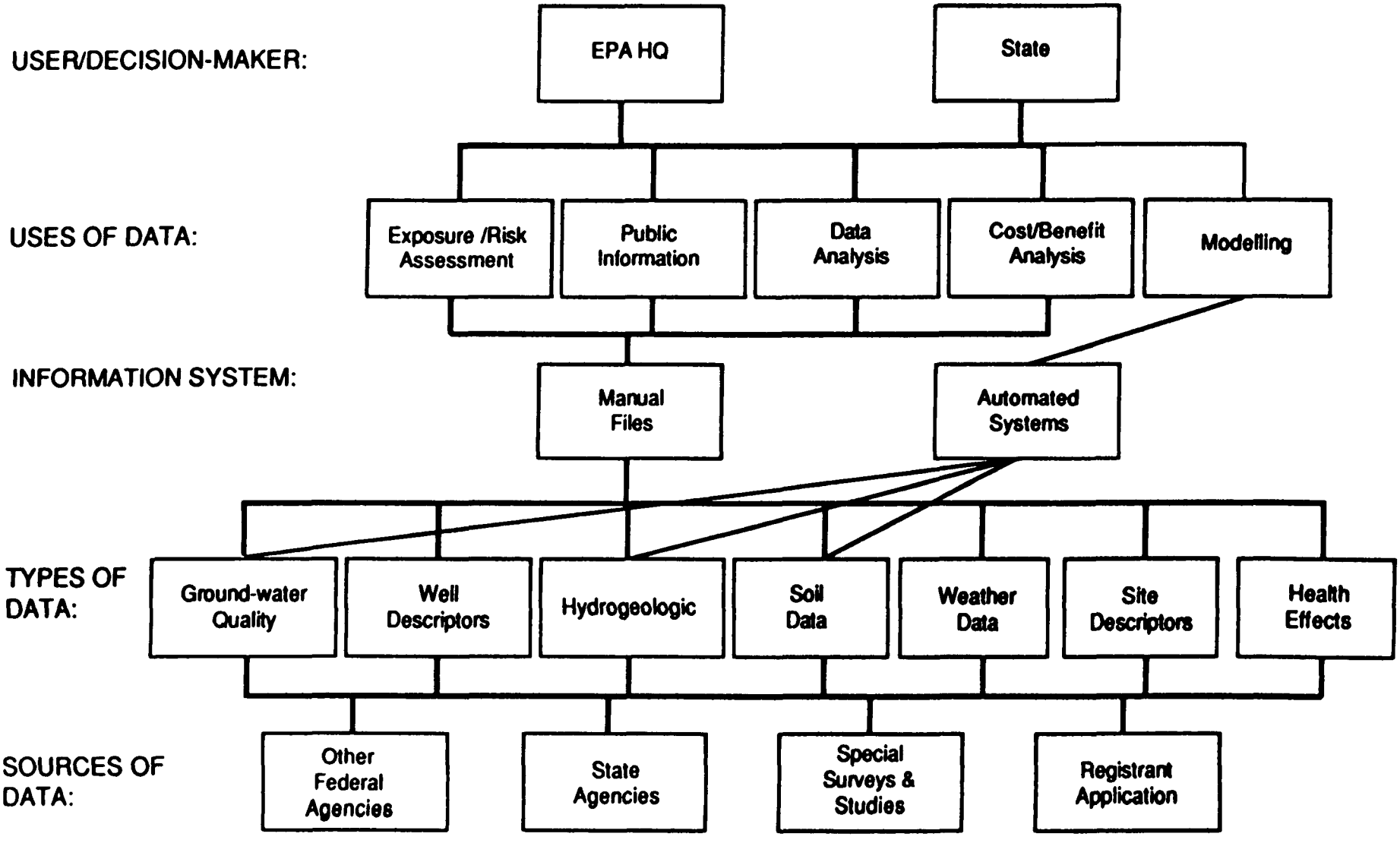
PROGRAM: Pesticides

DECISION: Should the registration for an approved pesticide be suspended, cancelled, or restricted because of ground-water contamination?

Current Decision-Making Process	Information Management Requirements	Comments
• EPA collaborates with the USGS and state and county governments on the design and execution of field studies which often generate data necessary to make these types of decisions. • State and EPA Regional Offices identify and report to EPA HQ incidents of pesticide contamination of ground water. • EPA HQ evaluates the ground water contamination incidents and determines the potential for any adverse health effects. It is important to underscore the fact that a finding of unreasonable risk under FIFRA involves a process that weighs health risks against the benefits of continued use of pesticide. Information regarding the potential of a pesticide to leach through the soil into ground water is factored into EPA's assessment of exposure to pesticides.	• Ground water quality samples taken to provide evidence of ground water contamination. Information needs include: -- Common pesticides of use in the area -- Location of area drinking water wells -- Analysis of ground-water samples for pesticides. • Data requirements to support a suspension or cancellation include: -- Economic benefit (e.g., value to crops) -- Health effects of exposure to pesticide compounds -- Potential of pesticide to leach under varying soil and climatic conditions.	• At present there is no mechanism that automates transfer of the pesticide ground-water data from the states to EPA headquarters. • USGS (GWSI) and the Soil Conservation Service are sources of water level and soil data, respectively. • Historic ground-water data is used if available. • Several types of special studies are used when available or conducted to enhance the final determination -- pesticide monitoring in groundwater -- soil-core studies

PROGRAM: Pesticides

DECISION: Should the registration for an approved pesticide be suspended, cancelled, or restricted because of ground-water contamination?



Toxics

PROGRAM: Toxic Substances

DECISION: Should the manufacture, processing, distribution, use or disposal of a toxic substance be regulated; should testing (Section 4) or additional existing information be requested of the manufacturer (Section 8)?

LEGISLATIVE AND REGULATORY AUTHORITY: Toxics Substances Control Act -- Section 4, 5, 6 and 8

RESPONSIBILITIES: The objective of toxic regulation is to ensure against an unreasonable risk of injury to health or the environment (including ground water) from the manufacture, processing distribution, use or disposal of a chemical substance or mixture. Because it encompasses all aspects of a chemical pathway through society, including use and disposal, TSCA has the potential for directly addressing ground water contamination.

CURRENT AND FUTURE WORKLOAD:

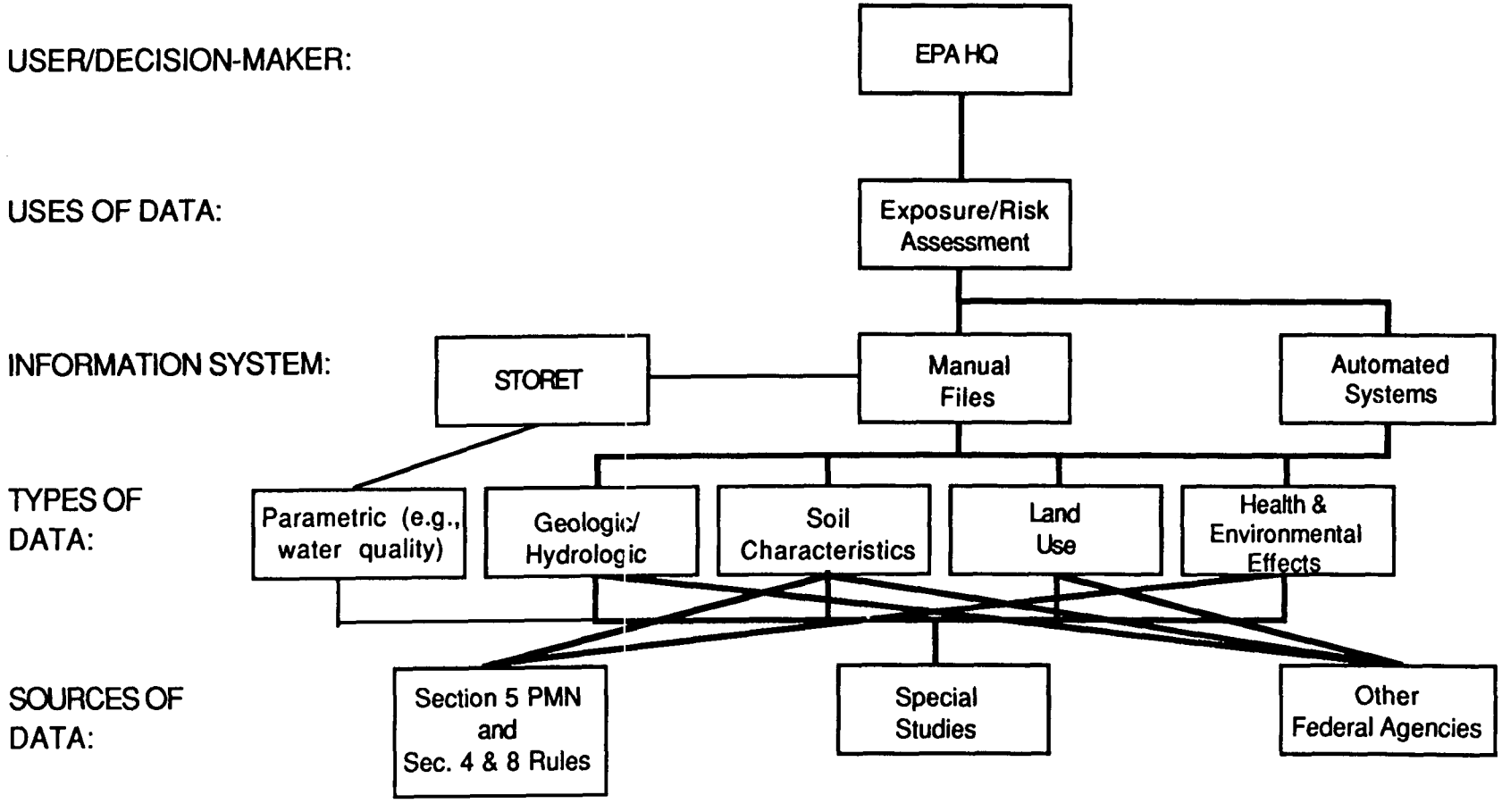
OTS reviewed over 1,700 new chemicals in FY86 and processed as many existing chemicals in the program as resources permit.

RESOURCE REQUIREMENTS: The Office of Toxic Substances program is supported at the level of approximately 500 Full-time Employees (FTE's) per year.

ORGANIZATIONAL STRUCTURE: The Office of Toxic Substances at EPA Headquarters makes the decision.

PROGRAM: Toxic Substances

DECISION: Should the manufacture, processing, distribution, use, or disposal of a toxic substance be regulated; should testing (Section 4) or additional existing information be requested of the manufacturer (Section 8)?



PROGRAM: Toxic Substances

DECISION: Should the manufacture, processing, distribution, use, or disposal of a toxic substance be regulated; should testing (Section 4) or additional existing information be requested of the manufacturer (Section 8)?

Current Decision-Making Process	Information Management Requirements	Comments
• TSCA is an integrative tool which can be used to collect and assess data on health and environmental effects of toxic substances in ground water (Sec. 4, 5, & 8) and control the production, transport, storage, disposal and use of toxic substances (Sec. 5 & 6) for those problems involving ground water contamination from toxic substances. To this end OTS can: -- Review the health effects of the toxic substance and the magnitude of exposure to human beings -- Review the magnitude of exposure and effects on the environment -- Assess the benefits of product use and consider the availability of alternative substances -- Determine the economic consequences of a ruling to regulate the toxic -- Choose a regulatory action or rule (e.g. test, ban, restricted use, disposal requirements). • OTS uses ground-water models, field studies and exposure assessments to assess the threat a toxic presents to the ground water.	• OTS uses the following data: -- Ground-water quality data (e.g., monitoring data, concentration values, MCL violations) -- Hydrogeologic data (e.g., soil characteristics, aquifer classification and vulnerability, depth to ground water) -- Ground-water use data (e.g., as drinking water, irrigation, salt aquifer) -- Site/facility background data (e.g., population at risk, location of drinking water wells, private wells, and hazardous facilities. -- Weather information -- Health effects -- Human monitoring data • Additional data is required to perform the cost/benefit analysis. • The Geographic Exposure Modelling System (GEMS) is a model management system which has access to several databases.	• TSCA requires a cost/benefit assessment. Ground water contamination is considered as part of that determination. • OTS needs to access on-line geographic groundwater information and other geologic data (e.g., saturated and unsaturated zones) on a national basis. It currently has access to several databases (e.g., Geoecology Data Base, National Soils Data, Cities Environments Data, Groundwater Management File).

State and Local Programs

STATE/LOCAL PROGRAM DECISIONS

1. **Water Allocation** (AZ,GA,MA,MN,NJ,SC,UT,VA,WA)

   - How much water should a facility be allowed to withdraw? From which aquifers?
   - What are the future ground-water needs in the area?

2. **Landfill Permitting** (CA,IL,SC,TX,VA,AZ,MA)

   - Should a solid-waste landfill receive a permit?
   - What is the ground-water monitoring plan?

3. **Zoning and Planning** (MN,CT,UT,MA,AZ)

   - Should land use restrictions be developed and implemented to protect the ground water in selected areas?
   - What should be the land use policy developed for either the protection or industrial use of ground water resources?

4. **Chemigation Permitting** (NE)

   - Does the chemigation system provide an actual or imminent threat to ground-water supplies?

5. **Highway Construction** (MN,AZ)

   - How and where should a highway be constructed so that it will not affect the ground water?
   - Where should rest areas be located to ensure access to drinking water quality ground water?
   - Should the transportation authority purchase land for highway construction? Is the ground water for the parcel under consideration already contaminated?

6. **Ground-Water Discharge Permitting** (AZ,CT,NJ,TX,VA,WY,MT,MO,CA,MA)

- Should a facility or activity receive a discharge permit?
- What measures is the facility taking to protect the ground water?

7. **Mine Permitting** (VA)

- Should a mining activity receive a permit? How will the ground water be affected?
- Where should the ground-water monitoring wells be located? What will the reporting requirements be? What is the background water quality?

8. **Well-head Protection** (Dade Co. FL,AZ,VT,MA,NY,CT)

- Should protection measures be implemented to protect a drinking water well production field from migrating sources of ground-water contaminants and surface discharges?

- Should off-site recharge areas be protected?

9. **Ground-Water Protection Areas** (NE,NJ,WA,UT,CT,NY,IL,Dade, Co.FL)

- Should discharges be limited in an area because of aquifer contamination problems? Should the aquifer or area be given a special protection?

- Should re-charge areas be protected?

10. **Ground-Water Use Classification** (CT,NJ,SC,MT,WY,AZ)

- What should be the designated uses of aquifers throughout the state?

- What is the current or potential use of the ground water based upon its quality?

11. Well Permit Program (AZ)

- Should a permit be issued to an applicant for the drilling and construction of a well?

12. Land Tranfer Program (MA,MO)

- Should the state approve the sale or transfer of corporate and commercial land in Massachusetts or hazardous waste disposal sites in Missouri between an authorized seller and buyer?

PROGRAM: Water Allocation

DECISION: How much water should a facility be allowed to withdraw? From which aquifers?

What are the future ground-water needs in the area?

LEGISLATIVE AND REGULATORY AUTHORITY: A state program

RESPONSIBILITIES: Many states, especially states which have had water quantity problems in the past, regulate the withdrawal of ground-water. The regulations usually apply only to facilities which withdraw large quantities of water (e.g., more than 1,000 gallons per day). The facility is required to submit a permit detailing the aquifers which are to be tapped, the amount of ground-water to be withdrawn, well logs, water levels, other wells in the vicinity, and, sometimes, water quality data. The state, or delegated district/locality, will assess the effect of the withdrawal on the aquifer, future water supplies, and on other water users in the area.

The state water allocation program is tied with other state programs and regulations. The well permitting program is often part of the water allocation program. The public water system (PWS) program, which focuses on the quality of the water supply, often coordinates its efforts with the water allocation program.

USGS has traditionally been more involved with water supply issues than EPA. Many states store their data on SWUDS.

CURRENT AND FUTURE WORKLOAD: As ground-water supplies become more scarce due to depletion of aquifers and contamination problems, state water allocation programs will receive more attention nationwide.

ORGANIZATIONAL STRUCTURE: The water allocation program is administered from the state department of environmental protection or from the state water resource commission or board.

PROGRAM: Landfill Permitting

DECISION: Should a solid-waste landfill receive a permit?

What is the ground-water monitoring plan?

LEGISLATIVE AND REGULATORY AUTHORITY: Currently a state program. Federal regulations under the Resource Conservation and Recovery Act, Subtitle D, are being developed.

RESPONSIBILITIES: Although EPA is presently developing regulations for solid-waste landfills, many states have already developed their own programs. States which issue permits to solid-waste landfills have implemented their programs similarly to the RCRA Subtitle C program, however, the requirements are much less stringent. Landfill owners or operators are required to submit a permit application detailing how the facility is constructed and proposing a ground-water monitoring plan. The monitoring plan (i.e., the placement of the wells and the parameters to be monitored) will depend on the hydrogeology and the solid wastes contained in the landfill. Reporting requirements will also vary by state and by facility type.

Ground-water data is used to detect leaks from a landfill. States will identify when MCLs are violated. Ground-water data is also used for trend analyses on the type of substances most likely to leak from the facility.

Most states regulate landfills. In some states landfills are regulated through the ground-water discharge permit program.

