# Environmental Information
# Exchange Network:
## *Improving Environmental Results*

Environmental Information
eXchange
Network

# Executive Summary

Over the last 25 years, environmental analysis and reporting systems have evolved from paper files to mainframe computers to desktop computers and, finally, to networked computers and servers. The Environmental Information Exchange Network (Exchange Network), which includes the Environmental Protection Agency (EPA), states, tribes, and territories, has made it possible to address the issue of environmental information collection, maintenance and sharing by using improved technology and agreeing on environmental and health data formats in which to exchange information. These standards and protocols increase the efficiency, timeliness and accuracy of data exchanges.

Currently, over 40 partners have established a presence on the Exchange Network by developing a Network "Node." EPA's presence on the Network is through the Central Data Exchange (CDX). This brochure highlights "Success Stories" that demonstrate how Exchange Network partners have worked together to address the problems that hindered the electronic access and sharing of data.

# Program Overview

Since EPA's creation, partnerships have come to play a larger and more important role in environmental protection. Over 90% of EPA's environmental data comes from state environmental agencies. Partners are finding it increasingly beneficial to share their data with each other, as well as with EPA, with the recognition that ecosystems, like watersheds, commonly cross jurisdictional boundaries. Computer systems that were developed to manage this information in the past now hinder attempts at collaboration, interoperability and data sharing because they operate on incompatible platforms, databases, languages and formats. Increasing data integrity problems, rising computer maintenance costs, and the need to modernize systems outside the confines of an existing national collection system have added to the complexity of environmental data collection.

In 1998, the Environmental Council of the States (ECOS) and EPA decided to meet these challenges and created a collaborative solution. The growing information needs of environmental protection, rising e-commerce expectations, and the demand for more and faster public access to environmental data, dictated improvements in information management. The Exchange Network is an Internet-based approach to exchanging environmental, health and other types of data among trusted partners (e.g., EPA, states, tribes and territories). EPA's presence on the Exchange Network is CDX. CDX supports Web-based submissions, as well as automated Web service exchanges with partners on the Exchange Network. The Exchange Network enables participants to control and manage their own data, while making it available to partners over a secure Internet connection. The Exchange Network also represents a fundamental transformation in the way that information is shared. This collaborative partnership among EPA, states, tribes, and territories across the nation supports better environmental and health-related decisions through improved access to, and exchange of environmental, health, and geographic information.

The Exchange Network Grant Program, implemented by EPA, served a crucial role in providing the necessary resources to establish the Exchange Network. This competitive program awarded a total of $84 million from FY 2002 — FY 2005, to states, tribes, and territories. The innovative and collaborative work funded through the grants program addresses some of the issues related to data sharing and integration, improved data timeliness and accuracy, reduced costs and burdens associated with reporting, and enhanced access to information in order to make better environmental decisions.

*Exchange Network Objectives:*

- Improve the timeliness and accuracy of data
- Reduce the burden and costs associated with reporting data
- Enhance data access for environmental professionals
- Support better decisions on environmental and health issues

# Success Stories

The "Success Stories" contained in this brochure illustrate how the Exchange Network has grown and addressed specific issues that hindered the management of environmental data. These success stories illustrate how Network partners have increased timeliness and efficiency and improved technology and data quality.

Each success story has a short introduction which describes the issue that needed to be resolved. The solution to the issue is provided to illustrate how Exchange Network partners worked collaboratively on a resolution. Benefits of each success story are described to demonstrate the value of each project in addressing environmental information needs and concerns, such as data consistency and integration; better and more comprehensive environmental information; cost and reporting burdens; access to real-time information; and, increased collaboration among partners due to increased interoperability.

Hopefully these success stories will inspire others to replicate them, and create insights that will lead to other types of Exchange Network successes.

# Electronic Drinking Water Report (eDWR)

## What was the issue?

States have the primary responsibility for implementing and enforcing the drinking water standards promulgated under the Safe Drinking Water Act. Most of the laboratory data a State Drinking Water Program receives is in hardcopy paper documents that must then be manually entered into the state's information system. The number and complexity of EPA mandates on State Drinking Water Programs, as well as the need for states to make better decisions regarding the environment and public health, necessitates that states improve efficiency through the use of electronic technologies to satisfy regulatory reporting obligations.

