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Paper Title: Exporting Safety and Environmental Best Practices to Energy Frontiers: A Web-Based Solution

Archie R. Thompson, Jr./SEMPCheck Services, Inc.

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Abstract

Ever growing worldwide demand for oil and natural gas production continues to geographically challenge an aging, experienced workforce. Worker safety and pollution control are largely dependent upon proper human behavior.

Most U.S. based operators integrate API, EPA and Coast Guard standards into their international operations. These standards can be complex and difficult to follow on the fly, and even more so in regions that lack an abundance of local experienced workers.

Increased reliance on intelligent tools to systematically capture knowledge and best practices for day-to-day operations is becoming the norm in the United States. By using the world-wide-web as the conduit, these best practices can be accessed and applied to both frontier as well as human resource-challenged theaters of operations.

The paper describes the development, implementation and capabilities of a proprietary Internet based safety and compliance system that is currently in use by owners/operators in the Gulf of Mexico. The system provides in a real time format for the continuous monitoring, verification and documentation of compliance with all U.S. federal codes and regulations for producing operations.

Continuous oversight of remote producing operations is afforded via the Internet. A real-time audit trail is electronically maintained in a format that permits 24/7/365 access without having to physically visit the remote sites.

Users in the field are systematically guided through the practical tasks required to maintain safe and environmentally friendly operations. Thus, the system can also be used as a continuing education and training tool for field personnel as well as for verification of on site training and skill levels.

Interested Parties. All parties involved in corporate HSE and Regulatory Compliance. All parties involved with keeping remote producing operations safe and environmentally friendly. All parties involved with training and verification of employee skill levels.

Introduction

Most threats to safety and the environment from the production of oil and natural gas involve the release of hydrocarbons.

Industry's role in this matter is to design safety systems that focus on preventing such releases, stopping the flow to a leak if it occurs and minimizing the environmental effects of hydrocarbons that are released. Host governments' role is to ensure incident free exploration and development activities within their defined jurisdictions and to further ensure that these activities are conducted with appropriate environmental protection.

These two roles interact through legislation, regulation and compliance. The resultant regulatory process includes mandates to conduct periodic inspections and verifications of the integrity of safety systems, of production components and of other auxiliary equipment on the platform.

Recent industry surveys substantiate the trend towards a smaller, less experienced workforce as the more experienced workers retire and leave the industry. Increased reliance on intelligent systems to systematically capture knowledge and best practices for day-to-day operations is becoming the norm throughout the industry.

By using the world-wide-Web as the conduit, safety and environmental best and recommended practices can be accessed and applied to either remote offshore, international, frontier or human resource-challenged theaters of operations.

The U.S. Gulf of Mexico is usually regarded as one of the world's most mature and regulated theaters of offshore oil and natural gas operations. Where applicable, most U.S. based operators integrate API, EPA and U.S. Coast Guard standards into their international operations. These standards can be complex and difficult to follow on the fly and even more so in regions that lack an abundance of local qualified workers.

A proprietary Internet based safety and compliance management system has been developed that enables the continuous preparation, monitoring, verification and documentation of regulatory compliance for offshore producing operations. Continuous oversight of remote producing operations is afforded via the Internet.

An audit trail is electronically maintained in a database format that permits 24/7/365 access without having to physically visit the remote facilities or chase down data through third parties.

The existing U.S. federal codes and regulations for offshore producing operations as well as best and recommended practices are the standards embedded in the database logic. Nonetheless, the portability and modular structure of the system easily affords the opportunity for modification to any specific corporate or host government requirements.

Demographics and Intelligent Systems¹

Over the past two decades, the total number of workers in the industry has declined by over fifty percent. Employment in the industry peaked during the early 1980's and dropped off dramatically by the end of that decade.

Figure 1 shows the contrast between continued increases in worldwide oil and natural gas production with the corresponding assumption of the continuation of the decline in the number of people employed in the industry.