CURRENT AND FUTURE WORKLOAD: There are approximately 10,000 to 50,000 solid-waste disposal facilities which receive small quantity generator hazardous waste and household waste. While many of these facilities are permitted through state programs, the permits will have to be renewed on a regular basis.

RESOURCE REQUIREMENTS: Permitting solid-waste landfill facilities is much less resource intensive than permitting hazardous waste facilities.

ORGANIZATIONAL STRUCTURE: The landfill permit program is implemented by the state department of environmental protection in the solid waste division.

PROGRAM: Zoning and Planning

DECISION: Should land use restrictions be developed and implemented to protect the ground water in selected areas?

What should be the land use policy developed for either the protection or industrial use of ground water resources?

LEGISLATIVE AND REGULATORY AUTHORITY: Primarily a local program with technical assistance provided by the state or region.

RESPONSIBILITIES: Local communities and Regional planning boards develop land use planning and zoning policies to protect sensitive ground-water areas. They require ground-water areas to meet a designated use (e.g. drinking water source or industrial use area).

CURRENT AND FUTURE WORKLOAD: As ground water as a source of drinking water becomes increasingly scarce and the demand for water increases, communities will seek cost effective methods of providing necessary water supplies. The protection and preservation of existing sources of supply is a concern for many communities across the county.

RESOURCE REQUIREMENTS: State planning agencies (e.g., MN, CT, MA) play an active role in protecting ground water resources by promoting local communities to adopt zoning restrictions, growth policies, and land use plans to protect the resource.

ORGANIZATIONAL STRUCTURE: Local communities or regional governing bodies are responsible for zoning and planning decisions. The state planning agency provides guidance and technical assistance.

PROGRAM: Chemigation Permitting

DECISION: Does the chemigation system provide an actual or imminent threat to ground-water supplies?

LEGISLATIVE AND REGULATORY AUTHORITY: In Nebraska, legislative authority is given by the Nebraska Chemigation Act.

RESPONSIBILITIES: The Nemaha Natural Resource District (NRD) chemigation program requires that after January 1, 1987, all chemigation activities must be permitted. In order to receive a permit, the applicant must meet certain technical requirements and the NRD must inspect the irrigation distribution system.

The NRD needs ground-water data in order to assess if there is an actual or imminent threat of danger to people or the environment due to the operation of a chemigation system. The NRD can suspend operation of the system if a threat is found. Ground-water data will have to be received and analyzed on a regular basis in order to make such a determination.

CURRENT AND FUTURE WORKLOAD: The Chemigation Act will go into effect on January 1, 1987. It is not clear yet what contamination problems will be found.

RESOURCE REQUIREMENTS: Resource requirements will be determined when the program is implemented.

ORGANIZATIONAL STRUCTURE: The Natural Resource Districts will be responsible for implementing the program in Nebraska. If a NRD does not fulfill its responsibility, the state will implement the program.

PROGRAM: Highway Construction

DECISION: How and where should a highway be constructed so that it will not adversely affect ground-water quality?

Where should rest areas be located to ensure access to drinking water quality ground water?

Should the transportation authority purchase land for highway construction? Is the ground water for the parcel under consideration already contaminated?

LEGISLATIVE AND REGULATORY AUTHORITY: Highway construction is a state program.

RESPONSIBILITIES: The transportation authority or highway department must:

- Ensure adequate supplies of potable water are available for rest areas
- Ensure that highway drain fields and seepage ponds will not contaminate ground water
- Protect ground water from highway de-icing agents (e.g., urea)
- Ensure the authority does not purchase, and subsequently become responsible for the clean-up of, a site with contaminated ground water.

CURRENT AND FUTURE WORKLOAD: The workload is determined by the extent of highway construction activities in a state.

RESOURCE REQUIREMENTS: Not extensive. State rely heavily upon the records of their state geologic survey and USGS atlases. Occasional field work is required but performed on a case-by-case basis.

ORGANIZATIONAL STRUCTURE: This program is usually implemented by the state department of transportation.

PROGRAM: Ground-Water Discharge Permitting

DECISION: Should a facility or activity (e.g., industrial discharger) receive a discharge permit?

What measures are the facility taking to protect the ground water?

LEGISLATIVE AND REGULATORY AUTHORITY: Ground-Water discharge permitting is a state program.

RESPONSIBILITIES: Program officials are required to issue permits and enforce compliance with permit limits established for regulated facilities and activities.

Typically, ground-water discharge permits are issued to any facility or operation capable of causing ground-water degradation (e.g., solid waste landfills, salt storage facilities, office buildings (i.e., heat pumps), industrial dischargers, and to municipalities for the land application of waste water).

Permittees often must submit a discharge permit application containing such information as well head elevation, estimate of ground-water flow direction, calculation of the zone of influence or expected area of contamination, characterization of the receiving waters and an estimate of the quality of the discharge.

As a permit condition, permittees submit routine monitoring reports providing chemical analyses of the ground water samples taken from the facility's monitoring well(s). This ground-water parametric data is used for program enforcement actions.

CURRENT AND FUTURE WORKLOAD: Of the states visited in this study Arizona, New Jersey, Connecticut, Massachusetts and Texas had ground-water discharge permit programs. In some cases the program was relatively new (not more than 3-4 years old) and was expected to grow.

ORGANIZATIONAL STRUCTURE: The program is usually implemented by the state environmental protection agency.

PROGRAM: Mine Permitting

DECISION: Should a mining activity receive a permit? How will the ground-water be affected?

Where should the ground-water monitoring wells be located? What will the reporting requirements be? What is the background water quality?

LEGISLATIVE AND REGULATORY AUTHORITY: A state program

RESPONSIBILITIES: While there is considerable variance in the regulation of state mining activities, increasingly states are regulating from the perspective of ground water pollution control. To this end many states have adopted mine permit programs with ground water quality monitoring requirements. A complete discussion of state mining activities is beyond the scope of this study, however, the State of Virginia mine permit program has been outlined here to illustrate fundamental program characteristics.

In Virginia, mining facilities are required to monitor both surface water and ground water. In the permit application, the applicant provides information such as the hydrogeology and background water quality and quantity. The applicant must also indicate other users in the area so that the state can evaluate the impact of the mining operation on other ground-water users.

Mining facilities report regularly to the state Division of Mined Land Reclamation (DMLR). DMLR identifies any potential ground water degradation or diminution from the facility. The state also uses the data from the operation to evaluate the possible role of the mining facility when a complaint is made regarding the ground water quantity and quality in the area.

CURRENT AND FUTURE WORKLOAD: Virginia has approximately 700 active mines. These sites have 700 to 800 ground-water monitoring wells and an additional 700 to 800 ground water source monitoring points including springs, seeps, and shallow wells in regraded material. In the near future, the number of ground water monitoring points is expected to significantly increase when Virginia's new mining regulations go into effect. The regulations require that, in addition to monitoring surface

disturbances and deep mines facilities must also monitor ground water quality and quantity associated with their underground activity.

ORGANIZATIONAL STRUCTURE:

The program in Virginia is implemented by the Department of Mines, Minerals, and Energy, Division of Mined Land Reclamation.

PROGRAM: Well-Field Protection

DECISION: Should protection measures be implemented to protect a drinking water well production field from migrating sources of ground-water contaminants and surface discharges?

Should off-site recharge areas be protected?

LEGISLATIVE AND REGULATORY AUTHORITY: Currently a program in Dade County, Florida but soon to be a national program pursuant to the implementation of the Safe Drinking Water Act Amendments of 1986.

RESPONSIBILITIES: County officials are responsible for the protection of the drinking water well production field in the county. This field is the water supply for Miami, Florida.

Program activities include:

- Development and implementation of land use restrictions in field recharge area
- Analysis of water quality from ground water monitoring wells surrounding the field
- Modelling the approach of any contaminant plume
- Instituting remedial action necessary to protect the field (e.g., construction of a deep interceptor drainage ditch).

CURRENT AND FUTURE WORKLOAD: Dependent upon state interest in participating in the voluntary state program.

ORGANIZATIONAL STRUCTURE: Currently a program this study found in Dade County, Florida but soon to be a national program pursuant to the implementation of the Safe Drinking Water Act Amendments of 1986. This is a voluntary state program. The EPA Regions will review state applications and provide grants.

PROGRAM: Ground-water Protection Areas

DECISION: Should discharges be limited in an area because of aquifer contamination problems? Should the aquifer or area be given a special protection?

Should recharge areas be protected?

LEGISLATIVE AND REGULATORY AUTHORITY: A state program

RESPONSIBILITIES: In some states, an aquifer or area can be given a special designation due to the critical nature of the area or its ground water contamination problems.

The State of Washington has developed its Ground-water Management Areas Program and has designated eight protection areas as of June 1986. These areas are developed through the cooperative efforts of local and state agencies. The program is intended to protect ground-water quality and assure ground-water quantity for current and future uses. After designation a hydrogeologic profile or characteriztion is developed for the area. Based upon this characterization a protection area use plan is developed. The plan includes a detailed workplan, model ordinances, and a monitoring plan to ensure that specified goals and objectives are meet.

In the State of Nebraska a Ground-water Protection Area can be designated should ground-water contamination occur or be likely to occur in that area. After designation the appropriate Natural Resource District (NRD) is responsible for developing an action plan to describe how the contamination will be mitigated. Possible contamination sources are identified. Methods to control contamination may include educational programs for water users or requirements that best management practices be adopted by the agricultural community. NRD requires information on the background ground-water quality, hydrogeology, and potential sources of contamination of the designated area.

CURRENT AND FUTURE WORKLOAD: Varies by state

ORGANIZATIONAL STRUCTURE: In Nebraska, the Natural Resource Districts (NRD's) are responsibel for implementing the program. In Washington the program is administered by the Department of Ecology.

PROGRAM: Ground-water Use Classification

DECISION: What should be the designated use of aquifers throughout the state?

What is the current or potential use of the ground-water based on quality?

LEGISLATIVE AND REGULATORY AUTHORITY: This program established in the State of Connecticut. New Jersey, Wyoming, Montana and South Carolina are also initiating this program.

RESPONSIBILITIES: Responsibilities can include the identification and mapping of state geological and hydrologic characteristics and the assignment of a designated use classifications for each aquifer based upon current use and future need for ground water in an area.

Ground-water use classification is also implemented in response to land use or ground-water discharge program. The current or potential use classificatioon is used as a tool to establish ground-water discharge permit conditions.

In this program the local community is often responsible for the implementation of the land use and zoning controls. The state provides planning consultation and the technical assistance necessary to assist the communities with their land use determinations.

CURRENT AND FUTURE WORKLOAD: The geologic and hydrologic characterization of Connecticut is complete and designated uses must be developed. New Jersey is still developing their classification criteria and South Carolina is beginning to classify its aquifers.

ORGANIZATIONAL STRUCTURE: Upon the request of the local community or as seen to be needed by the state, the state provides the planning and technical assistance to protect the community's ground-water resource.

PROGRAM: Well Permit Program

DECISION: Should a permit be issued to an applicant for the drilling and construction of a well?

LEGISLATIVE AND REGULATORY AUTHORITY: This program is established in the State of Arizona.

RESPONSIBILITIES: Many states now require that an applicant receive a permit prior to well drilling and construction. The permitting agency may be the State Geological Survey, Bureau of Mines and Minerals or other responsible authority. Permit requirements vary by state. The State of Arizona has a permit program for all new wells drilled in the state since 1980. Other states limit permits to specific types or classes of wells (e.g. drinking water, UIC, oil and gas wells). Permit conditions usually require submission of the well driller's log to the permit authority.

CURRENT AND FUTURE WORKLOAD: Workload will increase as well permit programs mature.

ORGANIZATIONAL STRUCTURE: This is a state program. The permit authority resides with the permitting agency.

PROGRAM: Land Transfer Program

DECISION: Should the state approve the sale or transfer of corporate and commercial land in Massachusetts or land containing hazardous waste disposal sites in Missouri between an authorized seller and buyer?

LEGISLATIVE AND REGULATORY AUTHORITY: This program is established in the states of Massachusetts and Missouri.

RESPONSIBILITIES: The Land Transfer Act in the State of Massachusetts is becoming an increasingly important source of ground-water information for the state. Prior to the sale of corporate or commercial properties (e.g., office buildings, manufacturing facilities, lots, land) the seller must certify to the buyer that the land has no ground-water contamination problems. In an effort to comply the sellers usually commission a consultant to sample the ground-water quality associated with the sale property. Sample results are submitted to the Massachusetts Department of Environmental Quality Engineering.

In the State of Missouri the Land Transfer Program is applicable to land on which the presence of abandoned or uncontrolled disposal of hazardous waste either prior to regulations or illegal disposal, has been confirmed. These sites are identified and placed on a state register. Site owners have the right to appeal such a designation. Once placed on the state register, the designation becomes a permanent part of the land title and the property cannot be sold without state approval.

CURRENT AND FUTURE WORKLOAD: Increasing awareness of ground-water contamination problems will expand the scope of this program. New buyers wish to ensure that the property under consideration has no ground-water contamination. Buyers do not wish to "inherit" the ground-water problems of the previous owner. In the State of Missouri 51 sites are currently on the state register and 38 are proposed.

ORGANIZATIONAL STRUCTURE: This is a state operated program.

Appendix F -

Questions and Answers About Ground-Water Data Management Issues By Program

1. What RCRA program functions give rise to the need for ground-water data?

The RCRA program regulates proposed, existing, and closed industrial and commercial facilities which store, treat, and dispose of hazardous wastes (TSD facilities). Ground-water data are used primarily to review permit applications and issue permits, determine if contaminants are leaching into the ground water, define the extent and flow of contaminant plumes, and identify and evaluate corrective action alternatives. Ground-water monitoring is the principal method used by states and EPA to determine if a RCRA facility is leaching into the ground water.

There are a number of specific RCRA program activities which rely upon ground-water data to make decisions. These activities include:

- facility permitting
- ground-water monitoring of operating land disposal facilities
- evaluation of corrective action alternatives
- post-closure monitoring.

For example, in facility permitting, state or EPA decision makers must evaluate the suitability of a location for a proposed or existing RCRA facility. This evaluation includes determining the impact the construction and operation of such a facility will have on the environment, the nature of activities to be undertaken at the facility, and the potential for ground-water contamination resulting from the operation of the facility. Accordingly, ground-water data influences facility operating conditions, ground-water monitoring plans, and construction activities (e.g., design criteria at land disposal units) as well as other facility-related items.

2. What ground-water and related data does the RCRA program need, and why?

The RCRA program requires a number of different types of ground-water data to support its decision making. In particular, RCRA program personnel utilize:

- **Well descriptors** ... including well location, depth of well, well construction, well log, and well casing materials ... to provide a context for interpreting ground-water quality information.
- **Hydrogeologic descriptors** ... including depth to ground water, aquifer designation and boundaries, and stratigraphy ... to determine the potential or actual speed and direction of contaminant transport.
- **Water quality/sample descriptors** ... including the contaminants sampled for and the resulting concentration values, sampling procedures, and laboratory analysis procedures ... to establish background levels for a facility's ground-water and to compare the current quality of the ground-water to background (up-gradient) levels and previous sample results.
- **Related data** ... including site/facility background information such as particular disposal activities undertaken at the facility, waste stream, as well as land use and population density ... to assess the impact and risk of ground-water contamination.

In some instances, RCRA ground-water information is directly collected and analyzed in direct response to RCRA program requirements. For example, each facility's Part B permit defines specific ground-water monitoring requirements. To operate in accordance with its permit, the facility owner/operator must sample the ground-water regularly from specified wells, analyze the results using specified techniques, and report the resulting data to the appropriate regulatory authority. In enforcement actions, EPA or state personnel may sample and analyze ground-water to confirm results submitted by a regulated facility or contractor. Similarly, a facility's Part B permit application typically contains extensive ground-water quality and hydrogeologic data generated by the facility owner (who often relies on a contractor) explicitly for inclusion in the application.

In many cases, however, the ground-water data used by RCRA program authorities may be initially collected by other organizations for other purposes. These data primarily include spatial information (e.g., land-use,

population, topography) and health effects data (e.g., toxicity, environmental fate).

For example, RCRA permit writers often compare information on site hydrogeology provided in the permit application with data already available through USGS, research laboratories and universities, state government agencies (such as state geological surveys, oil and gas commissions, and water resources boards), and local government bodies. Decision makers would use this data to identify and investigate any important inconsistencies between the permit application and other, more general data on stratigraphy and other key site features. Similarly, information on land use and population in the area of a land disposal might be collected from USGS, the Bureau of the Census, and/or state and local government agencies.

3. Who uses this data?

The RCRA program is designed to be fully delegated to the states. At present, approximately half of the states have primacy in the RCRA program. For the remainder of the states, the RCRA program is the responsibility of the appropriate EPA Region, although states still play important roles in many situations. The key decision makers for the RCRA program are therefore the states and EPA Regions.

During the operating life of RCRA facility and for post-closure monitoring, the states and EPA Regions use ground-water related data. In the early phases of the program, EPA Regions and delegated states are responsible for permitting all active hazardous waste land disposal facilities. Only those facilities with a permit or which are in "interim status" may be operated. The facility performs ground-water monitoring on a regular (at least quarterly) basis. Thus, although the states or Regions receive and interpret the results of regular ground-water quality sampling to establish background water quality or determine permit compliance, the samples themselves are taken and analyzed by the regulated community and their contractors.

If contamination is detected, these data are used to determine the extent and direction of flow of the contamination. EPA and state personnel collect ground-water data only on a sampling basis during periodic inspections or special investigations.

