

## **Developing a Stormwater Auditing Program for Construction Sites**

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### **Biographical Sketch:**

Jennifer Keyes has spent the last 7 years assisting commercial, municipal, industrial and developer clients with the management of stormwater from their construction sites. With an M.S. in hydrology and a B.A. in biology, Jenn also specializes in environmental site assessments (ESAs), stormwater, best management practices, regulatory permitting, bioassessments and water quality issues including watershed management. Jenn is a Colorado Department of Transportation Erosion Control Supervisor and a Certified Professional in Erosion and Sediment Control. She serves as an Advisory Committee member for the Mountain States Chapter of the International Erosion Control Association.

### **Abstract:**

This presentation is a nuts-and-bolts account of the benefits and requirements of a successful auditing program for stormwater from construction sites. Covered topics include: what deficiencies in Stormwater Management Plans and BMP implementation are commonly cited by regulators; samples of fines levied; the key components and considerations of an audit program; and regulatory requirements for a construction site stormwater auditing program. Case studies from various industries are described.

### **Keywords:**

**Stormwater, Audits, Compliance, Construction and BMP's**

# Developing a Stormwater Auditing Program for Construction Sites

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## Background and Purpose

A growing number of regulatory programs on the national, state, and local levels are aimed at reducing the potential for sediment to enter receiving waters, with specific regulations aimed at the construction industry. Although regulatory programs such as Phases I and II of the National Pollutant Discharge Elimination System (NPDES) have been in effect since 1992 and 2003, respectively, some of the newer municipal and state regulations have been rapidly changing. In addition, USEPA's proposed Effluent Limitations Guidelines have the potential to cause significant changes to the way stormwater is managed on construction sites. With regulations from multiple levels of government and evolving regulatory requirements, maintaining compliance with permit requirements can require a detailed understanding of existing regulations and diligent tracking of proposed or newly adopted changes.

One strategy that many permittees have adopted to help ensure that they are complying with all of their stormwater permitting requirements is to develop a stormwater auditing program. This paper discusses many of the issues and resources related to developing effective stormwater auditing programs for construction sites. Examples are provided from auditing programs from the homebuilding industry, oil and gas development, and a state transportation group.

Frequently, permittees believe that they are in compliance only to discover after an official inspection of their site that they are not. Some of the most common violations that have been issued recently (2007 to 2009) in Colorado are listed below:

### Stormwater Management Plans (SWMPs) Deficiencies

Failure to prepare and maintain a complete and accurate SWMP, including:

- Inspection records not being kept.
- Did not provide a description of the proposed sequence of major activities.
- Site map did not include the material storage and stockpile area that was observed during the onsite inspection.
- Area to undergo clearing/excavation/grading was not clearly and accurately defined.

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- Description of which BMPs will be implemented at each phase of construction was not included.
- Did not provide an estimate of the total area of the site.
- Did not provide an estimate of the percent of pre-project vegetative ground cover.
- BMPs in use in the field were not listed or described in the SWMP.
- A copy of the SWMP was not retained onsite.
- SWMP did not contain procedures for materials handling and spill prevention.

#### Best Management Practices (BMPs) Deficiencies

Failure to implement and/or maintain functional BMPs, including:

- Silt fence had fallen down and gaps were observed under the silt fence.
- Silt fence was buried with sediment.
- Silt fence did not extend across the entire disturbed area.
- Support stakes for the silt fence were installed on the upgradient side of the fencing fabric.
- Silt fence had broken stakes and was falling over.
- Only one stake anchored the hay bale in the dike (instead of 2).
- Erosion control blanket was torn and not fully anchored.
- Building materials had been placed on top of wattles.
- Wattles showed signs of wear and tear from vehicles driving over them.
- Wattles were not trenched.
- Torn straw wattles.
- Straw wattles present but not installed.
- Straw wattles were not installed/maintained correctly.
- Support backers and 2x4 planks for inlet protections were not observed in place.
- Pollutant-contaminated soils had not been cleaned up.

Some of the fines after settlements were made with the State of Colorado associated with the stormwater violations listed above are listed in Table 1.