## What was the solution?

A five state team developed an electronic data flow from laboratories to the State Drinking Water Programs using the Exchange Network as its foundation. The states developed an eXtensible Markup Language (XML) schema broad enough to accommodate all types of drinking water data; it also allows states to implement only those pieces that are appropriate for their individual state needs. The states worked closely with EPA to ensure that the schemas conformed to the Safe Drinking Water Information System State-implementation assistance product, an EPA database that helps states manage their drinking water resources.

## What are the benefits?

The project advanced the understanding of participant states in electronic data transfer technologies and tools. The Electric Drinking Water Report (eDWR) project developed and implemented a process of electronically flowing drinking water data from laboratories to state program offices. This effort will reduce the reporting burden on the regulated community and result in a higher level of data quality by eliminating the need for multiple data entry. Additionally, participant states worked to ensure that the data exchange schemas can be expanded to accommodate other laboratory to state data flows — further improving the quality and timeliness of state environmental data. Thus far, two states have developed the schema, five other states are in the development phase, and two additional states are planning to deploy the schema.

### *Participants:*

- New Hampshire
- Maine
- New Jersey
- Rhode Island
- Vermont

### *Project Goal:*

Use the Exchange Network to facilitate the flow of laboratory drinking water data.

### *Project Benefits:*

The Exchange Network's support of eDWR enables states to:

- Utilize a consistent data format for data flows from a laboratory to a state
- Improve data quality by eliminating the need for paper reporting
- Reduce the reporting burden on the regulated community

# Facility Registry System (FRS)

## *Participants:*

- States
- EPA Program Offices
- EPA Regions

## *Project Goal:*

Use the Exchange Network to exchange and improve the quality of information about facilities that are subject to environmental regulation or are of particular environmental interest.

## *Project Benefits:*

The Exchange Network's support of FRS enables the Agency to:

- Provide the public access to one authoritative source of information about regulated facilities in their community
- Update facility information continually and easily
- Eliminate redundant collection of facility data by EPA and State programs

## What was the issue?

States and EPA's Program Offices and Regions have always collected information about facilities subject to environmental regulation or of environmental interest. EPA created the Facility Registry System (FRS) — a national database of information on facilities subject to environmental regulation — to respond to the need for a central repository of facility information. However, because FRS collected facility information from many sources, the information in the system was sometimes contradictory and inaccurate.

## What was the solution?

EPA began an improvement strategy, using the Exchange Network to improve the accuracy and quality of information within FRS. FRS uses the Exchange Network to collect and store key facility identifying information, such as: facility names, alternate facility names, geographic locations (street addresses and latitude and longitude), mailing addresses, points of contact, permit and system identification numbers, industrial codes, and parent organizational structures. FRS is publicly accessible through Envirofacts, where the public can access information on over 1.5 million records from more than a dozen environmental program information systems including data from three dozen states. Additionally, EPA receives correction and verification information from the reporting community via Web-based access and through information exchange supported by the Exchange Network.

## What are the benefits?

FRS is critical to EPA's efforts of providing the public with access to high quality environmental information. The FRS database supports key EPA public access tools, such as the Envirofacts Data Warehouse, EnviroMapper, and Environmental Compliance History Online Web sites, as well as the Integrated Compliance Information System.

EPA is utilizing the Exchange Network to further improve, enhance and expand FRS. Partners who have developed Nodes can exchange facility data with EPA via the Exchange Network. This increases the amount of information, including increasing the locational data, which supports Geographical Information System mapping applications throughout the Agency.

# Hazardous Waste Transporter Data Exchange

## What was the issue?

The premise of the Resource Conservation and Recovery Act (RCRA) is cradle-to-grave management of hazardous waste. Once a hazardous waste is generated, it is tracked on its way to a treatment, storage or disposal facility (TSDF). Hazardous waste manifests help facilitate this process by capturing the waste type and quantity that is transported from the generator facility to the TSDF. However, the information on these paper reports is typically not available to regulators of out-of-state destinations in a fashion that allows for timely cross-checking of shipments. There was no way to exchange hazardous waste manifest information electronically between states.