If corrective actions are required at a RCRA facility, ground-water data are used to assist in characterizing the problem and approving/disapproving possible corrective action alternatives. Ground-water sampling is used during the corrective action process to evaluate the effectiveness of the clean-up efforts. Again, most of the ground-water data is collected by the facility owner/operators and their contractors -- not the regulatory authorities, which receive the resulting data for review and decision making.

Finally, RCRA facilities must be monitored for a number of years (thirty years is the suggested length) after their closing. Ground-water sampling and analysis are performed during this period to insure that facility contaminants do not leach into the ground water.

4. What are some examples of how improved ground-water information management could benefit the RCRA program?

- **Collection and Use of Data During Facility Permitting**

  Opportunity for improved efficiency and effectiveness. In support of the RCRA facility Part B permit process, permit writers at the responsible state and EPA Region are interested in obtaining as much information as possible regarding the proposed facility and the surrounding environment. Facility-specific information includes background ground-water quality, the configuration of the facility, the exact wastes to be disposed, and the processes and methods by which such disposal will be accomplished. Site/facility background information includes the hydrogeologic conditions in the immediate vicinity of the facility (as perscribed in applicable regulations), adjacent land use or the location of drinking water wells, and health effects data for the contaminants present at the proposed facility.

  The facility owner or operator provides extensive information in the permit application. However, to obtain all of the data required to make proper decisions, RCRA program personnel may also contact a number of other state and federal agencies. For example, additional information about background (up-gradient) ground-water quality near

the facility may help ensure that the samples taken from up-gradient wells at the site are truly representative of background water quality.

Relevant information management actions. Facility permitting would be performed more efficiently if state or EPA Region personnel had access to either a paper or automated index to sources of available ground-water and related data (e.g., background water quality, hydrogeologic and land use data). For example, an index to land uses (e.g., RCRA facilities, Superfund sites, drinking water wells) in a state or Region could be established. This would enable permit personnel to identify quickly land use close to the proposed facility and to include this in their evaluation of the facility's permit application. Alternately, training or publicity programs focusing on inter-agency sharing of ground-water data might achieve similar results.

Long Term Ground-Water Monitoring

Opportunity for improved efficiency and effectiveness. RCRA program activities may include detection, assessment, and post-closure ground-water monitoring. Such monitoring is performed by the facility and its contractors, with the results forwarded on paper forms to the RCRA program office at the state or EPA Region. Using appropriate statistical analysis techniques (e.g., Student's T test) RCRA program authorities determine facility compliance and may analyze for trends in ground-water quality. At present, this analysis is performed mostly by hand. In some cases, the data are first entered into a computer and then automated analysis is performed.

A major data management problem is the large amount of sample results received by the state or Region as result of program monitoring requirements. Each well at a RCRA facility is required to be sampled at least four times a year. There is also a minimum of four wells per RCRA facility. Monitoring must also be continued after the facility ceases operation. This ground-water quality information is currently provided on paper. This vast amount of data (some facilities have hundreds of wells) is difficult at best to store, manage, and retrieve and will become unmanageable with time.

Relevant information management actions. In order to manage the ground-water sampling results, even if only at the facility level, an automated system would prove to be useful. Such a system would improve the storage, management, and retrieval of the sampling data. In addition, the electronic storage of such data would increase the use of modeling, statistical, and trend analysis, as the data would already exist within a computer.

To facilitate the collection of this information, facility operators or the analytical laboratories could be encouraged or required to submit their water quality results both in paper and in machine readable formats. This would reduce the data entry and data cataloging burden and result in more sampling data available for

analysis sooner than in the past.

- **Selection and Evaluation of Corrective Action Alternatives**

  Opportunity for improved efficiency and effectiveness. Should contamination be detected at a facility, the RCRA program authorities must determine if corrective action is required and approve the appropriate actions. To support this determination, several types of ground-water data are required. Data include ground-water sampling data (the exact contaminants detected and their concentration values), hydrogeologic data, health effects information for the contaminant, and adjacent land use and population data. All of this information is reviewed to determine the threat posed to the environment by the contaminant.

  Some analysis is performed manually, while other portions are automated. The physical relation of the RCRA facility to other adjacent land use areas is usually accomplished through a manual review of available information. This can be a difficult task since within a state or Region there is generally no one central storage point for the location of drinking water wells, other RCRA facilities, Superfund sites, and so forth. The RCRA program office often must contact other program offices or agencies to obtain this locational information. Program authorities, in some instances, need water quality data for use with computer models to predict the movement and dispersion of the contaminant plume.

  After the corrective action alternative is selected and initiated, the RCRA program office must monitor and evaluate the effectiveness of the action. This activity relies heavily upon analysis of ground-water quality data. The analysis results are forwarded to the RCRA office by the facility owner/operator. In some instances, the lab may furnish the results directly to the RCRA program office. At the program office, the results are compared with the background levels for the facility as well as the ground-water sampling data collected during the operation of the facility. Most of this analysis is performed by hand. Some data is entered into statistical analysis or ground-water flow models to estimate the spread or contraction of the contaminant plume.

  Relevant information management actions. An important component of the RCRA corrective action activity is an assessment of the risk posed to the public and the environment by the contaminant. A manual or automated index of land uses within a state or Region would improve the effectiveness and efficiency of risk assessment. For example, drinking water wells adjacent to the facility would be quickly identified and protective measures for these types of land use could be immediately intitiated.

  A second index, one cataloging types of contamination with treatment/corrective action alternatives, would also improve program effectiveness. A RCRA program office faced with a first-time decision regarding approval or disapproval of an owner/operator's proposed corrective actions could reference this index and contact

other states/Regions with experience in handling similar leakages.

An automated system to store, manage and retrieve ground-water quality and other data would increase and improve the use of ground-water and statistical models. The models could be used in a variety of "What If" scenarios to assist in the evaluation of corrective action alternatives.

RCRA Program Actions Which Require Ground-water Data

DATA TYPES	PROGRAM ACTIONS AND RESPONSIBILITIES				COMMENTS
• Well Descriptors • Hydrogeologic Descriptors • Water Quality/Sample Descriptors • Related Data	Facility Permitting Responsibility: State, Region	Ground-Water Monitoring Responsibility: State, Region	Corrective Actions Responsibility: State, Region	Post-closure Monitoring Responsibility: State, Region	Legend: ● Primary Data ○ Nice to Have
Well Descriptors					
Well location, e.g., - latitude/longitude - FIPS county code	●	●	●	●	Needed to geographically/legally identify the source of the sample. Necessary when modelling contaminant plume direction and dispersion.
Depth to ground water	●	○	●	○	Needed to determine from which aquifer the sample was taken.
Availability/content of well log	○		○		Can be important in corrective action where as much hydrogeologic data as possible is sought (e.g., subsurface stratigraphy).
Well characteristics, e.g., - well type - well purpose - construction - elevation - screen size - screen depth	●	○	●	○	Provides enhanced detection/analysis capabilities; well characteristics can influence sample analysis results.
Well status, e.g., - abandoned - flowing Quantity pumped	○				Denotes possible source of background water quality data for use in permit process.
Hydrogeologic Descriptors					
Hydrogeologic descriptors, e.g., - geologic structure - aquifer characterization - stratigraphy - topography - soil	●	○	●	○	Needed to evaluate suitability of proposed ground-water monitoring plans and other permit considerations; also used extensively to select appropriate clean-up response and then to evaluate effectiveness of corrective actions.

RCRA Program Actions Which Require Ground-water Data

DATA TYPES	PROGRAM ACTIONS AND RESPONSIBILITIES				COMMENTS
• Well Descriptors • Hydrogeologic Descriptors • Water Quality/Sample Descriptors • Related Data	Facility Permitting Responsibility: State, Region	Ground-Water Monitoring Responsibility: State, Region	Corrective Actions Responsibility: State, Region	Post-closure Monitoring Responsibility: State, Region	Legend: ● Primary Data ○ Nice to Have
Water Quality/Sample Descriptors					
Ground-water quality	●	●	●	●	Needed for all activities.
Sampling type, e.g., - grab - duplicate - split - treated?	●	●	●	●	Needed to correctly interpret ground-water samples taken at a well; helpful in assessing data QA/QC.
Sample identifiers, e.g., - name collecting agency - date and time sample taken	●	●	●	●	Needed to relate a specific sample with prior/future samples; also serves as one indicator for data QA/QC.
Analytic method, e.g., - EPA standards - USGS standards	○	●	○	●	Needed to evaluate a specific sample's effectiveness in identifying contamination; one indicator for data QA/QC.
Related Data					
Location of revelant facilities and wells	●		●		Important for permitting to know if drinking water wells are near facility; in corrective action, needed to identify potential risks to public.
Demographic data	○		●		Used to identify population at risk from spread of contamination.
Other sources of contamination, e.g., - agricultural - septic tanks - highway networks	●		●		Used in permitting to evaluate suitability of location of facility; also, used in permitting to determine impact of facility operation on adjacent population/wells/ etc.; used in corrective action to identify risks to the public and environment.
Site descriptors, e.g., - wastes found on site - wastes injected - site responsibility	●	○	●	○	Important in permitting a TSD facility, reviewing ground-water monitoring plan, and in identifying/implementing corrective actions.
Health Effects data	●		●		Used in permitting and corrective action to determine risk of facility or contamination plume to public and environment.
Environmental fate	●		●		Used in corrective actions to predict extent, flow and behavior of the contaminant plume; also used to evaluate risk to public and environment.

SUPERFUND

1. What Superfund program functions give rise to the need for ground-water data?

Under the Federal Superfund program, federal and state government organizations, often with contract support, conduct site-specific hydrogeologic investigations. As part of such investigations, decision makers determine the rate and direction of ground-water flow, evaluate the type, extent, and risk posed by ground-water contamination at a site, select/approve remedial action options, and monitor the effectiveness of ground-water contamination control and clean-up efforts. Ground-water contamination is a key concern in a large proportion of Superfund sites.

Ground-water data is used to support decision making in a number of different Superfund program activities, including:

- emergency response
- threat assessment
- evaluation of remedial action alternatives
- site monitoring.

For example, in selecting the remedial action alternative to be implemented at a site, decision makers may wish to evaluate the effectiveness of each option in preventing the spread of ground-water contamination to near-by streams and rivers, public and private drinking water wells, and sensitive ecological areas (such as wetlands).

2 What ground-water and related data does the Superfund program need, and why?

Superfund program personnel require several types of ground-water data and related information to make sound decisions. In particular, Superfund program personnel use:

- **Well Descriptors ...** such as well location, depth to ground water, well construction, well log, and well casing material ... to provide a context for interpreting ground-water quality information
- **Hydrogeologic Descriptors ...** such as subsurface stratigraphy, geoglogic structure, aquifer designation and boundaries, ... to determine the speed and direction of contaminant transport.
- **Water Quality/Sample Descriptors ...** such as contaminants sampled (qualifying and quantifying contamination), sampling procedures, and laboratory analysis procedures ... to identify the types and extent of ground-water contamination at a site
- **Related Data ...** such as exposure/concentration and health risk relationships ... to evaluate the health impacts of various levels of ground-water contamination. Site descriptor data such as the type of business and waste stream that was/is operating on site to help assess the impact risk posed by ground-water contamination.

In many cases, this data will be collected specifically for use by a Superfund program decision maker. For example, an EPA Region or a state may direct a contractor to drill ground-water monitoring wells and collect and analyze samples in order to map a plume of ground-water contamination originating at a Superfund site.

In other instances, however, Superfund program decision makers may rely on information originally collected for other purposes. For example, some categories of spatial data (e.g., land use, population density, topography) are commonly gathered from existing sources, such as local governments and other federal agencies.. Similarly, existing water quality data from near-by drinking water wells may be used in the early phases of site assessment and investigation to help gauge the extent of ground-water contamination in the area.

3. Who uses this data?

The key decision makers using ground-water data in the Superfund program are EPA Regions and state governments. For each site, investigation and remedial action activities are commonly performed by contractors hired by EPA, the state, or a group of responsible parties. Accordingly, the greatest amount of detailed ground-water data is collected and analyzed by contractors rather than by EPA or state employees. It is still EPA or the appropriate state agency, however, that remains primarily responsible for Superfund program decisions made with ground-water data.

EPA and state environmental decision makers use ground-water data to review the recommendations of their own contractors and to evaluate the clean-up strategies proposed by responsible parties. In addition, ground-water data helps EPA and state personnel assess the risks associated with each site, thereby influencing program priorities and the allocation of contractor and in-house resources among sites. As clean-up actions are completed at an increasing number of Superfund sites, EPA and state decision makers will also use ground-water data to monitor the long-term effectiveness of remedial activities and to identify the need for additional actions at sites where ground-water contamination continues to be a problem.

In addition to the Federal Superfund program mandated by the Comprehensive Environmental Response, Compensatation, and Liability Act (CERCLA), many states have passed their own legislation authorizing the clean-up of abandoned hazardous waste sites. These state-specific programs typically focus on sites that are not addressed by the Federal program. In general, however, states' program activities and ground-water data needs in these programs are similar to those of Superfund.

4. What are some examples of how improved ground-water information management could benefit the Superfund program?

- **Collection and Use of Data During Site Investigation and Assessment**

  Opportunity for improved efficiency and effectiveness. In the early phases of investigating a Superfund site, EPA and state decision makers are interested in all available ground-water quality data for the near vicinity of the site. This information is sometimes difficult to access, since it may be stored in a variety of locations, including local government files, academic libraries, other EPA program offices, different field offices of various state departments and other Federal agencies, including the Corps of Engineers, the U.S. Geological Survey, and the Bureau of Reclamation. Furthermore, the data at each of these sources may be stored in inconsistent manual formats, using different codes for elements such as hazardous contaminants, well casing, data quality, and sampling procedures. In many cases, key descriptive information (e.g., the depth from which the sample was taken) may not be available at all.

  Relevant information management actions. Site investigation and assessment could be performed more efficiently if EPA and state personnel had access to a manual or automated index of available ground-water data. An index of available ground-water information would also help ensure that all relevant data was obtained, possibly leading to different decisions on the risks associated with a site. Data from these diverse sources would be more useful if it were stored in a standard format and contained key descriptive information; such consistency could be encouraged by the development and promulgation of ground-water data collection and storage guidelines.

- **Contractor Oversight**

  Opportunity for improved efficiency and effectiveness. In most cases, Superfund site clean-up is performed by contractors hired by EPA, states, or responsible parties. For some sites, EPA Regions may wish to audit the work performed by others by performing statistical analysis and modelling using existing ground-water data. To perform this activity, Superfund personnel must either perform all computations by hand or identify and become familiar with an automated system that can be used to support their review. Ground-water data must be obtained from the contractor. If an automated system is to be used to support EPA's analysis, the paper-based ground-water data received from the contractor must be entered into the system by hand before being analyzed; if data is available from the contractor in automated form, EPA must write computer programs to convert that data into a format that can be used by the Agency's system.

  Relevant information management actions. EPA personnel could review, verify, and audit contractors' technical analyses more efficiently if they had ready access to an existing, well-documented automated system on which they could store and manipulate ground-water data. Data collection, storage, and exchange standards would allow the data submitted by contractors to be loaded into this system more quickly

and easily, reducing data handling costs. In some cases, Superfund personnel might also benefit from technical support in the selection and application of appropriate ground-water models.

- **Long Term Monitoring and Institutional Memory**

  Opportunity for improved efficiency and effectiveness. Over the next several years, remedial actions will be completed at a growing number of Superfund sites. Some sites, dependent on the type of remedial action, may require long term ground-water monitoring. Such responsibilities raise several questions with respect to ground-water data:

  -- To what extent will future contractors need access to detailed ground-water data in automated form? How can EPA effectively transfer critical information from one contractor to another?

  -- As EPA personnel change over the next several years, what steps should EPA itself take with respect to ground-water data in order to preserve an "institutional memory" of important data and avoid over-dependence on manual files and the knowledge of a few key individuals?

  -- Is there any way to automate the computations associated with long-term ground-water monitoring to order to improve accuracy, consistency, and efficiency?

  Relevant information management actions. The availability of an automated file that could be used to store generated Superfund ground-water data could help ensure that EPA and the states have access to vital site information. Depending on priorities and resources, Superfund managers could determine which sites' data should be entered and, for each site, how much information should be automated. Personnel might also benefit from the capability to perform any statistical tests associated with long-term ground-water monitoring. An automated system for ground-water data collection, storage, with appropriate data exchange standards could help ensure that data can be effectively transferred from one user to another over time.

Superfund Program Actions Which Require Ground-Water Data

DATA TYPES	PROGRAM ACTIONS AND RESPONSIBILITIES				COMMENTS
• Well Descriptors • Hydrogeologic Descriptors • Water Quality/Sample Descriptors • Related Data	Emergency Response Actions Responsibility: State, Region	Threat Assessment Actions Responsibility: State, Region	Alternatives Evaluation Responsibility: State, Region	Site Monitoring Actions Responsibility: State, Region	Legend: ● Primary Data ○ Nice to Have
Well Descriptors					
Well location, e.g., - latitude/longitude - FIPS county code	●	●	●	●	Information used in modelling plume direction and dispersion.
Depth to ground water	○	●	●	●	Needed to determine from which aquifer the sample was taken.
Availability/content of well log		○	○	○	Used to verify existence of wells in site review area and help characterize subsurface stratigraphy.
Well characteristics, e.g., - well type - well purpose - construction - elevation - screen size - screen depth			○	●	Descriptors that provide estimates of direction of ground-water flow; location of contaminants; and can influence water quality sample results.
Well status, e.g., - abandoned - flowing					
Quantity pumped					
Hydrogeologic Descriptors					
Hydrogeologic descriptors, e.g., - geologic structure - aquifer characterization - stratigraphy - topography - soil	○	●	●		Data required to conduct site specific hydrogeologic investigations providing information on the rate and direction of ground-water contaminant flow. Identifies recharge and discharge areas.

