

**Implementation of an Integrated Information Management System for the US DOE Hanford Tank Farms Project – 14224**

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**ABSTRACT**

In its role as the Tank Operations Contractor at the U.S. Department of Energy's site in Hanford, WA, Washington River Protection Solutions, LLC is implementing an integrated document control and configuration management system. This system will combine equipment data with technical document data that currently resides in separate disconnected databases. The new system will provide integrated information, enabling users to more readily identify the documents that relate to a structure, system, or component and vice-versa. Additionally, the new system will automate engineering work processes through electronic workflows, and where practical and feasible provide integration with design authoring tools. Implementation of this system will improve configuration management of the technical baseline, increase work process efficiencies, support the efficient design of future large projects, and provide a platform for the efficient future turnover of technical baseline data and information.

**INTRODUCTION**

In its role as the Tank Operations Contractor (TOC) at the U.S. Department of Energy's site in Hanford, WA, Washington River Protection Solutions, LLC is in the process of preparing a safe and effective system/process for retrieval and movement of tank waste feed materials to the Waste Treatment and Immobilization Plant (WTP).

In order to support a broad strategic initiative to improve operating work practices across its managed facilities, the TOC is implementing SmartPlant<sup>®a</sup> Foundation (SPF) software as a new integrated document control and configuration management system. SPF will consolidate equipment data with technical document data that currently resides in separate disconnected databases. The new system will provide integrated information, enabling users to more readily identify the documents that relate to a structure, system, or component and vice-versa. In addition, the system will automate engineering work processes through electronic workflows, and where practical and feasible provide integration with design authoring tools. The long-term goal for the TOC is to use SmartPlant Foundation as the central hub for all creation, review, editing, and change management of engineering information for projects and facilities.

Implementation of this system will improve configuration management of the technical baseline, increase work process efficiencies, support the efficient design of future large projects required for waste feed delivery to the WTP, and provide a platform for the efficient future turnover of technical baseline data and information from the WTP.

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<sup>a</sup> SmartPlant is a registered trademark of Intergraph Corporation, in the USA and other countries

## DISCUSSION

### Data Consolidation and Current Configuration

One of the primary objectives for implementing SPF is to improve configuration management by providing a single consolidated application that can be used to organize engineering information on a structure/facility, system, and component basis. This engineering information includes both legacy data that is migrated to SPF as well as new data created within the system.

As part of the data cleanup and consolidation effort, seventy years of legacy data contained within four primary databases has been reviewed and imported into SPF. Referring to the following Figure 1, these four primary data sources include:

1. Data related to approximately 1,700 facilities and locations was imported from a standalone database.
2. Data related to approximately 2,000 users and 200 organizations was imported from a second standalone database.
3. Data related to approximately 70,000 equipment records and 7,000 preventive maintenance records was imported from a third standalone database.
4. Data related to approximately 190,000 document and drawing revisions was imported from a fourth standalone database.

