COMPENDIUM OF BEST MANAGEMENT PRACTICES FOR ENVIRONMENTAL COMPLIANCE AND STEWARDSHIP AT HIGHWAY TRANSPORTATION MAINTENANCE FACILITIES

Requested by:

American Association of State Highway and Transportation Officials (AASHTO)

Standing Committee on the Environment

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LIST OF ACRONYMS

AASHTO	American Association of State Highway and Transportation Officials
AMS	Asset Management System
BMP	Best Management Practice
Caltrans	California Department of Transportation
CESQG	Conditionally Exempt Small Quantity Generator
CFR	Code of Federal Regulations
DEC	District Environmental Coordinator
DelDOT	Delaware Department of Transportation
DOT	Department of Transportation
EMS	Environmental Management System
EPA	Environmental Protection Agency
GDOT	Georgia Department of Transportation
HDOT	Hawaii Department of Transportation
INDOT	Indiana Department of Transportation
IVM	Integrated Vegetation Management
MaineDOT	Maine Department of Transportation
MassHighway	Massachusetts Department of Transportation
MDOT	Michigan Department of Transportation
MDSHA	Maryland State Highway Administration
MDT	Montana Department of Transportation
MdTA	Maryland Transportation Authority
MODOT	Missouri Department of Transportation
NCHRP	National Cooperative Highway Research Program
NDDOT	North Dakota Department of Transportation
NHDOT	New Hampshire Department of Transportation
NYSDOT	New York State Department of Transportation
ODOT	Oregon Department of Transportation
OHWL	Ordinary High Water Line
POTW	Publicly Owned Treatment Works
RCRA	Resource Conservation and Recovery Act
SCOE	AASHTO's Standing Committee on the Environment
SHARCS	State Highway Administration Regulatory Compliance System
SOP	Standard Operating Procedure
SPCC	Spill Prevention, Containment, and Countermeasures
TRB	Transportation Research Board
TDOT	Tennessee Department of Transportation
TXDOT	Texas Department of Transportation
UDOT	Utah Department of Transportation
VDOT	Virginia Department of Transportation
VOC	Volatile Organic Compound
WSDOT	Washington State Department of Transportation
WYDOT	Wyoming Department of Transportation

Abstract

This report documents and presents the results of a study of environmental best management practices performed at highway maintenance facilities. Information about best management practices (BMPs) was obtained through surveys and interviews with agency personnel and a literature review. Participants self-selected BMPs performed at their maintenance facilities for a range of practices, such as vehicle washing, hazardous waste management, and animal carcass management. The research team then applied the criteria of cost savings, time savings, and effectiveness at meeting regulatory obligations and preventing pollution to these BMPs, and compared the results in order to identify BMPs. The results were compiled into the BMP Compendium to be used as a resource by highway transportation maintenance managers.

Executive Summary

The commitment by most state transportation agencies to environmental stewardship is demonstrated on a daily basis through their compliance with federal, state, and local environmental regulations as well as their proactive pollution prevention activities at highway maintenance facilities located throughout their respective states. These agencies are constantly seeking new ways of fulfilling environmental requirements, and enhancing environmental practices and relatively few sources of information are available that address environmentallyrelated activities which occur at maintenance facilities.

To help fill this information gap, the American Association of State Highway and Transportation Officials (AASHTO) recognized that transportation maintenance managers would benefit from of the development of a compendium of environmental best management practices (BMPs) performed at transportation maintenance facilities throughout the United States and analogous agencies in Guam and Puerto Rico. This Compendium documents these BMPs.

The term "BMP" used in this BMP Compendium is defined as any program, technology, process, operational method, measure, or device which controls, prevents, removes, or reduces pollution in a manner which has been shown to meet regulatory requirements and save time, reduce costs, or improve effectiveness. As this BMP Compendium shows, state highway agencies have adopted numerous BMPs to address the range of activities at maintenance facilities.

The Compendium includes 19 major topics addressed by BMPs. These topics, in order as presented in the survey and in this BMP Compendium, are as follows:

- Vehicle fluid management
- Vehicle and equipment washing
- Waste aerosol can collection and disposal
- Line striping paint waste management
- Universal waste management
- Employee training
- Documentation/recordkeeping
- Oil/water separator management
- Bulk material stockpiling

- Hazardous waste management
- Street sweeping waste management
- Container management
- Material inventory control
- Emergency response
- Pollution prevention techniques
- Storm water management
- Vegetation management
- Air pollution emission reduction
- Animal carcass management

The BMP Compendium also includes an "other" category for other BMPs identified by the Departments of Transportation (DOTs) that could not be categorized into any of the 19 categories.

The research team used a web-based survey and interviews to capture respondent input. In the survey and interviews, each participating DOT was asked to self-select BMPs performed at any of their maintenance facilities. A total of 52 invitations were sent requesting participation and a total of 22 DOTs accepted and provided information about their BMPs. Each geographic area of the United States was represented by at least one participating DOT. In conjunction with the results of a literature review performed by the research team, the information from participating DOTs served as the basis for this BMP Compendium.

The BMPs identified from the surveys, interviews, and literature review are summarized in Table ES-1 by topic. As evident in the table, survey respondents practice a variety of BMPs. Where possible, the research team identified benefits of implementing BMPs regarding cost savings, time savings, or effectiveness at complying with regulations or preventing pollution.

	BMP Selected Due To:		
	Cost	Time	
BMP (Implementing DOT)	Savings	Savings	Effectiveness
Vehicle Fluid Management			
Perform pre-trip vehicle inspections (ODOT, NHDOT, and			✓
WYDOT)			
Perform preventative vehicle maintenance (ODOT)	✓	✓	✓
Perform maintenance indoors and on impervious surfaces			✓
(ODOT)			
Use drip pans during vehicle fluid changes and during vehicle			✓
storage (ODOT, MDSHA)			
Consolidate petroleum products into one container to reduce	✓		✓
handling and the number of potential spills or leaks (Multiple			
DOTs)			
Routinely inspect vehicle storage areas (ODOT)			✓
Drain vehicle fluids or tie up or plug hoses during long-term			✓
storage (MDOT)			
Store vehicles in covered areas and on impervious surfaces away			✓
from storm water conveyances and water bodies (ODOT)			
Store waste fluids in clearly marked or color-coded containers			✓
(Multiple DOTs)			
Recycle waste fluids (TDOT)	✓		✓
Puncture and drain oil filters for 24 hours (Multiple DOTs)			✓
Consolidate waste petroleum products (INDOT)	✓	✓	
Burn waste oil for heating purposes (NHDOT, MaineDOT, MDT)	✓		
Seal floor drains which lead to septic systems (TDOT)			\checkmark
Seal shop floors and use dry methods for all shop floor cleaning at			\checkmark
all facilities (TDOT)			
Perform vehicle maintenance at fewer facilities in order to reduce	\checkmark		✓
regulatory requirements at those facilities which no longer			
perform vehicle maintenance (TDOT)			
Vehicle and Equipment Washing			
Send wash water to sanitary sewer system for treatment at a	\checkmark	✓	✓
Publicly Owned Treatment Works (POTW) (WYDOT, HDOT)			
Use pre-treatment technologies, such as oil/water separators			✓
(WYDOT, HDOT, NYSDOT)			
Wash only vehicle bodies, not engines or undercarriages (NHDOT,			✓
MDSHA, ODOT)			
Separate vehicle fluid changing areas from wash areas (ODOT)			\checkmark
Test wastes from pre-treatment technologies prior to disposal			✓
(ODOT)			
Have detailed vehicle washing Standard Operating Procedure			\checkmark
(SOP) available for staff to review and train staff on the SOP			
(MDSHA)			
Wash vehicles with cold water only (ODOT)	\checkmark		✓
Convey wash water to evaporation pits (ODOT, TXDOT)			\checkmark
Recycle or reclaim wash water (Multiple DOTs)			\checkmark
Install high pressure, low volume vehicle washing equipment in	\checkmark		\checkmark
order to reduce water consumption and the quantity of waste water			
generated (TDOT)			

