ENVIRONMENTAL RESTORATION AND THE NEW EPA STORMWATER REGULATIONS

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ABSTRACT

This paper provides background information on the generation and enforcement of new stormwater regulations issued by the Environmental Protection Agency and the implications of these regulations for sites managed by the U.S. Department of Energy as part of its Formerly Utilized Sites Remedial Action Program (FUSRAP). A case study for one FUSRAP site, the Hazelwood Interim Storage Site in Hazelwood, Missouri, is presented. Permit requirements for the site, the existing compliance scheme, and lessons learned during the permitting process are included in the discussion.

INTRODUCTION

In response to new stormwater regulations issued by the Environmental Protection Agency (EPA) in 1990, the U.S. Department of Energy (DOE) conducted an evaluation to determine whether these regulations would affect activities at DOE facilities, including those managed by DOE's Formerly Utilized Sites Remedial Action Program (FUSRAP). FUSRAP is an environmental restoration program initiated in 1974 to identify and clean up or otherwise control sites where low-activity radioactive contamination remains from the early years of the nation's atomic energy program or from commercial operations causing conditions that Congress has authorized DOE to remedy. The program currently consists of 43 sites in 14 states. Remediation under FUSRAP is performed in accordance with the Comprehensive Environmental Response, Compensation, and Liabilities Act (CERCLA) and the National Oil and Hazardous Substances Contingency Plan (NCP), as applicable and cost effective.

STORMWATER REGULATIONS

Generation and Enforcement of Stormwater Regulations

In 1972, Congress enacted the Federal Water Pollution Control Act (FWPCA), which established the basic framework for federal water pollution control regulation. In 1977, Congress renamed the FWPCA the Clean Water Act (CWA) and changed the regulatory focus to rigorous control of toxic waste pollutants. The objective of the act is to restore and maintain the chemical, physical, and biological integrity of the nation's waters. The principal means of achieving this goal is a system to impose effluent limitations on, or otherwise to prevent, discharges of pollutants into any body of water of the United States. This system includes several basic elements, one of which is the National Pollutant Discharge Elimination System (NPDES) permitting program administered by EPA.

The NPDES program resulted in the issuance of permits for the discharge of process effluent from publicly owned treatment works and manufacturing facilities. Permitted facilities are required to disclose the volume and nature of their discharges and to monitor and report their compliance or noncompliance with the limitations imposed by EPA. NPDES authorizes EPA and citizen enforcement in the event of noncompliance (1).

Between 1978 and 1983, EPA funded research under the National Urban Runoff Program to evaluate the chemical and biological quality of stormwater discharges from a variety of sources. These studies concluded that contamination from stormwater runoff was of concern and needed to be regulated. EPA was given regulatory authority under the CWA to protect the nation's waters from pollutants conveyed in stormwater discharges from point sources; protection was to be implemented through the NPDES program (2). Regulations pertaining to the permitting of stormwater discharges were published by EPA on November 16, 1990 (55 CFR 47990 et seq). These regulations required that permits be obtained by October 1, 1992, for stormwater discharges from industrial facilities and from municipal stormwater sewer systems that discharge directly to waters of the United States.

Types of Permits

Under terms of the CWA, EPA may authorize a state to administer an NPDES program if the state chooses to do so. The state is then responsible for issuing permits. The state program must be consistent with federal requirements, and may be more stringent. Currently, 39 states or territories are authorized to, at a minimum, issue NPDES permits for municipal and industrial sources. In six of these states, EPA issues permits for discharges from federal facilities.

If a facility discharges stormwater to a combined municipal sewer system (i.e., a sewer system that conveys both stormwater and sanitary waste to a municipal wastewater treatment facility), an NPDES permit is not required. However, if the facility discharges stormwater directly to waters of the United States or to a separate storm sewer that conveys stormwater directly to waters of the United States, a permit is required.

Three types of NPDES permit applications are available to industrial facilities: a general permit, a group permit, or an individual permit. A general permit is granted on a case-by-case basis. If a general permit was not previously issued for a site, the facility must elect to apply for either a group or an individual permit. The group application allows similar industries with sufficiently similar stormwater discharges to submit a single application as a group. This approach is usually a cost-effective and time-saving alternative to preparing and submitting individual permit applications. However, states with NPDES programs authorized by EPA may establish requirements that are more stringent than EPA requirements and may require industrial facilities to submit individual applications rather than participate in a group application.

