

Implementing a Multi- Refinery Environmental Data Management System at Shell Oil Products US

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Sandy Martin
Shell Oil Products US
1100 Louisiana
Houston, TX 77002
(713) 241-1425
skmartin@shellopus.com

Rich Jenks
Trinity Consultants
12800 North Central Expressway
Suite 1200
Dallas, TX 75243
(972) 661-8100
rjenks@trinityconsultants.com

Introduction

Environmental engineering staff at refineries across the country invest a significant amount of time each year preparing routine reporting requirements. Besides looking for opportunities to simplify and expedite these reports, a multi-refinery corporation such as Shell Oil Products US (SOPUS) is also seeking opportunities to develop cross-refinery consistency and work practices. In order to accomplish these objectives, the installation and implementation of an Environmental Management Information System (EMIS) was initiated.

This paper will discuss the implementation of ESP's ops*Environmental*TM EMIS for environmental reporting and Title V compliance tracking at the six refineries operated by SOPUS in the U.S. The paper will provide an overview of the implementation project, a discussion of the project team and schedule, a description of the functional components implemented, and focus on specific project hurdles. Implementation challenges to be discussed include: data gathering at each facility, maintaining an aggressive project schedule, engaging and developing ownership of the system at each refinery, standardizing emission calculations and reporting requirements across the refineries, and maintaining the original scope of the project.

Additional considerations when implementing an enterprise-wide EMIS such as infrastructure issues and integration of data from legacy systems will also be addressed during the course of this discussion.

Background

In late 2002, SOPUS was operating seven refineries in the United States. These refineries were located across the country, at the following locations:

- Bakersfield, CA
- Convent, LA
- Delaware City, DE
- Los Angeles, CA
- Martinez, CA
- Port Arthur, TX
- Puget Sound, WA

Besides being spread across multiple environmental agencies, each of refineries developed under diverse backgrounds, having not been historically operated by single corporate entity. As such the methods and practices used in performing routine reporting requirements had become highly individualized. As such, there was little opportunity for leveraging environmental resources across the alliance. In an effort to rectify this scenario, a top-down edict to develop consistency in federal reporting requirements was issued. To realize this, the implementation of a single EMIS system (ops*Environmental*TM) was initiated. The reports to be generated in the EMIS for all facilities included the following:

- Annual Emissions Inventories (formatted to local agency requirements)
- Discharge Monitoring Reports
- Toxic Release Inventories
- Corporate Indicators and GHG Reports

In order to accomplish these reporting requirements, SOPUS elected to implement the ops*Air*, ops*Water*, and ops*FormR* modules. In addition to developing consistency across reporting requirements, the ops*Compliance* module was implemented to track Title V compliance and assist in generating compliance certifications and deviation reports. In this fashion, each refinery would also develop consistent Title V recordkeeping and tracking protocols through the EMIS.

Project Team

In assigning the proper resources to the EMIS implementation project, SOPUS identified a few critical factors to consider.

1. **Top-down guidance.** As an enterprise-wide endeavor, strong central support and involvement would be necessary to ensure the overall success of the project.
2. **Central Project Management.** In order to achieve consistency across the refineries, a strong central project team would have to be involved in each refinery's individual implementation of the EMIS.
3. **Refinery Buy-In.** The biggest threat to the success of the project would be local refinery-level support and adoption of the EMIS post-implementation.

To address these issues, SOPUS assigned three distinct teams to oversee the success of this project. The primary team was the Core Project Team. This consisted of the project IT manager, corporate environmental (business-level) manager, and the implementation team manager. This team was established to oversee the day-to-day implementation activities and coordinate with each of the refineries. The project IT manager was responsible for aligning corporate IT resources and infrastructure during the installation and implementation, overseeing the integration efforts between legacy systems and the EMIS, and addressing ongoing maintenance and support issues with the software vendor. The business-level manager was responsible for ensuring that individual refinery needs are being addressed during the implementation without overly sacrificing the goal to establish consistency. Finally, the implementation manager was responsible for coordinating the configuration of the EMIS, tracking the day-to-day project status, and facilitating communication between the implementation project staff and the management team. In order to maintain the momentum of each implementation and ensure that the objectives are being met at each specific refinery, the Core Project Team met on a weekly basis throughout the entire implementation process to discuss any issues.

