**Environmental Requirements Management:
Maintaining an Effective Compliance Program is Key to a Robust Environmental
Management System-15184**

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ABSTRACT

CH2M HILL Plateau Remediation Company (CH2M HILL) is the U.S. Department of Energy (DOE) prime contractor responsible for the environmental cleanup of the Hanford Site Central Plateau. As part of this responsibility, the CH2M HILL is faced with the task of complying with thousands of environmental requirements which originate from over 200 federal, state, and local laws and regulations, DOE Orders, waste management and effluent discharge permits, Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) response and Resource Conservation and Recovery Act (RCRA) corrective action documents, and official regulatory agency correspondence. The challenge is to manage this vast number of requirements to ensure they are appropriately and effectively integrated into CH2M HILL operations.

Ensuring compliance with a large number of environmental requirements relies on an organization's ability to identify, evaluate, communicate, and verify those requirements. To ensure that compliance is maintained, all changes need to be tracked. The CH2M HILL identified that the existing system used to manage environmental requirements was difficult to maintain and that improvements should be made to increase functionality. CH2M HILL established an environmental requirements management procedure and tools to assure that all environmental requirements are effectively and efficiently managed.

Having a complete and accurate set of environmental requirements applicable to CH2M HILL operations will promote a more efficient approach to:
- Communicating requirements
- Planning work
- Maintaining work controls
- Maintaining compliance

INTRODUCTION

Since October 2008, CH2M HILL has been the prime contractor responsible for the environmental cleanup of the Department of Energy's (DOE) Hanford Site Central Plateau. CH2M HILL is committed to safely and sustainably protecting the environment and the public while meeting the goals of cleaning up the Hanford Site. In demonstration of this commitment, CH2M HILL established, implements, and maintains an International Organization for Standardization (ISO) 14001:2004-certified Environmental Management System (EMS). In conforming to the ISO 14001:2004 requirements, the EMS adopts the methodology of plan-do-

check-act in its implementation of the five core elements; Environmental Policy, Planning, Implementation and Operation, Checking, and Management Review. This approach provides the framework for integrating environment requirements and controls into work planning and execution. A major part of this framework is the identification of environmental requirements and their implementing mechanisms.

In executing environmental cleanup activities, CH2M HILL is tasked with performing work in compliance with all applicable federal, state, and local laws and regulations, DOE Orders, waste management and effluent discharge permits, Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) response and Resource Conservation and Recovery (RCRA) corrective action documents, and official regulatory agency correspondence (together referred to as "Directives"). Together the Directives involve tens of thousands of environmental requirements. CH2M HILL's challenge is to manage this vast number of requirements to ensure they are appropriately and effectively integrated into CH2M HILL operations. These operations include: radioactive, dangerous, and mixed waste generation; facility deactivation, decommissioning, decontamination, and demolition; interim and final status permitted dangerous waste treatment, storage, or disposal unit operation; CERCLA waste site and groundwater response actions; and RCRA waste management unit corrective actions.

For CH2M HILL, the Environmental Protection (EP) organization is the owner and technical authority for environmental directives. EP establishes, implements, and maintains the programs to ensure that applicable environmental requirements are incorporated into approved work activities. The Environmental Compliance and Quality Assurance (ECQA) organization maintains processes and tools that provide for the flow down of environmental requirements. The ECQA also provides independent compliance oversight of environmental requirement implementation.

CH2M HILL has been successful in consistently ensuring that work is performed in compliance with applicable environmental requirements. The cost of responding to and recovering from a non-compliant occurrence can be very high, not only in terms of financial liability, but in potential impact to the confidence level that the regulatory community has in the organization. Through 2013 the EP managed their environmental requirements through a series of compliance matrices and implementation plans. In 2013 CH2M HILL recognized several opportunities for improvement and established a company-wide system for managing environmental requirements. This Requirements Management System (RMS) includes use of procedures, compliance matrices, and software applications to ensure both environmental requirements and implementing mechanisms are understood and clearly articulated. It also requires the directive owners to work closely with the affected programs and projects in the application of RMS.

DISCUSSION

ECQA established and implemented a procedure defining a formal and consistent approach in the identification and flow down of applicable environmental requirements from the established directives. The procedure addresses roles and responsibilities, identification and verification of requirements, identification and verification of implementing mechanisms, change management, and configuration control.