Superfund Program Actions Which Require Ground-water Data

DATA TYPES	PROGRAM ACTIONS AND RESPONSIBILITIES				COMMENTS
• Well Descriptors • Hydrogeologic Descriptors • Water Quality/Sample Descriptors • Related Data	Emergency Response Actions Responsibility: State, Region	Threat Assessment Actions Responsibility: State, Region	Alternatives Evaluation Responsibility: State, Region	Site Monitoring Actions Responsibility: State, Region	Legend: ● Primary Data ○ Nice to Have
Water Quality/Sample Descriptors					
Ground-water quality	○	●	●	●	Used to determine ground-water quality, identify presence and extent of contamination.
Sampling type, e.g., - grab - duplicate - split - treated?		○	●	●	Information used to identify sampling procedures, responsible sampling authority and analytic methods that meet quality assurance and "chain of custody" requirements.
Sample identifiers, e.g., - name collecting agency - date and time sample taken		●	●	●	Same as above.
Analytic method, e.g., - EPA standards - USGS standards		●	●	●	Same as above.
Related Data					
Location of relevant facilities and wells	○	○	●		Location of PWS and other drinking water wells needed for site evaluation.
Demographic Data	○	○	●		Determines potential population at risk.
Other sources of contamination, e.g., - agricultural - septic tanks - highway networks	○	●	●		Provides useful site contextual information to help identify possible sources of site contamination.
Site descriptors, e.g., - wastes found on site - wastes injected - site responsibility	○	○	●		Knowledge of wastes on-site necessary for sample planning, contaminant identification, and suitability of remedial actions.
Health Effects data	○	●	●		Needed to assess health risk to population.
Environmental fate	○	●	●		Determine chemical degradation, mobility and accumulation.

UNDERGROUND STORAGE TANKS

1. What Underground Storage Tank program functions give rise to the need for ground-water data?

EPA's Office of Underground Storage Tanks is currently developing the Federal regulations for the UST program. Over the next several years, EPA will promulgate regulations covering areas such as corrective action, inspection and enforcement, technical standards, and financial responsibility. A key component of OUST's program strategy is to implement the program at the state level; the role of EPA Headquarters and Regions in day-to-day program operations is likely to be fairly limited.

Since the regulated community is very large (approximately 1 million tanks) and unsophisticated (e.g., local gasoline stations), the goal of the UST program is to keep the regulations simple and straightforward. Instead of extensive ground-water monitoring requirements such as those that exist in RCRA, the UST program will probably focus on tank leak prevention (e.g., double-walled tanks, cathodic protection to prevent corrosion) and leak detection measures which will locate the leak quickly (e.g., tightness testing, inventory monitoring). EPA has suggested that there will be no Federally-imposed ground-water monitoring requirements for this program and the corrective action requirements will be broadly stated (e.g., limit endangerment to human health and environment).

Some states -- such as California, Florida, Kansas, and Rhode Island -- have existing UST programs based on state legislation. These state programs typically differ in some respects from Federal standards. For example, Florida regulates above-ground tanks as well as underground tanks, and Rhode Island's program covers many petroleum products but not hazardous substances. Other states are moving ahead with the implementation of their own UST programs.

Based upon discussions with EPA, state, and local program officials, ground-water data could be used to support two significant UST program functions:

- enforcement actions
- corrective actions.

Because of the diversity of program characteristics, however, the exact uses of ground-water data will vary from state to state. In general, ground-water data will probably be used most often in enforcement and corrective action activities; comprehensive monitoring of ground-water quality on a tank-by-tank basis is likely to be relatively rare and will probably not be required by Federal regulations.

2. What ground-water and related data does the UST program need, and why?

UST program at the Federal level does not require ground-water data. At the state and local levels, the need for ground-water data is dependent upon the unique characteristics of that program. For example, Dade County (Florida) requires ground-water monitoring wells for all gasoline stations in the county and collects the supporting ground-water quality monitoring data; Dade County's monitoring requirements are motivated by the hydrogeology of southern Florida -- highly permeable soils and very high water table levels -- and by the fact that practically all drinking water in the area is drawn from ground water.

While comprehensive ground-water monitoring is not likely to be specifically required by Federal UST regulations, several types of ground-water data may be used to support enforcement and corrective action. Such data include:

- **Well Descriptors ...** such as well location, depth to ground water, well construction, well log and well casing materials ... to provide a context for interpreting ground-water quality information
- **Hydrogeologic Descriptors ...** such as geologic structure and soils ... to provide data needed for hydrogeologic investigation in support of a corrective action

- **Water Quality/Sample Descriptors ...** such as contaminants sampled and the concentration values ... to detect leaking tanks (in selected situations and where required by state or local programs) and identify the rate and direction of contaminant flow once a leak has occurred

- **Related Data ...** such as location of drinking water wells, other sources of contamination in the area (e.g., industry or agricultural use) ... to provide data needed for hydrogeologic investigation in support of a corrective action.

Although comprehensive monitoring of ground-water quality for every tank or facility will not be performed except under special circumstances, the ground-water data needed to characterize and clean up a tank leak may in some cases be extensive.

Should a leak or contamination be detected, corrective action may be required. In the context of the UST program, corrective action will be broadly defined and may not require an on-site hydrogeologic investigation. However, should the extent of contamination or local regulations mandate such an investigation, related data such as contaminant sources or location of other relevant facilities provided from some outside source, would be most useful.

3. Who uses this data?

The key decision makers using ground-water data in the UST program are delegated states and, in some cases, localities. It is most probable that tank site investigations will be more commonly performed by contractors hired by the tank owner or the responsible state or local government agency. Accordingly, should a problem arise, ground-water data will be most often collected and analyzed by contractors. Responsibility for reviewing ground-water monitoring data (if applicable) and approving the selection of a corrective action will still rest with the responsible state or local program authority.

EPA Regions will be users of ground-water data only in a very limited number of cases. For example, a state might request technical assistance from

EPA in evaluating alternative corrective action strategies for ground water clean-up. Similarly, EPA might be responsible for certain program operations responsibilities in states that do not have UST program delegation. Finally, EPA may have additional oversight and audit responsibilities for corrective actions financed through the Underground Storage Tank Trust Fund authorized by the recent Superfund amendments.

4. What are some examples of how improved ground-water information management could benefit the UST program?

- **Enforcement Actions**

  Opportunity for improved efficiency and effectiveness. To some limited extent, ground-water quality data can be used to support enforcement actions and to detect any migration of contaminants from leaking tanks. Detection of contamination in near-by wells can indicate a condition (e.g., tank leak) which would require an enforcement action.

  Relevant information management actions. The availability of an automated file or a manual index to existing ground-water quality data could provide an indication of a problem with an underground tank. UST program participants would not collect this data for their sites but responsible authorities could review this information using it as a supplement to other detection techniques. Data collection, storage, and exchange standards would ensure common format for this water quality information.

- **Corrective Actions**

  Opportunity for improved efficiency and effectiveness. While current Federal regulations regarding corrective action have not been developed, ground-water data may in many situations be useful to support corrective actions. Upon detection of a leak, the responsible party or UST program authorities may be interested in available ground-water data (e.g., water quality, well descriptor, hydrogeologic information) for the near vicinity of the site. This information is sometimes difficult to access, since it may be stored in a variety of locations, including local government files, academic libraries, other EPA program offices, different field offices of various state departments, and other Federal Agencies, including the Corps of Engineers, the U.S. Geological Survey, and the Bureau of Reclamation. Furthermore, the data at each of these sources may be store in inconsistent manual formats, using different codes for elements such as hazardous contaminants, well casing materials, data quality, and sampling procedures.

Relevant information management actions. A site investigation and corrective action could be performed more efficiently if EPA and state/local personnel had access to a manual or automated index of available ground-water data. An index of available ground-water data would also help ensure that all relevant data was obtained, possibly, leading to different decisions on the risks associated with a tank leak. Data from these diverse sources would be more useful if it were stored in a standard format and contained key descriptive information; such consistency could be encouraged by the development and promulgation of ground-water data collection and storage guidelines.

Underground Storage Tank Program Actions Which Require Ground-water Data*

DATA TYPES	PROGRAM ACTIONS AND RESPONSIBILITIES		COMMENTS
• Well Descriptors • Hydrogeologic Descriptors • Water Quality/Sample Descriptors • Related Data	Enforcement Actions Responsibility: State, Region, Locality	Corrective Actions Responsibility: State, Region, Locality	Legend: ● Primary Data ○ Nice to Have
Well Descriptors			
Well location, e.g., - latitude/longitude - FIPS county code	○	●	Information used in modelling plume direction and dispersion from tank leak.
Depth to ground water	○	●	Needed to determine from which aquifer the sample was taken.
Availability/content of well log	○	○	Used to verify existence of wells in site review area and help characterize subsurface stratigraphy.
Well characteristics, e.g., - well type - well purpose - construction - elevation - screen size - screen depth Well status, e.g., - abandoned - flowing Quantity pumped	○	○	Descriptors that provide estimates of direction of ground-water flow; location of contaminants; and can influence water quality sample results.
Hydrogeologic Descriptors			
Hydrogeologic descriptors, e.g., - geologic structure - aquifer characterization - stratigraphy - topography - soil	○	○	Data required to conduct site specific hydrogeologic investigations to support corrective action providing information on the rate, direction and quantity of ground-water contaminant flow.

* Regulations for this program are currently in development. Need for ground-water data not clearly defined at this time.

Underground Storage Tank Program Actions Which Require Ground-water Data*

DATA TYPES	PROGRAM ACTIONS AND RESPONSIBILITIES: Enforcement Actions Responsibility: State, Region, Locality	PROGRAM ACTIONS AND RESPONSIBILITIES: Corrective Actions Responsibility: State, Region, Locality	COMMENTS
• Well Descriptors • Hydrogeologic Descriptors • Water Quality/Sample Descriptors • Related Data			Legend: ● Primary Data ○ Nice to Have
Water Quality/Sample Descriptors			
Ground-water quality	○	●	There are no ground-water monitoring requirements at Federal level. Should a tank leak, this data used to determine ground-water quality, identify presence and extent of contamination.
Sampling type, e.g., - grab - duplicate - split - treated?	○	○	Information used to identify sampling procedures, responsible sampling authority and analytic methods that meet quality assurance concerns.
Sample identifiers, e.g., - name collecting agency - date and time sample taken	○	○	Same as above.
Analytic method, e.g., - EPA standards - USGS standards	○	○	Same as above.
Related Data			
Location of revelant facilities and wells		○	Location of PWS and other drinking water wells needed for threat assessment.
Demographic data	○	○	Determines potential population at risk.
Other sources of contamination, e.g., - agricultural - septic tanks - highway networks	○	○	Provides useful site contextual information to help identify possible sources of site contamination.
Site descriptors, e.g., - wastes found on site - wastes injected - site responsibility	○		Useful in linking ground-water contaminants with substances stored in specific tanks.
Health Effects data			
Environmental fate			

* Regulations for this program are currently in development. Need for ground-water data not clearly defined at this time.

UNDERGROUND INJECTION CONTROL

1. What Underground Injection Control program functions give rise to the need for ground-water data?

The UIC program authorizes -- either by permit or by rule -- the underground injection of wastes. Typically, injection wells include those for the disposal of hazardous waste, the reinjection of brine from oil and gas exploration and production, and wells from certain mining processes (e.g., solution mining). The UIC injection well classification system is detailed below.

- Class I Wells: Hazardous Wastes

  Class I wells may not be located where another known well penetrates the injection zone within the area of the zone expected to be influenced by the Class I well, if the other well could act as a conduit for wastes to escape from the injection zone. Class I wells must inject below the lowest underground source of drinking water, must be cased and cemented, and must have a packer of approved fluid seal set between the injection tubing and the casing, immediately above the injection zone.

- Class II and III Wells

  EPA regulations establish similar requirements for the injection of fluids associated with oil and gas production or oil and gas storage (Class II wells) and for Frasch method of mining of sulfur, in situ production of uranium and other metals or solution mining of salts or potash (Class III wells). Specific regulations for Class II and III wells are tailored to the industries to which they apply. [See 40 CFR Sections 146.21-146.25 and 146.31-146.35.]

- Class IV and V Wells

  Class IV wells are those which inject radioactive wastes or wastes classified as hazardous under RCRA into or above underground sources of drinking water. All such wells must be plugged and abandoned within six months after a UIC program is in effect in a state.

  Class V wells are miscellaneous injection wells that are not Class I, II, III or IV or single family residential cesspools

or septic systems disposal wells. Class V wells include:

-- Recharge wells used to replenish the water in a aquifer
-- Subsidence control wells
-- Air conditioning return flow wells
-- Salt water intrusion barrier wells
-- Cooling water return flow wells

The UIC well is authorized only where the applicant demonstrates that the injection will not endanger underground sources of drinking water (USDWs). Where injection existed prior to the EPA UIC program, EPA has authorized existing injections by rule to provide well owners and operators a sufficient period of time to obtain a permit. The duration of injection by rule varies by well class.

The UIC program functions which are supported by various types of ground-water data are:

- injection authorization (by permit or rule)
- program enforcement.

For example, in reviewing a UIC permit application, decision makers need data concerning the proposed location of the injection well relative to near-by aquifers and information to allow for an evaluation of the likelihood that wastes injected into the UIC well could contaminate USDWs. Similarly, a review of ground-water quality data from wells, other than wells for injection, near a UIC site might identify situations in which injection wastes are contaminating a USDW.

2. What ground-water and related data does the UIC program need, and why?

UIC program personnel need several types of ground-water data and related data to support authorization and enforcement actions. Specifically, delegated states and EPA Region personnel in charge of undelegated programs use:

- **Well Descriptors ...** such as well casing, surface casing, setting depth, length, packer setting depth, elevation, bottom pressure, age, and location of both the injection well and wells in the area of review ... to evaluate well construction integrity and identify potential pathways for the migration of injected wastes

- **Hydrogeologic Descriptors ...** such as site hydrogeologic features, location of USDWs ... to determine the suitability of the injection formation, calculate area of endangerment, injection formation pressure, permeability, transmissivity, and the storage coefficient.

- **Water Quality/Sample Data ...** such as contaminants sampled and the concentration values ... to ensure that near-by USDWs are not being contaminated by injected wastes

- **Related Data ...** such as site characterization of waste stream (e.g., waste type, injection volume, pressure, timing) ... to determine the suitability of the injection formation and calculate the area of endangerment, and injection formation pressure.

Sources for these data are many and varied. Ground-water quality data are not routinely collected by permittees for an injection well but may be made available for review by program authorities through the State Public Health Department (public and residential drinking water wells). In addition, permittees submit a water quality analysis of the injection zone and some permit conditions for Class I wells do require ground-water quality monitoring. Well descriptor and site/facility background data about the injection well and wells in the area of review are provided by the permit applicant. Program authorities then review the application and check the information provided from a number of sources including the U.S. Geological Survey, state geological surveys, state oil and gas commission, public health department, water commission and even field inspections.

Overall, the UIC program has a relatively limited need for ground-water quality data. Ground-water monitoring is seldom performed for UIC wells, with the exception of post-closure monitoring requirements for Class I wells; in a small number of instances, ground-water monitoring is also required as a condition of injection authorization. However, a review of ground-water quality data from wells in near-by USDWs can help determine if injection wastes have migrated from the injection formation.

3. Who uses this data?

The key decision makers using ground-water data in the UIC program are EPA Regions and delegated states. Patterns of delegation are fairly complex,

since EPA can delegate the UIC program to a state for some classes of wells, while retaining responsibility for other well types. In addition, not all classes of wells are found in all states.

For each proposed injection well, the actual or prospective well owner must submit information about the injection formation and wells in the area of review -- usually an area within a 2 1/2 - 3 mile radius of the proposed well. Typically, the owner will hire a consultant to develop the information required. It is still the EPA Region or delegated state, however, that retains the responsibility to review the data submitted and determine that the injection well will not endanger a USDW. Hydrogeologic and well descriptor information are extremely important in assisting program authorities in evaluating the likelihood that injected wastes could contaminate a USDW, either through waste migration via an existing well or waste movement through the subsurface rock strata.

4. What are some examples of how improved ground-water information management could benefit the UIC program?

- **Review of UIC permit applications**

  Opportunity for improved efficiency and effectiveness. Information on the geologic and hydrologic characteristics of the subsurface strata at the regional and local levels is fundamental to the evaluation of the suitability of a site for injection. While consultants hired by the well owner usually develop the information required, the EPA Region or delegated state must review all information submitted by the permittee and make the appropriate determination. For example, decision makers need data concerning the location and construction characteristics of wells in the area of review; in many instances, this information is difficult to access. In some cases, EPA Regions perform extensive field inspections or conduct record reviews to ensure that all wells in the area of review have been properly identified and characterized. Permit authorities also need hydrogeologic data to determine the suitability of the injection formation; this determination is often made with the assistance of simple computer models and mathematical equations computed manually.