	BMP Selected Due To:		
	Cost	Time	
BMP (Implementing DOT)	Savings	Savings	Effectiveness
Hazardous Waste Management			
Use tracking logs for waste generation and disposal (ODOT)		✓	✓
Upgrade management practices to include those required of a larger		✓	✓
quantity generator status, despite actual smaller quantity generator			
status (MDTA, MaineDOT)			
Frequently inspect facilities for compliance with regulations and			\checkmark
pollution prevention techniques which manage hazardous wastes			
(MaineDOT)			
Centralize vehicle maintenance activities (TDOT)	~		✓
Reach an agreement with state environmental protection agency to	~		✓
allow transport of used material to centralized facilities where			
hazardous waste determinations are performed (TDOT)			
Universal Waste Management			
Treat universal wastes as universal waste (versus hazardous	~	✓	✓
wastes) (MDT, MaineDOT)			
Use a bulb crusher (MDT)	~		✓
Carefully pack universal waste to avoid breakage (MaineDOT)	~		✓
Dispose of universal wastes earlier than the maximum 1-year			✓
storage time allowed by federal law (MaineDOT)			
Obtain and store receipt of universal waste disposal (MaineDOT)			\checkmark
Transport universal waste to central facilities for packaging and	✓		
storage in preparation for collection by hauler (TDOT)			
Animal Carcass Management			
Compost carcasses and reuse compost (Multiple DOTs)	\checkmark		\checkmark
Incinerate carcasses (MDSHA)			\checkmark
Haul carcasses to disposal facilities (MaineDOT)		✓	✓
Natural disposal (MaineDOT)	~	✓	✓
Line Striping Paint Waste Management			
Use water-based instead of oil-based paints (ODOT, TDOT)			✓
Hire a contractor to perform painting (TXDOT, DelDOT)			✓
Characterize paint wastes to identify proper management			✓
techniques (ODOT)			
Use paint totes (MDSHA, MDT, ODOT)			✓
Use a washing solution of dish soap and ammonia (WYDOT)			✓
Collect paint vehicle wash rinsate, allow liquid to evaporate, and			✓
dispose of solids in landfill (MDSHA)			
Waste Aerosol Can Disposal		-	•
Drain all aerosol cans using a depletor system (ODOT, MDSHA,	✓		✓
TDOT)			
Remove tips from aerosol cans before placing in storage containers			✓
(VDOT)			

	BMP Selected Due To:		
BMP (Implementing DOT)	Cost Savings	Time Savings	Effectiveness
Line Striping Paint Waste Management			
Use water-based instead of oil-based paints (ODOT, TDOT)			✓
Hire a contractor to perform painting (TXDOT, DelDOT)			✓
Characterize paint wastes to identify proper management techniques (ODOT)			✓
Use paint totes (MDSHA, MDT, ODOT)			✓
Use a washing solution of dish soap and ammonia (WYDOT)			\checkmark
Collect paint vehicle wash rinsate, allow liquid to evaporate, and dispose of solids in landfill (MDSHA)			√
Street Sweeping Waste Storage			
Reuse sweeping materials for roadside projects (MDT, ODOT, MassHighway, WSDOT)	~		~
Screen and test sweeping wastes to ensure proper disposal (WSDOT)			~
Use dewatering/drying beds to ensure capture of all contaminants (MDOT, HDOT)			✓
Segregate sweepings with the potential to be contaminated with	✓		\checkmark
hazardous wastes from "clean" sweepings and reuse clean sweepings (HDOT)			
Avoid triggering solid waste facility status by regularly disposing of street sweepings (MaineDOT, MassHighway)			~
Develop a statewide profile for street sweeping and similar wastes in order to eliminate the need to profile the waste prior to each disposal (TDOT)	~	~	

		BMP Selected Due To:		
1		Time		
BMP (Implementing DOT)	Savings	Savings	Effectiveness	
Employee Training				
Use interactive/self guided software (NHDOT, MDT)	\checkmark	\checkmark	\checkmark	
Use contracted trainers (MDSHA)	✓		✓	
Incorporate training with other topics (i.e., safety) (MaineDOT, MDSHA)		~	\checkmark	
Use formal and informal training techniques (NHDOT, NYSDOT, MDSHA)			~	
Use written reference guides and other material and post on the DOT's intranet for trainee reference (MDSHA, MaineDOT, NYSDOT)			~	
Use a mix of media to train staff: poster boards, newsletters, email, etc. (HDOT Multiple DOTs)			\checkmark	
Develop training content based on audit/inspection findings (VDOT, TDOT)			\checkmark	
Documentation and Recordkeeping	L		L	
Develop written guidance on record keeping (ODOT, MDSHA, MaineDOT)		~	\checkmark	
Use electronic databases for record retention and document tracking			~	
(HDOT Multiple DOTs)				
Use color-coded hard copy filing system (MDSHA, TDOT)		✓	✓	
Oil/Water Separator Management	Γ	1		
Use non-emulsifying soaps during washing operations to improve the			\checkmark	
capture of oils in oil/water separators (1D01)				
Regular inspections of oil/water separator systems (ODOT, MDSHA,	✓		\checkmark	
MassHighway, MaineDOT)				
Use absorbent materials in oil/water separators (ODO1, NHDO1, MaineDOT)			\checkmark	
MaileDOT				
Stanknoor drain entuent based on operations (ManeDOT)			v	
Stockpue and Bulk Materials Management		1		
Dise designated storage areas (ManeDOT)			•	
Nisk rank stockpiles to ensure proper management (MDSHA, MD1,		✓	\checkmark	
DD01)				
Proventerive weed control (MDT)		1	• •	
Lice covered storage buildings (MDT_INDOT_NHDOT)		•	• •	
Use other forms of covaring of stocknilas (i.e., terns) (MDT)			· ·	
Store stockniles on impervious surfaces (MaineDOT_MDSHA_ODOT)			· ·	
Berform readyou analysis to determine affectiveness of de ising			•	
operations (NVSDOT)	\checkmark		\checkmark	
Operations (NTSDOT)				
and install secondary containment where necessary (ODOT)			\checkmark	
Slope entrances at storage buildings to prevent run off (MDOT, TDOT)				
Capture and raise of salt containing runoff (VDOT)	<u></u>		• •	
Use of a mobile reverse osmosis/ultrafiltration system to tract contured	*		•	
storm water runoff from salt transfer areas (VDOT)	✓		✓	
Establish salt "lay back" distances within salt storage structures (TDOT)			✓	