Guiding the overall implementation effort and providing the top-down guidance identified as a critical need for the success of the project, a Steering Team was formed to provide high-level support to the Core Project Team. The Steering Team consisted of a corporate IT manager, refinery-level environmental managers, and the corporate environmental director. The Steering

Team meant monthly throughout the course of the project. It was the purpose of the team to review issues that had either escalated to the point of requiring non-project resources to solve or become potential project risks. Further, this team reviewed the overall project status and made executive decisions whenever scope, schedule, or budget revisions were requested.

Finally, at each individual refinery, a local team of team leads associated with each specific ops*Environmental* module was formed. The responsibility of this team was to provide the Core Project Team with the necessary data and methodologies needed to generate the standard reports for the refinery in question. Further, this team played a very active role in the quality assurance and acceptance testing of the implementation effort. Besides providing an additional level of quality control on the implementation, this function encouraged the eventual end-users of the system to become familiar with the changes being made in their work processes due to the EMIS implementation. This assisted with developing buy-in and ownership of the system from an early stage in the implementation process. This team met with the Core Project Team weekly during each individual implementation to address data issues, calculation methodologies, and review the implementation to date.

Project Schedule

SOPUS required a fairly aggressive schedule be set to ensure that the implementation effort did not lose any momentum. An end date of 2004 was set to complete the overall project. In order to accommodate this request, the implementation team proposed a phased approach to the project. First, pilot facility was selected to implement initially. During this pilot phase, the base templates to be applied across all of the refineries for consistency were developed. Further the data integration between the refineries' legacy systems and the EMIS were developed and implemented. Once the pilot phase was complete, two more refineries were implemented simultaneously with a 10 week schedule for completion. The remaining refineries were rolled out consecutively using this same approach, as depicting in the figure below. Following the implementation at the last refinery in mid-July of 2004, the project began to wind down and address minor issues and items added to the project as expanded scope. It is the goal of SOPUS to fully complete implementation and enter a "run and maintain" mode by the end of 2004.

ID	Task Name	Duration	Q1 03		Q2 03			Q3 03			Q4 03			Q1 04			Q2 04			Q3 04	
			Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug
1	Road Show & Configuration Meetings	4w	■																		
2	Installation and Data Integration	4w		■																	
3	Pilot Plant - Convent Refinery	18w			■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	
4	Puget Sound and Los Angeles Refineries	14w					■	■	■	■	■	■	■	■	■	■	■	■	■	■	
5	Delaware City Refinery	12w									■	■	■	■	■	■	■	■	■	■	
6	Martinez and Port Arthur Refineries	13w												■	■	■	■	■	■	■	
7	Expanded Scope and Additional Reports	11w																	■	■	

Figure 1. SOPUS ops*Environmental* Implementation Schedule

Implementation Details

Infrastructure

The ops*Environmental* software was installed on central application and database servers in Houston, TX. When originally installed, ops*Environmental* 5.1 was the current version of the

software. During the course of the implementation process, the software has been upgraded twice: first to *opsEnvironmental* 6.1 (old compliance) in the fall of 2003, and then to *opsEnvironmental* 6.1 in the spring of 2004. To give refinery users access to the system, a Citrix server was implemented for remote connection to the application server. The *opsWeb* component, used for tracking compliance tasks and generating reports, was available to all users through the SOPUS intranet portal.

Data Integration

A key requirement to success for the implementation of the EMIS was to leverage existing data collection systems to provide as much automated data for performing emissions calculations. For SOPUS, there were two critical systems that needed integration with *opsEnvironmental*. For storage tank service and throughput data, an Oracle based accounting and inventory system, SHARE/Advisor, is used at each of the refineries. Other process parameter tracked continuously at the facility are stored in SOPUS process historian, Honeywell's PHD. Data Integration with these systems was accomplished by developing a custom Visual Basic application that would automatically establish a connection to these systems for each refinery each night and retrieve the data for the previous day for use within the *opsEnvironmental* system.

opsAir Module

The *opsAir* module is the “workhorse” of the implementation. This module allows for the calculation of criteria pollutants for annual emissions inventories, toxic pollutants for TRIs, and greenhouse gas emissions, which are included in the corporate performance indicator reports. The configuration of each emission source allows for data to flow from three possible sources: automatic data collection through the data integration application, manually entered data from end-users, and importing of data from external file sources (e.g., spreadsheets or text files). Besides the formatted reports specified in the scope of the project, the *opsAir* module allows for ad-hoc reports to be developed for users to view emissions results for day-to-day data needs. Further, these reports can be exported to a spreadsheet or document format for users to further manipulate the data.