  Relevant information management actions. Permit reviews could be performed more efficiently if permit authorities had access to a manual or automated index of available ground-water data (e.g., well location, characteristics, hydrogeologic data, location of USDWs).

An index of available ground-water data would also help ensure that all relevant data were obtained to support a permit action, increasing the quality of decision making. For example, the ability to identify the existence of several unplugged oil wells near a proposed UIC well might significantly increase the reliability of detecting possible contamination sources. In addition, the availability of a series of applicable automated models -- ranging from simple to complex -- could reduce the amount of time spent in mathematical computations to determine the suitability of the injection formation.

- **Enforcement Actions**

Opportunity for improved efficiency and effectiveness. Ground-water quality data can be used to support enforcement actions and to detect any migration of injected wastes from the injection formation into USDWs. Detection of contamination of wells in near-by USDWs can indicate conditions (e.g., fractured injection formation, leaking injection well, excessive injection pressure or volume) which would require an enforcement action.

Relevant information management actions. The availability of an automated file or a manual index to existing ground-water quality data could provide an indication of a problem with an injection well. Data collection, storage, and exchange standards would ensure common format for this water quality information. Such data would be especially useful if it were indexed by ground-water quality contaminant, allowing EPA and state personnel to identify quickly the presence in USDWs of any wastes being injected near-by.

UIC Program Actions Which Require Ground-Water Data*

DATA TYPES	PROGRAM ACTIONS AND RESPONSIBILITIES		COMMENTS
• Well Descriptors • Hydrogeologic Descriptors • Water Quality/Sample Descriptors • Related Data	Permit Actions Responsibility: State, Region	Enforcement Actions Responsibility: State, Region	Legend: ● Primary Data ○ Nice to Have
Well Descriptors			
Well location, e.g., - latitude/longitude - FIPS county code	●	●	UIC permittees must submit location of all wells in area of review. Ready access to this data would speed review of permit application by the regulatory authorities.
Depth to ground water	●	●	Injection zone must be below lower most USDW, except for class IV wells must be flagged 6 months after program in effect.
Availability/content of well log	○		Confirms existence of wells in the area of review.
Well characteristics, e.g., - well type - well purpose - construction - elevation - screen size - screen depth	○		Poor construction of well in area of review could provide pathway for migration of injection wastes.
Well status, e.g., - abandoned - flowing			
Quantity pumped			
Hydrogeologic Descriptors			
Hydrogeologic descriptors, e.g., - geologic structure - aquifer characterization - stratigraphy - topography - soil	●	○	Used to determine suitability of injection formation including size, porosity and permeability of disposal reservoir. Also required to calculate area of endangerment and injection formation pressure.

* There are 5 different classes of UIC wells. Data requirements vary by well class.

UIC Program Actions Which Require Ground-Water Data*

DATA TYPES	PROGRAM ACTIONS AND RESPONSIBILITIES		COMMENTS
• Well Descriptors • Hydrogeologic Descriptors • Water Quality/Sample Descriptors • Related Data	Permit Actions Responsibility: State, Region	Enforcement Actions Responsibility: State, Region	Legend: ● Primary Data ○ Nice to Have
Water Quality/Sample Descriptors			
Ground-water quality	○	○	Ground-water quality data not routinely collected by UIC program. However, a change in background water quality of near-by wells could indicate a leak in an injection well or zone.
Sampling type, e.g., - grab - duplicate - split - treated?			
Sample identifiers, e.g., - name collecting agency - date and time sample taken			
Analytic method, e.g., - EPA standards - USGS standards			
Related Data			
Location of revelant facilities and wells	○		Used to assess possible impact of potential USDW contamination.
Demographic data	○		Same as above.
Other sources of contamination, e.g., - agricultural - septic tanks - highway networks	○		Same as above.
Site descriptors, e.g., - wastes found on site - wastes injected - site responsibility	●	●	Injected wastes are regulated by permit/rule. Recordkeeping of injected wastes is required. Helps link injected wastes with potential contamination incidents.
Health Effects data			
Environmental fate			

* There are 5 different classes of UIC wells. Data requirements vary by well class.

DRINKING WATER

1. What Drinking Water program functions give rise to the need for ground-water data?

Under the Safe Drinking Water Act (as amended), the Drinking Water program does not specifically require ground-water data. The Safe Drinking Water Act requires only that "finished or treated" water not exceed maximum contaminant levels (MCLs) for specified substances. Neither Federal statute nor EPA regulation mandates the collection, storage, or analysis of raw ground-water quality data.

The absence of a Federal legislative or regulatory requirement, has not prevented some states from using ground-water quality data in the operation of their delegated drinking water programs. Although the SDWA is concerned only with water quality at the tap, some states (for example, the states of Washington and Illinois) routinely collect ground-water quality data from Public Water Supplies in instances where ground water is a source of drinking water. Other states (such as California) are engaged in special programs to investigate the quality of ground water used as a source of drinking water by PWSs.

Such states use ground-water data to support:

- public water supply approvals (i.e., approval of new PWSs or changes to existing supplies)
- compliance and enforcement activities.

In these cases, states use ground-water data to evaluate the suitability of ground water as a source of water supply, to help investigate compliance with applicable state water quality standards and MCLs (e.g., to determine the reason for a violation of MCL standards at the tap), to identify water quality trends, and to help correct ground-water contamination problems. Ground-water data are used only in a small fraction of all drinking water compliance and enforcement cases, however.

At the Federal level, ground-water data may be used to develop MCLs, in special studies, and in program oversight and audit activities.

2. What ground-water and related data does the Drinking Water program need, and why?

The Safe Drinking Water Act (as amended) does not require the collection of ground-water quality data. The Act focuses on the quality of finished or treated water at the tap. Some state drinking water programs, however, require that PWSs collect and report on the ground-water quality where ground-water wells are the source for drinking water.

In addition to support for state drinking water programs, water quality data from PWSs are used in many other activities. Some states are engaged in special programs which use information from drinking water wells. For example, Florida uses water quality data from selected drinking water wells in Dade County as part of that state's ambient ground-water monitoring network. Similarly, Illinois collects data from 300 PWS drinking water wells to develop a picture of ambient ground water quality, to analyze public water supply water quality over time, and for use in a special pesticide/herbicide detection program. Much of this water quality information would be of value to other EPA program offices (e.g., OPTS, OSWER).

To monitor the quality of ground water used by Public Water Supplies, to help ensure that PWSs meet MCL and other applicable standards, to identify ground-water contamination problems and sources, state drinking water programs need:

- **Well Descriptors ...** such as well location, well depth, quantity pumped, pump rates, well construction, well log, and well casing materials ... to provide a context for interpreting ground-water quality information and calculate aquifer yield and cone of influence.
- **Hydrogeologic Descriptors ...** such as depth to ground water and geologic structure ... to perform, when necessary, hydrogeologic investigations.

- **Water Quality/Sample Data** ... such as the contaminants sampled and the concentration values, sampling procedures, and laboratory analysis procedures ... to ensure that new or existing ground-water supplies are suitable sources of drinking water and to help investigate existing facilities' compliance with applicable state standards and MCLs.

- **Related Data** ... such as the type of business operating near a PWS well, expected contaminants, land use, and health effects information ... to evaluate the potential threats to underground sources of drinking water, (where clean-up actions are appropriate) determine the speed and direction of contaminant transport, evaluate alternative corrective actions and evaluate the health impacts of various levels of ground-water contamination.

In most instances, the primary sources for ground-water information in the drinking water program are public water supply owner/operators and the state public health department. In most state programs, where ground water is a source of the public water supply, the facility owner submits water quality, well descriptor, and limited hydrogeologic data (usually restricted to aquifer yield characteristics) during facility plan and specification reviews.

For operational facilities where well contamination is identified and alternative sources are not available, state water or public health authorities may perform a site specific investigation to develop corrective action alternatives. These activities are not part of the Federal drinking water program but are state activities. On occasion, additional hydrogeologic information is obtained from the state geologic survey or as a result of a contamination investigation.

Many state personnel interviewed for this study also indicated a need for better health effects information. Where no MCLs are available, other standards are needed. Existing sources of health effects information include scientific literature, EPA health advisories, and state public health authorities.

3. Who uses this data?

The implementation and program management responsibilities for the Drinking Water program are divided among EPA Headquarters, EPA Regions, and states and localities.

The most important users of ground-water data in the Drinking Water program are state governments. Delegated states are responsible for program operations. States examine hydrogeologic data to characterize the aquifer from which drinking water is drawn and the impact of pumpage on the aquifer. States may use ground-water quality data to approve new PWSs and changes to existing supplies, as well as for certain compliance and enforcement actions.

EPA Regions are responsible for the oversight of delegated programs. Regions must ensure that state public water supply facilities are in compliance with MCLs, but are interested only in the quality of the finished or treated water. Accordingly, EPA Regions are not major users of ground-water data in the drinking water program.

EPA Headquarters uses ground-water quality data to help designate MCLs. These data are not directly supplied by the Drinking Water program. Data to support the creation of new MCLs are developed from literature searches, feedback from delegated programs, special studies, and stratified random surveys.

4. What are some examples of how improved ground-water information management could benefit the Drinking Water program?

- **Ground-water quality trend analysis and collection of incident data**

  Opportunity for improved efficiency and effectiveness. Delegated states collect hundreds of thousands of bits of ground-water quality information each month. In addition to sampling for MCLs, states periodically test for contaminants such as chemical organics, pesticides, heavy metals, volatile organic compounds, and other substances. Some state programs would like the opportunity to look for trends in water quality (e.g., IL, MA), but cannot simply because of the volume of information. Further, much of this valuable "incident of contamination" data are not readily available to other organizations who would find it of value. For example, EPA Headquarters might use information on commonly found contaminants to help guide research into health effects, treatment technologies, and (potentially) MCLs and health advisories.

  Relevant information management actions. Ground-water quality trend analysis could be performed more efficiently if state personnel could store and have automated access to ground-water quality data. Ready

access to incidents of contamination might also be useful to EPA's Office of Drinking Water and Office of Pesticide Programs.

- **Collection and Use of Data for Corrective Actions**

  Opportunity for improved efficiency and effectiveness. Contamination of a drinking water well may give rise (at the state level) to the need for some corrective action. In many cases, the preferred remedy is to eliminate or reduce use of the well or implement effective treatment processes. In other instances, hydrogeologic investigation of the well site may be necessary to support corrective action. Hydrogeologic data is sometimes difficult to access, since it may be stored in a variety of locations, including local government files, academic libraries, other EPA program offices, different field offices of various state departments, and other Federal agencies. In many cases, key descriptive information (e.g., site aquifer characteristics) may not be available at all.

  Relevant information management actions. Well site investigations could be performed more efficiently if state personnel had access to a manual or automated index of available ground-water data (e.g, hydrogeologic information, land use, water quality data). An index of available ground-water data would also help ensure that all relevant data was obtained and possibly reduce the need to collect duplicative information. Data from these diverse sources would be more useful if it were stored in a standard format and contained key descriptive information; such consistency could be encouraged by the development and promulgation of ground-water data collection and storage guidelines. Facilities could provide this information for the state review of the facility plan and specifications now conducted during the approval process.

Drinking Water Program Actions Which Require Ground-Water Data

DATA TYPES	PROGRAM ACTIONS AND RESPONSIBILITIES			COMMENTS
• Well Descriptors • Hydrogeologic Descriptors • Water Quality/Sample Descriptors • Related Data	PWS Approval Actions Responsibility: State	Enforcement Actions Responsibility: State, Region/ HQ	MCL Development Actions Responsibility: EPA HQ	Legend: ● Primary Data ○ Nice to Have
Well Descriptors				
Well location, e.g., - latitude/longitude - FIPS county code	●	○		Physical location of PWS wells important to other programs and needed by facility if contamination discovered.
Depth to ground water	●			Needed to determine from which aquifer the sample was taken.
Availability/content of well log	○			Used to characterize subsurface stratigraphy.
Well characteristics, e.g., - well type - well purpose - construction - elevation - screen size - screen depth	●			Useful in correction of contamination problems.
Well status, e.g., - abandoned - flowing				
Quantity pumped	○	○		Useful for regulation of water withdrawals; a related program in many states, (e.g., MN, AZ, GA, etc.).
Hydrogeologic Descriptors				
Hydrogeologic descriptors, e.g., - geologic structure - aquifer characterization - stratigraphy - topography - soil	○	○		Required to conduct hydrogeologic investigation should corrective action be necessary.

Drinking Water Program Actions Which Require Ground-Water Data

DATA TYPES	PROGRAM ACTIONS AND RESPONSIBILITIES			COMMENTS
• Well Descriptors • Hydrogeologic Descriptors • Water Quality/Sample Descriptors • Related Data	PWS Approval Actions Responsibility: State	Enforcement Actions Responsibility: State, Region/ HQ	MCL Development Actions Responsibility: EPA HQ	Legend: ● Primary Data ○ Nice to Have
Water Quality/Sample Descriptors				
Ground-water quality	●	●	○	SDWA requires water quality monitoring "at the tap" for MCLs. Some state programs monitor at the source and analyze the sample for a broader range of contaminants.
Sampling type, e.g., - grab - duplicate - split - treated?	●	○	○	Information used to identify sampling procedures, responsible sampling authority and analytic methods useful to assess data quality.
Sample identifiers, e.g., - name collecting agency - date and time sample taken	●	○	○	Same as above.
Analytic method, e.g., - EPA standards - USGS standards	●	○	○	Same as above.
Related Data				
Location of revelant facilities and wells	○	○		Location of PWS and other drinking water wells useful in detection of contaminant sources.
Demographic data				
Other sources of contamination, e.g., - agricultural - septic tanks - highway networks	○	○		Provides useful site contextual information to help identify possible sources of site contamination.
Site descriptors, e.g., - wastes found on site - wastes injected - site responsibility				
Health Effects data		○	●	Needed to assess health risk to population.
Environmental fate		○	○	Determine chemical degradation, mobility and accumulation.

PESTICIDES

1. What Pesticide program functions give rise to the need for ground-water data?

Under the authority of the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), the Office of Pesticide Programs (OPP) at EPA Headquarters is responsible for the registration and review of pesticide products. Registration and review responsibilities reside in several different branches in OPP. As part of these registration and review processes, ground-water monitoring data are used in exposure and risk assessments to help determine if a pesticide use should be cancelled, denied, brought into compliance, or reclassified.

Ground-water monitoring data can be used to support decision making in a number of activities, including:

- Determining the impact of old (existing) pesticides on human health and the environment
- Evaluating the impact of regulatory decisions to permit new chemicals and/or new uses
- Measuring user and industry compliance with regulatory decisions
- Determining trends of pesticides in the environment.

The primary goal of monitoring for pesticides is to provide information on exposure to enhance the accuracy of pesticide risk assessments and, thereby, improve the soundness of FIFRA risk/benefit regulatory decisions.

In general, monitoring data can contribute in several ways to assessing the impact of existing pesticides in the environment, including:

- Preparation of exposure profiles for pesticides undergoing registration standards
- Development of labeling restrictions for pesticides undergoing registration standards
- Reassessment of permissible residue levels (tolerances) for pesticides undergoing registration standards or special reviews
- Definition of priorities for chemicals that are candidates for special review
- Development of exposure and risk assessment for chemicals undergoing special review.

In general, human exposure to pesticides through leaching, contamination of ground-water, and injection is an important concern in most pesticides program decisions.

2. What ground-water data does the Pesticide program need, and why?

Ground-water data and related information are used by the Pesticide program in its decision making to determine presence and extent of ground-water contamination and to evaluate the persistence and transport of particular pesticides.

In particular, Pesticide program staff use:

- **Ground-water sample data** ... such as contaminants sampled and the concentration values, sampling procedures, and laboratory analysis procedures ... to identify the nature and extent of pesticide contamination of ground-water
- **Well Descriptors** ... such as depth, type, casing, screen, seal, seal method, packing, location, well owner ... to provide a context for interpreting ground-water quality information and identifying locations of areas with pesticide contamination problems
- **Site/facility environment** ... such as weather data, crops under cultivation, pesticide usage, soil type, water table level ... to determine potential problem areas and evaluate pesticide leachability

- **Health effects data ...** such as toxicity, exposure/concentration and health risk relationships .. to evaluate the health impacts of exposure to pesticide contamination.

In some cases data are collected specifically for use by the OPP staff (e.g., Hazard Evaluation Division) in a special study contributing to a regulatory decision. For example, pesticide monitoring was conducted in Georgia specifically to determine the extent of ethylene dibromide contamination. In another case, the Office of Drinking Water and OPP are conductng a nationwide survey of pesticides in drinking water wells to investigate the extent of and factors contributing to pesticide contamination across the country. In other instances, Pesticide Program decision makers rely on information collected by other agencies and organizations. For example, EPA/OPP collaborated with the State of California's Department of Food and Agriculture conducted extensive soil profile analyses to determine DBCP, EDB, simazine and carbofuran ground-water contamination in the San Joaquin valley. Similarly, Vermont, Minnesota and other states are conducting state pesticides-in-ground-water surveys and will make the results available to OPP. OPP also obtains data (e.g., water quality, well descriptors, land use, hydrogeologic data) from existing sources to aid in problem identification and pesticide registration and review activities.