## What was the solution?

The Washington Department of Ecology and Oregon Department of Environmental Quality saw an opportunity to leverage the Exchange Network infrastructure to solve this problem. Washington and Oregon developed and implemented an approach to capture electronic information from their state hazardous waste generators. They worked together to develop XML schema, the common language of the Exchange Network, and agreed to publish (e.g., make the data available) their waste information data on their Network Nodes. In doing so, Oregon and Washington can now query hazardous waste data on each other's Network Node. This information allows them to track and reconcile waste shipments between both states.

## What are the benefits?

The Exchange Network allows Oregon and Washington to easily identify where the waste was shipped, verify the transport to the TSDF, and identify discrepancies between the type and amount of waste sent from one facility to another. This functionality enables the states to more easily respond to potential environmental hazards associated with lost shipments. It also helps ensure that hazardous waste is managed appropriately when waste is shipped offsite for treatment, storage or disposal.

### *Participants:*

- Oregon
- Washington

### *Project Goal:*

Use the Exchange Network to exchange and improve the quality of information about hazardous waste shipments from one state to another.

### *Project Benefits:*

The Exchange Network enabled the states of Washington and Oregon to:

- Track hazardous waste shipped between their states in real time
- Identify discrepancies between hazardous waste sent from one facility and received by another

# Michigan's Electronic Discharge Monitoring Reports

### *Participants:*

- Michigan
- Michigan facilities which submit electronic discharge monitoring reports
- EPA

### *Project Goal:*

Use the Exchange Network to support a more efficient and effective approach to collecting Discharge Monitoring Reports.

### *Project Benefits:*

The Exchange Network enabled the state of Michigan to:

- Save between $250,000 to $500,000 annually
- Eliminate a three-year backlog of daily reports
- Improve the timeliness and accuracy of its discharge wastewater data

## What was the issue?

Facilities in Michigan that discharge wastewater are required to submit daily Discharge Monitoring Reports to the Michigan Department of Environmental Quality. Reports were submitted via mail and the data was manually entered into state and federal databases. As a result, a three-year backlog of the daily reports developed, making timely information almost impossible to access. With the high demand for quality data, the State of Michigan needed a better way of doing business.

## What was the solution?

Michigan partnered with EPA and used the Exchange Network to create a solution — electronic Discharge Monitoring Reports. Facilities upload their electronic Discharge Monitoring Reports through the state's Web site, and enter their data into the secure electronic database. The information is entered one time and then transferred from the facility to Michigan. Michigan then transfers the data via the Exchange Network to EPA accurately and efficiently.

## What are the benefits?

The electronic Discharge Monitoring Reports System enables reporting facilities and the State of Michigan to save money annually. Approximately half of Michigan's permitted facilities use the electronic Discharge Monitoring Report System and save $2,000 each year, resulting in a total of $1,200,000 annual savings for reporting facilities statewide. The State of Michigan is able to save between $250,000 and $500,000 annually because the resources needed to manage submitted data have been significantly reduced. The State of Michigan no longer needs to manually enter data or correct mis-keyed information. The system also helped to eliminate the three-year backlog of daily reports within the first 18 months after system implementation.

The quality and timeliness of data has improved dramatically due to implementation of this system. This allows managers and analysts access to high quality data so they may make better decisions regarding the environment. EPA has recognized Michigan as having one of the most advanced and efficient wastewater reporting systems in the country.

Solutions similar to that developed in Michigan have been deployed in five other states. Two states are currently in development and 15 additional states are planning to use a similar solution.

# New Jersey Beach Monitoring Solution

## What was the issue?

The State of New Jersey needed a way to quickly and accurately monitor the environmental condition of beach water quality and then communicate this information to the public, and state and local officials. In the past, gathering this type of data, analyzing it and then communicating the information to the public, and other state and local government entities was extremely time consuming.