Employment and Production

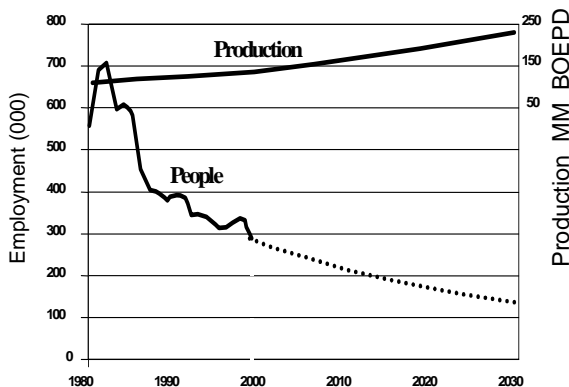


Figure 1

An industry survey released in the year 2000 determined that the average age of active workers in the exploration and production industry was 48 years.

Due to the skewed bell curve distribution of the population, by the year 2007 the industry could be in the midst of a reduction by as much of 60% of the current workforce as these older workers become eligible for retirement and leave the industry. Figure 2 illustrates these phenomena.

Industry Population by Age Group

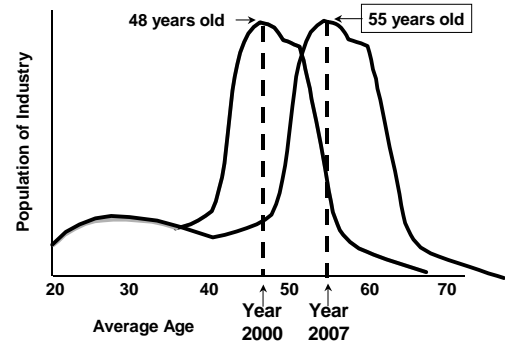


Figure 2

Figure 3 is a depiction of the manner in which technology and knowledge capture have managed to compensate over the past 50 years for the fluctuations in the number and average age of the workforce.

Number of Workers in Each Decade

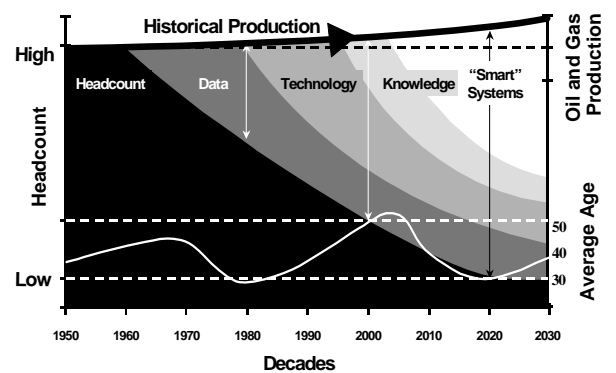


Figure 3

Technology, knowledge capture and the use of smart systems have been the primary compensators for the reduction of headcount since the early 1980's. Most industry experts project that the continued development and use of "smarter systems" will dominate the manner in which the industry compensates for the severe shortages of experienced workers that will occur over the next several decades.

U.S. Federal Regulatory Compliance Standards

Under the Outer Continental Shelf (“OCS”) Land Act of 1953, the U.S. Department of the Interior was given charge with managing the exploration and development of mineral resources in federal jurisdictions. The Secretary of the Interior vested this responsibility in the Mineral Management Service (“MMS”).

Amongst its many responsibilities the MMS administers safety and environmental compliance with applicable federal rules and regulations. Effective June 7, 2002 the MMS also became authorized to conduct inspections of the U.S. Coast Guard regulated items on fixed OCS platforms.

Operators of oil and natural gas facilities in the Gulf of Mexico must abide by and document safety compliance under a host of federal regulations. The operators are required to at least annually inspect and conduct integrity tests on all process safety systems, components, equipment and on the physical structures themselves. The majority of safety shutdown devices require monthly testing. MMS inspectors evaluate and determine regulation compliance by going out to the offshore facilities and auditing all of the required paperwork.