	BMP Selected Due To:		
BMP (Implementing DOT)	Cost Sovings	Time	Effectiveness
Container Management	Savings	Savings	
Develop written guidenee on rouse of containers (MaineDOT)	1		
Materials Inventory Control	•	•	•
Materials Inventory Control Use a controlized purchasing unit (ODOT)			
Minimize purchases of bezerdeus meterials (MDOT, NHDOT)	•	•	· ·
Share excess materials between facilities (MDOT, NHDOT)	•		· ·
Durchess products from an approved list (TVDOT, MainsDOT	•	•	•
TDOT)			✓
Release, Response, Containment, and Clean-Up		-	
Ensure readily accessible spill kits (MDOT, ODOT)			\checkmark
Use rolling carts for easy transport of cleanup materials (TXDOT)		\checkmark	\checkmark
Establish and enforce absorbency requirements for the purchasing			1
of new spill response materials (MaineDOT)			•
Perform spill response training (ODOT)			✓
Develop written emergency response plans or SOPs (MaineDOT,			1
TDOT)			•
Maintain a spill log (for all spills regardless of size) (MaineDOT)			\checkmark
Pollution Prevention			
Use alternative 'green' products (i.e., cleaners) (Multiple DOTs)			\checkmark
Recycle materials (Multiple DOTs)	\checkmark		\checkmark
Reduce water and energy usage (HDOT, TDOT)	\checkmark		\checkmark
Use bulk storage systems (DelDOT)	~	✓	\checkmark
Storm Water Management			
Inspect vegetated areas for erosion (California Department of	<i>√</i>		1
Transportation)	•		· ·
Use vegetated areas for filtering and slowing storm water runoff	1		1
(ODOT, NYSDOT, MDT)	-		•
Use detention basins to reduce pollutant loading in nearby			1
waterways (ODOT, NYSDOT)			
Use catch basis sumps to trap sediments from storm water runoff			✓
(ODOT)			
Use absorbent materials at storm water drains to capture pollutants			\checkmark
(NHDOT, HDOT)			
Vegetation Management		1	
Use secondary containment for pesticide storage (ODOT)			✓
Use approved herbicides only (MDSHA)			✓
Transfer excess materials between facilities to ensure product	\checkmark		✓
turnover (MDSHA)			
Research into product impacts and effectiveness (TXDOT)	\checkmark		✓
Use carcass composting material for re-vegetation efforts (NYSDOT)	✓	✓	✓
Clean mowing equipment at each mowing site to reduce the spreading of invasive species between mowing sites (NHDOT)	~	~	~

	BMP Selected Due To:		ue To:
BMP (Implementing DOT)	Cost Savings	Time Savings	Effectiveness
Air Pollution Reduction			
Use volatile organic compound (VOC)-free paints and adhesives (NYSDOT)			✓
Use alternative fuels and high mileage vehicles such as hybrid vehicles (Multiple DOTs)	~		✓
Encourage carpooling of employees (MDT)	\checkmark		\checkmark
Other BMPs			
Use internal environmental committees (Multiple DOTs)	\checkmark	\checkmark	\checkmark
Implement an Environmental Management System (EMS) or similar program (HDOT Multiple DOTs)	~	~	\checkmark
Allow no more than two unserviceable vehicles to be stored at a maintenance facility at one time (MaineDOT)			~
Perform environmental assessments of activities to identify environmental impacts (TXDOT)			~
Centralize vehicle maintenance repair facilities to reduce the regulatory burden (HDOT)			\checkmark
Perform annual audits of environmental practices, including waste audits, EMS audits, or compliance audits (INDOT, TDOT)	~		~
Develop easy-to-use environmental guidance manuals (NDDOT)			✓
Develop and implement a green buildings program (NYSDOT)	\checkmark		\checkmark

CHAPTER 1 BACKGROUND

State highway agencies are constantly seeking effective and efficient ways to improve upon existing practices or to implement new practices that help meet environmental goals and requirements. These efforts include commitments to comply with local, state, and federal environmental regulations at a minimum, but often also embrace the larger goal of pollution prevention. In some cases, agencies devise improvements independent of the activities performed by other transportation agencies. In other cases, agencies rely upon various information sources, such as trade organizations, publications, or conference workshops, to become acquainted with innovative ways of performing activities.

Information sources detailing best management practices (BMPs) associated with highway design and construction activities, such as low-impact roadway construction and roadway storm water management practices, are readily available and have been intensely studied by the Transportation Research Board (TRB). However, fewer information sources describing BMPs at transportation maintenance facilities are available. The American Association of State Highway and Transportation Officials (AASHTO) recognized that state highway agencies and, in particular, transportation maintenance managers, would benefit from the compilation of BMPs performed at maintenance facilities. This Compendium is intended to fill this information gap: it compiles BMPs that are performed at state highway maintenance facilities throughout the United States to meet environmental regulations and prevent pollution.

AASHTO's Standing Committee on the Environment (SCOE), with the cooperation of the Sub-Committee on Maintenance, commissioned this BMP Compendium through the National Cooperative Highway Research Program (NCHRP) Project 25-25, Task 46. In 2003, SCOE initiated the NCHRP 25-25 research program to develop improvements to analytical methods, decision support tools, procedures, and techniques employed by practitioners to support transportation planning, programming, and development. As such, this BMP Compendium is a part of a significant body of work published by AASHTO that highlights successful initiatives adopted by state highway agencies and, in particular, those related to environmental protection.

1.1 GOAL

As previously stated, SCOE's goal for this project was to research and capture BMPs implemented at transportation maintenance facilities and publish these in a compendium. The BMP Compendium serves the following purposes:

- To provide a resource for agencies intending to restructure environmental programs or intending to develop new environmental programs in order to meet pollution prevention or environmental compliance goals
- To be used as a tool for benchmarking against other agencies' programs
- To assist in the planning process of setting environmental performance goals.

1.2 SCOPE

To develop this BMP Compendium, research activities were restricted to environmental practices performed by transportation maintenance facilities of United States' state highway agencies and those similar agencies in Guam and Puerto Rico (collectively referred to as "highway agencies" and "DOTs" (Departments of Transportation) throughout the remainder of this document). Broadly, the activities that occur at maintenance facilities serve to support vehicles, equipment, and infrastructure used to build and maintain highway systems. Examples of activities which may occur at maintenance facilities include:

- Administrative services
- Vehicle refueling
- Pesticide storage/application
- Bulk material storage
- Vehicle and equipment maintenance
- Hazardous waste generation.

The term "best management practices" in this report refers to all practices that are associated with environmental compliance and pollution prevention at transportation maintenance facilities. In the context of this BMP Compendium, the term "BMP" is defined as any program, technology, process, operational method, measure, or device which controls, prevents, removes, or reduces pollution in a manner which has been shown to save time, reduce costs, or improve upon common practices.

1.3 PROJECT PARTICIPANTS

A panel comprised of seven AASHTO SCOE members was assembled to guide this project. Panel members represented the DOT agencies from New Hampshire, Ohio, Illinois, North Carolina, and New York and the Federal Highway Administration. This panel provided input on the draft survey and the criteria used to establish the survey questions, and provided oversight of the Compendium development. The panel was supported by a research team of private consulting firms: Parsons Brinckerhoff teamed with EA Engineering, Science, and Technology, Inc. who led this effort.

CHAPTER 2 RESEARCH APPROACH

In order to capture maintenance facility-related BMPs performed by highway agencies, the research team relied on the results of environmental BMP surveys, interviews, and a literature review. The methods to develop, distribute, and compile survey results, perform the interviews, and perform the literature review are described below.

2.1 SURVEY METHODOLOGY

In order to develop the BMP survey, the research team identified a wide range of potential topics of interest to maintenance facilities managers. This list then was refined by applying a set of three criteria. Topics that met one or more of these criteria were included in the BMP survey. The criteria for selecting topics for inclusion in the survey were:

- 1. The topic is not well documented in current literature (including the internet).
- 2. The regulation(s) associated with a particular topic allow for the innovation and application of BMPs.
- 3. The topic relates to a significant regulatory hurdle for many state highway agencies' maintenance facilities.