The requirements management procedure clarifies organizational roles and responsibilities associated with the RMS as illustrated in Figure 1. ECQA is responsible to manage and control the RMS which includes 1) own the RMS procedure, 2) manage and control software applications, and 3) administer the processes for creating and maintaining configuration control of compliance matrices.

EP is responsible to 1) identify all environmental directives, 2) identify individual environmental requirements, 3) verify that implementing mechanisms meet the specified requirements 4) monitor environmental directives for new or changed requirements 5) inform the affected program and/or projects of new or changed requirements and 6) review proposed changes to implementing mechanisms that are associated with environmental requirements.

The affected program and/or project is responsible to 1) identify implementing mechanisms, 2) confer with EP to confirm adequacy of implementing mechanism, 3) maintain implementing mechanisms, 4) "Tag" the implementing mechanism and/or sections that are associated with environmental requirements, and 5) obtain reviews from EP of all proposed changes to "tagged" documents.

Figure 1 Requirements Management System Roles and Responsibilities.
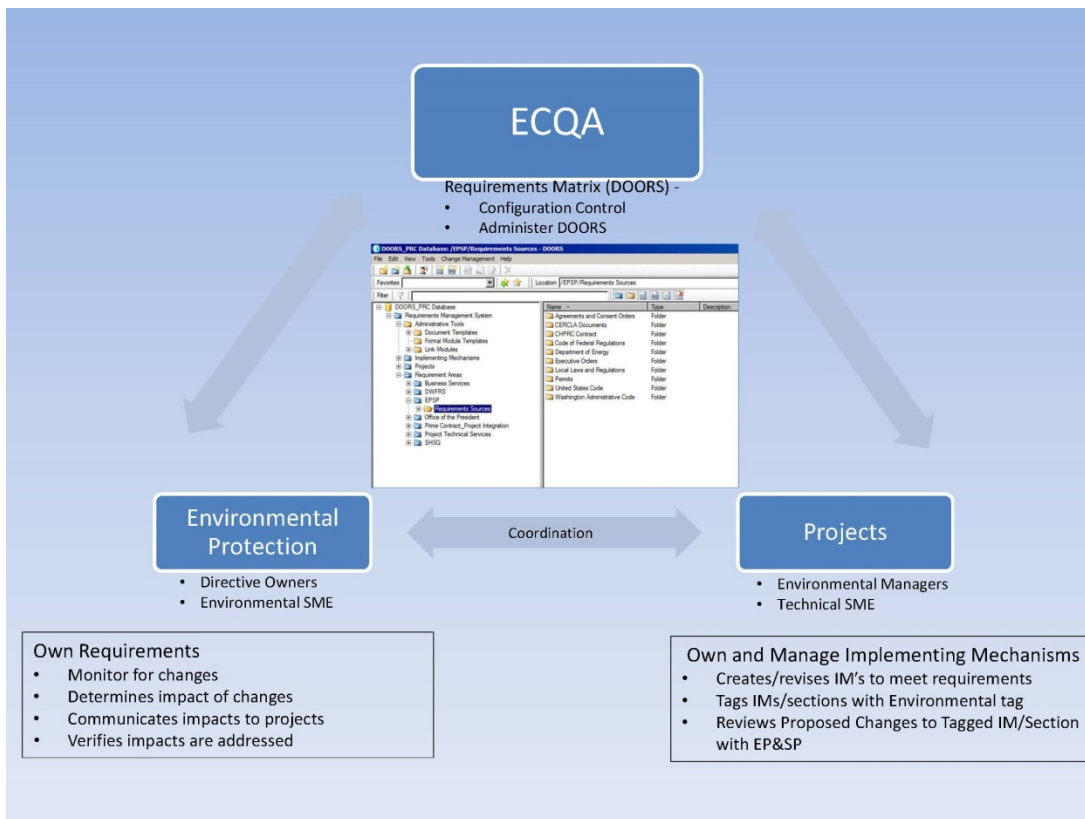
Requirements Management System

