TETRA TECH, INC.

December 16, 2008

Department of Administration, Purchasing Division
2019 Washington Street East
PO Box 50130
Charleston, WV 25305-0130

RE: RFI EHS90078: The Office of Environmental Health Services (OEHS) RFI for Information on the Development of a Data Exchange Node

Tetra Tech, Inc. is pleased to submit our proposal in response to RFI No. EHS90078: The Office of Environmental Health Services (OEHS). Julie Scarangella is the point of contact has extensive experience in managing government contracts, managing task orders and leading project teams. In addition, Tetra Tech has a large pool of highly qualified personnel it can draw upon to provide the information technology services once the RFP is released.

We are excited about this opportunity to help support the State of West Virginia in its RFI process and are committed to providing the required technical services and products of the highest quality in a possible response to the RFP Should you have any questions regarding this proposal, please feel free to contact Julie Scarangella at (703) 385-6000

Sincerely,

Julie Scarangella
Project Manager

Response to Request for Information: EHS90078

Development of a Data Exchange Node

Submitted
December 16, 2008

Prepared for
The State of West Virginia
Office of Environmental Health Services
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TETRA TECH

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1   Introduction

Tetra Tech, Inc (Tetra Tech) is pleased to present information and expression of interest in response to West Virginia Office of Environmental Health Services' (OEHS's) request for information on the feasibility of developing an Environmental Data Node Exchange. Tetra Tech understands that the OEHS's goal is to establish a centralized data node exchange that can be incorporated into the U S Environmental Protection Agency's (EPA's) Exchange Network. Tetra Tech also understands that the objective of establishing an exchange network is to improve the accuracy, efficiency, and real-time access to critical data Tetra Tech's suggested approach to establishing a flexible, comprehensive, and reliable exchange network that consists of using the open source CGI Exchange Network Node 2.0 coupled with a functionally aligned, process-driven program management approach

2   Company Qualifications

In addition to Tetra Tech's proposed approach, this package includes our qualifications to support the OEHS in implementing the data exchange node with the Source Water Protection Technical Help Program. Tetra Tech is a leading provider of consulting, engineering, environmental science, and technical services worldwide Tetra Tech and its subsidiaries have a staff of more than 8,500 people representing more than 40 scientific and engineering disciplines in a nationwide network of 275 offices. As such, we are a diverse company, including individuals with expertise in science, research, engineering, construction, and information technology. Our strength is in collectively providing integrated and multidisciplinary services—delivering the best solutions to meet our clients' needs. In a complex world with competing demands for limited resources, Tetra Tech offers clear solutions made possible with sound science, understanding, innovation, and industry-leading approaches.

Tetra Tech is consistently ranked by the industry as a financially stable, top-quality environmental engineering firm In 2008 *Engineering News-Record* ranked Tetra Tech as #1 in Water for the fifth consecutive year. We were also ranked as #1 in Environmental Science, 6th overall in the Top 200 Environmental Firms, in addition to several other Top 20 rankings The broad technical expertise of the combined staff enables our individual offices to provide a tailored team of specialists to cost-effectively meet our clients' needs. Tetra Tech offers a full range of professional services related to water resources, surface and groundwater contaminant characterization, water quality modeling and analysis, environmental compliance, and remedial engineering. Tetra Tech can offer integrated services to clients combining all aspects of the project into one seamless team We are always looking for ways to expand and enhance the field of water resources through unique applications, innovative tools, and integrating advancing technology.

Additionally, Tetra Tech has qualifications specifically relevant to this OEHS initiative. The members of the proposed Tetra Tech team possess a breadth of experience that ensures that each component of the data exchange node effort is conducted by staff with direct and relevant experience We feel that we can provide OEHS with unmatched experience in all the skill areas required to successfully complete and implement the data exchange node Tetra Tech has demonstrated these qualifications in the following ways:

- We maintain an office in downtown Charleston, West Virginia, across the street from the DHHR office, with six regional water resources office locations with staff focused in all facets of water resources and potential contaminant source surveys.
- Tetra Tech has extensive experience documenting and presenting potential sources of contamination throughout West Virginia watersheds
- We have experience with developing SWAP plans and drinking water vulnerability studies throughout the country.
- Tetra Tech has extensive experience with public stakeholder facilitation and conducting training in all facets of water resources management
- The proposed staff have consistently worked on key West Virginia projects for many years and can provide a high level of experience and continuity.
- The proposed staff are adept at using Oracle and Arc GIS as primary tools for data storage, collection, and manipulation for other large West Virginia projects
- We have the ability to provide local service and draw on regional and national experts.