Nineteen major topics that met one or more of these criteria were included in question format within the survey. These topics, in order as presented in the survey and in this BMP Compendium, are as follows:

- Vehicle fluid management
- Vehicle and equipment washing
- Waste aerosol can collection and disposal
- Line striping paint waste management
- Universal waste management
- Employee training
- Documentation/recordkeeping
- Oil/water separator management
- Bulk material stockpiling

- Animal carcass management
- Hazardous waste management
- Street sweeping waste management
- Container management
- Material inventory control
- Emergency response
- Pollution prevention techniques
- Storm water management
- Vegetation management
- Air pollution emission reduction.

The BMP Compendium also includes an "other" category for other BMPs identified by the DOTs which could not be categorized into any of the other categories. These topics were converted to topical questions using a standard question format and these questions made up the majority of survey questions. For example, "To what extent has your facility implemented BMPs related to *inadvertent vehicle fluid release*?" Survey respondents were requested to self-assess their agencies' performance using one of three standard answers per question:

- 1. Not applicable/no practices implemented
- 2. Only common practices implemented
- 3. Potentially BMPs implemented.

Respondents who selected answer Number 3 were asked to detail the BMP in the survey. In addition to these 21 questions, background questions were also asked of the respondents, such as miles of highway managed, and an open-ended question was asked which allowed respondents to share other related topics not addressed in the survey.

The survey requested that respondents describe how each practice that they listed in the survey saved time, reduced costs, or improved effectiveness. Practices which identified a time savings would help ensure minimal disruption to the transportation agencies' core mission of highway construction and maintenance. Practices that reduce costs help to keep budgets in check or help to ensure future return on investments over time. Practices that improve effectiveness help ensure compliance with environmental regulatory requirements at a minimum, but also can help to meet transportation agency goals of pollution prevention.

To identify potential survey respondents, an email requesting participation in the survey was sent to the transportation agencies by AASHTO (see Appendix A). In addition, the survey team solicited survey participation in person at the annual meeting of the AASHTO Subcommittee on Maintenance in July 2009. Those agencies which responded affirmatively were sent a follow-up email that contained an internet link to the survey which was hosted on a survey software site. A copy of the blank survey is included as Appendix B. A compilation of the survey results are provided in Appendix C.

2.2 INTERVIEWS

Following receipt of completed surveys and review of the responses, the research team attempted to follow up with each of the survey respondents using a brief interview format. The purpose of the interview was to obtain additional information about one or more BMPs described in the respondent's survey. While not all survey participants could be interviewed for this BMP Compendium due to scheduling conflicts or lack of response to solicitations for an interview, 16 telephone interviews occurred. Interviewee responses are included in descriptions of topics found in Chapters 3 and 4.

2.3 LITERATURE REVIEW

In addition to distributing and assessing the surveys, the research team also performed a literature review. For the literature review, a search on the internet for BMPs was performed. The literature review allowed for the discovery of documented BMPs that were not identified through the use of the survey and allowed for capture of implemented BMPs at transportation agencies which did not participate in the survey. These BMPs were added to this Compendium as appropriate.

Several documents and multiple websites were particularly useful resources for this BMP Compendium. One of the documents used for reference is titled the *Environmental Stewardship Practices, Procedures, and Policies for Highway Construction and Maintenance,* and was published September 2004 as part of NCHRP's Project 25-25, Task 4. The Task 4 document was used as a resource and model for this BMP Compendium. The Task 4 document provides a broad overview of the construction and maintenance practices performed by transportation agencies, including certain specific practices implemented at some transportation agencies' maintenance facilities. While not intending to define the *best* practices, the document describes maintenance facility practices that fall into the category of BMPs in this BMP Compendium. For example, the Task 4 document provides detailed practices for general storm water management that were selected in this BMP Compendium for BMP status. In addition, several DOTs provided reference material, such as work instructions and guidance manuals. The content of these resources has been incorporated within this BMP Compendium where appropriate. These documents, websites, and reference material are cited within Chapter 4.

The research team also reviewed several transportation agency websites in order to identify additional information on implemented BMPs. For example, in California, California Department of Transportation (Caltrans) listed dozens of BMPs related to storm water; some of these BMPs were incorporated into the BMP Compendium. However, most transportation agencies' websites either did not list BMPs related to maintenance facilities or those listed were too general in nature to provide useful information for this BMP Compendium.

2.4 DETERMINATIONS OF BEST MANAGEMENT PRACTICES

Individual responses to the survey were compared by the research team to all the survey responses and the literature review results to determine the *best* practices for inclusion into this BMP Compendium. Most DOTs described at least one BMP (self-determined by the respondents) in the returned survey. To help define what made the management practices a BMP, survey respondents and interviewees were asked to describe estimates of costs savings, time savings, or realized improvements in the effectiveness of environmental compliance or pollution prevention. Given resource constraints, most DOTs do not formally calculate these estimates. DOT personnel did indicate that the management practice selection process entails an informal consideration of these factors (costs, time, and effectiveness).

Given the minimal direct information from participating DOTs about the effect of BMPs on cost, time, and effectiveness, the management team compared the identified management practices using the team's knowledge of maintenance facilities and environmental practices to evaluate costs savings, time savings, and effectiveness. The results of these evaluations are provided in a table for each of the environmental topics identified in Chapter 4. Those BMPs with significant savings or effectiveness are indicated as such in these tables. Most of the BMPs identified have the benefit of increasing or maintaining the level of compliance and, as a result, reducing the potential for penalties. As such, this benefit was not specifically called out for individual BMPs. However, the research team suggests that readers consider these cost savings when evaluating BMPs. Consideration should be given to the following costs:

- Fines and other penalties associated with non-compliance
- Environmental cleanup costs
- Legal fees
- Health impacts
- Public perception
- Other costs unique to the situation.

The research team did not limit the number of BMPs listed for each environmental topic: the research team recognized that no one BMP can meet the needs of all DOTs due to varied regulatory requirements applicable to DOTs and varied natural environments within which facilities are located, among other factors. These variations exist from state to state and even between maintenance facilities within the same DOT. For example, animal carcass disposal at a landfill may be a BMP for some maintenance facilities, but for those facilities which cannot dispose of carcasses at landfills due to local landfill regulations, other methods of disposal would constitute BMPs. Therefore, this BMP Compendium suggests multiple BMPs for each topic.

CHAPTER 3 PROFILES OF SURVEY RESPONDENTS

Twenty highway agencies participated in the survey and an additional two agencies provided information about their BMPs, but did not submit a survey. Among the population of 52 state transportation agencies, the participation response rate among agencies was 42 percent. Table 3-1 lists the survey respondents and the respondents' reported number of facilities, estimated total mileage of roadway, and any special operational considerations. Appendix D provides contact information for primary contacts at each of the participating DOTs.