IMPLICATIONS FOR FUSRAP

Summary of FUSRAP Program Status

Because activities at many DOE sites are classified as industrial activities (as defined by the Standard Industrial Classification), the sites were evaluated to determine the applicability of the new stormwater regulations. At the time of the evaluation, FUSRAP consisted of 33 sites in 13 states; however, only seven sites were owned or leased by DOE. When a facility is owned by one entity but operated by another it is the operator's duty to obtain a permit [40 CFR Section 122.21(b)]; therefore, it was determined that DOE was not required to submit a stormwater discharge permit application at sites where DOE simply provides support for remedial activities and another entity operates the facility. Based on this determination, only the seven sites listed below were evaluated further:

- Hazelwood Interim Storage Site (HISS), Hazelwood, Missouri;
- Maywood Interim Storage Site (MISS), Maywood, New Jersey;
- Middlesex Sampling Plant (MSP), Middlesex, New Jersey;
- New Brunswick Site (NBS), New Brunswick, New Jersey;
- Wayne Interim Storage Site (WISS), Wayne, New Jersey;
- Colonie Interim Storage Site (CISS), Colonie, New York; and
- Niagara Falls Storage Site (NFSS), Lewiston, New York.

Screening Process for FUSRAP Stormwater Permit Applications

The first step in the screening process was to identify DOE sites that must comply with the notification requirements of 40 CFR Section 122.26. This regulation requires operators of certain facilities to notify EPA if discharge from the site enters a municipal separate sewer system (MSSS). Notification is required only in cities or incorporated municipalities with populations in excess of 100,000; therefore, operators of facilities with stormwater discharge through large- and medium-size MSSSs [defined in 40 CFR Sections 122.26(b)(4) and (7), respectively] are required to make the notification. Cities or incorporated municipalities that fall within these definitions are listed in 40 CFR Section 122, Appendixes F, G, H, and I.

Review of the applicable appendixes showed that DOE has facilities located in the vicinity of only two MSSS authorities referenced in the regulation: CISS in Colonie, New York, and HISS near St. Louis, Missouri. Although CISS is located in Colonie, the property borders the city limits of Albany, and stormwater from the site discharges into the Albany MSSS. HISS is not within the city limits of St. Louis and has no point sources that can be characterized as MSSS outfalls. The site is served by stormwater drainage systems of other smaller municipalities that do not fall within the regulatory definition of a large- or medium-size MSSS authority. However, the stormwater regulation was determined to be applicable to HISS because an individual NPDES permit for HISS was issued in 1990.

A second screening step required the identification of outfalls at all relevant sites. An outfall, as defined in 40 CFR 122.2, is a point source where an MSSS discharges to waters of the United States. This definition does not include (a) open conveyances connecting two MSSSs or (b) pipes, tunnels, or other conveyances that connect segments of the same stream or other waters of the United States and that are used to convey waters of the United States. An evaluation of site characteristics identified outfalls at all of the sites being screened except NBS and MISS, where only sheet-flow runoff occurs. The absence of point-source outfalls eliminated the need to file permit applications for these two sites.

Based on review of the EPA regulations and an engineering evaluation of the stormwater drainage system at each site, it was determined that CISS is the only site subject to the MSSS notification requirements of 40 CFR Section 122.26 and that four other sites are subject to the new NPDES stormwater requirements because of outfalls identified. On September 30, 1992, DOE submitted stormwater discharge permit applications to the State of New York for CISS and NFSS, and to the State of New Jersey for WISS and MSP. The permit for HISS was renewed in February 1992.

CASE STUDY

Site Description

HISS is a 2.1-ha (5.3-acre) site that is leased by DOE for the interim storage of soils contaminated with low levels of radioactivity. The site was previously used for storage of uranium ore residues and uranium- and radium-bearing process wastes generated by a plant in St. Louis from 1942 through 1957 under contract with the Atomic Energy Commission and its predecessor, the Manhattan Engineer District. HISS was assigned to DOE as part of the decontamination research and development project authorized by Congress under the 1984 Energy and Water Development Appropriations Act. The site was added to the EPA National Priorities List in September 1989.

Three office trailers, a storage building, a decontamination facility, miscellaneous maintenance equipment, and 18 groundwater monitoring wells are located on the site. Also onsite are two stockpiles of radioactively contaminated soil covered with geotextile material secured with steel cables and a geogrid fabric. The piles have surface areas of approximately 5,546 and 1,486 m^2 (59,700 and 16,000 ft^2) (Fig. 1). Stormwater discharges from the site through two outfall structures (Fig. 2). The site is fenced to restrict public access.

In June 1990, DOE and EPA Region VII signed a federal facilities agreement (FFA) for the St. Louis sites, including HISS. Part of the intent of an FFA is to ensure that the environmental impacts associated with past and present activities at the site are thoroughly investigated and that appropriate remedial action is taken, as necessary, to protect public health or welfare and the environment, in compliance with all federal requirements. In accordance with the FFA and DOE General Design Criteria (3), a stormwater permit was obtained at HISS on December 28, 1990. Specifically, DOE General Design Criteria invoke CWA requirements for the development and implementation of stormwater management systems, which "shall be cost effective and shall provide flood protection commensurate with the value and operation requirements of the facility to be protected" (3).