The RMS work flow is illustrated in Figure 2. The first step in managing any set of requirements is to ensure all Directives are identified and agreed upon. Many of the Directives, representing the sources for environmental requirements for which EP is assigned ownership, are identified in the Plateau Remediation Contract (PRC). The listing includes references to applicable federal, state, and local regulations, DOE Orders and documents, permits, and consent orders and although extensive, is not complete. Environmental requirements applicable to CH2M HILL operations are also found in approved CERCLA and RCRA response and corrective action documents and work plans, as well as official correspondence and other agreements from regulatory agencies and DOE. CH2M HILL worked with the EP directive owners, Technical Authorities and Subject Matter Experts from both the program and the projects, to compile a complete list of all environmental directives applicable or potentially applicable to CH2M HILL work scope.

Environmental requirements and implementing mechanisms are initially identified in compliance matrices. EP uses Microsoft® Excel[1] spreadsheets to document the individual requirements identified within the directives. Each requirement is identified by source citation and includes the text of the requirement, taken verbatim from its source. Other attributes (description, applicability, and generation of record material) of each requirement are added to provide context. Once the set of requirements has been "pulled" from the directive and recorded in the spreadsheet, it is reviewed and verified for completeness and accuracy by the appropriate EP Subject Matter Expert (SME). Key to the success of this activity is the collaboration between EP and Project staff.

Following EP SME verification, the project verifies attributes and identifies procedures, plans, work packages, etc. used to implement each requirement. Each implementing document is reviewed by an EP SME to ensure that the work performed will comply with the applicable requirement. Those implementing documents determined to satisfactorily implement the environmental requirements are reference marked, or "tagged", by the project. The tagging is a visible identifier that the document or applicable sections within the document are associated with environmental requirement compliance. For those implementing documents determined to not satisfactorily implement requirements, the project is responsible to initiate the appropriate actions and revise existing or develop new implementing documents. These revised or new implementing documents also incorporate the environmental requirement reference marking.

The use of electronic spreadsheets is an interim measure to manage environmental requirements. The spreadsheets are useful in documenting requirements and the associated implementing mechanisms; however, the large number of individual spreadsheets hampers the user's ability to use this information efficiently. In addition, maintaining configuration control is labor intensive. A single repository or query-able database for the collection of the identified environmental requirements would improve functionality.

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[1] Microsoft Excel is a trademark of the Microsoft Corporation in the United States and/or other countries.