Throughout this BMP Compendium, the following acronyms will be used to identify participants:

- California Department of Transportation (Caltrans)
- Delaware Department of Transportation (DelDOT)
- Georgia Department of Transportation (GDOT)
- Hawaii Department of Transportation (HDOT)
- Indiana Department of Transportation (INDOT)
- Maine Department of Transportation (MaineDOT)
- Maryland State Highway Administration (MDSHA)
- Maryland Transportation Authority (MdTA)
- Massachusetts Department of Transportation (MassHighway)
- Michigan Department of Transportation (MDOT)
- Missouri Department of Transportation (MODOT)
- Montana Department of Transportation (MDT)
- New Hampshire Department of Transportation (NHDOT)
- New York State Department of Transportation (NYSDOT)
- North Dakota Department of Transportation (NDDOT)
- Oregon Department of Transportation (ODOT)
- Tennessee Department of Transportation (TDOT)
- Texas Department of Transportation (TXDOT)
- Utah Department of Transportation (UDOT)
- Virginia Department of Transportation (VDOT)
- Washington State Department of Transportation (WSDOT)
- Wyoming Department of Transportation (WYDOT).

	Number of Maintenance	Estimated Roadway	
State Agency (State)	Facilities ²	Miles ²	Special Considerations ²
DELDOT (DE)	28	12,000 lane	
, <i>, , , , , , , , , , , , , , , , , , </i>		miles	
GDOT (GA)	10		
HDOT (HI)	19	2,400 lane	HDOT is currently subject to a Consent
		miles	Decree from the U.S. Environmental
		25.602	Protection Agency (EPA).
INDOT (IN)	34	27,693	
MaineDOT (ME)	About 120	About 8000	
MDOT (MI)	11		
	20 mimory and	4,440	 MDSUA has four maintananas facilitias
MDSHA (MD)	29 primary and	10 movable	MDSHA has four maintenance facilities
	10 satellite	bridges	area: the Chesapeake Bay Watershed has
		onages	more stringent environmental regulations.
MDT (MT)	132	24,500 lane	Montana is faced with several
		miles	environmental factors associated with air
			and water quality. Total Maximum Daily
			Loading of Montana watersheds and PM
			10 and 2.5 non-attainment areas have been
			identified throughout the state.
MODOT (MO)	300	32,340	
NDDOT (ND)	80	16,938 lane	
		miles	
NHDOT (NH)	130 +/-	9,200 +/-	
NYSDOT (NY)	250	15,000	New York regulations are more restrictive
			in particular regions of the state, such as
			the Adirondack and Catskill Parks, which
			have special protection in the State
			Constitution, reservoirs in the New York
			resources and pipe barrens on Long Island
ODOT (OR)	Approximately	Approximately	
	100	7.500 center	
		line	
TDOT (TN)	108	87,000	TDOT was subject to a judicial consent
			order until 2008 which imposed additional
	201	00.000	inspection and reporting requirements.
TXDOT (TX)	304	80,000	
UDOT (UT)	98	6,000	
VDOT (VA)	Approximately 300	57,867	

Table 3.1	Characteristics of	AASHTO	Survey	Respondent	ts ¹
I uble 5 I	Character istics (Durvey	Respondent	10

State Agency (State)	Number of Maintenance Facilities ²	Estimated Roadway Miles ²	Special Considerations ²
WSDOT (WA)	61	7,000	
WYDOT (WY)	35	16,193	WYDOT owns roads within 3 National Forests and 2 State Parks

Table 3-1 Characteristics of AASHTO Survey Respondents¹

1) MassHighway, Caltrans, and MdTA are not included in this list because they did not submit a survey. However, staff did provide information about their environmental practices or, in the case of Caltrans, the research team obtained information from Caltran's web site.

2) The number of maintenance facilities, roadway miles, and special considerations were provided by the DOTs. A blank cell indicates that a DOT did not respond to the request in the survey for this information.

3.1 DRIVERS OF ENVIRONMENTAL MANAGEMENT PRACTICES

Some respondents were proactive in their approach to environmental compliance and pollution prevention. In implementing their BMPs, many of the respondents adopted measures over and above the requirements of applicable regulations. Other DOTs were reactive, strictly adhering to regulatory requirements and doing no more than was necessary to comply. As part of the survey, the research team sought to identify some of the reasons for this dichotomy of proactive versus reactive and to link one or more "causes" with the BMP "effects." The specific drivers behind compliance and pollution prevention approaches are as varied as the individual BMP practices themselves, but generally fall within the four categories described below.

1. Regulatory agency scrutiny of the DOT.

Regulatory scrutiny is a particularly potent driver for DOTs given the potential for enforcement actions, fines, and negative publicity associated with findings of noncompliance. Four of the 20 survey respondents identified a high level of scrutiny by regulatory agencies, namely EPA or a state or county environmental agency, for compliance of environmental laws. For these survey respondents, the agency's scrutiny entailed inspections which lead to negative findings and enforcement actions. These violations were related to the following topics:

- Spill Pollution Control and Countermeasure Plan development and implementation
- Degradation of nearby drainage-ways due to runoff
- Salt pile runoff into private property
- Disposal techniques of hazardous waste
- Exceeding storm water contaminant levels.

Those DOTs that had violations were quick to meet any enforcement requirements, such as identifying and implementing remedies to satisfy the regulatory agency, which would include meeting the regulatory requirements.

In two instances, given the severity of the findings, enforcement actions led to the establishment of consent decrees or similar agreement between EPA or the state or county environmental agency and the DOT. In most cases, the agreements stipulated a time frame within which the DOT must be brought into compliance for the findings and identified areas needing attention in order to bring the DOT's maintenance facility into compliance.

2. Perceived potential future scrutiny as a result of regulatory action taken upon a sister agency, other DOT, or other similar organization.

The perceived threat of scrutiny by a regulatory agency may be enough to instigate action on the part of a DOT to adopt practices that comply with regulations. This driver was responsible for at least some of the implemented environmental BMPs by at least one of the respondents of the survey.

3. DOT leadership committed to environmental stewardship.

The drivers of environmental practices need not be based on scrutiny or perceived scrutiny by regulatory agencies, but based on an environmental ethic held by DOT leadership. Several respondents noted that their executive leadership understands that environmental protection "is the right thing to do." Such commitment may lead to an effort to comply with all applicable environmental regulations or push the agency to exceed regulatory requirements and institute voluntary pollution prevention measures. One DOT noted that an Executive Order from the governor of the state requiring state agencies to improve environmental performance was a primary driver for their activities.

4. Resources available to implement practices are adequate/not adequate.

Implementation of environmental practices may require an initial outlay of resources and, in some cases, ongoing utilization of resources. Resources in this case include funding, time, and staff. In sufficient quantity, resources can drive the development and implementation of environmental practices. When resources are not available, or in limited supply, environmental stewardship practices may suffer. Given the economic difficulties that many states are experiencing due to the economic downturn, fewer resources are available to implement and maintain environmental practices. The financial impacts of reduced state revenue upon DOTs were noted by survey respondents during post-survey interviews.

Note that these four drivers are not necessarily mutually exclusive. For example, at least two DOTs noted that both a commitment by DOT leadership coupled with a perceived threat of regulatory scrutiny were the impetus to implement new environmental practices and expand existing practices. BMP development and implementation is also impacted by the degree to which regulations permit innovation. Prescriptive regulations constrain the development and implementation of BMPs, as evident in the survey responses. For example, hazardous waste regulations prescribe how waste is accumulated, transported, and labeled; define accumulation duration; and specify container types. As such, few DOTs identified BMPs on the topics of hazardous waste in their survey responses.

CHAPTER 4 DESCRIPTIONS OF BEST MANAGEMENT PRACTICES BY TOPIC

This section of the Compendium presents best management environmental practices that have been implemented at DOTs across the country. The practices are segregated into sections, and each section has a table which summarizes the BMPs identified in the section and why the practices were selected as BMPs. As previously described, BMPs were selected if they resulted or may result in a significant cost savings, time savings, or increased the effectiveness of regulatory compliance or pollution prevention.