During the MMS offshore audits, operators are required to produce paper copies of all safety, environmental and compliance tests and reports. A twenty-four (24) month history of filed records is required and copious record keeping is the mandate. All of these records along with other platform documents (drawings, permits, departures, etc.) are filed in paper form in filing cabinets (on the actual offshore site).

API Recommended Practice 14-C². Regulations are based on a number of American Petroleum Institute (API) Recommended Practices (“RP”) and Codes of Federal Regulations (“CFR”). One such document, the API RP 14-C, addresses the specific requirements from which the MMS determines operator compliance with the installation and routine inspection of platform safety systems.

The API RP 14-C contains the criteria for designing, installing and testing a safety system on an offshore platform. It identifies each undesirable event that could affect a process component and discusses safety device selection criteria for each component type. Process component types include:

- Wellheads and Flow Lines
- Wellhead Injection Lines
- Headers
- Pressure Vessels
- Atmospheric Vessels
- Fired Vessels
- Pumps
- Compressor Units
- Pipelines
- Heat Exchangers

The undesirable events that could affect a process component include:

- Overpressure
- Leaks
- Liquid overflow
- Gas blow by
- Underpressure
- Excess temperature (Fired and Exhaust Heated)
- Direct ignition source (Fired Components)
- Excess combustible Vapors in the firing chamber (Fired Components)

Failure to meet RP 14-C requirements can result in expensive fines to the operators and in severe cases, require an interruption of production which drives large income losses to the operator until compliance is restored. In all cases of noncompliance the operators are issued citations termed an Incident of Noncompliance (industry slang for this report is termed “INC” pronounced “ink”). The civil fines can run up to \$25,000 a day for each failure of compliance as determined by the MMS inspections.

The MMS is also charged with verifying that offshore field personnel are trained and qualified to perform their requisite tasks. New performance-based Subpart O, Well Control and Production Safety Training regulations took effect on October 15, 2002. The new requirements are outlined in 30 CFR 250, Subpart O and require that training records be maintained for all offshore field personnel. These records are now a major component of compliance documentation.

The SEMP³. During the 1990’s the API, in cooperation with the MMS, developed RP 75 – Development of a Safety and Environmental Management Program for OCS Operations and facilities (the “SEMP”). The API also produced a companion document, RP 14-J, for identifying safety hazards on offshore production facilities. The SEMP is a process for coordinating OCS oil and natural gas operations that recognizes worker safety and pollution control are largely dependent upon proper human behavior. The MMS asked OCS operators to voluntarily make the SEMP the way they do business.

The SEMP contains twelve audit protocols. The protocols are consistent with the four principal SEMP objectives adopted by the MMS.

1. Focus attention on the influences that human error and poor organization have on accidents;
2. Continuous improvement in the offshore industry’s safety and environmental records;
3. Encourage the use of performance-based operating practices; and
4. Collaborate with industry in efforts that promote the public interests of offshore safety and environmental protection.

Integral to the process is a method of determining that the safety systems have the necessary components, that they are in place and that they are effective. A producer’s SEMP

specifies how he:

- Operates and maintains facility equipment
- Identifies and mitigates safety and environmental hazards
- Changes operating equipment, processes and personnel
- Responds to and investigates accidents, upsets and “near misses”
- Purchases equipment and supplies
- Works with contractors
- Trains personnel

Web-based Safety and Environmental System

A Web-based system has been developed and is now in use in the U.S. Gulf of Mexico for the management of safety and environmental regulatory compliance.

The system proactively verifies API RP 14-C compliance by checking user inputs on the fly against the codes of recommended practices and generates automatic inspection prompts from a compliance checklist for all of the other MMS, EPA and Coast Guard compliance requirements. It also proactively addresses all twelve SEMP audit protocols.