3   Technical Approach

3.1   Setting Up and Configuring Node 2.0 Software

The Node 2.0 will be set up and configured using the CGI Exchange Network Node 2.0 Implementation. The CGI Node 2.0 has been developed with the Java programming language, and it was developed to use the Java 2 Enterprise Edition (J2EE) platform and a relational database. However, unlike other node implementations, the CGI Node 2.0 implementation is licensed under the GNU Public License version 2 (GPLv2), and its source code is freely available for distribution and modification

Because the CGI Node 2.0 has been implemented with Java and open source components, it can be deployed on a variety of Java-based application servers, such as Apache Tomcat, Oracle Application Server, and IBM WebSphere. The GCI Node 2.0 supports a number of different databases, such as Oracle, MySQL, and Microsoft SQL Server. To set up and configure the node, administrators need to choose an application server that is supported by the GCI Node 2.0 and a database from which the node will interact with the data. In addition, after the node has been successfully installed, administrators need to configure data flows, which can submit or solicit data to or from EPA or other client nodes

Using the CGI Exchange Network Node 2.0 has the following benefits:
1. The CGI Node 2.0 implementation is licensed under the GNU Public License version 2 (GPLv2), and its source code is freely available for distribution and modification. This means that the node is essentially free and can be installed and configured without having to pay license fees
2. The CGI Node 2.0 is based on Java and a number of open source components and supports a variety of application servers and databases. Hence, the node can either use an application server or database that is being used or can be set up and configured using open source application servers (Apache Tomcat) and databases (MySQL), which are free
3. In addition to the Node 2.0 EPA specifications, the CGI Node 2.0 allows node administrators to develop and deploy custom data flows with only knowledge of a relational database without having to write code or Java interfaces. This is achieved by using the Flow Processor, which is an extraction and transformation tool written in Java that has been embedded in the CGI Node 2.0

4. Because the Safe Drinking Water Information System (SDWIS) runs on a Java-based application server, the CGI Node 2 0 can be deployed on the same server as the SDWIS system. Hence, this approach will be cost-effective, and it will not require the purchase of new hardware components

## 3.2 Training OEHS Staff on How to Use the Administration Piece of the Node 2.0 Software

The CGI Node 2 0 comes with two manuals on how to administer the node and use the flow processor:

1. *CGI Node 2 0 Administration and Installation Guide*—This document presents instructions on how to properly install, configure, and maintain the components of the CGI Node 2.0 implementation. It is intended for system administrators and developers and is not appropriate for end users. It is assumed that readers have sufficient application server, database, and system administration knowledge to successfully deploy a Java-based application

2. *Flow Processor Guide*—This document provides an overview of the Flow Processor and guidance on how this tool can be used. It is intended to be a source for anyone wishing to use the Flow Processor as a stand-alone tool or integrate it into existing applications.

In addition, user training sessions can be arranged to train the OEHS staff according to needs