4.1 VEHICLE AND EQUIPMENT MANAGEMENT

4.1.1 Vehicle Fluid Management

Summary of Vehicle Fluid Management BMPs				
	BM	BMP Selected Due To:		
	Cost	Time		
BMP (Implementing DOT)	Savings	Savings	Effectiveness	
Perform pre-trip vehicle inspections (ODOT, NHDOT, and WYDOT)			✓	
Perform preventative vehicle maintenance (ODOT)	✓	\checkmark	\checkmark	
Perform maintenance indoors and on impervious surfaces (ODOT)			✓	
Use drip pans during vehicle fluid changes and during vehicle storage (ODOT, MDSHA)			✓	
Consolidate petroleum products into one container to reduce handling and the number of potential spills or leaks (Multiple DOTs)	~		✓	
Routinely inspect vehicle storage areas (ODOT)			✓	
Drain vehicle fluids or tie up or plug hoses during long-term storage (MDOT)			✓	
Store vehicles in covered areas and on impervious surfaces away from storm water conveyances and water bodies (ODOT)			✓	
Store waste fluids in clearly marked or color-coded containers (Multiple DOTs)			~	
Recycle waste fluids (TDOT)	✓		✓	
Puncture and drain oil filters for 24 hours (Multiple DOTs)			✓	
Consolidate waste petroleum products (INDOT)	✓	✓		
Burn waste oil for heating purposes (NHDOT, MaineDOT, MDT)	✓			
Seal floor drains which lead to septic systems (TDOT)			\checkmark	
Seal shop floors and use dry methods for all shop floor cleaning at all facilities (TDOT)			✓	
Perform vehicle maintenance at fewer facilities in order to reduce regulatory requirements at those facilities which no longer perform vehicle maintenance (TDOT)	~		✓	

Maintenance facilities are a hub of vehicle activity, including refueling, vehicle maintenance, fluid waste management, and vehicle storage. Given the frequency and number of vehicles at these locations, inadvertent fluid releases are a common occurrence. Fluids include used oils, antifreeze, and brake fluid. A release of any of these materials into the environment may not only negatively impact waterways or drinking water, but may also be cause for citations or penalties due to violations of environmental regulations or permits. In response, DOTs have

implemented BMPs to prevent the inadvertent release of vehicle fluids and, when a leak occurs, to manage spills in a way as to minimize environmental impact. It should be noted that smaller equipment (i.e., mowers, tractors, etc.) is often maintained and stored at maintenance facilities and also may be a source of inadvertent releases. Therefore, some of the practices associated with vehicles described below may be applied to equipment management practices.

4.1.1.1 Vehicle Inspections

Many DOTs, including ODOT, NHDOT, and WYDOT personnel, are required to perform pretrip vehicle inspections. The inspections are intended to identify any leaks which may be present before regular daily usage. If any leaks are found, personnel are instructed to inform the vehicle maintenance department personnel who will make the necessary repairs. Most DOTs also have vehicle maintenance personnel perform routine vehicle inspections. These inspections usually include inspection of hoses, fluid vessels, and other vehicle components in order to reduce the likelihood of a malfunction leading to a fluid release. MDSHA provides drip pans and other absorbent materials to be used in the event a leak is identified during a routine inspection.

4.1.1.2 Prevention of Releases During Vehicle Repairs

Preventative vehicle maintenance is a common practice among DOTs and is intended to address potential problems which may lead to a vehicle fluid release into the environment. Preventative maintenance also can help reduce vehicle repair costs and the time necessary to make repairs. ODOT practices preventative vehicle maintenance and provides its employees with a structured training program as well as written procedures which reference detailed work instructions on vehicle maintenance and repair activities. These instructions are documented in ODOT's Environmental Management System (EMS) and are intended to reduce incorrect maintenance practices which may lead to a fluid release. In addition, all employees who perform repairs are trained in vehicle fluid management, spill response, and cleanup activities so that personnel can quickly respond to spills. To keep fluids from releasing into the environment, ODOT's repair activities are to occur indoors whenever possible, and fluid transfers are conducted on impervious surfaces whenever possible. If repairs are conducted outside, they are to be conducted away from storm water conveyances, soil, and bodies of water; containment must be used or installed to ensure that fluids are not discharged to the environment, and repairs are to be performed immediately to ensure no additional fluids are lost. To prevent contamination of nearby rivers that may flood, ODOT repair work is to be performed above the Ordinary High Water Line (OHWL) [ODOT (1)].

In an effort to contain and prevent any inadvertent fluid releases, ODOT utilizes drip pans, absorbent pads, or other containment materials to direct fluids to holding tanks. These materials are made readily available to personnel performing maintenance and repair. MDSHA also utilizes drip pans and other absorbent materials during vehicle fluid changing and vehicle storage for those awaiting repair—these materials are placed strategically under the vehicle where any spills or drips may occur. In order to prevent waste from entering the environment through floor drains, TDOT has sealed all floor drains in maintenance bays that discharge to septic systems. TDOT has banned wet washing of shop floors, requiring personnel to use dry methods of cleaning. TDOT has sealed all its maintenance shop floors to prevent oil staining and uses an oil-encapsulating dry sweep material on any oil spills. The dry sweep material is swept up and containerized following use.

4.1.1.3 Vehicle and Equipment Storage Techniques

Inadvertent releases can occur during routine maintenance activities, but may also occur while vehicles or equipment are being stored in maintenance bays, parking lots, storage buildings, wash bays, or other locations. For example, at most maintenance shops, equipment that is used only seasonally may be left idle for extended periods of time, such as trucks used to spread salt or other deicing chemicals during snow events. Seasonal vehicles and equipment are particularly susceptible to undetected leaks if they are stored in locations away from day-to-day activities.

Often, vehicle equipment leaks occur when the vehicles are stored in the off-season due to the degradation of hoses, gaskets, and seals. MDOT, ODOT, and MassHighway implemented BMPs for seasonal storage techniques to prevent leaks from occurring. MDOT requires any equipment containing hydraulics, like snow plows, to be stored with the hoses tied up in the off-season. This helps ensure that leaks are contained within the equipment and do not accumulate on the pavement where it could be exposed to storm water and/or enter surface water. Most of ODOT's fleet is stored in designated areas above the OHWL, away from storm drains and bodies of water. In addition, vehicles used seasonally and stored for extended periods of time are stored in designated and covered areas where precipitation events cannot wash any fluid releases into storm water conveyance systems or directly into water bodies. If site constraints prohibit the storage of a fleet away from storm drains or bodies of water, then containment structures such as berms and filters are installed. ODOT personnel also inspect vehicle storage areas monthly for vehicle leaks [ODOT (1)].

MassHighway requires that street sweepers, spreaders, and other seasonal equipment be drained of all fluids once taken out of service for the season and requires vehicles and equipment to be stored outside of wetland and riverfront areas, if possible [MassHighway (2)]. In contrast, HDOT does not discern short- and long-term storage of vehicles and requires the use of drip pans under all stored vehicles, regardless of the length of time the vehicle is stored. The large pan is stored under the vehicle to capture oil leaks.