3. Who uses this data?

The key decision makers using pesticides in ground-water data are the Pesticide Program at EPA Headquarters and state agency officials. EPA headquarters is responsible for the implementation of pesticide registration and review programs. EPA Regions are not directly responsible for these activities. Regions provide EPA Headquarters with incident information about problem pesticides, but are primarily responsible for providing technical assistance to the states to aid in the training of certified applicators and in program enforcement to ensure that pesticides are being properly applied.

In several instances (e.g., DBCP, EDB), the Federal EPA and/or particular State agencies have taken action to restrict or ban pesticide use because of significant health-risks associated with exposure via ground-water. These

decisions have been based on acquiring pesticide ground-water contamination data through monitoring. In some cases, the registrant provides State and/or EPA OPP staff with ground-water pesticide monitoring data.

4. What are some examples of how improved ground-water information management could benefit the Pesticides program?

- **Collection and Use of Data for Pesticide Reviews**

  Opportunity for improved efficiency and effectiveness. EPA Headquarters' access to state pesticide ground-water contamination monitoring data in conjunction with pesticide use data would improve trend and risk analysis capabilities. For example, the regulatory decision making for pesticide review requires an assessment of the impact of existing pesticides in the environment (e.g. potential to leach under varying soil and climatic conditions). Several state programs are conducting ambient ground-water monitoring that may provide warning signs for potential drinking water problems (e.g. New Jersey, California) and could assist in the identification of problem pesticides under many different use scenarios.

  Relevant information management actions. Review actions could be performed more efficiently if EPA and state personnel had access to a manual or automated index of available ground-water data indexed by contaminant (e.g., pesticide or active ingredient). These data are not usually archived in an automated data base and the identification of these data sources would be extremely useful. An index of available ground-water data would also help ensure that all relevant information was obtained. Data from various sources would be more useful if it were stored in a standard format and contained key descriptive information; such consistency could be encouraged by the development and promulgation of ground-water data collection and storage guidelines.

Pesticide Program Actions Which Require Ground-Water Data

DATA TYPES	PROGRAM ACTIONS AND RESPONSIBILITIES			COMMENTS
• Well Descriptors • Hydrogeologic Descriptors • Water Quality/Sample Descriptors • Related Data	Pesticide Registration Actions Responsibility: EPA HQ	Pesticide Review Responsibility: EPA HQ	Special Review Responsibility: EPA HQ	Legend: ● Primary Data ○ Nice to Have
Well Descriptors				
Well location, e.g., - latitude/longitude - FIPS county code		●	●	Used to establish proximity of contaminant area.
Depth to ground water		○	●	Needed to determine from which aquifer the sample was taken.
Availability/content of well log		○	○	Used to verify existence of wells of interest to pesticide program.
Well characteristics, e.g., - well type - well purpose - construction - elevation - screen size - screen depth		○	●	Descriptors which provide estimates of direction of ground-water flow; location of contaminants and can influence water quality sample results.
Well status, e.g., - abandoned - flowing				
Quantity pumped				
Hydrogeologic Descriptors				
Hydrogeologic descriptors, e.g., - geologic structure - aquifer characterization - stratigraphy - topography - soil	●	●	●	Data used in model applications to determine pesticide ground-water contamination and vulnerability.

Pesticide Program Actions Which Require Ground-Water Data

DATA TYPES	PROGRAM ACTIONS AND RESPONSIBILITIES			COMMENTS
• Well Descriptors • Hydrogeologic Descriptors • Water Quality/Sample Descriptors • Related Data	Pesticide Registration Actions Responsibility: EPA HQ	Pesticide Review Responsibility: EPA HQ	Special Review Responsibility: EPA HQ	Legend: ● Primary Data ○ Nice to Have
Water Quality/Sample Descriptors				
Ground-water quality	●	●	●	Used to determine ground-water quality, identify presence and extent of contamination. Provides data for trend analysis. Assist in setting priorities for pesticides that are candidates for review.
Sampling type, e.g., - grab - duplicate - split - treated?	○	○	●	Information used to identify sampling procedures, responsible sampling authority and analytic methods are useful indicators of data quality. Absent these indicators, data still of value.
Sample identifiers, e.g., - name collecting agency - date and time sample taken	○	○	●	Same as above.
Analytic method, e.g., - EPA standards - USGS standards	○	○	●	Same as above.
Related Data				
Location of revelant facilities and wells				
Demographic data	●	●	●	Determines potential population at risk.
Other sources of contamination, e.g., - agricultural - septic tanks - highway networks		○	○	Provides useful site contextual information to help identify possible sources of site contamination.
Site descriptors, e.g., - wastes found on site - wastes injected - site responsibility				
Health Effects data	●	●	●	Needed to assess health risk to population.
Environmental fate	●	●	●	Determine fate of pesticide and pesticide by-products in the contaminant.

* Data for Special Reviews is applicable to state agencies conducting special pesticide surveys on studies (e.g., MN, IL, UT).

TOXIC SUBSTANCES

1. What Office of Toxic Substances (OTS) program functions give rise to the need for ground-water data?

The Office of Toxic Substances uses ground-water data in two general areas:

- to regulate the production and use of new and existing toxic substances
- to assess the risk to health and environment posed by toxic substances.

TSCA is the EPA statute that provides the broadest range of authority in protecting human health and the environment from harmful exposure to toxic chemicals. As a result, it is an integrative tool which can be used to collect and assess data on exposure of humans and the environment to toxic substances [TSCA, Sections 4, 5, and 8] and control the production, transport, storage, disposal, and use of toxic substances [TSCA, Sections 5 and 6] which pose risks to human health or the environment as a result of ground-water contamination.

For example, knowledge of incidents of contamination from either special studies or outside sources (e.g., drinking water programs, health departments) can assist in problem identification and could provide EPA with the data necessary to require a manufacturer to submit additional information about the toxic substance (TSCA, Section 4 and 8) or make the case for the need for additional controls (TSCA, Section 6).

2. What ground-water data does the Office of Toxic Substances need, and why?

The Office of Toxic Substances does not routinely collect ground-water related data (e.g., water quality, hydrogeologic information). With the exception of special studies and some site specific investigations, OTS does

not generate ground-water data but rather collects it from other sources (e.g., USGS, USDA, Census, NOAA, NIH). However, in some instances, manufacturers of toxic substances may be required by rule to provide additional test data (Section 4) or existing data (Section 8) concerning the environmental and health effects of such substances. While not used extensively to date, such rules may provide for the collection of ground-water monitoring parametric data.

In support of program activities and the OTS ground-water data management proposal, OTS will collect the following types of data from the literature, unpublished sources/data bases, or (where necessary) by field studies, surveys of State agencies, public drinking water supplies, and rules under TSCA sections 4,5, and 8:

- **Well Descriptors ...** such as well depth, sample depth and location ... for use in future studies to help characterize extent of aquifer contamination

- **Hydrogeologic Descriptors ...** such as hydrogeologic features (e.g., aquifer classification/vulnerability, soil characteristics -- adsorptions/desorption ... to characterize problem areas and assess aquifer vulnerability.

- **Water Quality/Sample Descriptors ...** such as contaminants sampled, the concentration values, detection limit ... to identify type and extent of toxic contamination of ground water and determine national "hot spots"

- **Related Data ...** such as climatic data; ground-water use (e.g., as drinking water, irrigation, salt aquifer); agricultural use, location of drinking water wells, landfills, surface impoundments, hazardous waste sites, and health risk assessement information ... to identify source of contamination and for use in scenario-based risk assessment model runs.

OTS can use this information in several ways including:

1. Site-specific assessments of premanufacture notice (PMN) chemicals and existing chemicals.

2. Development of stochastic method for assessing potential ground-water exposure to PMN chemicals disposed of in a unspecified landfill or impoundment.

3. Identification of appropriate areas for field studies of substances such as VOCs, fertilizers (non-agricultural), and septic tank chemicals ("hot spot" areas) to learn more about the sources and mechanisms of ground-water contamination.

4. Identification of areas with heavy use of chemicals released to ground-water such as fertilizers and septic tank cleaners.

3. Who uses this data?

The key decision maker using ground-water data in OTS is EPA headquarters. Control of toxic substances is a headquarter function. There are no major toxic substances functions in EPA's Regions and relatively little activity at the state or local levels.

4. What are some examples of how improved ground-water information management could benefit the Office of Toxic Substances?

- **Collection of data in support of toxic control activities (e.g., regulation of production, use, distribution and disposal of toxic substances)**

  Opportunity for improved efficiency and effectiveness. Information regarding incidents of ground-water contamination by toxic substances would assist OTS in its efforts to control these contaminants. Compilation of such data could be the basis for several actions, which might include a rule directing the manufacturer to test the substance (Section 4) or provide existing health and environmental effects of the substance (Section 8). To supplement incident data, OTS needs hydrogeologic and land use information to help identify the source of the contaminant. For example, nitrate contamination could be the result of contamination from an animal feed lot (not regulated under TSCA) or result from the use of fertilizer (potentially regulated under TSCA) containing nitrates.

  This supporting data is often difficult to access, since it may be stored in a variety of locations, including local government files, academic libraries, other EPA program officies, various state departments (e.g., Health, Agricuture, Geologic Survey), and the U.S. Geologic Survey. Furthermore, the data at each of these sources may be stored in inconsistent manual formats, using different codes for elements such as hazardous contaminants and aquifer code. In some cases, key descriptive information, (e.g., the depth from which the sample was taken or well location) may not be available at all.

  Relevant information management actions. Access to incident data or ground-water quality data would assist OTS in setting priorities for future field studies and in the development of a system for identifying sources of ground-water contamination. An index of available ground-water data would help ensure that all relevant data were obtained, possibly leading to different research priorities. Data from these diverse sources would be more useful if it were

stored in a standard format and contained key descriptive information; such consistency could be encouraged by the development and promulgation of ground-water data collection and storage guidelines.

Office of Toxic Substances Program Actions Which Require Ground-Water Data

DATA TYPES	PROGRAM ACTIONS AND RESPONSIBILITIES		COMMENTS
• Well Descriptors • Hydrogeologic Descriptors • Water Quality/Sample Descriptors • Related Data	Control New/Existing Toxics Responsibility: EPA HQ	Assess Health & Environmental Effects of Toxics Responsibility: EPA HQ	Legend: ● Primary Data ○ Nice to Have
Well Descriptors			
Well location, e.g., - latitude/longitude - FIPS county code	○	●	Used to identify problem areas or "hot spots."
Depth to ground water	○	○	Needed to determine from which aquifer the sample was taken and to identify vulnerable ground-water.
Availability/content of well log			
Well characteristics, e.g., - well type - well purpose - construction - elevation - screen size - screen depth	○		Descriptors that influence water quality sample results, possibly needed for future field studies.
Well status, e.g., - abandoned - flowing			
Quantity pumped			
Hydrogeologic Descriptors			
Hydrogeologic descriptors, e.g., - geologic structure - aquifer characterization - stratigraphy - topography - soil	○	○	Data to characterize problem areas, assess aquifer vulnerability and for use with GEMS model runs.

Office of Toxic Substances Program Actions Which Require Ground-Water Data

DATA TYPES	PROGRAM ACTIONS AND RESPONSIBILITIES		COMMENTS
• Well Descriptors • Hydrogeologic Descriptors • Water Quality/Sample Descriptors • Related Data	Control New/Existing Toxics Responsibility: EPA HQ	Assess Health & Environmental Effects of Toxics Responsibility: EPA HQ	Legend: ● Primary Data ○ Nice to Have
Water Quality/Sample Descriptors			
Ground-water quality	○	●	Used to determine ground-water quality, identify presence and extent of toxic contamination. Often result of special studies (e.g., VOCs, TCE). Assist in setting priorities for toxics that are candidates for review.
Sampling types, e.g., - grab - duplicate - split - treated?	○	○	Information used to identify sampling procedures, responsible sampling authority and analytic methods that effect quality assurance.
Sample identifiers, e.g., - name collecting agency - date and time sample taken	○		Same as above.
Analytic method, e.g., - EPA standards - USGS standards	○		Same as above.
Related Data			
Location of revelant facilities and wells	○		Location of PWS and other drinking water wells needed for exposure assessment.
Demographic data	○		Determines potential population at risk.
Other sources of contamination, e.g., - agricultural - septic tanks - highway networks	○		Provides useful information to help identify possible sources of contamination, such as hazardous waste sites and practices resulting in contamination (e.g., animal feed lots and irrigation).
Site descriptors, e.g., - wastes found on site - wastes injected - site responsibility			
Health effects data (e.g., risk assessment or exposure data)	●	●	Needed to assess health risk to population.
Environmental fate	●	●	Determine fate, mobility and accumulation of toxic.

Appendix G -

Data Requirements Case Studies

A Case Study:
The State of Florida Decision to Suspend EDB Use As a Soil Fumigant

Background: EDB Use in Florida

The nematocide ethylene dibromide (EDB) has been applied as a soil fumigant to control burrowing nematodes that infest peanuts, soybeans, and citrus crops in Florida for more than twenty years. In central Florida both state supported programs and private applicators have used EDB to establish a chemical fence or "barrier zone" in citrus groves to keep nematodes out. In a second application program, "push and treat", as many as 4,000 acres have been treated with EDB after infested citrus trees were pushed down and removed from the groves. In the Florida Panhandle, peanut and soybean fields were treated with EDB before planting to minimize nematode damage to the growing crop. EDB has also been used extensively on golf courses throughout the state to control nematode damage to the greens.

Ground-Water Contamination Concern

Florida's ground-water is especially susceptible to contamination because of the state's thin soils, high ground-water table, and porous limestone formations. Over 90 % of the state's population relies on ground-water as a source of drinking water. Four major aquifers supply this drinking water supply to the populace. The Floridian aquifer is highly susceptible to EDB contamination due to the large concentration of citrus groves in the central portion of the state.

Initial concern over the potential threat to Florida's ground-water supply from EDB occurred in July of 1983 when the Commissioner of Agriculture was convinced by his staff that discovery of EDB contamination to ground-water supplies in California, Hawaii, and Georgia warranted his attention. It was well known that EDB had been used for years by Florida in the citrus growing regions as part of state supported pesticide control programs. Futhermore, previous discovery of aldicarb ground-water contamination in Florida had sensitized the Department, legislature, environmental action groups and citizens to the problem of potential drinking water contamination by pesticides. Evidence of the health risk of EDB was provided in the mid 1970's by National Cancer Institute (NCI) studies that found the pesticide highly toxic and very carcinogenic. These NCI studies prompted EPA to begin its own review of EDB in the late 1970's and provided the Florida Commissioner of Agriculture with concrete evidence that EDB was a potential state wide health problem. Consequently, the Commissioner of Agriculture requested that several divisions cooperate to collect and analyze drinking water samples from wells in close proximity to EDB treated citrus groves to determine, if in fact, an EDB drinking water contamination problem existed.

Role of Ground-Water Data in the Decision-Making Process

Initially, both irrigation and drinking water wells were sampled in the counties of Highlands, Lake, and Polk in central Florida and in Jackson and

Santa Rosa counties in the Panhandle. Three divisions within the Department of Agriculture and Consumer Services (DACS) were involved in the sampling stategy and implementation. The Division of Plant Industry provided detailed maps detailing the location, dates and amounts of state EDB application in citrus groves. With this information the Division of Inspection in cooperation with the Florida Department of Health and Rehabitiative Services (DHRS) collected water samples from 131 wells. The county health DHRS workers provided the necessary information so that DACS workers could locate appropriate sampling wells.

The DACS Division of Chemistry was responsible for conducting laboratory analysis of the water samples. Using standard water quality analytical techniques, the Lab found that 30% of the samples tested positive for EDB contamination at the detectable level of .1 ppb.

State Administrative and Political Response

With confirmation of the presence of EDB in drinking water wells, the Commissioner of Agriculture called together representatives from the Department of Environmental Regulation (DER), Department of Community Affairs (DCA) as well as DHRS to express his concern and determine the next course of action. This group formed an early ad hoc interagency EDB working group. As a result of these meetings and evidence, the State Health Officer advised citizens to refrain from using well water with EDB levels of 0.1 ppb. In addition DHRS established and maintained an EDB hotline and newsletter to provide health information and allay concern.

Remedial action included providing potable drinking water to the owners of EDB contaminated wells and expanding an ongoing research contract on aeration and filtration treatment technologies for volatile organic compounds through DER. Funds were provided from the DER Water Quality Assurance Trust Fund as well as each state Department's operating budget to support these activities.

The above information and activities culminated with the temporary suspension of use of EDB as a soil fumigant through issuance of an emergency order on September 16th, 1983. This was followed by the permanent ban prohibiting sale, distribution and use of EDB as a soil fumigant in October. The types of data used and responsible state organizations involved in generation and use of the data are detailed in figures 1 and 2. In addition the relationship between data type, the particular component of the decision-making process and the accessibility of the data is presented in table 1. Overall, the various state agencies were able to work together efficiently and share the critical data needed to support this important environmental decision.

Continuing EDB Monitoring and Remedial Action Program

Following the late 1983 state suspension of EDB use as a soil fumigant numerous ground-water monitoring and other corrective action programs were expanded and initiated. A summary of the major activities is presented below:

- **Administrative response.** A number of state responses at both the legislative and executive levels occurred.

-- The Governor formally created the EDB Task Force that included representatives from DACS, DER, DHRS, and DCA.

-- The State Legislature authorized 3.1 million dollars for use in the well-filtering program.

- **Environmental fate research** was conducted to determine the transport and persistance characteristics of EDB.

