

**NATIONAL PETROCHEMICAL & REFINERS ASSOCIATION
1899 L STREET, NW, SUITE 1000
WASHINGTON, DC 20036**

**CASE STUDY OF THE DEVELOPMENT OF A TITLE V COMPLIANCE
ASSURANCE TOOL**

By

**Ron Ricks – BP West Coast Products LLC
and
Rajiv Grover – Jacobs Engineering Group Inc.**

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Case Study of the Development of a Title V Compliance Assurance Tool

Ron Ricks
Rajiv Grover

INTRODUCTION

Title V of the federal Clean Air Act, as amended in 1990, is finally becoming effective for refineries throughout the country. The BP Carson Refinery, in Los Angeles, CA is expected to receive an approved Title V permit this summer. Preparations are being made at the refinery to assist in compliance with all aspects of the Title V permit.

A Title V permit assimilates all of the air pollution control requirements into one single document with the goal of simplifying compliance tracking. For a major refinery there can be thousands of such requirements. Title V requires major sources to:

- Annually certify compliance with each requirement throughout the year; and
- Report any deviation from the requirements that occurred during the previous year.

The Responsible Official, typically the refinery manager, needs to sign the annual compliance certification annually. In addition, for many requirements, Title V requires prompt reporting of the deviations to the local regulatory agency.

To meet the demands of Title V certification and deviation reporting, the BP Carson Refinery worked with Jacobs Engineering Group to evaluate a variety of compliance assurance systems. After looking at both in-house and commercially available tools, and considering the stringency of California's regulations, the team's recommendation was to develop a refinery-specific web-based tool to assist in meeting these challenges of Title V. The tool is called "TVCat" for Title V Compliance Assurance Tool.

This paper will:

- Explain the development process of a Title V compliance assurance tool, from planning through implementation;
- Show examples of the tool to demonstrate its utility; and
- Explain the benefits observed to date of this unique tool's use at the refinery.

DEVELOPMENT PROCESS

After it was determined that the refinery would develop its own tool, a full software development life cycle was followed consisting of:

- Planning and requirements definition;
- Design;
- Tool building;
- Database population;
- Testing; and
- Transition.

Planning and Requirements Definition

In the planning and requirements definition phases, the type of tool that would meet the refinery's specific needs was identified in general terms. Planning and requirements definition activities were primarily conducted with representatives from operations management, environmental staff, information technology staff, staff from BP's IT services group (SAIC), and staff from BP's alliance partner (Jacobs Engineering Group). Several meetings were held to ensure the team understood the demands of Title V and to jointly decide on the best course of action for the refinery to take to meet these demands. We decided on a web-based tool because of its ease of use and familiarity of the refinery staff with other web-based tools. We also needed multiple users to be able to use the system simultaneously. We chose an Oracle back-end database to handle the anticipated large data demands of tracking thousands of requirements.

During the early stages of the planning, the team made a decision that affected almost every aspect of TVCat. We needed to decide who should be responsible for assuring compliance. Of course, the Refinery Manager will need to sign the compliance certification, but he or she will need to get most of his or her specific information from other sources. We chose to not have the refinery's environmental staff assure compliance with the majority of the requirements, because they would also have to gather their information from other individuals. We considered having operations management be responsible for assuring compliance with the operations related requirements; however, they were quick to point out that they would also have to get information from others. It was decided that the responsibility for assuring compliance with each requirement should be held by the person that was most familiar with that requirement. For operations issues, the individual with the most knowledge was the lead operator at each unit. Under BP's system, the lead operators have the first responsibility to assure compliance with operations issues. Similarly, responsibilities for assuring compliance with Title V requirements in Maintenance, Engineering, Environmental, the lab, Fire & Safety, and Training were all assigned to the person or position with the most direct knowledge of the requirement. Nearly 60 different positions were assigned responsibility for requirements. Literally hundreds of individuals have been tasked with assuring compliance during the year.

