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**Case History of a Clean Water Act Compliance Agreement at the Rocky
Flats Environmental Technology Site Near Golden, Colorado**

ABSTRACT

A major Clean Water Act (CWA) Federal Facilities Compliance Agreement was signed on March 25, 1991 by the U.S. Department of Energy, Rocky Flats Field Office (DOE, RFFO) and the Water Enforcement Division of the Environmental Protection Agency (EPA), Region VIII. The agreement revised the Rocky Flats Plant's National Pollutant Discharge Elimination System (NPDES) permit and arose from permittee-requested changes in effluent monitoring points and permit violations, most notably the February 22, 1989 Chromic Acid Incident. The Rocky Flats Plant, now called the Rocky Flats Environmental Technology Site (Site) near Golden Colorado was operated at that time by Rockwell International Corporation, who later plead guilty to six misdemeanor and felony counts of the CWA (the aforementioned NPDES permit violations) and paid a \$4 million fine on March 26, 1992. The Compliance Agreement, hereafter referred to as the NPDES FFCA, called for three separate remedial action plans and contained a schedule for their submittal to the EPA. The compliance plans focussed on: 1) Waste Water Treatment Plant (WWTP) performance upgrades, 2) source control and surface water protection, and 3) characterization of the impacts from past sludge disposal practices. Projects that implemented the compliance plans were initiated soon after submittal to the EPA and are forecast to complete in 1997 at a total cost of over \$35 million. This paper presents a case history of NPDES FFCA compliance projects and highlights the successes, failures, and lessons learned.

Key Words: Compliance agreements, Clean Water Act, Federal Facilities Compliance Agreement, NPDES Permit

PHYSICAL SETTING

The Site is located in Jefferson County in the State of Colorado, and contains a 384 acre core industrial area surrounded by a 6,150 acre buffer zone. The buffer zone is generally bounded by Indiana Avenue to the east, and State Highways 93, 128, and 72 to the west, north and south, respectively. 61 percent (2.24 million people) of the state's population of 3.65 million people live within 50 miles of the plant boundary. This area includes 14

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counties and 75 incorporated cities with the majority of the population located within 30 miles of the Site to the east and southeast where populations exceeding 5,200 persons per square mile are found (EG&G, 1995a). Three east-flowing, intermittent streams traverse the Site, dividing it into three primary drainages (EG&G, 1993a). Six NPDES permitted outfalls lie on two of these streams which empty into drinking water sources for four downstream communities with a 1994 combined municipal population of 199,482 (EG&G, 1995a).

SITE OPERATIONS BACKGROUND

The Site is a part of the Department of Energy's (DOE) weapons complex and produced nuclear weapons components since early 1952 until January 1992 when the Site's mission changed to decontaminating, decommissioning and cleanup (EG&G, 1995b). During its years of manufacturing operations, the Site fabricated nuclear weapons components from both radioactive (e.g., plutonium and uranium) and nonradioactive (e.g., beryllium and stainless steel) metals that were shipped elsewhere for assembly. The Site also performed other activities in support of the nation's weapons program including the recycling of obsolete weapons components, metallurgical research, nondestructive testing and other related efforts (EG&G 1995b).

Waste water discharges from the site are authorized under the current Environmental Protection Agency (EPA) National Pollutant Discharge Elimination System (NPDES) permit. While the Colorado Department of Public Health and Environment (CDPHE) generally administers the NPDES program in Colorado, the EPA administers the program as it relates to federal facilities, including the Rocky Flats Plant. The Site's discharges have been regulated under the NPDES program since 1974, and its current NPDES permit No. CO-0001333, as modified in March 1991 by the FFCA, was issued on November 26, 1984. The 1984 NPDES permit was intended to control offsite discharges to as near zero as possible by use of spray irrigation to be conducted at all times unless weather conditions prohibited (DOE, 1989b). Because the WWTP treated radioactive laundry effluent from 1969 to 1972 and received contributions of Plutonium from an overflow incident in Building 701 in June 1972, the sewage sludge is treated as low level radioactive waste (EG&G, 1995b).