The key challenge was to design an extremely user friendly application that would account for the potential range of experience and skill levels of field personnel while simultaneously providing management with a quick look assessment of compliance performance.

This key challenge has been met. Users in the field are systematically guided through the practical tasks required to maintain safe and environmentally friendly operations. Management is provided access to a quick view, color-coded assessment of the accomplishment of these tasks and given the option to drill down through the system to view the supporting details.

Individual users who have access to the Internet are given levels of access commensurate with their jobs and responsibilities that range from users making data entries directly in the field to management who monitor company-wide compliance back at corporate headquarters. The system permits multiple users to simultaneously gain access to either make inputs or view data at any time and anywhere in the world.

Users are given unique passwords and identifications that allow them to either prepare, store, view, monitor, retrieve or print all necessary documentation of regulatory compliance. Some users may have the authority to only view and monitor, while others may have the authority to actually make inputs into the system.

The system includes a management of change module that electronically tracks this entire process from inception through assignment of tasks, execution and completion. All current drawings and documents such as Safety Analysis Function

Evaluation (“S.A.F.E.”) Charts, Piping and Instrumentation Diagrams (P&ID’S) and SEMP manuals can be electronically stored for easy access and updating.

Characteristics of the system include.

- Extremely user friendly
- Accessible over the Internet
- No special software requirements
- Provides for multiple users and viewers regardless of location
- Stores required information for MMS, EPA and Coast Guard reviews
- Independently verifies tolerance levels and due dates
- Instant electronic information on 24/7/365 basis
- Tracks user compliance and provides continuous documentation recall
- Provides independent compliance audit trail
- Establishes responsibility record of compliance

Getting Started. Qualified compliance technicians load specific platform information into the system database. The technicians require the latest approved set of S.A.F.E. Charts, Safety Flow Diagrams and the most recent copies of available compliance self inspections. Desktop audits of the initial information are conducted to identify potential areas of conflict with existing regulations. Once any conflicts are identified and resolved, then the platforms are loaded into the database and the users trained on their actual sites.

System Requirements. Besides the latest set of drawings, S.A.F.E. Charts and available compliance reports, the system requires very standard hardware and software applications. It is recommended that the hardware be comprised of at least an Intel Pentium II 400 MHz or equivalent processor with 128 MB RAM and 200 MB free HDD space.

The software requirements include Windows 95, 98, ME, 2000 or XP only with Internet Explorer version 5.5 or newer, Adobe Acrobat Reader Version 4.0 or newer and AutoDesk WHIP IE plug in (optional – for viewing drawings).

Security. The system is loaded onto a dedicated web server and dedicated database (SQL 2000 Database, Microsoft IIS Web server with .NET extensions). The confidentiality of data is of paramount concern. The security features built into the system are the best available. The system uses an encrypted 128-bit secure server certificate provided by Verisign, a world leader in outsourced Internet security.

Navigating through the System. After users have logged onto the system, they are immediately taken to a page of all authorized platforms to which they have access. The compliance status of each platform is visually apparent on this page from a system of categorized cells with color highlights.

A green highlighted cell signifies that all inspections of that particular category are current and that there are no outstanding areas of noncompliance. Yellow highlighted cells signify that there is a pending inspection and red signifies that

an inspection has been missed or that there are outstanding noncompliance issues to be addressed.

Figure 4 is an example of an expanded tabulation of platforms where the color-coded system is in force.