4.1.2 Vehicle Fluid Waste Management

Vehicle fluids are managed and disposed differently depending on the fluid type. For example, gasoline is a hazardous material and potentially hazardous waste. Hazardous wastes are those wastes which exhibit hazardous characteristics (flammability, corrosivity, ignitability, etc.) or wastes which are mixed with a hazardous waste. Those fluids that are mixed with hazardous waste gasoline, such as used oil mixed with diesel fuel, must be managed as hazardous waste. Some non-hazardous wastes, such as non-contaminated used oil and antifreeze, may be recycled. The regulations for vehicle fluid waste management are many and can be complex, making management of these wastes potential areas of non-compliance. For example, staff may inadvertently mix non-hazardous solid waste with hazardous waste, which may increase the cost of disposal because the entire mixture must be managed as hazardous waste. As another example, staff may dispose of a hazardous waste as a non-hazardous solid waste by accident, which is not allowed per federal regulations. In response, DOTs have developed several practices to help ensure personnel who have the responsibility to manage vehicle fluids do so in compliance with regulations and prevent pollution.

To ensure that personnel manage waste fluids properly, DelDOT, MDSHA [MDSHA (3)], MassHighway [MassHighway (2)], and ODOT [ODOT (1)] perform one or more of the following practices of proper management of automotive vehicle fluids.

- Waste fluids are stored in clearly marked and/or color-coded containers until disposal (e.g., "used antifreeze") to avoid improper disposal.
- Used antifreeze is recycled at least annually to avoid accumulating large quantities. Prior to disposal, antifreeze distillation residues are characterized to determine if the antifreeze is contaminated with hazardous waste.
- For used oil filters, personnel are required to puncture and hot drain used oil filters for 12-24 hours or to purchase filters which do not have an anti-drain back valve. The puncture must penetrate the outer metal casing as well as the inner valve located inside the center of the filter to allow trapped oil to fully drain.

Many DOTs allow maintenance shop personnel to consolidate petroleum-based wastes, such as uncontaminated used brake hydraulic fluid, used oil, and transmission fluid. Comingling translates to fewer separate waste collection containers required to be managed and disposed, thereby potentially reducing the number of releases or leaks to the environment. Pick-up costs by used petroleum products contractors may also be reduced if the contractor has fewer sites to collect the oil. Maintenance facilities usually have small waste tanks (250- to 500-gallon) in which these petroleum products are stored. Many DOT maintenance facilities have placed these tanks outside, immediately adjacent to an exterior wall where the waste is generated. A collection pipe located on the interior of the building leads to the tank.

Given the large quantities of used oil that is generated at maintenance shops, used oil disposal can be a significant cost for DOTs. Common options for disposal include transfer to a recycling facility, pick-up by a contracted disposal/recycling company, or transfer to a facility to burn the used oil (possibly as a fuel source for heating). The recycling of used oil can be a significant cost savings for DOTs. Often, disposal companies will pick up used oil from facilities for little to no cost. The used oil may then be re-refined or used as heating oil. INDOT also recycles used petroleum products, but buys back the products after the contractor re-refines the products. The re-refined product is used in state vehicles. Products re-refined and reused include oil, transmission fluid, and hydraulic fluid. All of these practices represent means to reduce the maintenance facilities' waste streams.

Some DOTs, such as NHDOT, MaineDOT, and MDT, burn their own used oil onsite in used oil furnaces. MDT also burns the oil in waste oil heaters, which are installed in division headquarters; waste oil from outlying facilities is transported to headquarters and used as a heat source during the winter.

The burning of used oil at maintenance facilities can be a cost savings for DOTs: disposal costs can be eliminated and heating bills can be reduced at the facilities with oil heaters. Manufacturers of waste oil heaters suggest that purchase costs of a used oil furnace are recuperated within 2 years of purchase. Transportation agencies, when considering the installation of waste oil burners or heaters, should consider any applicable air emissions permitting requirements.

As an alternative to disposal, TDOT recycles antifreeze at its facilities resulting in a net cost savings of approximately \$12,000 annually. The antifreeze is recycled and reused only in its older fleet of vehicles due to the fact that the use of uncertified recycled antifreeze may void any vehicle engine warranties. In addition, TDOT has reduced the number of facilities performing fluid changes from 102 to 28 by centralizing vehicle maintenance activities at specific facilities. This centralization has allowed increased control over waste management and reduced the number of regulatory requirements for the facilities which no longer perform vehicle maintenance.

Summary of Vehicle and Equipment Washing BMPs				
	BMP Selected Due To:			
	Cost	Time		
BMP (Implementing DOT)		Savings	Effectiveness	
Send wash water to sanitary sewer system for treatment at a Publicly			.(
Owned Treatment Works (POTW) (WYDOT, HDOT)	v	v	v	
Use pre-treatment technologies, such as oil/water separators (WYDOT,			1	
HDOT, NYSDOT)			v	
Wash only vehicle bodies, not engines or undercarriages (NHDOT,			.(
MDSHA, ODOT)			v	
Separate vehicle fluid changing areas from wash areas (ODOT)			✓	
Test wastes from pre-treatment technologies prior to disposal (ODOT)			✓	
Have detailed vehicle washing SOP available for staff to review and train			/	
staff on the SOP ¹ (MDSHA)			v	
Wash vehicles with cold water only (ODOT)	✓		✓	
Convey wash water to evaporation pits (ODOT, TXDOT)			✓	
Recycle or reclaim wash water (Multiple DOTs)			✓	
Install high pressure, low volume vehicle washing equipment in order to				
reduce water consumption and the quantity of waste water generated	✓		✓	
(TDOT)				

4.1.3 Vehicle and Equipment Washing

 The development of Standard Operating Procedures (SOPs) is a good practice for any of the topics discussed within this BMP Compendium. SOPs allow for the documentation of environmental practices, provide a reference for staff on proper techniques, and identify the responsibilities associated with the practice, among other benefits. Vehicle washing is an important practice to ensure the longevity of vehicles (e.g., reduce rusting) and as a safety precaution (e.g., promoting a clean windshield and headlights). Wash water from these washing operations often contains oil or other petroleum-based products and solids picked up from the road surface. If detergents or other surfactants are used as cleaning products, these too will be present in the wash water. Untreated wash water will pollute receiving water bodies. In addition, water discharge permits may not allow such discharge without treatment.

Common practices among maintenance facilities to protect the environment and meet permit requirements include designating wash areas where a wash water collection and management may be performed. The type of collection and wash water management depends upon how the wash water is disposed by the DOT. Typical discharge alternatives for DOT maintenance facilities include direct or indirect discharge to the local sewer system, or direct discharge to ground water or surface water. In addition, some maintenance facilities collect the wash water and transport offsite for disposal. For these methods, treatment or pre-treatment may be required, increasing the cost of disposal. In response, many DOTs have implemented a variety of BMPs to control and treat wash water so that the required contaminants are removed prior to discharge.

4.1.3.1 Sanitary Sewer Connections

Most respondents to the BMP Survey have wash bays or other designated areas for vehicle washing. These areas often have drains that are connected to sanitary sewer systems. WYDOT has instituted a policy which allows construction of new facilities *only* where there is access to a sanitary sewer system. Usually, pre-treatment of wash water is not required; however, in some instances the POTW may require the facility to remove sediment, oil, grit, or other contaminants from the wash water prior to discharge to the sanitary sewer. HDOT is required to pre-treat wash water, and does so by using oil/water separators prior to the discharge of the wash water to meet their POTW requirements. Oil/water separators are a common method to remove petroleum pollutants from wash water due to their low maintenance requirements and effectiveness of removing petroleum-based contaminants. Oil/water separators are discussed in more detail in Section 4.5 of this BMP Compendium.