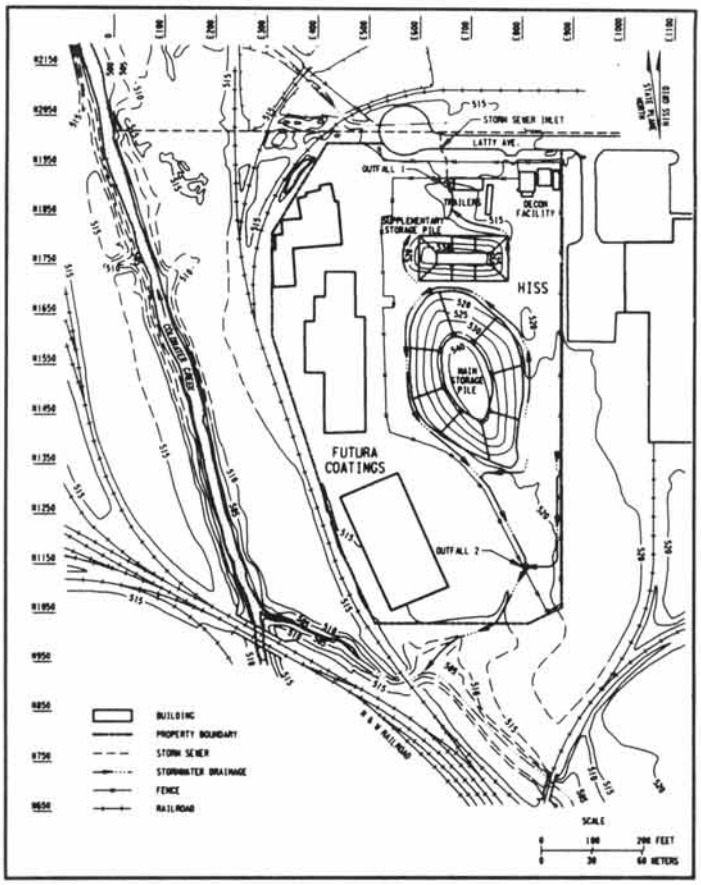

Fig. 1. Stormwater drainage at HISS.

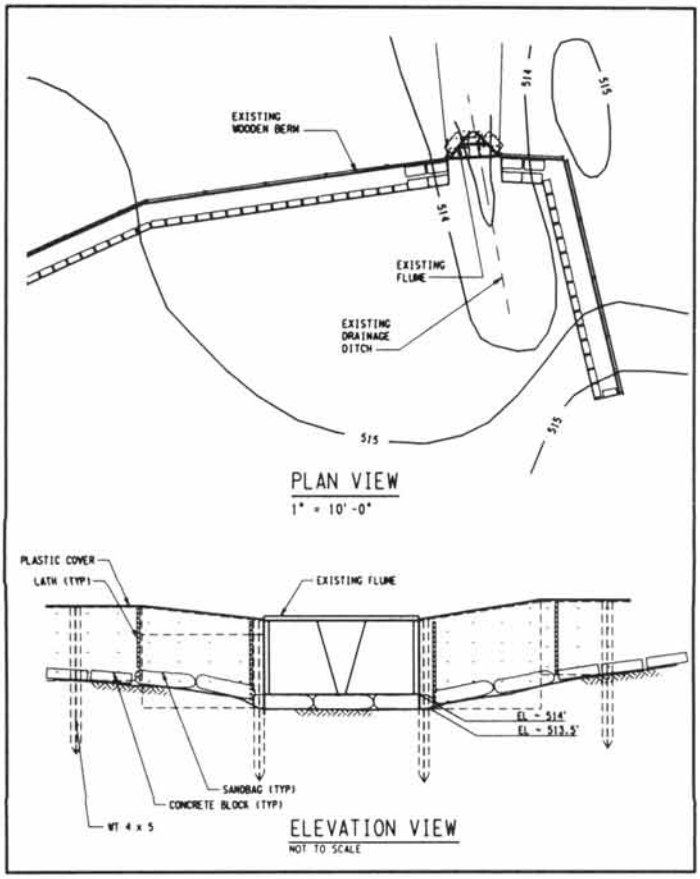

Fig. 2. Stormwater monitoring structure.

Monitoring Requirements at the Site

The State of Missouri administers its own NPDES program and was responsible for issuing the permit (MO-0111252) obtained by DOE for HISS in December 1990; the permit was renewed in February 1992 and will expire on December 31, 1994. Permit requirements include collection of composite samples to be analyzed for various indicator chemical parameters [settleable solids, total organic carbon (TOC), total organic halides (TOX)] and for specific radionuclides that may be contaminants at the site (radium-226, radium-228, thorium-230, thorium-232, total uranium, and lead-210). These data are submitted to the Missouri Department of Natural Resources (MDNR) in quarterly monitoring reports.