## What was the solution?

The New Jersey Department of Environmental Protection worked with EPA's Exchange Network and Earth 911, a clearinghouse for community-specific environmental information, and created the New Jersey Beach Monitoring Solution. The New Jersey Beach Monitoring Solution uses state-of-the-art technology and the infrastructure of the Exchange Network to streamline beach monitoring and notification processes. The system allows local water quality monitors to record sampling results on handheld Personal Digital Assistants and wirelessly upload them to New Jersey's data management system. Laboratories can also quickly and securely add sample results to data records over the Internet. Using the sampling and monitoring results, the system makes recommendations to agency or department officials on whether to order beach closures.

Beach closure determinations are immediately available to the public on the New Jersey Department of Environmental Protection and Earth 911 Web sites. As part of the notification system, citizens, lifeguards, media, resorts, and other stakeholders can receive immediate email alerts of beach closures and water quality advisories. The system uses the Exchange Network to immediately make data available to EPA via the eBeaches data exchange. The eBeaches data exchange system allows EPA to display state beach water quality and swimming advisory data.

## What are the benefits?

The New Jersey Beach Monitoring Solution is making use of technology to streamline data management processes at all levels of government. The system provides government-to-government and government-to-public information exchange through one seamless network. The ability to instantaneously disseminate beach closure information is a powerful tool for protecting public health. The project also leveraged a national public/private partnership with Earth 911 to help offset the cost of public notification requirements.

### *Participants:*

- New Jersey
- Earth 911
- EPA

### *Project Goal:*

Utilize the Exchange Network to expedite the processes for monitoring beach water quality and notifying the public of beach closures.

### *Project Benefits:*

The Exchange Network enables the project participants to:

- Reduce workloads and streamline data management processes
- Produce faster public notifications of beach closures and water quality advisories

# Pacific Northwest Water Quality Data Exchange

### *Participants:*

- Alaska
- Idaho
- Oregon
- Washington
- EPA Region X Office

### *Project Goal:*

Use the Exchange Network to develop a comprehensive source of water quality data for use in environmental decisions.

### *Project Benefits:*

The Exchange Network enabled the project participants to:

- Have faster access to improved water quality data
- Retrieve more data due to increasing involvement from other sources of information
- Involve more groups in data entry and retrieval due to the lower costs
- Provide more comprehensive and accessible data to decision makers for both planning and regulating environmental protection

## What was the issue?

Regional state, tribal, and local jurisdictions wanted the ability to make important water quality decisions based on good aggregated information related to the watershed and bodies of water that crossed their political and jurisdictional boundaries. The environmental and health data to do this analysis was inaccessible to decision makers because the relevant databases were incompatible.

## What was the solution?

The States of Alaska, Idaho, Oregon and Washington partnered with EPA's Region X office and used the Exchange Network to develop the Pacific Northwest Water Quality Data Exchange — a comprehensive source of water quality data for jointly-regulated watersheds and bodies of water. This data exchange uses a common set of data elements and XML schema requirements to define the data that are shared through individual Exchange Network Nodes. The Pacific Northwest Water Quality Data Exchange allows state environmental agencies, tribes, fishery commissions, universities, other federal and state agencies, local watershed councils, and others to acquire the data through a public Web site. Stakeholders can add data by contacting the project managers. This data exchange provides access to an ever-growing source of comparable water quality monitoring data, making this exchange a powerful management tool for environmental decision makers who need timely, accurate, and consistent data on watersheds in the Pacific Northwest.

## What are the benefits?

The Pacific Northwest Water Quality Data Exchange enabled the states in the region to share data more efficiently and effectively. Data that would have taken weeks to collect from disparate systems in multiple states is quickly accessible to many users. Data entry by project manager-approved stakeholders improves the environmental information; the data becomes more comprehensive and accurate.

Environmental decision-makers are now able to conduct customized data searches, which encourages enhanced research on the regional watersheds. For example, the State of Oregon is using the Pacific Northwest Water Quality Data Exchange to study water quality trends in the Columbia River basin — a geographic area that crosses four states.

# St. Regis Mohawk Tribe

## What was the issue?

The St. Regis Mohawk Tribe is an international tribal community located in northern New York and is bisected by the United States-Canada Border. The St. Regis Mohawk Tribe had years of backlogged ambient air quality data and needed a reliable way to electronically share air quality and other environmental data with EPA. Even though the data was being collected, funding to staff and maintain the necessary information technology (IT) assets and Internet connectivity was unavailable.