3.3 Creating a Web Site for West Virginia Public Water System Operators to View Their Information

To query the node for data, a Web-based application can be developed with Java and open source technologies, such as JavaServer Faces (JSF), Spring, Hibernate, and others. Public water system operators will be able to log in and access the application accordingly. This application can be deployed on the same application server as the SDWIS system or the CGI Node 2.0. Because the application can be developed with Java and open source components, it is not necessary to purchase any licenses for deploying or maintaining the application.
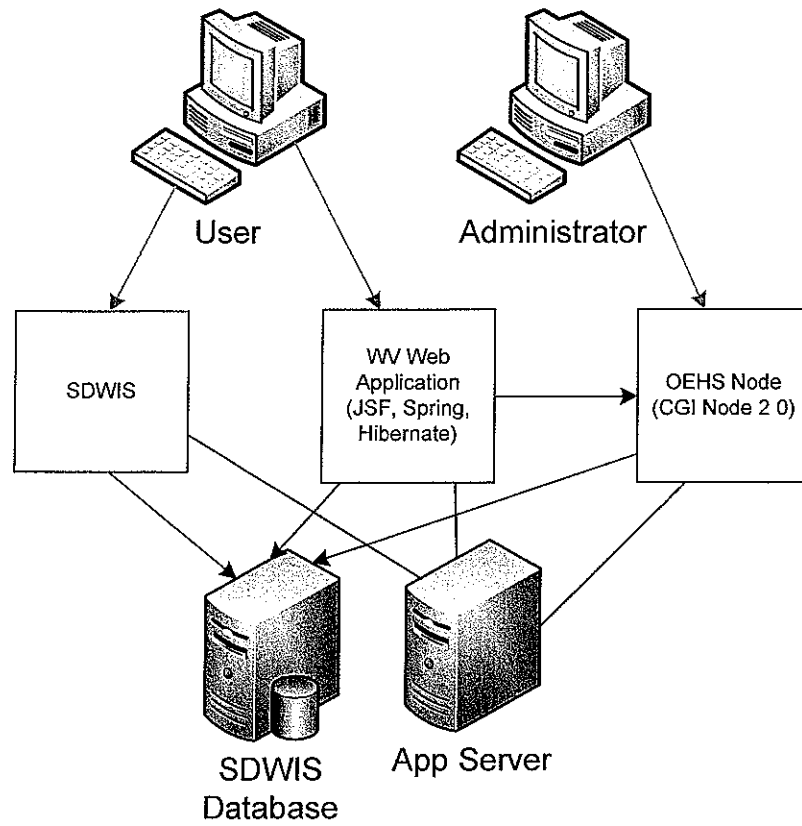
JSF flavors provide a rich set of components that radically simplifies rich Internet application development. They have a vast list of components such as grids, trees, panels, and tabs that provide a consistent look and feel. These can be easily customized according to user needs and help to design a rich interface, comparable to the most advanced Web 2.0 applications. Another benefit of using JSF is that it can be easily deployed on any Java-based application server. Finally, JSF is based on the MVC (Model-View-Controller) architecture, which makes it easier to develop a large-scale project and integrate with other frameworks and J2EE technologies.

The Spring framework is an open source application framework for the Java platform. This framework contains a number of modules, for this project, we suggest using the IoC (Inversion of control). The IoC container is easy to implement and can be run in any application server without any additional configurations. Finally, Spring has a lot of modules that can be easily integrated with existing implementations and frameworks such as Web services, Portlets, JSF, and Hibernate

Hibernate is an open source relational mapping framework, which greatly simplifies the developers' job of when dealing with databases. By using Hibernate, developers can write database access code in less time and more efficiently. In addition, Hibernate is a mature framework that has been thoroughly tested for several years and has been proven to be successful even when dealing with large sets of data.

This approach provides the following key benefits:

1. IA simplified development interface that allows for cost reduction, while providing the desired rich user friendliness
2. The open source frameworks will provide easier integration with the CGI Node 2.0 and other frameworks and save effort in the future
3. The development tools and frameworks can be obtained for free.

3.4 Configuring the OEHS Node 2.0 to Communicate with the WVGISTC Node 2.0

The CGI Node 2.0 has been developed to act both as a server and a client if necessary Hence, it is possible to set up and configure two CGI Nodes 2 0 that communicate with each other. The communication can be bidirectional, and one node can submit or query data to or from the other node and vice-versa. No additional configuration or enhancements will need to be applied to the CGI Node 2 0 to have the OEHS Node 2.0 communicate with the West Virginia State Geographic Information Systems Technical Center WVGISTC Node 2 0. This functionality comes out of the box with the CGI Node 2 0 implementation