SITE ENVIRONMENTAL COMPLIANCE BACKGROUND

Beginning in 1989, a series of incidents occurred which would profoundly change the compliance posture of the Site and the relationships between the Site's current operators and

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the regulating agencies. Highlights of these incidents are presented in chronological order in the following paragraphs.

In January 1989, a DOE internal audit revealed deficiencies with the Site's storage and handling of hazardous materials. Specifically, finding TS-7 noted that "The bulk storage of hazardous materials does not meet current safety and environmental requirements." (DOE, 1989a). On February 22 and 23, 1989, the Site's plating laboratory in Building 444 unintentionally released 30 pounds of chromium (including hexavalent chrome) to the WWTP (DOE, 1989b). This chrome, in the form of chromic acid, was processed by the WWTP and 25 pounds of chrome were collected in the sludge and 5 pounds released to Pond B-3 and the East Spray Fields.

In March of 1989 the U.S. Department of Justice gave final approval for the initiation of the first ever criminal environmental case against a federal facility. On June 6, 1989, 75 Federal Bureau of Investigation (FBI) and EPA agents participated in an 18-day search and seizure action known as "Operation Desert Glow" (Siegel, 1993). On August 1, 1989, Special Grand Jury 89-2 was impaneled and embarked on a two and one-half year investigation involving over 3.5 million documents, 800 interviews, and 110 grand jury witnesses.

In August 1989, the findings of a DOE "Tiger Team" audit that focused on environmental concerns other than those being investigated by Grand Jury 89-2 were published (DOE, 1989b). On September 22, 1989 the Site's operating contractor at the time, Rockwell International, had its contract terminated by the DOE after arguing in court that it could not fulfill its contract without violating environmental laws (Siegel, 1993). On September 28, the EPA put the Site on the Superfund cleanup list and on November 13, all plutonium operations were terminated. The chromic acid spill was the focus of several indepth investigations whose results were published in May (Rockwell Intl., 1989) and August (DOE, 1989c). Amid intense public scrutiny and subsequent criticism, Rockwell International entered a conditional plea of guilty to a ten-count plea agreement and paid total fines of \$18.5 million (United States v. Rockwell Intl., 1992). \$4 million of fines were for six criminal charges of the Clean Water Act, and these charges stemmed from exceedances of the NPDES permit (counts 5, 6, 7, and 8), improperly spray irrigating water from Pond B-3 (count 9), and the chromic acid spill (count 10).

THE COMPLIANCE AGREEMENT

While the February 22 chromic acid spill was contained on site and did not pose any health risk to the public, there was a high level of public scrutiny of Site operations. On March 16, 1989, EPA officials had gone on record stating that there was "... a need to tighten

controls." (Gottlieb, 1989). The Site's NPDES permit was due to expire in November 1989, and on April 10, 1989 EPA issued a proposed compliance agreement to DOE to modify the NPDES permit. DOE and EPA met to revise the proposed agreement, and EPA sent a revised agreement to DOE on July 18, 1989. This agreement, the NPDES FFCA, modified the terms and conditions of the Site's current NPDES permit with provisions that incorporated changes to NPDES monitoring requirements and required the submittal of three compliance plans. These plans were to address administrative and physical changes to the Site and contained aggressive schedules for submittal. The NPDES FFCA also required submittal of progress reports to EPA which would update the status and schedule of projects within each compliance plan. The net effect of the NPDES FFCA was to enhance the protection of surface waters and, in turn, enhance the protection of down-stream users of these waters. The FFCA met this goal in a timely, quantifiable, and publicly acceptable fashion while still allowing the regulated community some flexibility in determining the scope and timing of required modifications to facilities.