In order for TVCat to be widely accepted throughout the refinery, it was decided that we needed to make the tool as user friendly as possible. Each person assigned requirements was expected to be able to assure compliance with these requirements within 15 minutes. To do this, each requirement needed to be packaged in a simple question that could be answered with a "Yes", "No", or "N/A". Most questions are asked each shift, although for some questions the frequency could be weekly, monthly, quarterly, semiannually, or

longer. Each shift some individuals will have to address 25 to 70 questions related to their job responsibilities.

Design

During the design phase of the project, the required capabilities of TVCat were defined in a way that the programmers would be able to build a tool. The tool needed the ability to record any deviations from the requirements that occurred. A separate form pops up on the screen if the user notes that a requirement wasn't met. When a deviation form is completed an automatic email notice is sent to selected managers and environmental staff to allow for fast reporting to the regulatory agencies. Email notifications are also sent if an individual fails to make entries into TVCat on time. TVCat also allows for searching of requirements in multiple ways, including by process unit, regulation, permit condition number, primary responsible person for the requirement, etc. Similarly, searches for equipment and historical deviations can be made. Editing capabilities for tool administrators were incorporated. The tool administrators can perform such functions as adding or revising requirements, adding or removing personnel or positions, and modifying the email notification matrix.

Tool Building

To build the tool, Parijat Controlware, Inc. was selected to write the programming code. Parijat was given requirements and design direction. Based on these requirements and design specifications, Parijat was able to provide the refinery with screen shots that showed how the tool was going to look in advance. BP provided Parijat with feedback on any necessary design revisions after we saw what we were really going to get. Parijat worked closely with the team to ensure the developing tool would meet our needs. Advance work on design and review of the screen shots early in the process saved a tremendous amount of work compared with having to make revisions later in the process.

Database Population

One of the more challenging parts of the development process was the population of the database with appropriate requirements and questions. The majority of the requirements were extracted from detailed environmental procedures that had been developed and in use at the refinery for several years. These procedures incorporated all of the environmental air related rules as well as all of the specific conditions of Title V. However, translation of the lengthy procedures into succinct, appropriate questions required hundreds of hours of work and months of time. A first pass attempt at translating requirements in the procedures into questions was made. These original questions then were modified and improved by environmental staff more familiar with the specific work areas. Then, the managers of the individuals that would have to answer the questions were given a chance to improve the questions and modify how frequently the question would be asked. Finally, the staff that has to answer the questions had a say in how the question was to be phrased.

Testing

While population of the database was in progress, testing of the tool was in progress. A beta-test team made up of operations staff that would be required to use the tool in the

future was selected. The beta-test team made recommendations for tool enhancements that were quickly incorporated into the tool. A “bug” database was built on the web to record the problems that were found and to track each problem until it was corrected.

Transition

When most of the questions had been prepared and populated in the database and the tool had been beta-tested, then a user’s manual was developed and training of the users of the tool was performed. Because so many individuals could be called on to assure compliance with specific requirements, each of them had to be trained. Nearly four hundred refinery personnel have been trained in TVCat use to date.

Once training was completed, the users were asked to begin using TVCat routinely in a test environment. Once the users started to use the tool on a shift-by-shift basis, problem identification picked up the pace. In the four months that TVCat was in use in a test environment nearly a thousand comments were submitted to the development team. Most of the comments were either training related and required more explanation of tool operation, or were related to specific wording of the questions. However, several tool enhancement comments were also received. Furthermore, as questions in the tool were answered, the tool served one of its primary purposes by identifying a few potential deviations from the requirements and allowing these potential deviations to be addressed.

The tool was transitioned into a production environment simultaneously with several user-specified enhancements to TVCat, and has been in operation smoothly since that time with nearly every individual that has been assigned questions doing their part by answering them.

The refinery’s environmental staff has the responsibility to maintain TVCat. Maintenance of the tool requires reporting deviations to regulators, revising TVCat as the permit changes with time, and keeping current with personnel and positions.

DEMONSTRATION OF TVCat SCREENS


TVCat is a simple tool to use. The typical user will only use two screens, the “Requirements Due” screen and the “Deviation” screen. Occasionally, some users may choose to search for specific data also using a few other screens.

Requirements Due Screen

The Requirements Due screen includes all of the questions that a user is required to answer to assure compliance with requirements for which they are most knowledgeable. An example of this screen is below.