Figure 2: Environmental Requirements Management Process
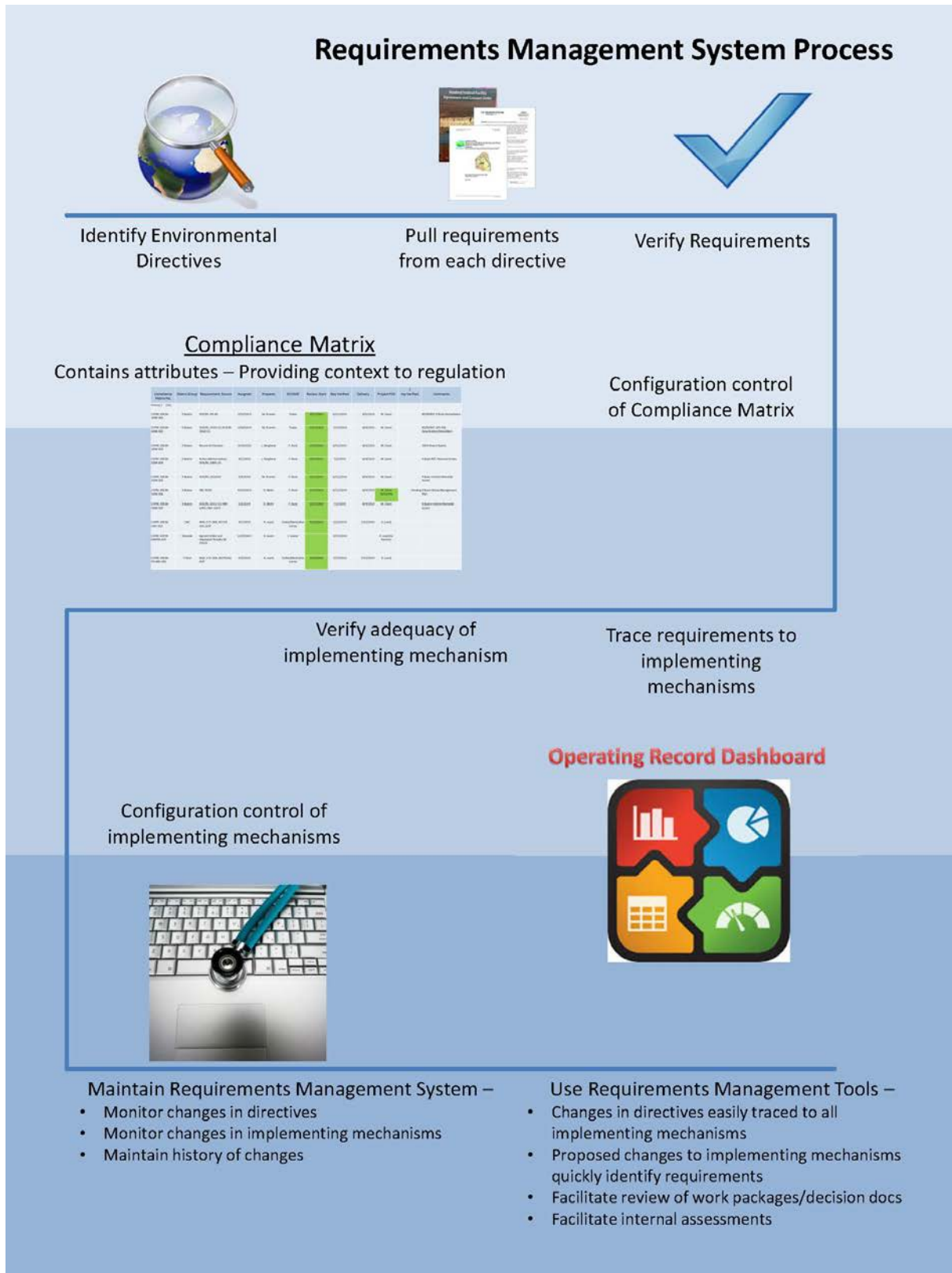
CH2M HILL evaluated a number of available software products for managing environmental requirements. The Rational® DOORS® software was selected by CH2M HILL to be the application used to construct the Environmental Program Requirements Management System (RMS). IBM® Rational® DOORS®[2] is a commercial off-the shelf license software application that contains the necessary features for capturing, tracking, and managing requirements. The selection was made in part due to the fact that IBM® Rational® DOORS® easily interfaces with Microsoft® Word and Excel formatted files for importing data. The application was procured in July 2014 and the RMS was designed, tested and placed into production in September 2014. RMS enables the efficient and consistent identification of environmental requirements and assigned ownership, communication of the identified requirements to affected company, functional area, and project level activities, traceability of requirements to implementing documents, and change control management of the data.

ECQA administers the process for maintaining configuration control of the RMS to ensure no changes are made without proper review and approval. For compliance matrices, ECQA controls individual edit permissions. Through ECQA administration of Rational® DOORS®, user rights and access are controlled.

CH2M HILL has procedures in place to maintain configuration control of documents including procedures, work packages, and operator aids. The Projects are responsible for applying those procedures to maintain configuration control of their work documents used to implement environmental requirements. Work documents that implement environmental requirements are required to be "Tagged." Tagging procedures will facilitate more thorough environmental reviews. When a project wants to change a procedure, they know immediately if they are affecting language associated with environmental requirements. The EP organization is required to review proposed changes to "Tagged" information. EP reviewers can easily identify the specific requirements associated with the proposed changes and determine how to help the project make needed changes without negatively impacting implementation of an environmental requirement.

CH2M HILL Requirements Management and Prime Contracts organizations monitor changes made to contract environmental directives and communicated through official correspondence. Those changes or additions are submitted to EP for impact evaluation. EP is responsible to monitor other environmental directives for changes or additional requirements. When existing requirements are changed within environmental directives, EP can easily determine which projects are affected. The system will also identify the specific implementing mechanisms potentially affected by the changes. EP works with the project, through the ECQA to incorporate approved changes to requirements and implementing mechanisms within the RMS.