NPDES FFCA PROJECT STRUCTURE

Managing the NPDES FFCA effort presented serious challenges. The operating contractor was directed to begin working the requirements of the NPDES FFCA while it was still in draft form. The operating contractor responded by immediately implementing the enhanced monitoring requirements and formed a team to write the first of the three required compliance plans. This plan focused on evaluating the performance of the Site's WWTP and defining projects required to upgrade performance. The team was composed of members of the operating contractor's functional organization responsible for implementing Clean Water Act requirements. Key personnel from other functional organizations were matrixed as required and the team submitted the first compliance plan on schedule. After this initial success, the team was reorganized as a functional division within the parent organization. Individual project managers were hired or transferred from the parent organization and were tasked with developing the remaining two NPDES FFCA compliance plans. It was recognized that WWTP Upgrades Projects would be a major line item project (estimated schedule: 3 years, estimated cost: \$10.1 million) and should adhere to the disciplined approach to project management established by DOE Order 4700.1, Project Management System.

The original project team transferred control of the WWTP Upgrades Projects to the division responsible for the operation of the WWTP. This division formed a new project team whose initial actions included writing the Project Management Plan and obtaining funds.

The original project team then turned their attention to the two remaining NPDES FFCA compliance plans, one of which addressed source control and surface water protection (the Chromic Acid Incident Plan), the other focussing on characterizing the impacts of past sludge disposal practices (the Groundwater Monitoring Plan). The original project team also represented the Site's operating contractor during ongoing negotiations with the EPA regarding the NPDES FFCA itself, which received final signatures on March 25, 1991. Implementation of these compliance plans began shortly thereafter. A work breakdown structure of the three NPDES FFCA Compliance Plans and their major components is presented in Figure 1.

The WWTP Upgrades Projects implements a series of three instrumentation upgrades projects that were designed to protect WWTP operations from upsets resulting from chemical inflows (Influent Instrumentation), reducing or eliminating the chances of exceeding effluent limitations (Autochlorination/Dechlorination), and improve effluent monitoring capabilities