Deepwater Resources				
Monday, December 02, 2002				
Login		Expand All	Collapse All	
Company Menu		Nonproducing		
Producing Platforms				
Facility Area - Block - Platform - OCS-G-Num	Next Inspection			
	MMS (14C)	Checklist	PSV	SCSSV / SSSV
East Cameron (1 Area(s))				
East Cameron - 1 (2 Platform(s))				
East Cameron - 1 - E - 2062	12/18/2002	12/17/2002	7/23/2003	
East Cameron - 1 - F - 2062	12/18/2002	12/13/2002	5/17/2003	
Grand Isle (1 Area(s))				
High Island (1 Area(s))				
Main Pass (2 Area(s))				
Main Pass - 1 (1 Platform(s))				
Main Pass - 2 (3 Platform(s))				
Main Pass - 2 - A - 16493	12/16/2002	12/9/2002	12/19/2002	
Main Pass - 2 - B - 16493	12/29/2002	12/4/2002	6/3/2003	
Main Pass - 2 - C - 16493		11/29/2002		
Ship Shoal (1 Area(s))				
Ship Shoal - 1 (2 Platform(s))				
South Pass (1 Area(s))				
South Pass - 1 (1 Platform(s))				
South Pass - 1 - A - 0000	12/13/2002	10/9/2002		


** The information on this page is updated every 5 minutes.

Figure 4

To get to specific items of concern, the user selects the affected platform and drills down through the system to the specific item via the Platform Documentation page, Figure 5.


Demonstration Exploration Grand Isle - 23 - Z - 5555
 Username: Test User
 Date: Wednesday, January 08, 2003

Please select one of the following options:




Platform Documentation

- Compliance Calendar
- Compliance Checklist
Next Test Due - 12/13/2002
- E-Library
 - Platform Specific Files
 - Company Files
- Drawings
- Daily Report



Input Report Data

- MMS Device Testing
 - Component Level
 - Device Level (remaining tests for this month)
- Create New PSV Report
- Create New SCSSV Leakage Form



View/Print Reports

- Compliance Checklist
- Action Item Summary (MMS, PSV)
- Blank Report Forms (MMS, PSV)
- Completed Report Forms (MMS, PSV, SCSSV)

Figure 5

After the user selects a platform from the summary page he is taken to the Platform Documentation where he encounters a menu of choices that the user commands upon moving to a specific platform site. He can then go to any of the modules and features of the system that are applicable to that specific platform site.

There are five major system modules/features: API RP 14-C, Compliance Checklist, e-Library, Management of Change and Drawings. As with the main system itself, each of the modules can be accessed at anytime and anywhere from locations having Internet access. A brief description of each is as follows.

API 14-C Module. The API 14-C module provides for compliance documentation down to the actual safety device level with the dates, readings and individuals performing the testing.

Capabilities of the API 14-C module include.

- Advance notification of individual device test dates
- Visual prompting for inspections
- Documents the tester, date of test and results
- Proactively error checks against API 14-C and CFR 250 federal regulations
- Color coded for easy use
- Guides, trains and tracks the users
- Documents user input errors and requires comment on the Action Item Summary report

Figure 6 is an example of a user input page for a production header that is flagging an input that is in violation of RP 14-C.

Equipment ID	Description	
GAS-2000	Production Header	
Device	Value	Tester
OPERATING RANGE HIGH	<input type="text" value="1100"/>	<input type="text"/>
OPERATING RANGE LOW	<input type="text" value="700"/>	<input type="text"/>
SET - PSH		<input type="text"/>
SET - PSL		<input type="text"/>
FOUND - PSH		<input type="text"/>
FOUND - PSL		<input type="text"/>
LEFT - PSH	<input type="text" value="1300"/>	<input type="text"/>
LEFT - PSL	<input type="text" value="0"/>	<input type="text"/>
SDV TEST	<input type="text" value="OPER"/>	<input type="text"/>
RECORDED PSV	<input type="text" value="1440"/>	<input type="text"/>

Microsoft Internet Explorer

! Error - PSH set out of tolerance (14C violation). Reset, or replace and retest.

OK

Figure 6

One of the selections that can be made from the Platform Documentation page is the Action Item Summary. This is a monthly summary of all API 14-C issues arising from warning and error messages generated during that particular month.

Before generating that month’s MMS report, the operator must make comments as to corrective actions taken.

Figure 7 is an example of an *Action Item Summary* report.

