

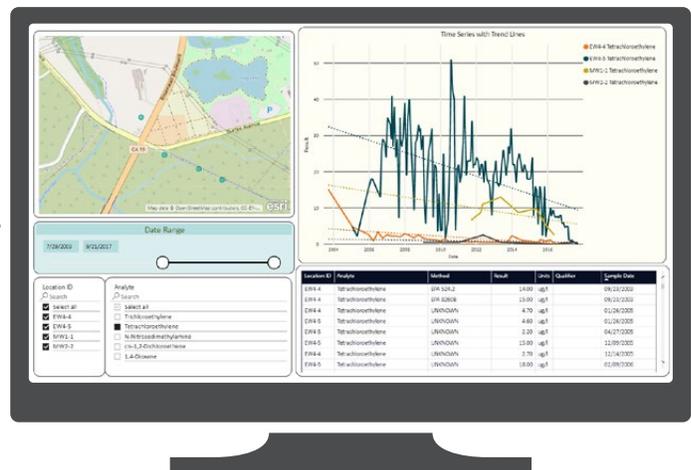
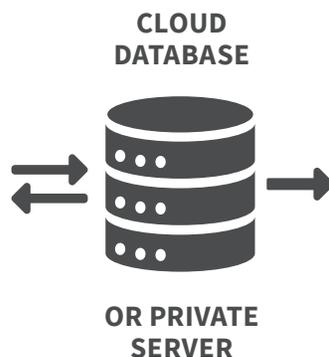
EnDAR: Environmental Database for Acquisition and Reporting

System Components

EnDAR is a data management system designed for collection, storage, and reporting of environmental data. It includes:

- A **data manager** for such tasks as planning sampling events and uploading Electronic Data Deliverables (EDDs) for reference, laboratory, and other data.
- A **mobile sampling application** that can be used offline in the field for recording sample collection, field parameters, and site photos.
- A **notification system** that emails users about system events such as data uploads, upload errors, and criteria exceedances.
- A **website** for printing bottle labels and chain-of-custody documents, uploading EDDs, downloading EDD templates, and downloading data.
- A **SQL Server database** for secure storage of all data.
- A **data dashboard** for visualization that allows user interaction with the data via maps, charts, and reports.
- **Web reports** for querying the database to generate custom tables and charts and exporting data in CSV or custom formats.

Collect large volumes of data and utilize innovative digital dashboards—tools that integrate, display, and analyze key data—to gain the insight necessary to make decisions and plan operations for the best future outcome.



Data Compatibility

EnDAR currently handles data for chemistry, water levels, lithology, well construction, field parameters, and toxicology. It can be easily expanded to contain additional types of data, with full support of the data management tools. In addition to its own standard CSV formats, imports and exports of data in California Environmental Data Exchange Network (CEDEN) formats are supported. The system also handles imports of high-frequency sensor data and automated downloads of weather data from an online data source.

System Features

EnDAR was developed by a team of scientists and engineers who have a strong understanding of monitoring programs and associated data management needs. The system incorporates a number of features to streamline and improve management of data at a facility or site. Techniques such as pick lists and auto-fill minimize keystrokes to avoid data entry errors and improve data quality. Immediate, interactive feedback on the status of uploads and identification of errors reduces time spent finding and fixing errors in EDDs. Tracking of who uploaded data and when, maintaining a history of all changes, and archiving of all EDDs allows for complete traceability of data entered into the system.

System Customization or Expansion

EnDAR was specifically designed with flexibility and expandability in mind, as it is intended to be a starting point for a customized data management system suited to meet a client's needs. Addition of tables or fields to the database to store new data types are automatically consumed by the Data Manager and website, so no code or configuration changes are required. The system can be

easily expanded to adopt specific import/export formats, provide custom reports, and incorporate R scripts or other analytical tools for data analysis. A custom EnDAR system can be hosted on Tetra Tech's infrastructure within the Microsoft Azure cloud service or it can be deployed to a client's servers.



Data Management for Coordinated Integrated Monitoring Programs

Tetra Tech's EnDAR system is being used for sampling at two Coordinated Integrated Monitoring Programs in southern California: The Upper Santa Clara River Watershed and the North Santa Monica Bay Coastal Watersheds. Sampling is performed across various water bodies to assess compliance with total maximum daily loads during both wet and dry conditions. Data is exported from EnDAR in California Environmental Data Exchange Network format and reported to the Water Board every six months. A custom data dashboard allows analysis of sampling data, including chemistry, field parameters, habitat, toxicity, and bacteria, to inform remediation efforts.

EnDAR was developed by the Tetra Tech Environmental Software and Data Management Services Group in Lafayette, California. This group has been providing custom software and data management solutions for more than 20 years to a variety of clients, including California Department of Toxic Substances Control, Electric Power Research Institute, Southern Company Services, Metropolitan Water District, the City of Los Angeles, and for Coordinated Integrated Monitoring Programs in Southern California.



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