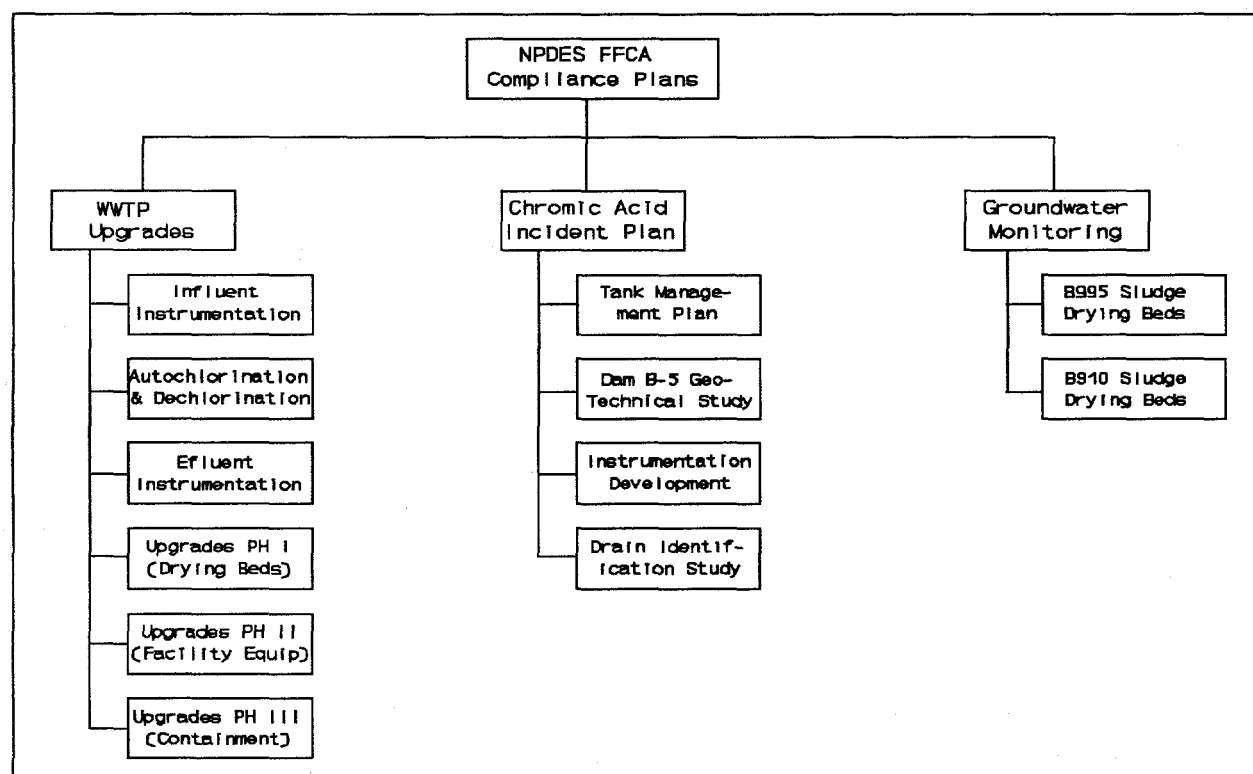


Figure 1. Work Breakdown Structure of the NPDES FFCA compliance plans, EG&G (1995).

(Effluent Instrumentation). The rest of the WWTP Upgrades Projects provided increases in WWTP sludge handling capacity (Phase I Upgrades), facility and utilities improvements (Phase II Upgrades), and meeting anticipated future permit requirements for nitrification/denitrification and spill control (Phase III Upgrades).

The Chromic Acid Incident Plan implements a series of four projects lasting 5 years and costing over \$21 million that are designed to reduce the possibility and impact of future spill events. These projects are focussed on source control and surface water protection that include bulk hazardous chemical storage (Tank Management Plan), a characterization of surface water to define normal and abnormal characteristics (Instrumentation Development), an evaluation of the safety of the Walnut Creek terminal pond dam integrity (Geotechnical Evaluation of the B-5 Dam Structure), and an evaluation of possible sources of hazardous influent to the sanitary sewer system (Drain Identification Study).

The Groundwater Monitoring Plan implemented a three-year, \$.637 million study characterizing groundwater beneath the WWTP sludge drying beds and utilized a phased approach beginning with monitoring and characterization of soil and water in the ground above the water table. This monitoring occurred within, or near, several of the Site's CERCLA Operable Units and all monitoring data is being made available for inclusion in the ongoing CERCLA site characterization efforts.

PROJECT STATUS

By September 1990, all three of the NPDES FFCA compliance plans had been submitted as required on schedule. To date, 75% of the compliance projects required by the three compliance plans have been completed. However, as illustrated in Table 1, there have been some notable schedule slippages, particularly with the WWTP performance upgrades projects. The WWTP performance upgrades projects began in August 1990 and are scheduled to complete in February 1996 (Phase II). Milestones for Phase III upgrades will be addressed during negotiations for the Site's new NPDES permit scheduled to be signed in late 1995. The current estimate at completion is \$14.8 million. The source control and surface water protection projects implemented by the Chromic Acid Incident Plan began in March 1992 and are scheduled to complete in October, 1997. These projects, originally estimated to cost over \$44 million (EG&G, 1991), were significantly descoped and are now projected to cost \$21 million. The sludge drying bed impact characterization project required by the Groundwater Monitoring Plan began in June 1992 and field work was completed in March 1994. This program was considered completed in December 1994 when the final report was delivered to EPA. No schedule was developed for implementation of the Groundwater Monitoring Plan.