Pipeline Action Items	
Equipment ID	Description
KAH-1000	Departing Oil P/L
ERRORS	
Error Message	Explanation
Error - PSH must be 5% below PSV setting.	PSH reset to proper value and retested
FAILED - Repair or Replace Valve.	typo - valve passed
NOTES	
Message	Explanation (not required)
NOTE - PSH set less than the 15% allowed.	Note acknowledged
NOTE - Found PSH set less than the 15% allowed.	Note acknowledged

Figure 7

Compliance Checklist and Checklist Calendar. The *Compliance Checklist* (“*Checklist*”) and its associated *Checklist Calendar* handle all of the other potential regulatory inspections that could possibly be germane to a specific offshore production, storage and transportation facility. The combined system features cover all safety, environmental and regulatory reporting that could possibly apply to either a fixed or floating offshore production and transportation facility. It can also be used for onshore facilities or even gravel/ice pods and man-made islands.

There is an endless list of items that can be accounted for on the *Checklist*. Some of the items that can be covered by the combined features of the *API RP 14-C* and the *Checklist* on fixed offshore platforms include:

- | | |
|---|-----------------------|
| API RP 14-C | Fire Pumps |
| Capsule inspections | Garbage daily logs |
| Casing diagnostics | Meter calibrations |
| Chain of custody | NavAids |
| Crane Inspections | Oil & grease analyses |
| Crane Pre-use daily log | Pipeline inspections |
| Emergency drills | Pollution daily logs |
| Emergency flare logs | Tubing plugs |
| ESD stations | Toxicity reports |
| Fire fighting | |
| Life saving equipment | |
| Fire pumps | |
| National Pollutant Discharge Elimination System (NPDES) | |

For deepwater platforms that require unique specifications germane to floating vessels (such as those required by the certifying marine authorities) the *Checklist* becomes a useful link to those compliance requirements. The combined features of the system can be used for any type of deepwater platform design such as Spars, Tension Leg Platforms or any type of semi-submersible application.

A number of automated maintenance systems are in use

throughout the industry. There are certain maintenance tasks in those systems that can be integrated through the *Checklist* feature for compliance verification purposes.

The *Checklist* has the following features.

- Comprehensive list of all compliance requirements
- Advanced planning and warning features
- Becomes a scheduling tool for compliance workforce
- Creates an opportunity for third party inspection efficiencies through advanced scheduling
- Captures previous and future test dates
- Color-coded for easy use
- Links to the *e-Library* feature

Figure 8 is an example of a *Compliance Checklist* page for a demonstration platform.

MONTHLY MMS INSPECTION FORM				Inspection Date:
COMPLIANCE CHECKLIST USER INPUT				1/8/2003
Type Inspection	Equipment ID	Previous Test Date	Test Due	Test Date MM/DD/YYYY
Capsule (Monthly)	Caps 22W	12/31/2002	1/31/2003	12/31/2002
Casing Pressure Report (Monthly)	QAY-A23	1/7/2003	2/18/2003	1/7/2003
Chain of Custody (Monthly)	(none)	1/6/2003	2/17/2003	1/6/2003
Coast Guard (Monthly)	(none)	1/5/2003	2/16/2003	1/5/2003
Emergency Drill (Weekly)	(none)	1/6/2003	1/13/2003	1/6/2003
Emergency Flare Gas Inspection (Monthly)	(none)	1/1/2003	2/12/2003	1/1/2003
Fire Fighting Equipment (Monthly)	(none)	11/25/2002	1/6/2003	11/25/2002
Fire Pump (Weekly)	(none)	1/5/2003	1/12/2003	1/5/2003
Gas Detector Calibration (Quarterly)	Lvg Qtrs	11/1/2002	2/1/2003	11/1/2002

Figure 8

The *Checklist* items can also be displayed in calendar form. Figure 9 is an example of a *Compliance Calendar* that can be used as a scheduling tool.