Benefits

By having established a procedure for implementing environmental requirements, CH2M HILL can consistently produce accurate and complete listing of requirements applicable to any project and/or activity. This improves our ability to communicate those requirements to the projects and

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[2] IBM Rational DOORS is a trademark of the IBM Corporation in the United States and/or other countries.

ensure compliance.   New directives are created each year, whether it be through RCRA or CERCLA work plans, new permits or other regulatory agreements. EP now has an efficient process to identify and document environmental requirements and flow down new requirements to affected programs and /or projects. The Plutonium Finishing Plant Closure Project is applying the information recorded on the applicable compliance matrices as part of the "Glovebox Size Reduction" readiness startup assessment. The Project is using the matrices to aid in identifying the applicable requirements and associated implementing documents that must be in place before project activities can begin.

A significant benefit already being realized through this process is the identification of potential gaps in the current implementation of applicable environmental requirements. Whereas the existing document and work control processes have functioned to ensure the integration of environmental requirements during development of approved written work instructions, this process provides a more thorough and in-depth evaluation of the implementing documents based on the exact wording of the individual requirements. In some instances, this level of review has begun to identify the potential need to revise existing documents or to produce new work documents in order to maintain compliant operations. For example, project personnel representing Decommissioning, Waste, Fuels and Remediation Support have been reviewing the documented set of environmental requirements against their implementing documents and have identified gaps in the implementation of work activities associated with dangerous waste manifests, secondary containment, and waste unit inspection requirements. These identified gaps have been entered into and are being tracked by the CH2M HILL Corrective Action Management System. The Project is working with EP personnel to develop the appropriate actions necessary to resolve the noted gaps with implementing documents.

In coordination with activities to identify and document environmental requirements, CH2M HILL has also been advancing improvements in the document and work control processes. These processes have been revised to provide additional instruction and guidance to procedure writers, technical authorities, and work control coordinators, on clearly identifying those parts of the work documents written specifically to implement an environmental requirement. Means of doing so include, direct citation of the requirements being implemented, reference marking the appropriate sections of the work instruction, and including declarations early in the document text indicating that the failure to perform the work instruction as written may result in a regulatory non-compliance.

CONCLUSIONS

CH2M HILL developed an RMS to assure that all environmental requirements are effectively and efficiently managed, providing a valuable tool to maintain compliance and increasing its compliance margin. When fully implemented, RMS substantially increases the likelihood of work being completed in a compliant and timely manner while enhancing the tenets of the CH2M HILL EMS; compliance, continual improvement, and pollution prevention.

Having a documented set of environmental requirements applicable to CH2M HILL operations, verified to be complete and accurate, will also promote a more efficient approach to;

- Communicating requirements. The use of the spreadsheets and transition to RMS to identify requirements and determine applicability is a significant improvement in the flow down of environmental requirements to the field.

- Planning work. Identifying applicable environmental requirements can be extremely time consuming and inefficient if the performer has to locate and review source documents each time a work activity planned. A defined set of requirements can be more easily queried and evaluated for applicability to the planned work.

- Maintaining work controls. More readily identify and communicate new or changed requirements and conversely, any changes in project activities or implementing documents that have the potential to impact compliance.

- Maintaining compliance. More effective and consistent performance of the internal compliance inspections and assessments. Points of compliance can be more easily determined and evaluated.

An external, independent audit of the CH2M HILL EMS was performed in July of 2014 by Mr. Joseph Birchfield, a Lead Auditor with NSF International Strategic Registrations (www.nsf-isr.org), 789 N. Dixboro Road, Ann Arbor, MI 48105. The audit report issued by Mr. Birchfield stated, among other things, that:

"The organization has undertaken a unique initiative to identify all regulatory drivers, flow down requirements and where these requirements are implemented in field documentation for all of CHPRC's large projects (e.g., PFP, Soil and Groundwater, etc.). This initiative is aimed at preventing regulatory noncompliances. This has not only been noted as a proficiency during this audit but is considered as a Best in Class activity for federal government entities in the opinion of the lead auditor."[1]

REFERENCES

1. Audit Report, *CH2MHILL Plateau Remediation Company (CHPRC), 2420 Stevens Center Place Richland, Washington, United States, 99352*, C0120121, NSF International Strategic Registrations, July, 2014.