**Table 1**  
**Colorado Department of Public Health and Environment Settlement**  
**Agreement – Stormwater Discharge Permit Actions**

<b>Year</b>	<b>Company Type</b>	<b>Monetary Fine</b>	<b>Additional Fees/Requirements</b>
2009	Home Improvement Retailer	\$15,750.00	
2009	Construction - Oil and Gas Production	\$15,375.00	
2009	Construction - Oil and Gas Production	\$22,500.00	
2009	Construction - Pipeline for Natural Gas	\$6,000.00	\$30,000.00 to SEP project \$24,000.00, donated to a local Fire Dept.
2009	Construction - Residential Housing Development	\$21,089.00	\$114,447.00 to SEP project.
2009	Construction - Commercial Development	\$50,000.00	
2009	Construction - Clear and Grade Plots for Oil/Natural Gas Resources	\$40,338.00	\$125,946.00 to EBP/SEP projects.
2008	Construction - Residential	\$11,500.00	
2008	Construction - Residential	\$21,000.00	
2008	Construction - Public Park	\$7,000.00	
2008	Residential Community	\$5,250.00	
2008	Construction - Residential	\$12,750.00	
2008	Construction - Public Parks	\$19,500.00	
2008	Construction - Residential	\$27,147.00	
2008	Construction - Subdivision	\$6,750.00	
2008	Construction - Residential	\$13,500.00	
2007	Construction - School	\$10,000.00	
2007	Construction - Commercial Development	\$4,500.00	
2007	Construction - Residential	\$10,500.00	
2007	Construction - Residential	\$5,937.50	
2007	Construction - Property	\$9,750.00	
2007	Construction - Residential	\$13,500.00	
2007	Construction - Commercial Development	\$8,000.00	
2007	Construction - Soccer Field	\$7,000.00	
2007	Construction - Commercial Development	\$4,500.00	
2007	Construction - Parking Lot	\$5,937.00	

Source: <http://www.cdphe.state.co.us/wq/enforcement/index.html>

Notes:

CDPS – Colorado Discharge Permit System  
 SEP – Supplemental Environmental Project  
 EBP – Environmentally Beneficial Project

Although auditing programs are not required by the Colorado General Permit for Stormwater Discharges Associated with Construction Activities (beyond routine and post-event inspection requirements), a major potential benefit of implementing an auditing program is that a number of states will give consideration to voluntary stormwater auditing programs when assessing permit compliance and determining fines that will be levied for instances of non-compliance. Adoption of an auditing program is an option that permittees facing potential fines may wish to consider to reduce the total amount of the fine and to improve compliance in the future.

### **Developing an Audit Program**

There are many decisions that go into developing an effective auditing program, and just because a specific auditing program is effective for one permittee does not mean it will necessarily be effective for others. Auditing programs should be tailored to meet site-specific needs of the permittee. In addition, it is useful to review recent Notices of Violation (NOVs) in the jurisdiction issuing the stormwater permit to determine if there are “hot button” issues that are widely cited as violations. Representative issues that must be addressed to create an effective auditing program include the following:

- Internal versus external auditing—will audits be conducted by the permittee’s staff or will a third party be hired? If permittee staff will be used, will they be familiar with the projects audited, perhaps working on a similar project to the one they are auditing, or will they be somehow removed?
- Will audits focus on paperwork (SWPPP, inspections, redlined drawings, maps, etc.), field implementation of BMPs or both?
- What type of documentation will be used for audits? Will photographs be included? Establishing a versatile audit checklist form and “test driving” the form on several sites is an important step early in the process.
- How will auditing results be reported and what entities will be informed of results? What level of detail of reporting will be provided (i.e. site-by-site/BMP-by-BMP versus summary overview of audit findings)?
- Will audits be unannounced or will operators be given advanced notice that an audit may occur?
- What sort of internal mechanism will the permittee use to respond to negative findings in the audits? Fines for operators?
- If multiple auditors will be used to cover different projects for the same permittee, how can consistency between different auditors best be achieved?

## **Case Studies/Example Stormwater Audit Programs**

### Example # 1 –Homebuilding Company

A national homebuilding company hired a team of third party consultants to perform audits across the nation. Bi-annually, local homebuilding offices were selected to be audited by the national headquarters for stormwater compliance. Standard forms were developed for the audits to provide consistency and the team of auditors met to go over the forms prior to starting a round of new audits to ensure the team was consistent. Standard forms were relatively general following standard USEPA guidelines for stormwater compliance. Auditors pulled applicable state and local requirements for the area they were auditing prior to the local visits. These visits were unannounced. Auditors contacted the local site managers and, if applicable, their environmental manager. Together the auditors and managers selected three of the projects in the area that had active stormwater permit coverage and performed a document review of the stormwater pollution prevention plan (SWPPP), the paperwork documentation including inspections and BMP site maps, and toured the site to evaluate field implementation of the BMPs. Audits findings were reported back to the national headquarters where internal “fines” were assessed when audit results indicated deficiencies.