  -- EDB was determined to have a chemical half-life of 1.5 to 2 years in Florida groundwaters at 22 degrees Centigrade.
  -- Hydrolysis is the major mode of degradation.
  -- These chemical properties make EDB fairly mobile in the subsurface environment and degraded products are likely to pose a long-term threat.

- **Creation of a spatial data base** containing both well site and EDB application information was accomplished.

  -- Initially a computerized data base was created on the Sperry computer using "Mapper" to retain both well name and address and EDB sampling results.
  -- Eventually this data base was transfered to an Intergraph mapping and data base management system at the Florida State University.
  -- A dedicated Intergraph workstation and plotter was made available at DER for the EDB monitoring program within the ambient ground-water protection program.

- **A long-term ground-water monitoring program** was established within DHRS to survey the entire state.

  -- Wells were sampled within 300 feet of EDB application sites.
  -- Priority was given to sampling public drinking-water wells located within 1,000 feet of EDB applications.
  -- More than 11,000 drinking wells have been sampled.
  -- Corrective action for positively identified EDB contaminated wells included use of charcoal filters, drilling of new wells, and hook ups to city water supplys.
  -- The corrective action program has resulted in classifying as uncontaminated 90% of the previously identified EDB contaminated wells.

The monitoring program conducted over the last four years has provided a relatively good picture of the extent and severity EDB ground-water contamination. The three counties with the largest number of contaminated wells-Polk, Highlands, and Lake- form the heart of the central ridge citrus area. Analysis of the data from the wells in which EDB was detected statewide showed that while the average contamination is about 6.5 ppb, higher averages and extreme values were found in Polk and Highlands counties. This is attributable to the high application rates in these counties, the large number of application sites, the lack of organic matter in the soil, and the high susceptibility of the surface aquifers to contamination.

In conclusion, the Florida case study and associated activities demonstrate how ground-water and related data are used to identify a ground-water problem, assess the extent and severity of the problem and provide a framework for corrective action and necessary funding.

Figure 1

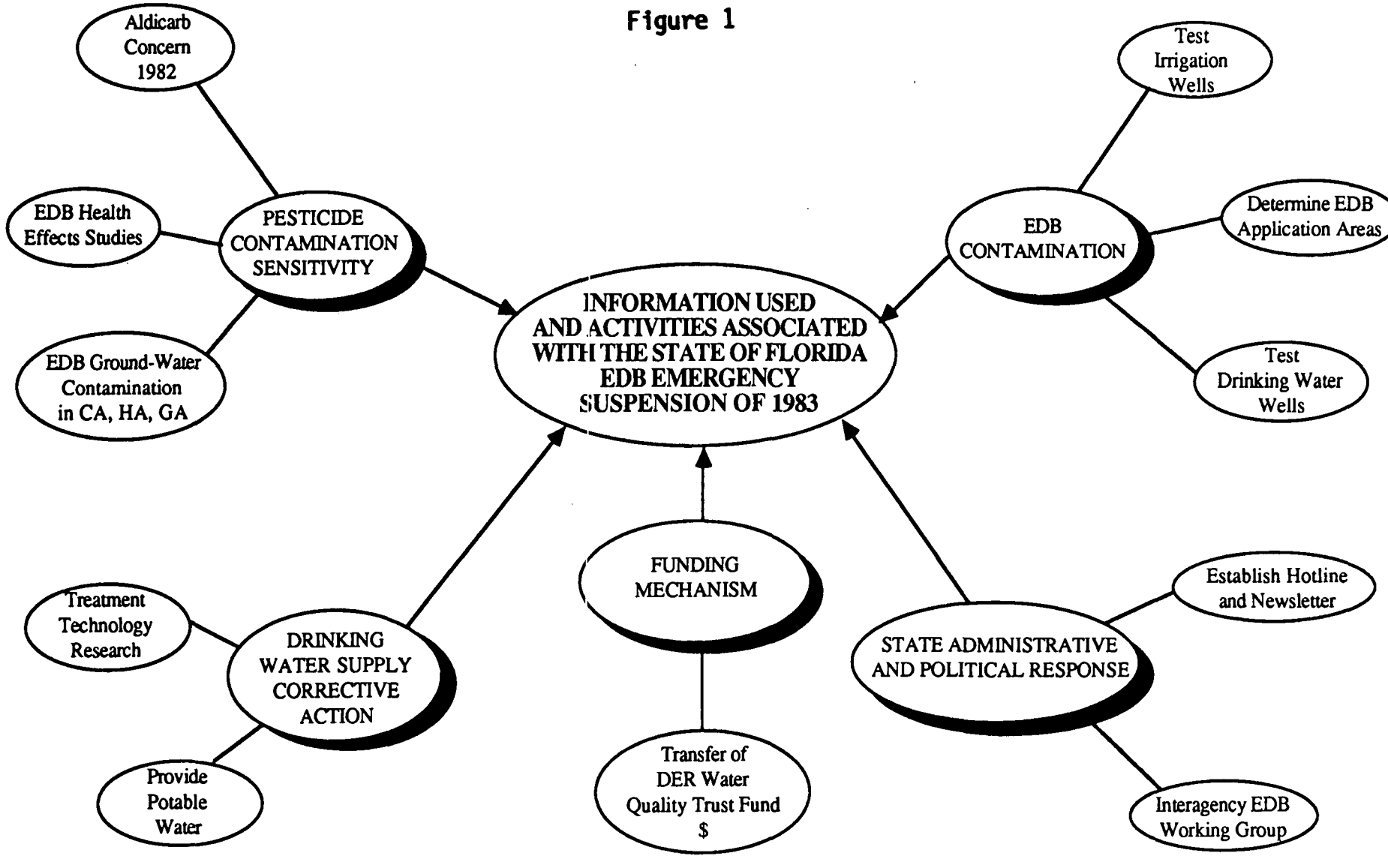
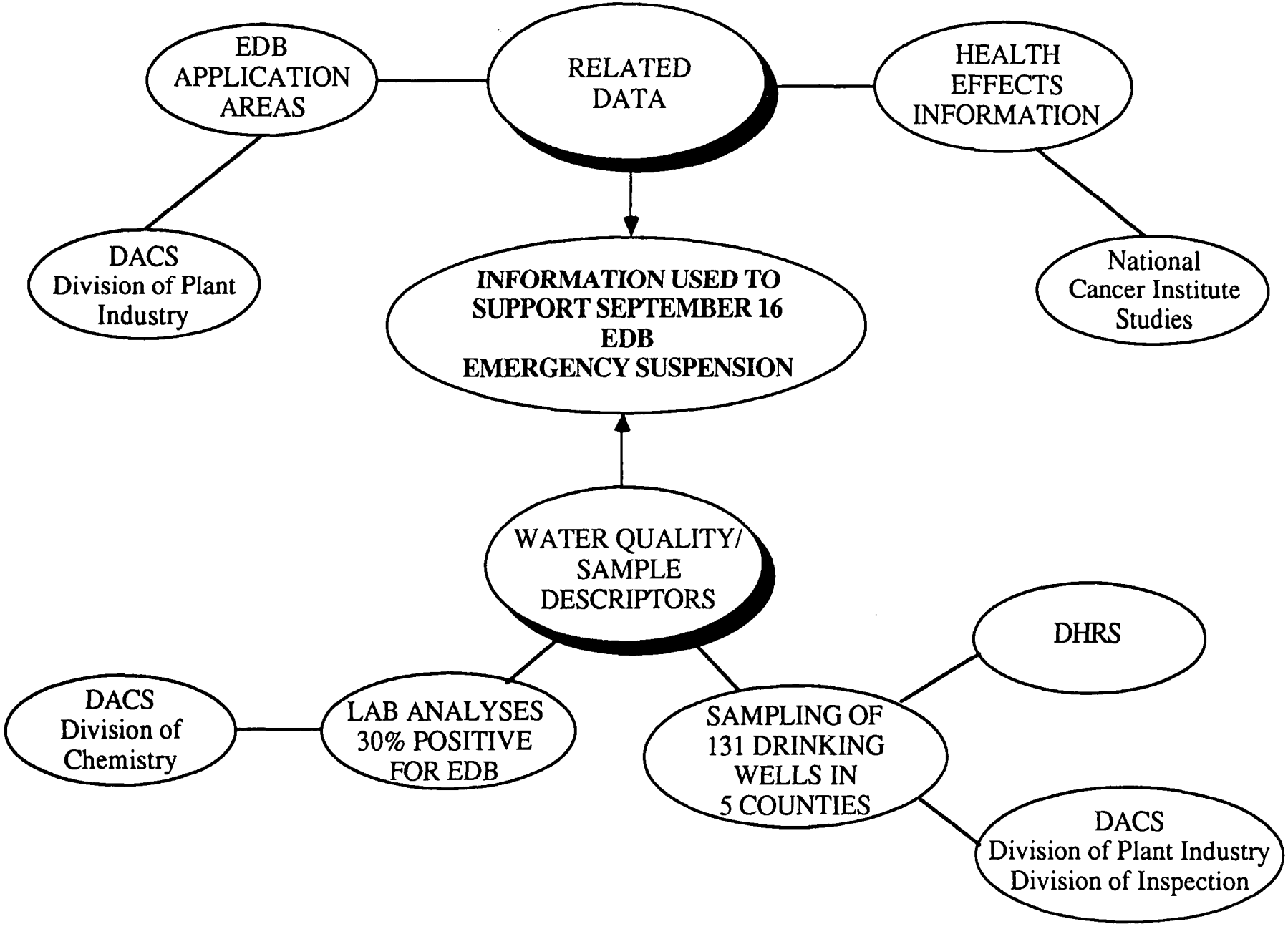

INFORMATION USED AND ACTIVITIES ASSOCIATED WITH THE STATE OF FLORIDA EDB EMERGENCY SUSPENSION OF 1983
PESTICIDE CONTAMINATION SENSITIVITY
Aldicarb Concern 1982
EDB Health Effects Studies
EDB Ground-Water Contamination in CA, HA, GA
EDB CONTAMINATION
Test Irrigation Wells
Determine EDB Application Areas
Test Drinking Water Wells
FUNDING MECHANISM
Transfer of DER Water Quality Trust Fund $
DRINKING WATER SUPPLY CORRECTIVE ACTION
Treatment Technology Research
Provide Potable Water
STATE ADMINISTRATIVE AND POLITICAL RESPONSE
Establish Hotline and Newsletter
Interagency EDB Working Group

Figure 2


EDB APPLICATION AREAS
RELATED DATA
HEALTH EFFECTS INFORMATION
DACS Division of Plant Industry
INFORMATION USED TO SUPPORT SEPTEMBER 16 EDB EMERGENCY SUSPENSION
National Cancer Institute Studies
WATER QUALITY/ SAMPLE DESCRIPTORS
DHRS
DACS Division of Chemistry
LAB ANALYSES 30% POSITIVE FOR EDB
SAMPLING OF 131 DRINKING WELLS IN 5 COUNTIES
DACS Division of Plant Industry Division of Inspection

Characteristics and Functions of the Data Types Used in the State of Florida Decision to Suspend EDB Use as a Soil Fumigant

DATA TYPES	Critical Need	DECISION COMPONENTS: Contamination Sensitivity	State Response	EDB Confirmation	Corrective Action	Funding Mechanism	SOURCE OF DATA	ACCESSIBILITY*
WELL DESCRIPTORS							• DHRS County health workers	• Location of wells and type of well information available at the county health departments
Well location	●		X	X	X	X		
Well type	●		X	X	X	X		
HYDROGEOLOGIC DESCRIPTORS								
Geologic structure	●		X	X	X	X	• Florida aquifer types well documented information	• Maps of Florida aquifers, geology, and soils are readily available in thematic maps with state agencies and as part of state atlas
Aquifer characterization	●		X	X	X	X		
Soils	●		X	X	X	X		
WATER QUALITY/ SAMPLE DESCRIPTORS								
Date sample	●		X	X	X	X	• Collection of well samples -- Collecting done by DACS Division of Inspection Division of Plant Industry -- Sampled 131 wells in citrus growing area of central Florida and peanut/soybean areas of Panhandle	• Sample descriptor information maintained by each responsible agency and made available, if needed, to any requesting agency through professional and administrative networks. All information existed in readily accessible paper files
Name of Collecting Agency	●		X	X				
Name of Analyzing Agency	●		X	X				
Name of lab	●		X	X				
Analytical method	●		X	X				

Characteristics and Functions of the Data Types Used in the State of Florida Decision to Suspend EDB Use as a Soil Fumigant (Continued)

DATA TYPES	Critical Need	DECISION COMPONENTS: Contamination Sensitivity	State Response	EDB Confirmation	Corrective Action	Funding Mechanism	SOURCE OF DATA	ACCESSIBILITY*
WATER QUALITY/ SAMPLE DESCRIPTORS (Cont.)								
Water quality	●	X	X	X	X	X	• Water Analysis -- Conducted by DACS Division of Chemistry -- Analyses using GC mass spectrograph • EDB contamination results 30% of wells tested positive at detection level of 0.1 ppb	• Water quality lab analysis results maintained in files readily accessible by interested agency. Summary of tests compiled into report.
RELATED DATA								
EDB Application	●		X	X	X	X	• State EDB application data -- Provided by DACS Division of Plant Industry -- Provided maps of treated nematode buffer zones and treatment areas in citrus groves -- Maps contained details about times and amounts of pesticide applied	• Detailed maps were provided to DHRS from Division of Plant Industry and became part of readily accessible paper files
Health Effects EDB Toxicology	●		X		X	X	• National Cancer Institute -- Research in mid 1970's showed that EDB was highly toxic and carcinogenic	• Reports readily accessible through professional papers and journals as well as special NCI notices

* The sharing of all the data collected in the summer of 1983 occurred efficiently as a result of regular interaction among the responsible state agencies and staff.

Tenneco Polymers -- A Case Study on the Use of Ground-water and Related Data at a Facility under RCRA Interim Status

Introduction

Tenneco Polymers, Inc., a New Jersey based firm, had been "grandfathered" into the Resource Conservation and Recovery Act (RCRA) regulations that became effective in November 1980. This was known as Part A or interim status. Tenneco has made the decision not to apply for a Part B permit under 40 CFR 264 regulations to operate their lagoons and sludge drying beds. At this date, Tenneco has ceased operations at the facility and are in the process of closing down the waste management units. The State of New Jersey now has the authority to administer this portion of the RCRA program and the closure/post-closure procedures are being negotiated with the State. This case history with accompanying graphics (Figure 1 and Table 1) outlines the diverse information requirements involved at this particular facility.

Background: Tenneco Polymers

Tenneco Polymers Inc., located in Flemington, New Jersey (Hunterdon County) was a manufacturer of polyvinyl chloride powder resins between 1966 and 1985. The compounds produced during the manufacturing process are considered hazardous substances under the Standard Industrial Classification (SIC code 2821) system and are included under RCRA Appendix 8. In the manufacturing process, raw materials were polymerized and blended to produce a slurry of resin in water. This slurry was dewatered by centrifuge and the resin was air dried, screened and then stored in silos. Unpolymerized materials were vacuum recovered and reused, and vapors generated from the recovery and stripping process were incinerated. Seven ground-water production wells existed on the plant property to provide water that was used in the manufacturing process of polymerization, cooling the reaction vessels, and steam generation. After use, this wastewater underwent pH adjustment before entering a concrete lined equalization basin that discharges to the Raritan Township Municipal Utilities Authority POTW.

Approximately 240,000 gallons per day of industrial chemical wastes were collected and treated separately from the cooling water. This wastewater was derived from dewatering centrifuges, cooling water from the incinerator, wastewater from a stripper device serving the recovery unit, miscellaneous floor and surface drainage, boiler blowdown, deionizer unit backwash, and filter backwash. This production wastewater underwent initial pH adjustment prior to entering three unlined lagoons (3.5 feet deep) in series for settling. Although the liquids in the three lagoons are presently classified as non-hazardous waste, corrosive hazarardous wastes were placed in the lagoons during 1982 and 1983. These lagoons were cleaned periodically, and the waste materials were placed in two unlined sludge drying basins. The sludge has been recently classified as non-hazardous waste but the fact that hazardous chemical waste material was disposed at one time in these surface impoundments caused concern to the NJDEP.

The discharge to ground-water is via the three lagoons in addition to the two unlined sludge drying basins. The affected aquifer is underlain by the Brunswick Formation of Triassic Age. This formation consists of a red argillaceous shale with local beds of fine-grained red sandstone. The beds are highly fractured both horizontally and vertically. The fracturing extends to 300 feet below the surface. The depth to bedrock is one to three feet below the ground surface. Most of the ground-water storage within the Brunswick aquifer is in the upper zone (0-300 feet) with little storage below this zone. The depth to ground-water is approximately 25 to 50 feet below the ground surface. Futhermore, the Bushkill Creek, a tributary of the South Branch Raritan River, runs adjacent to the site.