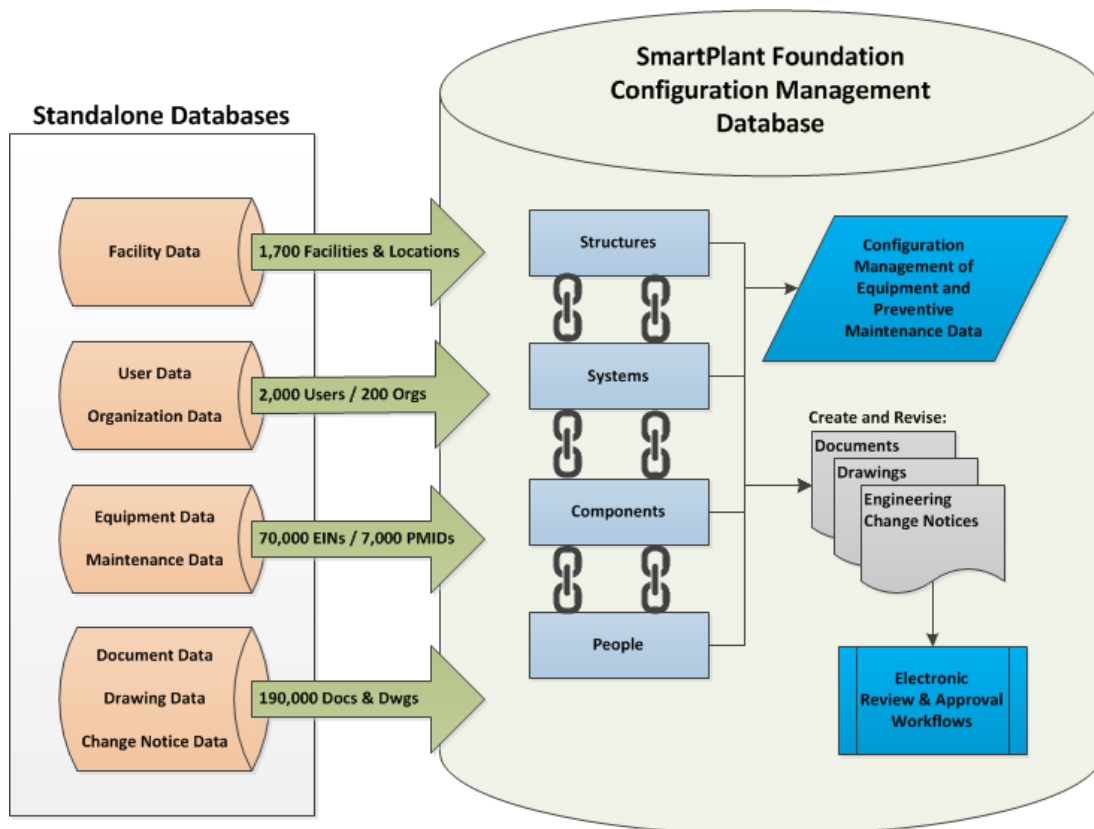


Figure 1. Consolidation of Initial Data Sources.

Data from these four sources was imported into SPF where relationships between the structures, systems, components, and users/people were constructed. Data cleanup activities, such as specifying missing location and system information for legacy equipment data, was performed prior to loading into SPF. Legacy document data, originally categorized as one of approximately fifty document types, was further organized into one of approximately 150 categories based upon evaluation of document number formats and keyword searches of titles.

Once the data has been modified and imported from the referenced data sources, the operational structure and external interfaces of the system will appear as follows in Figure 2.