REQUIREMENTS DUE - Microsoft Internet Explorer provided by BP Group Digital Business

File Edit View Favorites Tools Help

 Current User: Vincent Pallares Position: SPEC 5 Alky Shift: 12Hr Night

[Logout](#) [Main Menu](#) [Contact](#)

Requirements Due

Responsible Person: **SPEC 5 Alky** Due Date: **February 24, 2003** 

26 record(s) total, 6 per page
Page: [1](#) [2](#) [3](#) [4](#) [5](#)

Requirement Summary	Frequency	Due	Requirements Met	Deviation Summary	Deviation Comments	Correction	Correction Comments	No. of deviations since 7/1
For any vessel draining has the Environmental Reporting Engineer been notified of the volume and concentration of benzene when more than 10 ppm benzene is drained to sewer?	SHIFT	2/24/03 Day	<input type="radio"/> No <input type="radio"/> Yes <input type="radio"/> N/A	-	-	-	-	0
Have all 1173 tags been removed from replaced valves or other components and been sent to Fugitive Emissions Group to be removed from the database?	SHIFT	2/24/03 Day	<input type="radio"/> No <input type="radio"/> Yes <input type="radio"/> N/A	-	-	-	-	0
Following a turnaround or maintenance of 1173 equipment in Hydrocarbon gas, or gasoline range material has the Fugitive Emissions Group been notified of equipment startup?	SHIFT	2/24/03 Day	<input type="radio"/> No <input type="radio"/> Yes <input type="radio"/> N/A	-	-	-	-	0
Did operators visually inspect pumps, compressors, and atmospheric relief valves every 8 hours?	SHIFT	2/24/03 Day	<input type="radio"/> No <input type="radio"/> Yes <input type="radio"/> N/A	-	-	-	-	0
Were all relief valve releases (except RPV-5269-5278 & RPV-2467) directed to VRS or flare?	SHIFT	2/24/03 Day	<input type="radio"/> No <input type="radio"/> Yes <input type="radio"/> N/A	-	-	-	-	0

Start | eXursion | Inbox - Microsoft O... | NPRA TVCat Paper ... | REQUIREMENTS D... | Microsoft Office Sh... | 100% | 1:20 AM

The number of requirements due, or questions, varies from person to person and even shift to shift.

Deviation Screen

The Deviation screen is where the user describes any requirement that may not have been met. Once this screen is completed and submitted, then an email notification is sent to selected managers and to environmental staff in order to assess if it meets the criteria for a deviation, and address and report it as necessary. The Deviation screen is shown below.

The screenshot shows a web browser window titled "CONDITION DEVIATIONS - Microsoft Internet Explorer provided by BP Group Digital Business". The browser's address bar and menu bar are visible. The application interface includes a green header with the BP logo, user information (Current User: Vincent Pallares, Position: SPEC 5 Alky, Shift: 12Hr Night), and navigation links (Logout, Main Menu, Contact). The main content area is titled "Condition Deviations" and contains a table with the following data:

Process	P9 - Alkylation and Polymerization
System	C4 Alkylation Unit
Device	System
Requirement Summary	For any vessel draining has the Environmental Reporting Engineer been notified of the volume and concentration of benzene when more than 10 ppm benzene is drained to sewer?

Below the table is a form with the following fields:

- Date of Deviation:** 2/24/03
- Summary of Deviation:** [Empty text box]
- Comment on Deviation:** [Empty text box]
- Corrections Made:** **Correction Comment:** [Empty text box]

At the bottom of the form are "Submit" and "Cancel" buttons. The footer of the application displays "Title V Compliance Assurance Tool" and "Copyright © 2002". The Windows taskbar at the bottom shows the Start button, several open applications (eXcursion, Inbox - Microsoft O..., NPRA TVCat Paper..., CONDITION DEVI..., Microsoft Office Sh...), system tray icons, and the time 1:22 AM.

Search for Requirements

The Search for Requirements screen is an excellent tool to find specific requirements by a multitude of ways. Currently, TVCat has been populated with nearly 6,000 requirements that are stored in the Oracle database. A search capability is critical.