Engineering Strategies

Hydraulic structures were installed at the two onsite outfalls such that each can accumulate approximately 15 cm (6 in.) head of water (Fig. 2). The configuration of these structures allows measurement of runoff, provides a sampling station, and enhances erosion control. An automatic flow meter logs any point-source runoff. Two 0.7-m (2.5-ft) H-flumes installed at the collection points of the drainage areas have a wide range of flow measurement capability [0.05 to 547 L/s (0.0018 to 19.3 cfs)] and are capable of handling up to a 100-year maximum peak flow and a minimum flow result of a 0.25-cm (0.1-in.) storm event distributed over a 24-hour period. Limitations of the automatic flow meter, however, allow measurements of flow rates only as low as 2.5 L/s (0.09 cfs) within a maximum permissible deviation of less than ±10 percent from the true discharge rates.

Monitoring Strategy

Several new requirements were added to the renewed NPDES permit issued in 1992, one of which was the collection of 24-hour composite samples rather than grab samples. Because field personnel operate the stormwater management system, it was necessary to provide site-specific training in collection of composite samples and general coordination of related activities. Development of a procedure to comply with the new sampling requirement proved to be somewhat difficult because the permit does not specify a type of composite sample to be collected, and there is no documentation regarding collection of composite samples to comply with a state permit that has already been issued.

According to MDNR permit application instructions, composites are to consist of at least eight grab samples collected at periodic intervals during the operating hours of a facility over a 24-hour period (4). The aliquots are to be combined flow-proportionally. Either the time interval between each aliquot or the volume of each aliquot must be proportional to either the stream flow at the time of sampling or the total stream flow since the collection of the previous aliquot. It is important to note that these instructions target primarily industrial and commercial operations, many of which have continuous process streams and plant effluent. However, for a site such as HISS, where stormwater is the primary effluent and is intermittent, 24-hour monitoring is an extreme and unnecessary strategy. Limitations on personnel staffing at the site over a full 24-hour period and limitations on financial resources make a 24-hour monitoring approach infeasible.

EPA instructions for the collection of flow-weighted stormwater runoff composites for permitting purposes recommend collection of grab samples every 20 minutes for a period of 3 hours or the duration of the storm, whichever is shorter. According to EPA, the preferred method of preparing flow-weighted composites is to combine aliquots collected at regular time intervals using volumes proportional to the flow rate occurring at the time the aliquot was collected (5). Composites may be prepared manually from separate aliquots or may be collected and composited using an automatic sampler.

Because manual sampling is necessarily labor intensive and time consuming, sampling events may require long hours for site personnel. Automatic sampling would alleviate some of the potential problems with 24-hour sampling; however, the current permit requirement for collection of samples for analysis for TOX precludes use of an automatic sampler. Because the potential exists for off-gassing, with subsequent loss of volatile components of TOX, grab samples must be collected separately in small amber glass bottles with impermeable caps and composited by the analytical laboratory just before the samples are analyzed. For this reason, manual sampling over a 3-hour period and manual compositing is the most feasible approach at this time. However, if monitoring trends indicate that TOX is not a contaminant at the site, a permit revision eliminating the TOX requirement can be requested, and if granted, would make use of automatic samplers feasible.

Another problem associated with collection and analysis of samples at HISS is the need to analyze for certain parameters within specific holding times. For example, analysis for biological oxygen demand (BOD) must be performed within 48 hours of sample collection. To meet this time restraint, samples must be shipped to the analytical laboratory by an overnight delivery service. In Hazelwood, the delivery service accepts packages until 10:00 p.m.; therefore, sampling, compositing, packaging, and labeling must be completed before that time. In addition, many laboratories are not staffed on weekends, and special arrangements must be made for receipt of samples shipped for weekend delivery.

DOE is requesting permit modification from MDNR, offering technical justification for using the 3-hour sampling strategy recommended by EPA. In general, results of 3-hour sampling could be expected to be more conservative than those obtained from 24-hour sampling because greater concentrations of contaminants are washed away during the early hours of the runoff event. Later runoff essentially acts to dilute the higher first-flush concentrations of the contaminants. From an implementation standpoint, 3-hour monitoring is a more technically feasible and practical approach than is 24-hour monitoring, and, as such, it is an approach that could provide higher quality data.

CONCLUSIONS

Requirements for compliance with the terms of an NPDES permit vary depending on site-specific conditions. Coordination with regulators in the early stages of the permitting process can help identify potential problems at a site and alternatives that may be considered. Initial activities should focus on providing technical justification to the regulators during the development of a proposed compliance scheme. Compliance also requires coordination and communication among the various organizations responsible for implementing the monitoring strategy developed for a site.

REFERENCES

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