Demonstration Exploration Grand Isle, 23 "Z"							Today's Date 8 January 2003
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	
			1	2	3	4	
5	6 Fire Fighting Equipment (Monthly)	7	8	9	10	11	
12 Fire Pump (Weekly)	13 Emergency Drill (Weekly)	14	15	16	17	18	
19	20	21	22	23	24	25	
26	27	28	29	30	31 Capsule (Monthly)		

Figure 9

e-Library. The *e-Library* is essentially an electronic filing cabinet that stores all of the actual documentation of the *Compliance Checklist* inspection items. It has the capacity to store unlimited amounts of data and information. Some of the documents are standard e-forms that accept input directly into the database. Other documents, including third party inspections such as crane inspections and toxicity reports, are electronically stored in an Adobe Acrobat Portable Document Format (PDF).

The combination of the *14-C, Compliance Checklist* and *e-Library* modules enable company management and the regulatory agencies to conduct paperwork audits without having to physically visit the remote sites.

Figure 10 is an example of an *e-Library* listing which shows the flexibility of the system to house any number of documents. By clicking on any of the *e-Library* categories, the actual documents can be viewed or printed in PDF.

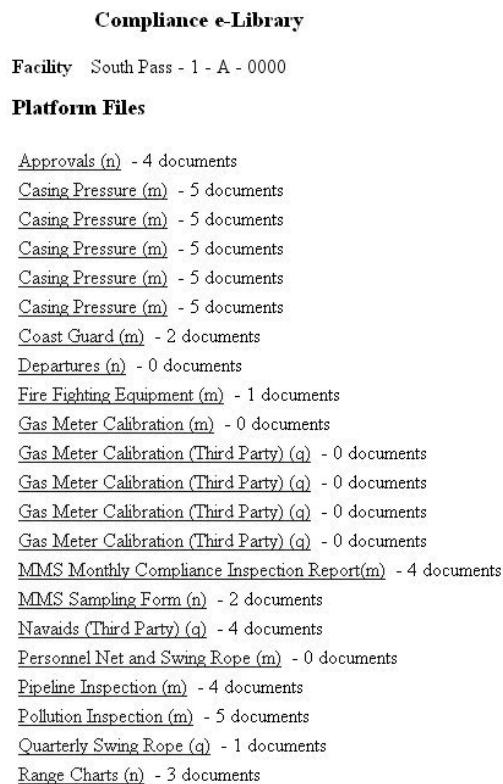


Figure 10

The *e-Library* features include.

- Provides documentation for non-API RP 14-C inspections
- Properly aligns producers for regulatory inspections
- Allows producers to be consistent in form usage
- Provides clerical order and focus
- Reduces paper, fax, phone confusion
- Manages and stores documents
- Allows a producer to document training, such as Subpart O

Management of Change (“MOC”). The *MOC* module enables the producer to document and track the entire approval and implementation process. Each platform setup includes the authorization hierarchy for that platform, thus linking change and authority with approval and execution.

Specific capabilities include.

- Ensures proper reviews and approvals
- Tracks change process form start to finish
- Notification is automatic via e-mails
- All MOC’s can be located via multiple query capability
- Ability to attach files, drawings, comments, etc.
- Stores all drawings and attachments

Drawings. Operators who have platforms in the system have the option of storing the latest set of drawings as further documentation of compliance. The drawings are in the AutoCAD format and can be viewed and downloaded, but the drawings in the system cannot be altered without authorized clearance. Capabilities of the *Drawings* feature include.

- Instant access to the latest set of drawings
- Drawings can not be altered without proper authorization
- Eliminates confusion as to approvals, revisions, etc.
- Drawings that form the basis of the platform setup in the database are readily available

e-Government Transformation Project

The MMS is in the midst of an e-Government initiative to integrate all of its business processes into a seamless operating environment. Their current plan is to re-engineer and streamline business processes by incorporating the Internet and moving most services online. By moving online the agency will become more connected to industry, citizens and other government agencies.