## What was the solution?

Web services (i.e., automated information services conducted over the Internet that simplify the exchange of large amounts of data) that supported affordable data storage, retrieval and wide tribal access made financial and strategic sense to the tribe. The Environment Division of the St. Regis Mohawk Tribe applied for Exchange Network grants to train staff and to acquire the necessary IT assets and Internet connectivity to create and use a Node on the Exchange Network. Once the data was prepared to fit Exchange Network protocols and uploaded onto the tribe's Exchange Network Node, the Environment Division of the St. Regis Mohawk Tribe became the first environmental agency to exchange Air Quality System (AQS) data through the Exchange Network. The AQS database contains ambient air pollution data collected by EPA, state, local, and tribal air pollution control agencies from thousands of monitoring stations.

## What are the benefits?

By submitting AQS data quickly and easily through the Exchange Network, the St. Regis Mohawk Tribe is able to effectively use its resources. The infrastructure and software used for the AQS data exchange can also be used to develop other data exchanges (e.g., ambient water quality monitoring data and Electronic Discharge Monitoring Reports). The use of the Exchange Network enables other tribes and agencies to view and use the tribe's data. Finally, the St. Regis Mohawk Tribe's use of the Exchange Network is a tangible example for other tribes who want to conveniently exchange data with EPA.

Ten states are in development for this data exchange, and an additional 12 states are planning to deploy the schema.

### *Participants:*

- St. Regis Mohawk Tribe
- EPA Program Office
- EPA Region II

### *Project Goal:*

Use the Exchange Network to implement AQS flow and maintain the IT resources needed to flow the data.

### *Project Benefits:*

The Exchange Network enabled the St. Regis Mohawk Tribe to:

- Pave the way for other Network partners to submit AQS data via the Exchange Network
- Develop the infrastructure and knowledge to quickly and easily submit information electronically

# Substance Registry System (SRS)

*Participants:*

- States
- Tribes
- Industry
- Federal Agencies
- EPA Program Offices

*Project Goal:*

Use the Exchange Network to improve the quality of substance identity information in state and tribal systems as well as in EPA program systems.

*Project Benefits:*

The Exchange Network enables users to:

- Access SRS to pull relevant environmental information on a substance
- Improve the quality of substance identity data submitted by states and tribes to EPA Program Systems

## What was the issue?

EPA tracks or regulates over 95,000 chemicals, biological organisms, and other substances. Many of these substances are of interest to multiple EPA Program Offices and most have a variety of valid synonyms. The diverse needs and missions of EPA Program Offices and the use of synonyms made it difficult to find cross-Agency environmental data for a particular substance. For example, it was difficult to determine which EPA programs regulate the chemical toluene because of the chemical's six different synonyms.

## What was the solution?

EPA created the Substance Registry System (SRS) to address this problem and catalogue the Agency's names and synonyms for diverse chemicals and substances. The Exchange Network is used to access the SRS database for information on a chemical, its synonyms, and which programs track it. A record for a chemical in SRS provides EPA's preferred standardized name, the Chemical Abstract Service name and number, the synonyms used across EPA and other sources, molecular weight, and other helpful information. SRS also offers public access to fact sheets from EPA offices, federal agencies and international organizations, such as World Health Organization (WHO), on these chemicals. Tools are available to improve the ability of states, tribes, and territories to use the SRS in their data systems, Web services and active metadata links.

## What are the benefits?

Exchange Network users can pull bulk data from SRS for single substances or for all substances for a particular EPA program. This allows states and tribes to improve the quality of their substance data, to ensure conformity with EPA program systems, to include accurate identity data when submitting their environmental reports to EPA or to other state agencies, and to utilize the standardized data in their own systems.

# Washington Fish Tissue Data Exchange

## What is the issue?

The Department of Ecology and the Department of Health in the State of Washington use fish tissue samples to monitor the quality of the water and its effect on human health. In order to integrate the environmental data with the health data, which come from different databases and were collected in different formats, it was necessary to standardize the data received.