### Example #2 – Oil and Gas Company

An oil and gas company developed an audit form that covered three areas:

- SWPPP review
- Documentation (e.g., inspections and field drawings)
- Field/Site review

The audits were based on state permit requirements and USEPA audit guidelines. The company developed a SWPPP template to use with all of their new projects. This template followed the state permit but prompted for site-specific information in appropriate places. The company underwent an official inspection at one of their sites. There were no identified deficiencies found with their written SWPPP so the company opted to gear their self auditing program toward their documentation and field implementation. Their self auditing program is performed biannually in the fall and spring. The timing allows for a full evaluation to ensure BMPs are ready for winter conditions when access in this part of the country can be difficult and in the spring when BMPs typically require increased maintenance. All sites with active permits are evaluated during these audits. Action items and long-term recommendations are made during the audit and at a subsequent close out meeting with the stormwater team and upper management. This allows for critical buy-in to the process from the company. A third party performs the audit, however, the local stormwater field team and the regional stormwater regulatory personnel attend.

### Example # 3 – State Transportation Department

A state transportation department developed a “mini- audit” that is performed as a Regional Erosion Control Assessment Team (RECAT) inspection.

The primary objective of the RECAT program is to perform inspections of construction projects in order to ensure compliance with permits (<http://www.dot.state.co.us/environmental/envWaterQual/RECAT.asp>). RECAT inspections are performed by trained transportation department staff. The RECAT program works to prevent, identify and resolve stormwater management issues associated with construction activities. A typical RECAT inspection includes the following:

- *Notification-Notification of a RECAT inspection is no more than 2 working days before the site visit;*
- *Pre-inspection meeting-The purpose of the pre-inspection meeting is to communicate the objectives for the RECAT inspection and provide the project personnel with an opportunity to communicate project status, progress, and challenges associated with the project. During the meeting, the [stormwater management plan \(SWMP\)](#) notebook will be reviewed. Administrative findings are identified at the end of the pre-inspection meeting;*
- *Field inspection-The construction site perimeter, all disturbed areas, material and/or waste storage areas that are exposed to precipitation, stormwater discharge location, and locations where vehicles access the site are inspected for evidence of, or the potential for, pollutants leaving the construction site, entering the stormwater drainage system, or discharging to state waters. All erosion and sediment control practices identified in the SWMP are evaluated to ensure that they are maintained and operating correctly;*
- *Post-inspection meeting-The RECAT team meets with the project personnel to discuss the issues identified and provide guidance regarding remedies. During the post-inspection meeting, the team also provides the project personnel with a list of action items that must be started immediately. Evidence of completion of the action items must be submitted to the RECAT inspectors within 3 business days;*
- *Distribute summary of corrective actions and assessment report-The RECAT assessment report provides further clarification of and the basis for the corrective actions communicated during the inspection. The report is prepared and delivered to the transportation department project manager within 2 working days of the inspection; and*
- *Corrective actions-Corrective actions need to be addressed as soon as possible, immediately in most cases.*

All three of these example programs offer various means and methods of developing a self-auditing stormwater program. This type of auditing program should be tailored to a company’s specific needs and areas that may need improvement.

## State and Federal Guidance

Several state and federal agencies have pilot programs and guidance on developing stormwater audit programs. In the State of Colorado, a pilot program, **Colorado Stormwater Excellence Program (CSEP)** was developed in March 2005 in order to create a public/private partnership in which participants voluntarily implement a stormwater management plan which exceeds permit requirements. The pilot program lasted four months.

Components of the CSEP:

- The report was broken into four tasks: “(1) Ensure consistency of current program with components of an Emergency Management System (EMS), (2) Implement an EMS-based program at construction sites, (3) Collect, analyze, and report data from participating construction sites, and (4) Develop an initial draft guidance document for implementation of an EMS-based program for construction sites.”
- “Stormwater Risk Management, Inc. (SRMI), acting as the construction reviewer, performed monthly initial third-party inspections at intervals of 30 days. Five business days later a follow-up inspection was performed to evaluate and record the participant’s response to the initial finding.”
- The pilot program is based on EMS elements, but can be differentiated because it does not address “all environmental concerns within an organization,” instead it is tailored to the construction industry in order to help them comply with “state, federal, and municipal stormwater quality requirements.”
- Following implementation in an “established organizational structure” the pilot program results in increased stormwater compliance improvements on construction sites.
- There were five principles to the pilot program: (1) *Corporate Commitment*- the company needs environmental policies in order to prevent pollution and comply with environmental regulations. (2) *Pollution Prevention and Compliance Assurance*-prioritize pollution prevention approaches by creating an “industry sector standard systems and tools that fit within the CSEP-pilot guidelines.” (3) *Measurable Results and Continuous Improvement*- Administrators regularly assess progress towards environmental goals. (4) *Accountability Structures*- Administrators need to “ensure full accountability of environmental functions throughout all program levels.” (5) *Pilot Principle*- Need to meet pilot guidelines