Regulatory Overview

The NJDEP has been delegated RCRA authority since early 1985 and the Department of Environmental Protection (DEP) through the Bureau of Groundwater Discharge Permits within the Division of Water Resources issues discharge permits to facilities that generate, treat, store or dispose hazardous and non-hazardous waste. Under RCRA Subtitle C, Tenneco is regulated as a land treatment, storage, and disposal (TSD) waste facility and DEP has the primary responsibility for developing and enforcing state and federal RCRA regulations to control the generation, treatment, storage, and disposal of solid and hazardous wastes. Both interim status and RCRA Part B permit standards are incorporated into the NJDEP RCRA Subtitle C permits. In 1980, Tenneco filed a RCRA Part A application to obtain interim status and conducted preliminary ground-water monitoring in accordance with interim status ground-water monitoring requirements. In 1984 NJDEP issued a ground-water discharge permit which was modified in 1986. All NJDEP/RCRA permits contain general standards covering the three major areas of: ground-water monitoring; closure/post closure; and financial assurance. All NJDEP discharge to ground-water (RCRA) permits contain ground-water monitoring requirements that include:

- Determining ground-water elevation at each well prior to pumping and sampling of the wells;
- Installation of a well by a licensed New Jersey well driller with certification by a licensed New Jersey Land Surveyor;
- Issuing of a well-drilling permit;
- New wells to be constructed according to DEP specifications and certified by a New Jersey Professional Engineer;
- All wells to be logged using the USDA Soil Textural Classification System;
- For sites with inadequate geological information, a DEP geologist must assist in determining well specifications prior to well drilling;
- All wells to be restricted to public access (i.e., fence, barricade);
- Each well to be inspected on a weekly basis for structural integrity;
- The permittee to obtain and analyze ground-water samples with chain of custody record for each sample maintained at the facility;
- All samples to be analyzed by a New Jersey Certified Lab;
- Samplying results to be reported on DEP forms.

Goundwater Monitoring

Under RCRA regulations, ground-water monitoring is required of owners or operators of a surface impoundment, landfill, land treatment facility and some waste piles used to manage hazardous waste such as the Tenneco facility. The ground-water monitoring requirements of the initial and subsequently modified NJDEP Tenneco permit consists of the following components:

- **Development and Installation of Monitoring System.** The ground-water monitoring program requires a mimimum monitoring system of four wells to be installed, one upgradient from the waste management unit and three downgradient. The downgradient wells must be placed so as to intercept any waste migrating from the unit, should such a release occur. The upgradient wells must provide data on ground-water that is not influenced by waste coming from the waste management unit (called background data). Tenneco was initially required to install six monitoring wells during the early 1980's as part of the Interim Status requirements.

- **Background Monitoring.** Once the wells were installed, Tenneco began monitoring them for a 1 year period (1982-1983) to establish background concentrations for selected parameters. Comparison of data from upgradient and downgradient wells indicated that the waste management units might be impacting ground-water quality. This conclusion was based on the reported parametric values and analyses provided only after two reporting periods. Consequently, both parties agreed that the background monitoring program needed to be modified to focus on waste specific parameters and NJDEP required the facility to include a priority pollutant volatile organics scan.

- **Modified Monitoring and Evaluation.** The modified monitoring program began in 1984. Background levels for waste specific parameters were established. Four major groups of parameters were monitoried on a quarterly basis. These include:

  --**Drinking water parameters** - numerous parameters including conventionals, metals, pesticides, and other toxics
  --**Ground-water indicator parameters** - pH, total organic carbon, total organic halogen, and specific conductance
  --**Ground-water quality parameters** - manganese, chlorine, iron, phenols, sodium, and sulfate
  --**Waste specific parameters** - volatile organics including vinyl chloride.

  The results of the modified monitoring program were compared to the background values to determine if any of the waste management units at the site were impacting ground-water quality. Tenneco was required to install an additional seven wells (all of which were deep wells because of the thick rock substrate) in addition to the existing six monitoring and seven production wells. These ground-water monitoring results showed that Vinyl Chloride, TCE, Methylene Chloride, and 1,2-trans-Dichloroethylene exceeded acceptable levels and were contaminating the ground-water.

- **Related activities.** Ground-water monitoring conducted as part of the above RCRA requirements showed significant vinyl chloride and other organic contamination. As a result, DEP felt it necessary to determine if there was any threat to the drinking water supply of the adjacent population. Consequently, DEP, in cooperation with the Hunterdon County Health Department analyzed residential wells for the presence of vinyl chloride and other suspected compounds. Testing indicted that there were no drinking water supplies contaminated. In addition, monthly ambient water quality measurements in the Bushkill Creek indicated that there was no contamination to the adjacent surface waters. A possible factor contributing to the absence of these pollutants in adjacent drinking water supplies is that Tenneco has been pumping well TP-21 (a production well) for several years. Scientists hypothesize that the contaminants may not be migrating off-site in the ground-water because of this process. Therefore,NJDEP has requested Tenneco to maintain pumping this well as a precautionary interim corrective action until a final corrective action is approved for the site.

- **Assessment Program.** When contamination was confirmed, Tenneco was required to implement a Ground Water Quality Assessment Program (GWQAP) in April 1985, to determine the extent and concentrations of the documented ground-water contaminants. Because early detection showed hazardous waste contamination, Tenneco is required to complete its assessment of ground-water contamination and report ground-water monitoring data on a quarterly basis until the facility submits its ground-water corrective action plan as part of its post-closure permit application requirements. The components of this program (which is still to be submitted and approved by NJDEP) must include the following:

  --the number, location, and depth of new wells;
  --sampling and analytical methods details;
  --a description of evaluation procedures;
  --procedures for ground-water decontamination;
  --a schedule of implementation;
  --information on the rate, direction, and extent of contamination;
  --details about the concentrations of hazardous wastes;
  --information describing the threat posed by contamination;
  --financial assurance.

Closure/Post-closure

Closure of Infiltration-Percolation Lagoons

Within two years (by April 1988), Tenneco Polymers, Inc. is required to complete final closure procedures of the three unlined lagoons, two sludge drying basins, and related structures according to an approved closure plan. This process will result in disposal of standing liquid, sludge removal, decontamination of facility equipment and appropriate wash water disposal. The permit also requires collecting and analyzing three undisturbed continuous soil cores from each lagoon (15 total soil cores) by boring to a depth of five feet. Chemical analysis for specified parameters is required to be performed on these soil samples at designated depth intervals. All of these analyses

must conform to EPA/NJDEP approved testing methods. The analyses will be used to produce a map showing soil core locations and used to determine the amount of underlying contaminated soil to be removed.

Ground-Water Decontamination and Post-Closure Monitoring

Within half a year of the effective date of the permit, Tenneco is required as mentioned above, to submit to DEP for review and approval, a comprehensive corrective action plan for ground-water decontamination. This program is to be based on data collected over a span of several years, including the Ground-Water Quality Assessment Program (GWQAP) conducted at the facility since mid-1985, as well as the ground-water data obtained as part of the Interim Status. The corrective action plan is also required to describe a post-closure ground-water monitoring program for the facility which will ensure that the decontamination system is performing adaquately and specify the financial mechanism that will ensure sufficient funding for ground-water cleanup and post-closure monitoring.

Ground-Water Data Analysis

NJDEP has several data analysis capabilities to assist in interpreting the extensive ground-water data accumulated in the NJPDES programs. First, all data generated by the permitees must be submitted on standard NJDEP data forms. These data are then key punched and maintained on a NJ Department of Transportation IBM mainframe using a RAMIS operating system. Access to this mainframe is via remote terminals in the Bureau of Permits Administration offices.

In addition, DEP uses COMPAQ PCs to run several software packages to assist in data interpretation and analysis. Contour maps can be produced using a Krieging algorithm on the PC where sufficient data is available. NJDEP geologists may also run the Random-Walk (Prickett,Naymik,Lonnquist) plume transport model. Data for corrective action pumping and injection programs is also modelled using an in-house modified Theis model. NJDEP anticipates having the capability to download data from the IBM mainframe to the COMPAQ workstations in the near future. To maintain current ground-water monitoring results, the quarterly Tenneco reports are reviewed by Bureau staff and exceedance limits are entered into a Tenneco Wordstar file.

The Tenneco ground-water monitoring data types can be aggregated into four major catagories as presented in Figure 1. The relationship between ground-water data type, under which permit component data is collected, the source of data, and relevance of data sharing to other NJDEP program offices is detailed in Table 1. Overall, there is an extensive amount of ground-water monitoring data generated and present NJDEP Bureau of Groundwater Quality Management program operations have adaquate capabilities for retrieving essential data for various analyses. Modifications to improve data access and development of new analytical tools are being planned to improve overall environmental decision making. As shown in Table 1, sharing of Tenneco ground-water monitoring data is extremely relevant for numerous state programs and enhancing the capability for data sharing becomes an important issue in terms of improving data management which contributes directly to more efficient site management.

Figure 1

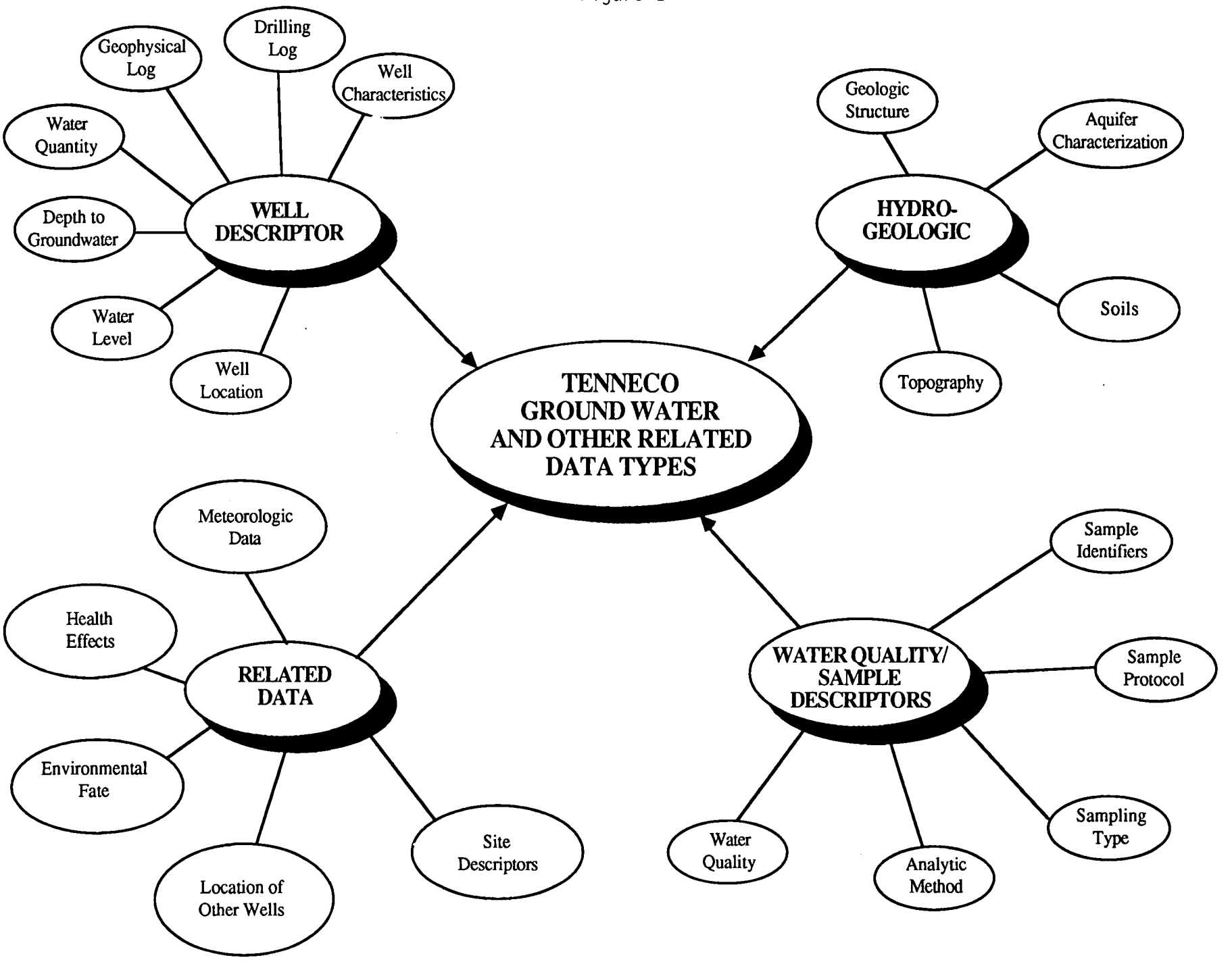

TENNECO GROUND WATER AND OTHER RELATED DATA TYPES
WELL DESCRIPTOR
Geophysical Log
Drilling Log
Well Characteristics
Water Quantity
Depth to Groundwater
Water Level
Well Location
HYDRO-GEOLOGIC
Geologic Structure
Aquifer Characterization
Soils
Topography
RELATED DATA
Meteorologic Data
Health Effects
Environmental Fate
Location of Other Wells
Site Descriptors
WATER QUALITY/ SAMPLE DESCRIPTORS
Sample Identifiers
Sample Protocol
Sampling Type
Analytic Method
Water Quality

Table 1. Tenneco Ground-Water Monitoring Data Types, Data Sources, and Associated Characteristics

DATA TYPES	CRITICAL NEED	NJDEP GROUND-WATER MONITORING COMPONENTS				SOURCES OF DATA	RELEVANCE OF DATA SHARING TO OTHER PROGRAMS*
		Development of Monitoring System	Background Monitoring	Routine Monitoring	Assessment Program		
WELL DESCRIPTORS							
Well Location	●	X	X	X	X	Tenneco[1]	Agencies: **2, 3, 4, 5, 8, 9, 10** • Provide details on location of monitoring well • Provide QA/QC information about well • Indicate what wells exist within a specified aquifer, facility, land use type, or other geographic unit
Water Level Data	●	X	X	X	X	Tenneco[1]	
Depth to Groundwater	●	X	X	X	X	Tenneco[1]	
Water Quantity	●	X	X	X	X	Tenneco[1]	
Availability of Geophysical Log	●	X				Tenneco[1]	
Well Driller's Log	●	X				Tenneco[1]	
Well Characteristics	●	X				Tenneco[1]	
-- Date of Construction	●	X					
-- Name of Driller	●	X					
-- Well Type	●	X	X	X	X		
-- Well Elevation	●	X	X	X	X		
-- Well Purpose	●	X	X	X	X		
-- [illegible]ion Method	●	X					
[illegible]	●	X	X	X	X		

[1]tractors working for Tenneco that includes in situ data as well as information secured from other sources.

Table 1: Tenneco Ground-Water Monitoring Data Types, Data Sources, and Associated Characteristics

DATA TYPES	CRITICAL NEED	NJDEP GROUND-WATER MONITORING COMPONENTS				SOURCES OF DATA	RELEVANCE OF DATA SHARING TO OTHER PROGRAMS*
		Development of Monitoring System	Background Monitoring	Routine Monitoring	Assessment Program		
HYDROGEOLOGIC DESCRIPTORS							
Geologic Structure	●	X	X	X	X	Bureau of Geology and Topography Bureau of Groundwater Quality Management Tenneco[1]	Agencies: **2, 8, 9, 10** • Useful new or supplementary information on geologic structure • Details about aquifer at specific location • Useful soil profile information
Aquifer Characterization	●	X	X	X	X		
Soil	●	X	X	X	X		
Topography	●	X			X	Bureau of Geology and Topography	
WATER QUALITY/ SAMPLE DESCRIPTORS							
Sample Identifiers	●	X	X	X	X	Tenneco[1]	Agencies: **1, 2, 3, 4, 5, 6, 7, 8, 9, 10** • Provide contamination details for surface water, drinking water and other pollution impact programs • Critical data for overall ground-water quality states at local, county, or state level • Useful inputs to ground-water models
Sample Protocol	●		X	X	X	Tenneco[1]	
Sampling Type	●		X	X	X	Bureau of Permits Administration	
Analytic Method	●		X	X	X	Bureau of Permits Administration	
Water Quality	●		X	X	X	Tenneco[1]	

Table 1: Tenneco Ground-Water Monitoring Data Types, Data Sources, and Associated Characteristics

DATA TYPES	CRITICAL NEED	NJDEP GROUND-WATER MONITORING COMPONENTS				SOURCES OF DATA	RELEVANCE OF DATA SHARING TO OTHER PROGRAMS*
		Development of Monitoring System	Background Monitoring	Routine Monitoring	Assessment Program		
RELATED DATA							
Location of Other Related Facilities[2]	●	X	X	X	X	Tenneco[1]	Agencies: **1, 2, 5, 7**
Other Point/Non-Point Sources[2] Contamination	●	X	X	X	X	Tenneco[1]	
Site Descriptors:	●	X	X	X	X	Elizabethtown Water Company	• Provide insight into pollution sources in surface waters
Ambient Surface Water Quality						Hunterdon Health Dept.	
Location of Other Wells:	●	X	X	X	X	Bur. of GW Discharge Permits	• Confirm groundwater contamination to drinking water supplies not occurring
Water Quality of Adjacent Drinking Water Supply						Raritan Town. En. Com.	
Land Use/Land Cover[2]	●					Tenneco[1]	
Demographic Information[2]	●					Tenneco[1]	

* Program Offices at NJDEP

[2] Interim Status

1 Office of Science and Research
Division of Water Resources

Water Quality Management

2 Bureau of Groundwater Quality Management

3 Bureau of Permits Administration

Water Supply and Management

4 Bureau of Water Supply

5 Bureau of Safe Drinking Water

Monitoring and Planning

6 Bureau of Systems Analysis and Wasteload Allocation

7 Bureau of Monitoring and Data Management

Geological Survey

8 Bureau of Groundwater Pollution Analysis

9 Bureau of Groundwater Resource Evaluation

10 Bureaui of Geology and Topography