FFCA PROJECT	Baseline Date ¹	When Modified	Forecast/Actual Date
WWTP Performance Upgrades ((STP) Compliance Plan)	7/30/90	N/A	7/30/90
Influent Instrumentation	5/90	N/A	5/90
Autochlorination/Dechlorination	3/91	N/A	3/91
STP Effluent	12/91	N/A	12/91
STP Upgrades PH I (Drying Beds Capacity Improvements)	10/92	9/30/92 (3 rd Qtr 92) 3/31/93 (1 st Qtr 93)	3/1/93 4/9/93
STP Upgrades PH II (Facility Equipment & Utilities Upgrades)	10/92	1/28/92 (4 th Qtr 91) 6/30/92 (2 nd Qtr 92) 9/30/92 (3 rd Qtr 92) 12/31/92 (4 th Qtr 92) 3/31/93 (1 st Qtr 93) 6/30/93 (2 nd Qtr 93)	10/93 2/94 7/94 2/95 6/95 2/96
STP Upgrades PH III (Containment, Nitrification/Denitrification) ³			
Source Ctrl, Surface Water Prot. (Chromic Acid Incident Plan)	9/30/90	10/90	11/15/90 ²
Tank Management Plan	11/30/95	4/22/94 (1 st Qtr 94)	11/30/96
Tank Surveillance Program	12/22/92	9/30/92 (3 rd Qtr 92)	6/30/93
Instrumentation Development ³	N/A	N/A	N/A
Geotechnical Evaluation of Dam B-5	8/31/93	N/A	8/31/93
Drain Identification Study	3/31/96	N/A	10/30/97
Sludge Drying Bed Impact Char. (Groundwater Monitoring Plan)	7/90	N/A	7/90 ²

NOTES: 1. For all construction projects, Baseline Date represents the completion of construction activities (i.e., Beneficial Occupancy).
 2. Subsequent modifications were requested by EPA and/or DOE.
 3. Completion dates were never identified due to the developmental nature of these activities and/or the governing regulations.

Table 1. NPDES FFCA compliance plan and compliance project status to date.

LESSONS LEARNED

The original project team had a great deal of success during the scoping and negotiation of the NPDES FFCA that resulted in a win/win situation for both the regulators (EPA) and the regulated community (DOE and the Site's operating contractor). The regulators were subject to intense public and political pressure to "get tough on Rocky Flats", and the NPDES FFCA provided EPA with a mechanism to do just that. The EPA was able

to tighten effluent limitations and monitoring requirements, and to also require the implementation of a series of projects designed to prevent future spills such as the chromic acid spill of February 1989. The regulated community was allowed some flexibility in tailoring the scope and timing of the compliance projects to fit the physical and budgetary constraints at the Site. Key components of the compliance plans were best management practices (BMPs) that until the FFCA, the contractor had never implemented due to funding constraints. In effect, the NPDES FFCA provided the sense of urgency and gravity necessary to obtain funding for the projects. The **lessons learned** are that compliance agreements, when negotiated in good faith by all parties, can result in mutual gains for all parties and that funding requests to implement BMPs will be more successful if they are tied to regulatory compliance agreements.

The project team that inherited the implementation of the WWTP performance upgrades successfully completed the first three of the six compliance projects (Table 1) on schedule. However, the team had problems completing the fourth performance upgrades project, known as the STP Upgrades Phase I (Drying Beds) project. The root cause of this failure has been attributed to a failure to "... realistically plan the Phase I implementation effort and manage to that plan." (DOE, 1993). The team had initially followed the disciplined approach to project management outlined in DOE Order 4700.1 but lost effectiveness when "numerous organization changes in the operating contractor's team and other key departments resulted in a loss of responsibility identification." (EG&G, 1993b). The results hampered the team's effectiveness and, as a result, the project missed the scheduled October 31, 1992 completion date. By August 1993 the project was eleven months behind schedule and 65% over budget. A briefing to DOE (EG&G, 1993b) summed up several root causes as follows; "New personnel, unfamiliar with existing systems or management of design/construction projects in general, could not identify and solve problems. As a result, the management oversight systems in place until 1990/91 collapsed." The **lesson learned** is that the four functions of successful project management; planning, leading, organizing, and controlling, cannot be performed efficiently in an environment where constant organizational change is the norm.

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