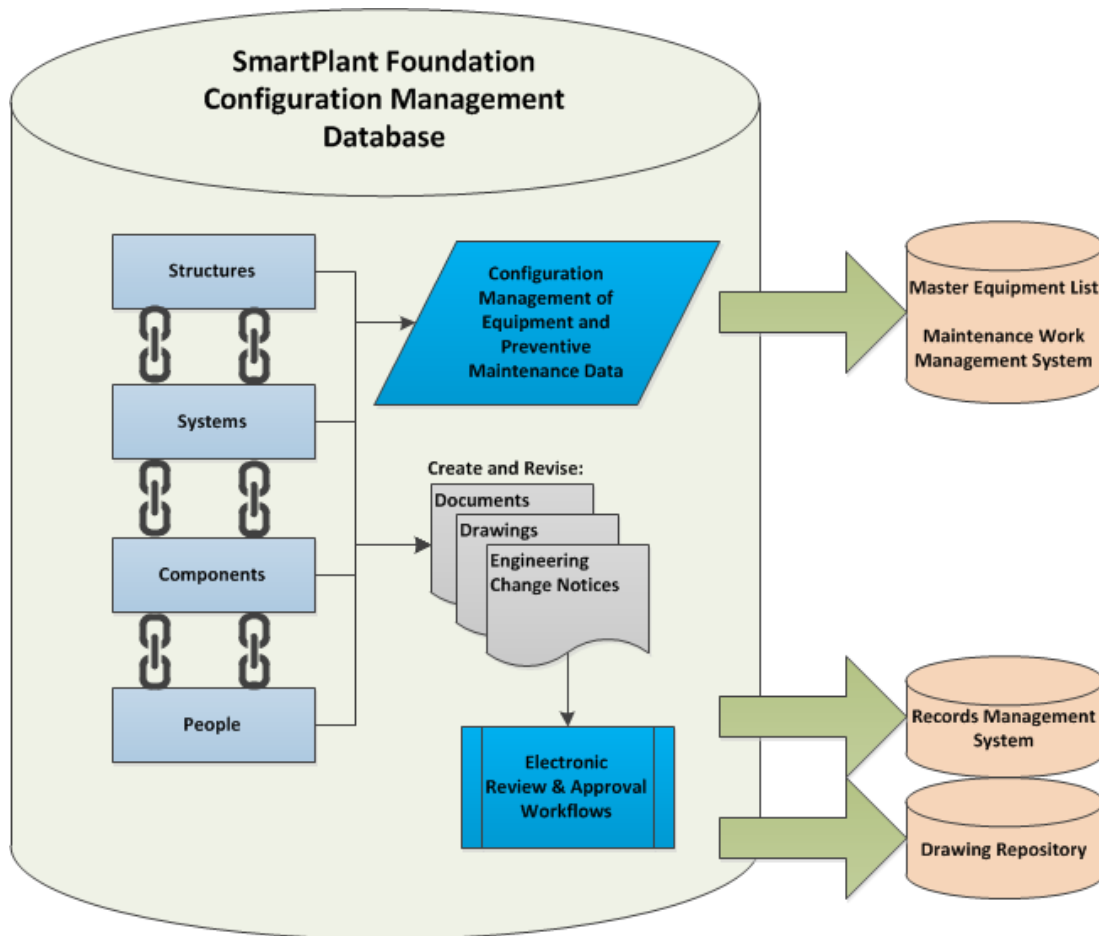


Figure 2. SPF Operational Structure and External Interfaces.

The relationships between structures, systems, and components are designed to help a user quickly find, review, and manage the information. Other tools to assist the user include simple searches, complex searches, queries, and reports on documents, systems, structures, components, and the relationships between them.

In addition to providing configuration management controls over the seventy years of migrated legacy data, SPF contains functionality to assist with the creation of new equipment and

document data. For equipment, SPF will provide features for automated equipment numbering and data management. Equipment data will be created, updated, and managed in SPF, with equipment records and corresponding preventive maintenance instructions electronically transferred to the maintenance work management system. For documents and drawings, SPF includes features for automated document numbering, native file management and viewing, automated PDF generation from native files, comment collection and management, and electronic approval and distribution. Documents and drawings will be created, revised, reviewed, and electronically approved in SPF, with PDFs electronically transferred to a separate records management system. PDF copies of drawings are electronically transferred to both the records management system and a separate site-wide drawing repository.

### Integration of Design Authoring Tools

Another key objective of implementing this configuration management system is to provide integration between the SPF database and design authoring tools. This integration has been focused on AutoCAD<sup>b</sup> drawing files for initial implementation. Functionality within SPF, termed “Hotspotting”, creates links between drawing objects and the database. Hotspotting involves a series of scheduled background tasks designed to find and compare objects represented within the AutoCAD file and the SPF database. When a successful match/connection between the two is made, the object within the drawing is displayed as a ‘hotspot’ or link. Selecting that object’s hotspot (within the drawing) provides the same functionality as selecting that object directly within SPF. As an example illustrated in the following Figure 3, selecting a component number hotspot within a drawing will display the associated properties for that component within SPF.