3.5 Data Flow from OEHS's SDWIS/State to EPA and WVGISTC

To set up a data flow between OEHS SDWIS/State to EPA and WVGISTC, two CGI nodes need to be installed and configured properly. One node needs to be installed for OEHS SDWIS/State and one for WVGISTC. Because the CGI Node 2 0 is based on Web services, it allows for bidirectional exchange of data between the various systems and the creation of custom data flows between the OEHS SDWIS/State Node and the WVGISTC Node. In addition, the CGI Node 2 0 takes advantage of the existing functionality of EPA's Central Data Exchange (CDX) Node and Exchange Networks Thus, it can reuse all the existing data flows of the EPA CDX Node with minor configuration efforts needed for the OEHS SDWIS/State and WVGISTC Nodes
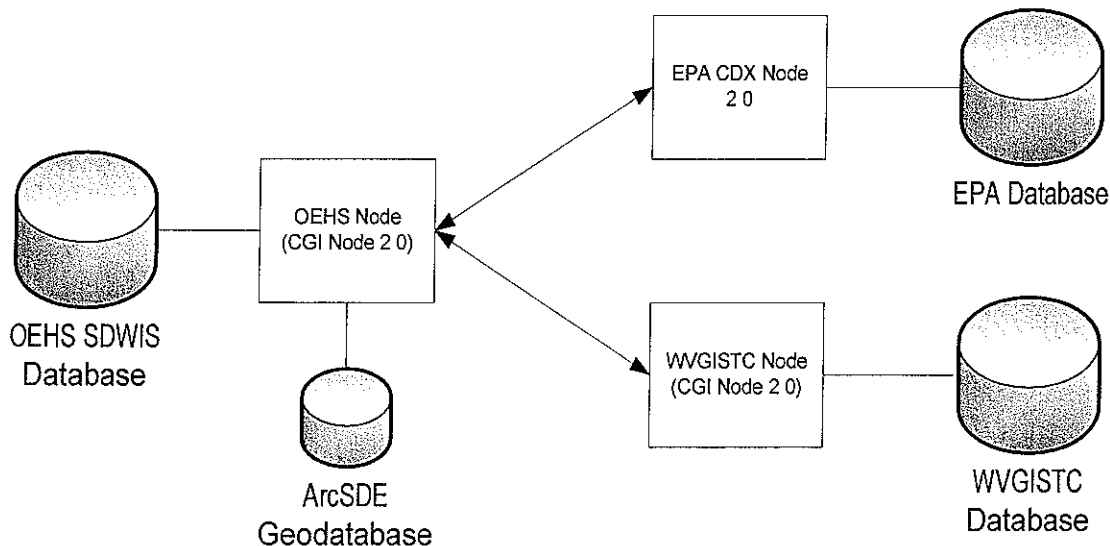
Depending on the complexity of the data flow, there are two ways to configure data flows in the CGI Node 2 0, which will be used to install the OEHS SDWIS/State and WVGISTC Nodes If the data flow is simple, a node administrator can configure the data flow from the OEHS Node to the EPA CDX Node and the WVGISTC Node using the Flow Processor. This approach will not require custom coding and can be handled by the current functionality of the node However, if the data flow is complex, the CGI Node 2 0 provides the ability to develop custom Java interfaces, which can be embedded in the node and can be used to implement complex data flows that can extract any type of data in different data formats

This approach provides the following key benefits:
1. Reusing existing EPA CDX Node services and data flows and integrating them with the OEHS SDWIS/State and WVGISTC Nodes for standardization purposes and cost reduction
2. Broader data access allowing many different partners to share and receive data bidirectionally
3. Reduced integration complexity and platform and technology independence
4. Reduced cost by adopting an open source platform