Results:

- The CSEP program is still relatively limited in its reach and has not been widely embraced in Colorado (implementation so far has only been as a pilot stage).
- The report concluded that if the program was properly expanded, it would significantly improve stormwater construction permit compliance.



- Benefits:
  - “The outside and relatively unbiased third-party inspection process is one element that supports the effectiveness and credibility of the environmental impact scoring, which in turn supports the performance summary reports that are important in creating the high level of accountability that is needed for the program to succeed.” he third party inspector is crucial because without it:
  - “Many of the important elements of the current program would be relatively ineffective and yield results that would lack credibility.”
  - Performance scores are standardized.
  - If a program like this is implemented it would allow state enforcement inspections to be prioritized (fewer inspections of companies following the CSEP program) which could minimize the resources for future regulatory enforcement.
  - A combination of public and private partnerships can be used to improve permit compliances.
  - Industrial companies would save “financial resources that would have been required to create their own compliance program of equal effectiveness, as well as through improved BMP planning and utilization.”
  - The pilot program was designed to support MS4 efforts.
  
- Concerns
  - One of the pilot participants suggested that the “role of the private consultant” that administered the program might be seen as financially motivated rather than motivated to improve compliance. This might discourage other firms from working with this program. To avoid this perceived conflict, a public company/or state office could be an alternative.
  - “Many of the criticisms that pilot participants had of the program were related to the high cost of involvement in both money and manpower, and the lack of tangible benefits other than achieving compliance. In the highly competitive construction industry, budgeting for stormwater compliance costs that are higher than your competition when bidding on a project could result in the loss of that program and of substantial revenues.”
  - The companies in the pilot program were usually unconcerned with long term success.
  - Most of the companies in the pilot program did not allocate sufficient budgets to support the levels of BMP implementation, inspections and documentation deemed necessary for a high level of compliance.

USEPA has created a planning guide, “Managing Your Environmental Responsibilities” (MYER), which is a planning guide for construction and development (<http://www.cicacenter.org/links>) which is a useful planning tool and can also be used to help develop a stormwater audit program. The MYER guide contains checklists for USEPA’s construction general permit (CGP) as well as a stormwater self-audit checklist. The check-list starts with some background information for the site and the auditor. Additionally, the check-list contains eight questions:

1. As described in the SWPPP, are the appropriate measures in place to control pollutants in stormwater discharges (e.g., BMPs as silt fencing)? List the control measures and observations.
2. As described in the SWPPP, are the structural practices (e.g., earth dikes and drainage swales) in place to divert flows from exposed soils, to store flows, or to otherwise limit runoff and the discharge of pollutants from exposed areas?
3. Are there any additional BMPs that need to be used (e.g., for any exposed areas)?
4. As described in the SWPPP, are the site practices in place to prevent stored materials (including solid, building, and waste materials) from being discharged into waters of the United States (except as authorized in the Section 404 permit)?
5. Are the site practices listed in the SWPPP in place to minimize off-site vehicle tracking of sediments and generation of dust?
6. Are roadways clear of debris (e.g., no off-site vehicle tracking)?
7. Are there any exposed litter, debris or chemicals? Check the following areas: equipment washing, maintenance, concrete washout, and site drainage locations.
8. As described in the SWPPP, are the appropriate measures in place to control pollutants in stormwater discharges with respect to erosion and sediment?

This type of guidance document and checklist can be used to develop industry or project specific audit forms.

## **Conclusions**

Developing a stormwater audit program can allow an organization to identify areas that need improvement quickly. These programs should be tailored to specific needs of an industry and must have upper management buy-in. The programs may appear to initially increase stormwater management costs. However, in the long-term these programs often reduce the potential for violations, increase the efficiency of stormwater programs, and increase communication on projects.

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