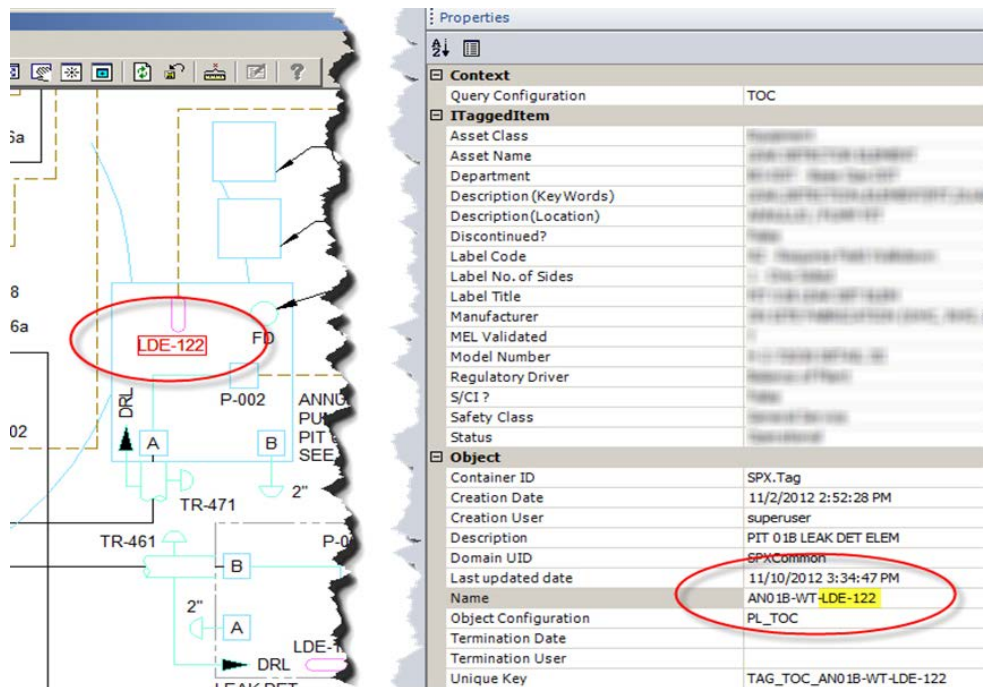


Figure 3. Hotspotting Example (Component Properties).

<sup>b</sup> AutoCAD is a registered trademark or trademark of Autodesk, Inc., in the USA and other countries.

Likewise, selecting hotspotted drawing numbers, such as off-sheet connectors, provides the user with the capability to either display the related drawing properties or view the related drawing within a separate window. This functionality, illustrated in the following Figure 4, allows the user to navigate directly from one drawing to another without having to leave the first drawing, search/find the second drawing, and then open/view the second drawing.