The CGI Node 2.0, which implements the EPA Node 2 0 specifications, allows for the bidirectional exchange of data and the creation or use of existing data flows by relying on the following Web services:
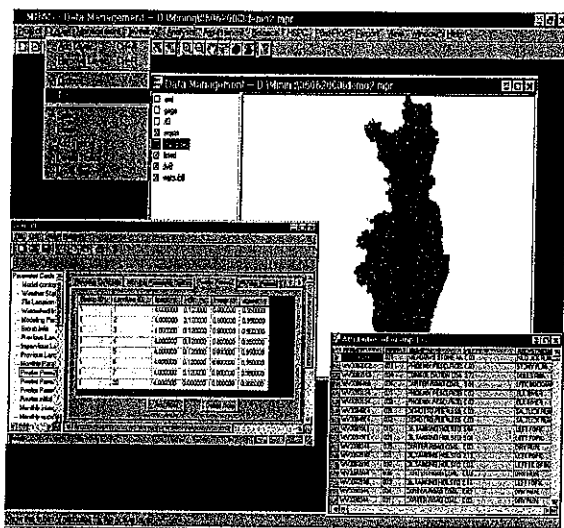1. Authenticate Web Service—This service allows users to authenticate before using the services and data flows of a node. The authentication is based on the existing CDX authentication mechanism The service returns an authentication token that can be used for subsequent service calls without having to authenticate with the node again
2. Solicit Web Service—This service allows users to query or export data from any database for which a data flow has been successfully configured in the node. In addition, this service can be integrated with external Web-based applications, such as a Web application that queries the node for data.
3. Submit Web Service—The service is used to submit data for processing to a node, which can be further processed by the receiving node For example, the OEHS SDWIS/State Node could use the Submit Web Service of the EPA CDX Node to submit data for a data flow.
4. Get Status Web Service—This service allows users to check of the status of a submitted transaction or service. The service accepts a unique transaction ID and an authentication token. The result of this service is one of three statuses: Pending, Success, or Failure
5. Download Web Service—This service allows users to download an error report for a transaction that failed or a data file in the case of solicit transaction The data file can be an XML file or any other format, depending on the configuration of the solicit data flow

4 Past Performance

The following is a summary of relevant past performance that demonstrates Tetra Tech's ability to successfully help OEHS achieve its goal to establish a centralized data node exchange.

## West Virginia Department of Environmental Protection

Over the past eight years, Tetra Tech has supported West Virginia Department of Environmental Protection (WVDEP) and EPA Region 3 in developing and fine-tuning a total maximum daily load (TMDL) methodology to address various water quality impairments caused by numerous point and nonpoint sources in West Virginia. Tetra Tech developed the innovative resulting modeling approach, the Mining Data Analysis System (MDAS), to simulate hydrologic and water quality conditions throughout large watersheds. MDAS is a comprehensive geographic information system (GIS), dynamic modeling, and analysis package that provides the ability to handle the difficult simulation of a large-scale watershed while maintaining a great level of detail.

Since 2003, Tetra Tech has been the exclusive TMDL contractor for WVDEP and as an ongoing effort, Tetra Tech staff routinely work with WVDEP staff to identify hydrologic and water quality characteristics of pollutant sources such as mines, harvested forest, oil and gas wells, acid mine drainage seeps, and failing septic systems throughout West Virginia. Furthermore, Tetra Tech has a great deal of experience querying WVDEP's databases (LUST database, WABbase, AML, oil & gas database, mining permit boundaries, mining and industrial permit outlets), which we have access to through a virtual private network connection from our Charleston, West Virginia, office.

EDAS2
Environmental Data
Analysis System
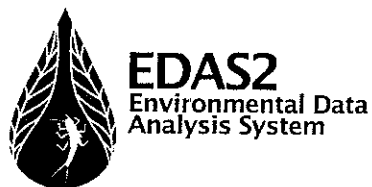
Ecological Data Analysis System (EDAS) Version 2.0

Tetra Tech developed the second generation, Web-based Environmental Data Analysis System (EDAS2) as a free and open source project for management, analysis, and exchange of environmental data. It is targeted at organizations that need a focused and low-cost solution for managing, analyzing, and visualizing a wide range of environmental data. The design focuses on adhering to EPA environmental data standards, provides functionality to exchange data following the EPA Water Quality Exchange (versions 1.0 and 2.0) specifications and allows data exchange among partners using the Network Exchange Node 2.0, which can be bundled with EDAS2. Benefits of the system include the following:

- Rich user interface speeds data management

- Easy to use, low/no cost to get started
- Provides core functions focused on managing environmental measurements
- Open source platform reduces costs for best-practice data management
- Records data and metadata in a secure and standard fashion
- Provides functions for data exchange and interoperability
- Supported through community portal

See more at http://www edas2 com

Surface Water Quality Monitoring Information System (SWQMIS)