opsWater Module

The *opsWater* module is used for a specific purpose; modeling of outfalls at the refinery for generating DMRs. Taking advantage of sampled data from outfalls being stored within the PHD system, much of the data needed for these reports could be automatically collected from the data integration application. The remaining parameters not automatically gathered were configured to allow users manual data entry points to supply this information. Finally, the federal DMR form is supplied standard with the *opsWater* module, so no additional development of the report itself was necessary during implementation.

opsFormR Module

The *opsFormR* module is specifically focused towards the generation of TRI reports. To accomplish this, the module integrates with the *opsAir* and *opsWater* modules for the calculation and compilation of facility release information. SOPUS did not elect to purchase the *opsWaste* module, so all offsite waste shipment data was imported from spreadsheets. Other data specific to TRI reporting is calculated within the standard *opsFormR* objects. As with the *opsWater* module, the TRI reports (threshold report, ATRS Form Rs, and TRI-ME export report) come standard with the *opsFormR* module, so no additional report development was necessary during implementation.

opsCompliance Module

Through the ops*Compliance* module, each refinery could load tasks necessary for maintaining compliance with their Title V permit. The site compliance lead (part of the local refinery project team) provided the implementation team with a list of tasks as well as the advanced email notification schedules. The implementation team then loaded these tasks into the module and activated them to begin the process of generating tasks, sending email notifications, and tracking completion status results within the system. Additionally, the implementation team developed a series of reports to assist users with compliance certification and deviation reporting.

Conclusions – Successes and Lessons Learned

During the course of the implementation there were several challenges that the team was able to address. An early issue concerned maintaining the project schedule. For example, after transitioning to a new pair of refineries, it was critical to “hit the ground running” in order to maintain the proper timetable. Early in the process, this was difficult to accomplish due to delays in gathering data from the refinery. To combat this occurrence, the project team began reaching out to upcoming refineries one month before the scheduled start date. By initiating meetings with the refinery early, the local refinery resources could begin getting acclimated to the implementation process before work began in earnest, and the transfer of data could begin prior to the official start date. Another scheduling conflict that arose was scheduling local resources during the quality assurance and acceptance testing. Typically, the last few weeks of the implementation required a significant amount of local refinery involvement to verify all of the reports and calculations were working properly. To ease this burden on the refinery resources, the implementation team adopted a “rolling implementation schedule”. By breaking up the acceptance testing criteria into smaller segments (e.g. acceptance of criteria emissions by individual emission type instead of waiting until the entire emissions inventory report was ready), the local resources were able to better allocate their efforts across the entire implementation schedule, rather than concentrate all of the time in the last few weeks.

Another hurdle encountered by the implementation team was meeting the objectives of standardization. Methodologies employed at each refinery to accomplish similar functions turned out to be very diverse. And it was often very difficult to get the local refinery resources to accept new methods for calculating and reporting emissions. Significant time was spent at each refinery demonstrating that the new, consistent methods were equivalent to their original methods or were at least equally or more accurate. Eventually, some variations from the strictest application of standard methods were adopted, but only in situations where such variations were “regulatory” requirements.

Perhaps the most challenging of issues encountered during the implementation was managing the scope of the project. Due to the nature of ops*Environmental*, local resources often found many new applications, calculations, and reports to roll into the EMIS. The implementation team did set aside time at the end of the project to supplement the scope with high priority additional functionality. However, during the course of each individual implementation, it was critical to manage the expectations of the local resources and focus on the approved scope of the project.

The project achieved both individual and overall successes. Acceptance was approved and signed off by each of the refineries. Each of the refineries has completed training on the system and begun loading data into the system and running reports from it as well. Title V task tracking using ops*Compliance* has been fully adopted and used at each of the refineries for many months now. On a local level, the refineries have begun using the system to generate their emissions inventory reports as well. The Martinez Refinery has fully switched over to generating their

monthly emission inventory reports with ops*Environmental*, and the Los Angeles Refinery is currently using the system to generate their current annual emission inventory. In June, all but one of the refineries used the system to successfully generate their TRI submittal and upload into the TRI-ME software for submittal to the agency. In general, SOPUS feels that this effort has been successful in standardizing reporting across the refineries and building institutional knowledge of their processes and requirements.