OCS Connect⁴. The *OCS Connect* program is a phased, multi-year e-Government transformation of the MMS that will dramatically reform and streamline business operations by fiscal year 2007. To meet future mission requirements, the MMS could then keep pace with the increasing complexity of operations, greater workloads, and demand for data exchange and more sophisticated technical analyses.

Their goal is to streamline internal processes as well as those used to interact with their three constituent groups: the industry, citizens and other government agencies.

Industry. Industry can enter a single portal to receive information and conduct more efficient online exploration, development and production transactions, resulting in time and cost savings.

Citizens. Citizens can enter a single portal that delivers customized and user-friendly information and encourages increased online participation in the

oil and natural gas regulatory and planning processes.

Other government agencies. Regulatory agencies share common data exchange standards and future applications. For example, multiple agencies may access an online permitting system to obtain information, conduct reviews and approve an industry request.

Internal MMS Processes. MMS employees spend less time processing paper applications and data, and more time responding to requests and analyses needs. As a result, the processing and analysis of digital information increases the quality of compliance monitoring, and the cycle time is dramatically reduced.

Virtual Compliance Inspections

There are over 4,000 oil and natural gas related structures in the Gulf of Mexico. MMS inspectors evaluate and determine regulation compliance by physically visiting and reviewing all required testing documentation maintained by operators for those structures.

Current MMS audit practice is fly out by helicopter to the individual platform sites and spend whatever time is necessary (from on average, two to three days per site) to audit the paperwork and walk down the physical plant. Through the *OCS Connect* program, the MMS have a stated objective to conduct the paperwork review and audits prior to arriving at the offshore platform site.

By auditing the paperwork from their onshore offices across the region via the Internet, the overall time spent on the offshore site should be reduced by as much as 70% to 80%.

Once the paperwork-related phase of the audit process is completed, the time required to conduct the remaining SEMP derived physical inspections would be limited to hands-on testing and eye witnessing the operations. Therefore, a typical two to four day inspection trip could be reduced to only one or even one half of a day.

There are tremendous time efficiencies gained for both the operator and the MMS by dramatically reducing the interaction times of these offshore audits. Operating personnel spend less time directly involved in the paperwork audit process and the MMS is able to increase the efficiencies of the overall process, a primary objective of *OCS Connect*.

First Virtual Inspections. The Web-based safety and environmental system described in this paper is presently being used in the Gulf of Mexico to enable the electronic inspection of mandatory compliance paperwork via the Internet, dubbed *virtual inspections*.

The system was used to conduct the very first virtual inspection of the compliance records of an offshore producing platform in February 2002. The audit was conducted by one

of the MMS District offices from an onshore location. The MMS inspection team was issued passwords and identification codes that permitted temporary access to the system modules.

The results of the initial virtual inspection were very satisfactory, with no incidents of non-compliance (INC's) attributable to the system's verification features.

There have been a number of virtual inspections conducted since February 2002 on other platforms loaded into the system. The overall experience factor demonstrates that the users of the system have experienced much, much lower than average ratios of INC's per components tested (a yardstick used by the MMS to evaluate and rank operator performance).

It is widely recognized that operators with INC's/Components tested ratios higher than MMS acceptable standards become subject to much closer scrutiny by the agency.

Conclusion

Industry demographics are driving the use of smarter, intelligent systems. The application of these systems is far-reaching and not limited to the technical arenas of geophysics, fluid dynamics, petroleum engineering, marine architecture or to other highly technical and scientific disciplines.

It has been demonstrated that practical, intelligent systems can also be designed for access via the Internet that allow for the transfer of industry best practices down to the field operating level.

This paper illustrates the manner in which an Internet-based safety and environmental system can be utilized to export best practices to energy frontiers around the globe. By doing so, operators can effectively reduce the threats to safety and the environment by incorporating these best practices in their day-to-day activities.

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