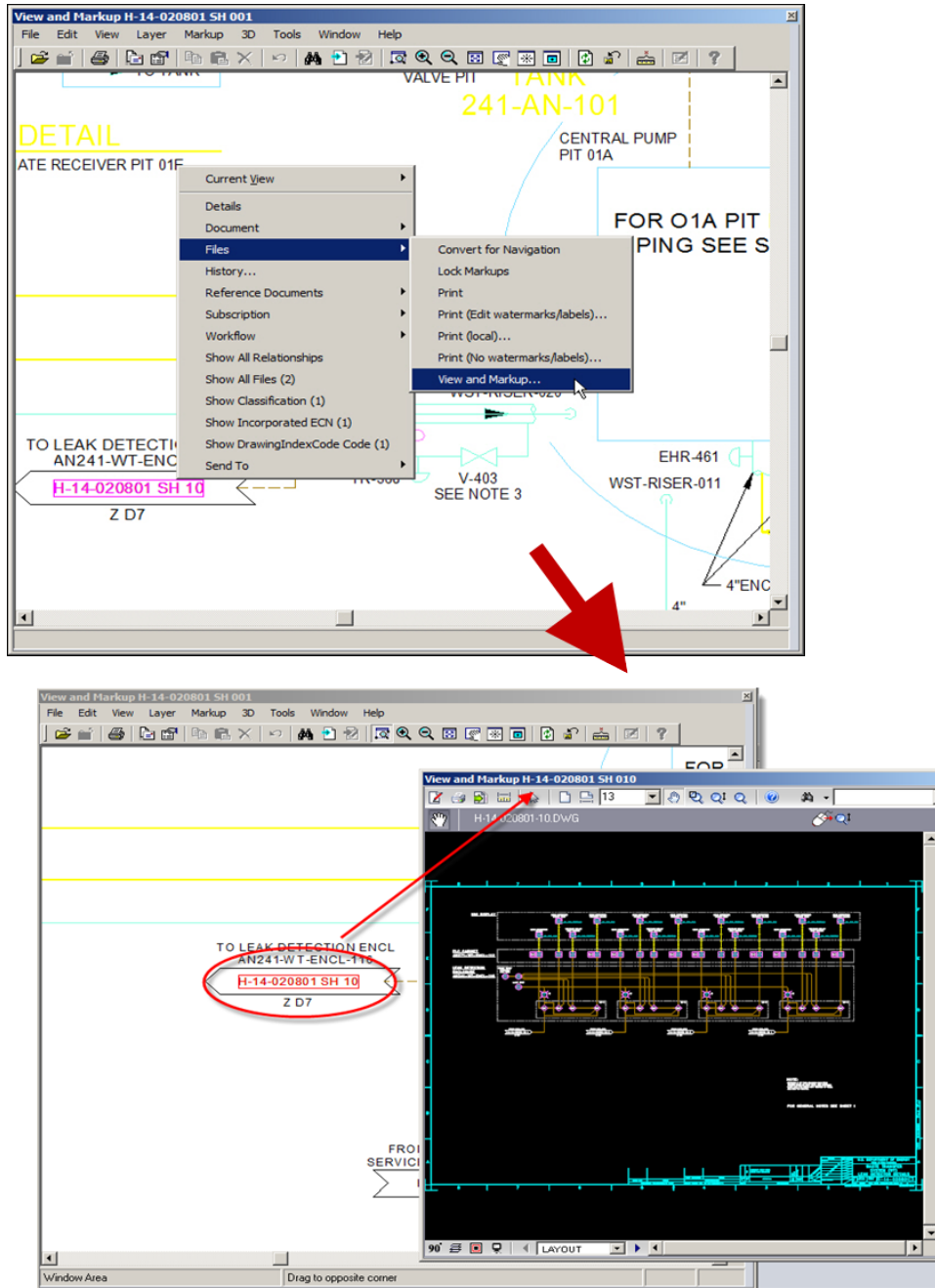


Figure 4. Hotspotting Example (Off-Sheet Connector).

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An additional integration between SPF and AutoCAD involves populating the AutoCAD titleblock with data directly from SPF. Data transferred from SPF to AutoCAD includes the drawing title, drawing number/revision, related buildings and systems, and approval titles/names/dates. Populating the title block directly from SPF eliminates duplication of effort. Additionally, approval names and dates are not transferred to the titleblock until they have been obtained within SPF.

It is anticipated that future large Engineering, Procurement, and Construction (EPC) projects will be required for waste feed delivery to WTP. Future integration of SPF with engineering authoring tools such as SmartPlant Instrumentation, SmartPlant P&ID, SmartPlant Electrical, and SmartPlant 3D will provide additional efficiency and consistency related to the transfer of data and design information generated either in-house or from subcontractors utilizing these tools.

### **Future Enhancements**

The largest upcoming future enhancement will be to begin the process of integrating the TOC and WTP projects. The TOC will receive vast quantities of complex, inter-related design data and engineering information once the WTP project transitions from the design-build phase to the commissioning-startup phase. SPF will provide a platform for the efficient turnover of this technical baseline information, and a joint TOC and WTP site license has been procured to facilitate this future integration.

Future enhancements currently under consideration include:

- Incorporate and manage Unreviewed Safety Question (USQ) activities and processes within the system.
- Incorporate administrative, technical/operational, and maintenance procedures within the system. Incorporation of these procedures will allow a more integrated identification of impacts to procedures from design changes.
- Enhance the vendor submittal management work processes including improved workflows, comment review and consolidation enhancements, and improved interface with records management system
- Establish a separate web portal and focused views of system data based on roles.
- Expand/incorporate new reporting and trending functionality.
- Evaluate the use of mobile platform applications such as tablet computers.
- Incorporate, or interface with, the Safety Equipment List.
- Enhance the existing design engineering work processes.
- Incorporate a tool that relates components and systems to associated requirements (i.e. design, safety basis, environmental, etc.) and demonstrate how compliance with those requirements is achieved.
- Incorporate additional design authoring tools such as SmartPlant Instrumentation

### **CONCLUSIONS**

Implementation of SmartPlant Foundation as a consolidated document control and configuration management system will accomplish the following four objectives.

The first objective to improve configuration management of technical baseline information is

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achieved by providing a single consolidated application that can be used to organize engineering information on a structure/facility, system, and component basis enabling a user to quickly find, review, and manage the information. This consolidation and organization will result in better management of the engineering information.

The second objective to increase work process efficiencies is achieved through the implementation of electronic workflows and electronic document approvals. This process will result in improved control of native document files and will reduce the time spent routing documents for review and obtaining hardcopy signature approvals. Implementing electronic workflows also has the benefit of increasing procedure compliance through ensuring that required reviews and approvals are obtained.

The third objective of integrating design authoring tools is realized through the hotspotting and titleblock integration functionality between SPF and AutoCAD. The navigational capabilities provided via the hotspotting functionality will reduce time spent finding and reviewing information. Additionally, the titleblock integration functionality will eliminate the need to manually retype information pertaining to data previously created within SPF.

The fourth objective of providing a means to integrate the TOC and WTP projects is currently underway. Although configuration of the WTP's SPF system has not yet begun, the site license held between the TOC and WTP projects provides a common platform that will greatly assist with turnover and integration of data.