

Science.

Technology.

Innovation.

An innovative knowledge management system, TWINS provides easy access to Hanford tank data.

Using TWINS, a tank characterization report can be generated in as little as 4 minutes.

Pacific Northwest National Laboratory

Operated by Battelle for the U.S. Department of Energy



Tank Waste Information Network System

Data development, analysis, and reporting for a cleaner environment

To help the U.S. Department of Energy (DOE) and its contractors safely store, empty, and treat the nuclear waste in Hanford Site's 177 underground tanks, Pacific Northwest National Laboratory created the Tank Waste Information Network System (TWINS), an innovative knowledge management system. Operators of the Hanford Site's nuclear waste tank system use TWINS to safely operate and analyze the tanks' 53-million-gallon contents. Hanford's nuclear safety and environmental compliance personnel, regulators such as the Washington State Department of Ecology and the U.S. Environmental Protection Agency, and research laboratories and universities also use TWINS to analyze tank data.

Product Description

TWINS contains the official data characterizing the Hanford tank wastes, including waste measurements, sampling data, and estimates of phase-based inventories and concentrations of some 80 analytes of interest, and tank waste transfer information. Built in Microsoft® SQLServer and .Net technologies, TWINS provides a common user interface to access 16 heterogeneous relational databases with 14 million records and a document repository of more than 4000 reports.

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In addition, TWINS provides a comprehensive set of tools used throughout the waste characterization data development lifecycle from data acquisition to data review and selection, from calculation of statistical means to official reporting. TWINS also provides analysis tools for performing nuclear criticality safety calculations, and for assessing the compatibility of planned tank waste transfers over a multi-year horizon.

Benefits

Fast, Inexpensive Reports

Before TWINS, the data-intensive tank characterization reports took several months and a team of experts to prepare. That “team of experts” is now reduced to a few who are able to analyze and document a much larger volume of sample data in a consistent, repeatable, and traceable manner. They do this by using TWINS tools such as

- **Resolve:** review, qualify, and flag data for use in estimating inventories
- **Autostat:** group analytical results based on the sampling structure; calculate statistical means and confidence intervals
- **Best-Basis Inventory (BBI):** examine the data’s pedigree; pick the most appropriate and accurate information for the BBI calculation; maintain configuration control over the published inventories.

Web users can now generate a tank characterization report directly from the TWINS databases in as little as 4 minutes. After submitting their request to TWINS, they receive a Microsoft® Word version of the report on their e-mail. TWINS has increased the users’ efficiency while reducing the contractors’ costs.

Quick Analysis

Waste managers and others can make quick and efficient decisions about series of waste transfers using the CAAT feature. This allows for long-term waste planning and the creation of compliance reports in real-time. Before CAAT, this type of analysis took at least a month

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Li	Be											B	C	N	O	F	Ne
Na	Mg											Al	Si	P	S	Cl	Ar
K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr
Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe
Cs	Ba	Lanthanides	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn
Fr	Ra	Actinides															
La	Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Tm	Ho	Er	Tm	Yb	Lu			
Ac	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr			

The Tank Waste Information Network System helps Hanford’s cleanup contractors understand complex tank waste, which contains over half of the elements on the periodic table.

to produce and binders full of reports. Now the analysis can be generated online in a matter of hours.

Another tool that helps waste managers is FLAGM; this tool performs sophisticated analysis to determine if the waste transfers could lead to a buoyant gob or gas release event in the tank. Required by federal law, this analysis is designed to prevent “burping” tanks, such as Hanford’s infamous 101-SY tank.

Other calculations that can be performed include lower flammability calculations, unit/liter dose calculations, and sum of fractions calculations used for transfers from onsite facilities into the tank farms.

Because of the dangerous nature of the tank waste, safety is a top concern for Hanford Site contractors. Using data analysis tools in TWINS, the contractors can quickly analyze “what if” scenarios regarding new procedures.

Other Potential Applications

The data development, reporting, and analysis features created to solve the Hanford Site’s tank waste knowledge needs can be applied to other complex, data-intensive applications, such as

- Medical and pharmaceutical test data
- Security-related watch lists

- Industrial chemical process management
- Atmospheric and climate change data
- International nuclear waste management.

Easy Contracting Methods

Through our agreement with the U.S. Department of Energy, Pacific Northwest National Laboratory is able to work with virtually any governmental or private client on proprietary and non-proprietary topics. Please contact us if you need data development, reporting systems, decision and analysis tools, or other knowledge management systems.

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