The screenshot shows a web browser window titled "SEARCH FOR REQUIREMENTS - Microsoft Internet Explorer provided by BP Group Digital Business". The browser's menu bar includes "File", "Edit", "View", "Favorites", "Tools", and "Help".

The application header features the BP logo on the left. A green navigation bar contains the text "Current User: Vincent Pallares", "Position: SPEC 5 Alky", and "Shift: 12Hr Night". Below this, a yellow bar has three links: "Logout", "Main Menu", and "Contact".

The main content area is titled "Search for Requirements" and contains a search form with the following fields:

- Due By Date: * [text input] [Clear]
- Process Name: * [dropdown]
- System Name: - select Process Name first - [dropdown]
- Condition No.: * [dropdown]
- Device ID: * [dropdown]
- Equipment No.: * [dropdown]
- Device: * [dropdown]
- Regulation: * [dropdown]
- Procedure ID: * [dropdown]
- Primary Responsible: * [dropdown]
- Frequency: * [dropdown]
- Type: * [dropdown]
- Show Disabled:

At the bottom of the form are "Search" and "Reset" buttons.

A footer bar contains "Title V Compliance Assurance Tool" on the left and "Copyright © 2002" on the right.

The Windows taskbar at the bottom shows the Start button, several open applications (eXursion, Inbox - Microsoft O..., NPRA TVCat Paper..., SEARCH FOR REQ..., Microsoft Office Sh...), a 100% zoom level, and the system clock showing 1:23 AM.

Not only can the users search for requirements, equipment, and deviations, but they can also edit these areas as needed. The editing capability allows this tool to keep current with ongoing permit changes with minimal database effort and with no programming changes.

BENEFITS OF USE OF TVCat

The primary benefits of a TVCat system are:

- Improved compliance assurance;
- Helps meet record keeping requirements;
- Helps in compliance with ISO 14001 requirements;
- Helps to make environmental compliance a personal responsibility;
- Can be expanded in the future for other environmental needs.

The biggest single benefit of using TVCat is that it greatly enhances the refinery's ability to assure improved Title V compliance. The Refinery Manager will be in a much more knowledgeable position to gather the information necessary to certify the refinery's compliance status every year. The refinery's reporting capability is also greatly increased. The necessary data is readily available to meet compliance reporting deadlines. We have met the primary goals for the tool development.

Title V has extensive record keeping requirements. Most records must be kept for five years. Mountains of paperwork in the form of paper logs may be required. TVCat can keep many of those records automatically and electronically.

BP's refinery is ISO 14001 certified. This international standard requires continual environmental attention and improvements. TVCat provides a means of keeping attention focused on environmental issues and identifying areas of needed system improvement. We believe that TVCat will help to maintain the refinery's ISO 14001 certification.

There is another benefit of this tool that wasn't clearly identified in the planning and requirements stages. With hundreds of refinery personnel trained in TVCat use, and dozens using the tool daily, we believe that we have noticed a re-focused attitude in the refinery personnel. Most everyone is taking his or her environmental responsibilities even more seriously than before. Partly it is a matter of having a better understanding of their responsibilities. Having to answer 25 to 70 questions each day about their responsibilities is an excellent training tool. Also, personnel are being reminded daily that they personally have a responsibility for environmental issues at the refinery. Individuals are taking it upon themselves to ask more questions about environmental issues. For example, note the thousand comments received by the tool developers from the users in four months. Many more questions are being asked of managers and other refinery staff. We hope this interest continues.

We are considering at this time the expansion of TVCat beyond the borders of Title V or even air compliance. We are discussing using it to also help the refinery's compliance with water and waste issues. We believe the tool is dynamic enough to allow these additions. TVCat is designed to suit the needs of any assurance system and is not limited in database size.

CONCLUSION

A tool similar to TVCat should be a great assistance to refineries in their Title V compliance assurance. This paper was designed to provide the reader with an understanding of the development process used to develop and implement a Title V tool at a large refinery, particularly in a regulatory environment similar to that in California. In addition, we have attempted to identify some of the key benefits of TVCat. The benefits of our Title V tool at our refinery are already becoming obvious and we expect these benefits to expand.