Tetra Tech, Inc designed and developed the Surface Water Quality Monitoring Information System (SWQMIS) for the Texas Commission on Environmental Quality (TCEQ). SWQMIS is a web-based application to support TCEQ's ambient surface water monitoring and assessment operations. This tool allows staff to track data associated with state-wide ambient water quality monitors, track water quality samples, and to prepare data for use by assessments Other key components include a geographic information system (GIS) spatial interface, Internet-based reporting (for the public), Internet-based monitoring station request and update forms, water quality standards tracking and evaluation, and equipment tracking.
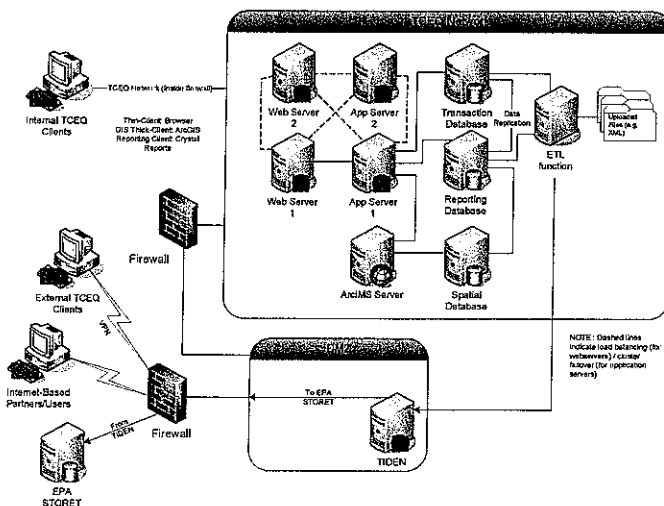
The SWQMIS interfaces include data exchange with EPA's STORET system, via the Texas Integrated Data Exchange Node (TIDEN), Assessment tools via SAS, reporting via Crystal Enterprise, and data transfer with other state, local, and lab systems via Oracle Warehouse Builder
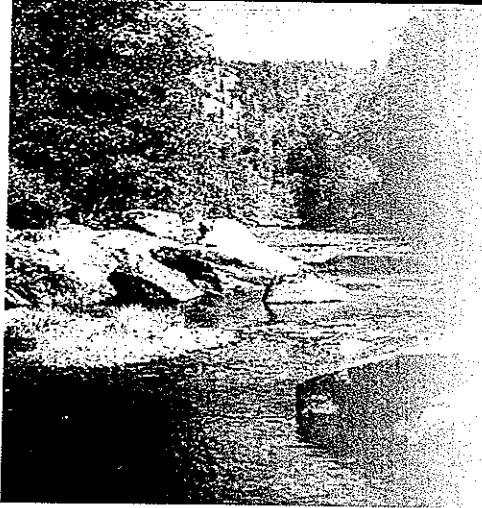
Environmental Information Technology and Advisory Services

Since the 1970s Tetra Tech has provided environmental management, program management, scientific modeling and software engineering services to USEPA, U.S. Forest Service, U.S. Air Force, and state, tribal and local environmental agencies. We have provided this critical support for complex models and decision support system and web-based applications which integrate and disseminate cross-programmatic information, manage water quality and support regulatory decision making, data management and exchange. Our ability to conceptualize, implement and integrate complex solutions for real-world environmental problems in a continually evolving business and computing environment is attributed to our unique mix of staff, qualifications and experience. Tetra Tech's profound understanding of environmental agency's mission, programs and goals allows us to deliver effective solutions and services to achieve a cleaner and healthier environment.

Geographic Information System Services

- 3D, 2D, and 4D Analysis
- Web-based GIS
- Geodatabase Development
- Image and GeoData Processing and Analysis
- Geodata Conversion, Assimilation and Management
- Map Production and Cartography
- Site-Level Data Collection
- Remote Sensing

For Fairfax County, VA, Tetra Tech supports the development of an online GIS-based system for data access, management and decision making which is helping the county prioritize watershed project implementations.

The U.S Forest Service relies on Tetra Tech to develop analytical and spatial data management software and to provide data production, quality control and analysis services

Modeling, Visualization and High-Performance Computing

- Applied and Computational Mathematics
- Scientific Systems Engineering
- Vectorization
- Visualization
- Parallelization
- Web-based Modeling and Web Services
- Model Desktop Integration
- Spatial Grid Generation
- Model Configuration
- High-Performance Computing

At the NASA Advanced Simulation Facility, Tetra Tech supported the procurement and installation of the Columbia Project—one of the world's largest production supercomputers

Tetra Tech worked with EPA's National Exposure Research Lab and National Environmental Super Computing Center to develop and benchmark a parallel version of the EFDC surface water modeling system.