## What is the solution?

The Department of Ecology and the Department of Health implemented an interagency exchange of fish tissue monitoring data in an effort to better integrate environmental data with human health data. The Department of Health was given access to fish tissue sampling results located on the secure Exchange Network Node at the Department of Ecology. With the push of a button, authorized users at the Department of Health can automatically incorporate fish tissue sampling data into their Fish Tissue and Birth Defects Assessment Application. The Department of Health uses this new dataset to correlate fish tissue contamination and instances of birth defects.

## What are the benefits?

This data exchange provides an excellent example of ways in which the Exchange Network is helping state agencies work together to protect human health. Effective management of public health risks requires access to a wide range of accurate and timely data on waste, air and water. With access to high quality environmental data, health officials are better equipped to study and manage potential threats posed by environmental hazards. As current environmental data becomes more readily accessible, health agencies can become more adept at anticipating problems before they occur. Preventing health problems can help reduce the burden on the healthcare system, lower treatment costs, and improve the health and quality of life for the community.

### *Participants:*

- Washington Department of Ecology
- Washington Department of Health

### *Project Goal:*

Use the Exchange Network to offer real-time, accurate data to help identify health impacts from environmental contaminants.

### *Project Benefits:*

The Exchange Network is enabling the project participants to:

- Perform more robust analyses on the effects of environmental contaminants on human health
- Retrieve data to help anticipate threats to public health before they become problems

# Building on Success

Progress is being made on a wide-variety of Exchange Network activities, including further development of CDX, EPA's Exchange Network Node; working with other federal agencies and tribes; and laying the groundwork for increased use. CDX provides the Exchange Network with common infrastructure, security, and procedures for partners to exchange and integrate information. In addition, CDX supports Web-based data submissions and automated Web service exchanges with states on the Exchange Network. In a pilot in four states, industry users of CDX submitted their Toxic Release Inventory (TRI) data to CDX. CDX servers then provided the information to the appropriate state, eliminating the need for dual reporting of TRI information to both EPA and the state. Facilities enjoyed decreased costs and needed only to submit their information one time.

Though the Exchange Network began as a partnership among EPA and states, we are now working with tribes, territories, other federal agencies. Discussions with the Centers for Disease Control and the Office of Surface Mining at the Department of the Interior, as well as other agencies, are taking place to assess the benefits of sharing environmental and health data.

The Exchange Network has increased its outreach and communication to tribes. The Network is also providing technical assistance to tribes and is developing long-term strategies for tribal environmental priorities. Additionally, tribes participate in the Network's governance structure so tribal input can be considered in future development efforts.

The Exchange Network continues to build upon the successes outlined in this brochure. The Exchange Network has identified clear, compelling, and replicable Network-enabled solutions to our nation's environmental and health information needs. As partners continue to identify business needs that can be met by the Exchange Network, the Network will continue to expand, providing the foundation for more effective and efficient environmental and health programs.

# List and Dates of Accomplishments

| | |
|---|---|
| 1998 | Environmental Council of the States (ECOS) and EPA join forces to create a solution to the challenge of sharing vital environmental data |
| 2000 | A Blueprint for a National Environmental Exchange Network is developed, which served as the conceptual design for the Exchange Network |
| 2001 | State/EPA Information Management Work Group (IMWG), a workgroup of Exchange Network partners, formally endorses Network design |
| 2002 | Implementation plan created |
| 2002 | Network Steering Board, equally represented by EPA and the states, is formed by IMWG to steer implementation |
| 2002 | EPA awards grants to states and tribes to participate in the Exchange Network |
| 2003 | EPA establishes the CDX as EPA's Node on the Exchange Network |
| 2003 | Exchange Network is launched |
| Fall 2003 | Washington is the first state to launch a Node on the Exchange Network |
| Summer 2004 | 13 states and 4 EPA systems successfully operate on the Exchange Network |
| Spring 2005 | 31 states and 7 EPA systems successfully operate on the Exchange Network |
| Fall 2005 | National Congress of American Indians (NCAI) joins forces with the Exchange Network to increase tribal participation. |
| Summer 2006 | 41 states, 1 tribe, and 9 EPA systems successfully operate on the Exchange Network |

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