Advisory Support Services

- Program Management
- Project Management
- Feasibility Assessments
- Solution Architecture
- Security Plan
- Business Process Management
- Quality Control
- On-site and Off-site Training Support

Tetra Tech provides comprehensive project management services using industry-standard processes and following earned value management (EVM) guidelines
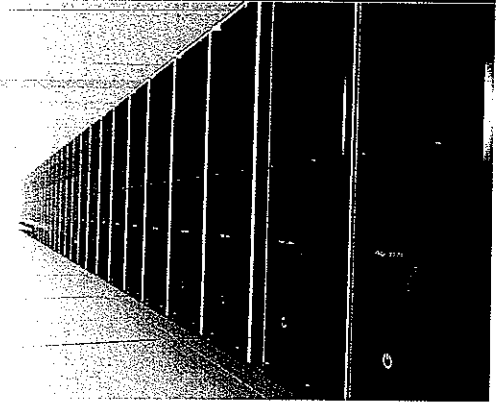
Software Engineering

- Requirements Gathering/Analysis
- Design
- Software Development
- Commercial Off-the-Shelf (COTS) Integration and Selection
- Testing
- Deployment

Tetra Tech developed and maintains the Electronic Notice of Intent (eNOI) system, on the Central Data Exchange, that supports one of EPA's largest regulatory programs with 40,000 construction sites per year, over 90,000 commercial vessels and 10,000 industrial facilities

Environmental Data Management and Support

- Data Modeling
- Data Comparison
- Data Migration
- Data Conversion
- Data Integration
- Data Flow and Transfer
- Statistical Services
- Data Mining
- Database-to-Model Integration

For Texas, Tetra Tech developed one of the first Water Quality Exchange data flows to EPA's Central Data Exchange Node

EPA's Office of Water relies on Tetra Tech to support its Asset Management Initiative through the development and implementation of Check-up Program for Small Systems which integrates asset inventory and management, preventive maintenance and work order management and full-cost pricing and financial activities.

Security Support

Tetra Tech provides a wide range of analytical services that assess the security of a variety of systems including telecommunications networks, operating systems, COTS applications and customer-developed or government-owned applications/systems. Tetra Tech's experience in providing software and application security support ranges from systems that support specialized teams of scientists and engineers to agency-wide enterprise systems with 40,000 users.
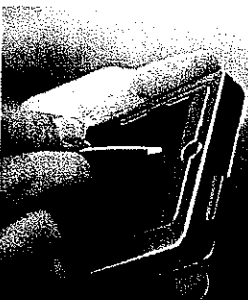
Tetra Tech, Inc., was founded in 1966 to provide engineering services and innovative solutions to complex problems for public and private clients. Over the years, Tetra Tech has become a leading provider of specialized management consulting and technical services for many market sectors in resource management, infrastructure, telecommunications and information technology (IT) Tetra Tech has grown to more than 8,500 associates strong and $2 billion in annual revenue across 275 U.S. and international offices. We have received numerous recognitions for excellence in service.

Tetra Tech's long history working with federal, state and local customers, coupled with our strong relationships with state and local governments, allow us to provide a collaborative approach to IT consulting. Today, we pride ourselves in our ability to successfully deliver a full range of IT services from supercomputing, visualization and performance modeling, to software engineering, security, data management and help desk support.

Our dedication to technical excellence and the complete satisfaction of our clients has contributed to our stability and continued growth, to national standings in major corporate lines and to our ability to retain existing clients. Our stability and continued growth were further validated when *SmartMoney Magazine* included Tetra Tech in its 2007 top 10 stocks for the next 10 years.

AK Juneau

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SC Aiken
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WV Charleston

Clients

- U.S. Environmental Protection Agency
- U.S. Forest Service
- U.S. Navy
- U.S. Air Force
- Fairfax County
- Montgomery County
- Prince Georges County
- Other State and Tribal Environmental Agencies

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