In order to meet POTW requirements, existing WYDOT facilities are constructed with troughs and containment sumps. Water, either from vehicle washing or snow melt, flows through the troughs into the containment sumps. Once in the containment sumps, solids are allowed to settle to the bottom and are collected later. Floating absorbent materials are used to collect any petroleum products which may be on the surface of the water. Once the water level in the sump reaches a certain level, the water will flow through an overflow into the sanitary sewer. The absorbent pillows are changed on an as-needed basis and disposed. The solids are cleaned out of the settling pits on an as-needed basis as well.

In some instances, DOTs may take pro-active steps to ensure that wash water is as free of contaminants as possible. For example, ODOT personnel do not change vehicle fluids in wash bays in order to prevent contaminating wash water with any additional hazardous or petroleum

wastes. Since the undercarriages of vehicles may also contain significant deposits of vehicle fluids, NHDOT and MDSHA maintenance crews do not wash the undercarriages and engines of vehicles, and ODOT crews only wash undercarriages when the wash bay drains are connected to sanitary sewers.

ODOT wash station sumps and pollution reduction systems are cleaned annually, and sediments are characterized through analytical testing, filing testing results, and disposing of the waste appropriately. Over time, a waste characterization history is developed. If the historical testing records indicate little or no change to the characteristics of the waste over time, testing ceases and all future waste is disposed in a manner befitting the historic testing results. However, when washing procedures change, the testing of the sediments is re-initiated to ensure proper disposal. ODOT's outdoor washing areas are graded to flow into pollution reduction systems, which include oil/water separators leading to grassy swales, settling vaults, and sediment filters [ODOT (1)].

MDSHA has documented methods of vehicle washing in the form of an SOP. All maintenance personnel must abide by these procedures when washing vehicles. The SOP identifies:

- The responsibilities of all personnel
- Washing procedures, including site-specific procedures
- Maintenance procedures
- Permitting procedures
- Wastewater sampling procedures.

All personnel are trained in vehicle washing SOPs during the annual environmental training [MDSHA (3)].

4.1.3.2 Discharge to Surface Water

In some maintenance facility locations, discharge to sanitary sewers is not feasible, and facilities therefore discharge to surface waters. Discharge to surface waters is heavily regulated in many states, requiring a discharge permit. These permits may specify treatment technologies and include discharge monitoring and testing requirements. Below is a description of various practices performed by DOTs. These practices may be informative for DOTs seeking alternative methods of permit compliance or additional levels of pollution prevention. These requirements may also be useful for DOTs that wish to site a maintenance facility in an area which does not have a sanitary sewer connection, helping the DOT plan for wash water management and any permits necessary.

NYSDOT is subject to permit requirements for discharge of wash water to surface waters, and many NYSDOT facilities are required to have State Pollutant Discharge Elimination System permits. The permits require basic pre-treatment of the water and discharge monitoring. NYSDOT facilities that discharge to surface water rely on grit collectors and oil/water separators in their washing facilities as pre-treatment technologies. Vehicles are washed indoors with water

only; detergents are not used, as they emulsify oils and render the oil/water separators ineffective. MassHighway also does not allow the use of soaps when washing vehicles, but does not allow soap use at any facility, regardless of the destination of the wash water [MassHighway (2)]. NYSDOT's permit requirement includes monthly or quarterly monitoring for pH, oil and grease, and volatile organic compounds (VOCs). Monitoring reports are kept at the facility for 3 years [NYSDOT (4)].

The temperature of the vehicle wash water may impact the characteristics of receiving surface waters and aquatic life. For example, large quantities of hot wash water may cause an abnormal increase in aquatic temperatures, which can negatively impact aquatic species that are heavily dependent upon a specific temperature range in their natural environment. In consideration of the impact of temperature on receiving surface waters, ODOT uses only cold water washes when wash water flows directly into a surface water body.

DelDOT has a treatment system that it terms the "treatment train," which is a series of treatment technologies designed to improve the quality of the wash water (i.e., reduce the contaminant content) and reduce or eliminate the quantity of water discharge to water bodies. The "treatment train" includes concrete wash pads, vegetative swales, and storm water ponds. The wash pads ensure that all wash water is captured and the vegetative swales (i.e., open channels) convey and filter the wash water runoff. Wash water that has not permeated the swales reaches storm water ponds where the water is stored until it percolates into the ground.

4.1.3.3 "No-Discharge" Management Techniques

Some maintenance facilities rely on evaporation or soil infiltration to manage wash water. These methods do not discharge into either sanitary sewers or directly into surface waters, thereby preventing the discharge of contaminated wash water. For example, ODOT utilizes a "no-discharge" management technique by washing on pervious surfaces (gravel, soil, or grass,) and allowing the wash water to evaporate and percolate into soil. This practice of washing on pervious surfaces is only allowed for ODOT facilities that wash less than eight vehicles per day, lest the area become oversaturated and lead to runoff to local water bodies.

TXDOT also practices a form of "no discharge" by utilizing bermed outdoor wash bays connected to adjacent evaporation pits. The pits are approximately 50 feet by 50 feet and are lined with asphalt. When the wash water evaporates and the remaining wash water residue reaches a marked fill line in the pit, the residue is collected and transported offsite for disposal. TXDOT calculates the evaporation rates and quantity of precipitation—in areas where the precipitation rate exceeds the evaporation rate, an evaporation pit is not practical due to the potential for overspill from the pit. Instead, TXDOT has constructed covered washbays in these areas and requires washing of vehicles in these locations.

4.1.3.4 Wash Water Recycling Systems

Some DOTs have constructed recycling systems at maintenance facilities. Due to the cost, these facilities are relatively rare; however, in some locations, the construction and

maintenance are either cost effective or the only effective way to manage wash water. For example, the New York City Watershed is an area that is subject to more stringent environmental regulations to protect local bodies of water from additional pollution. NYSDOT has a maintenance facility within this watershed and a vehicle wash water recycling system has been installed. The system reuses filtered water from previous washing activities. The system cost \$250,000 to install and costs roughly \$30,000 a year to maintain.

MDT's Atlanta Maintenance Facility implemented a wash bay reclamation system. In this system, all wash water is collected from vehicle washing and run through an aeration tank. The tank contains bacteria that feed off of grease, oil, grime, and soap, consequently filtering the water. Treated water is recycled for the next wash. The reclamation system claims to reduce fresh water usage by 90 percent. Regarding water savings, both MDT's recycling system and NYSDOT's system represent another benefit for areas with high water costs or in areas where water availability is limited.

The practice of recycling wash water can be an effective means to reduce wash water effluent; however, not all DOTs have positive experiences. DelDOT installed two wash water recycling systems in two separate maintenance facilities. These systems were not able to fully clean salt from the wash water and, therefore, the wash water eventually became briny and ineffective after one or two cycles of reuse. DOTs considering the installation of such systems must fully evaluate the effectiveness of the systems relative to the DOTs' needs.

INDOT and TDOT uses the brininess of wash water to their advantage. In at least one location, INDOT reuses wash water to make brine for roadway applications The wash water from vehicle washing is pumped to holding tanks. In INDOT's case, the holding tank is located in the salt storage building and the wash water is pumped to a brine maker in the building and is used as feed water for the salt brine. When the holding tank exceeds its capacity, wash water is sent to the sanitary sewer.

TDOT has installed vehicle wash water processing systems at many of its wash facilities. This system captures and cleans wash water for reuse as salt brine make-up water. In order to ensure that the wash water is relatively free of oil and other debris (which could clog the salt brine dispersion equipment), TDOT has installed oil/water separators and grit chambers at the wash bays. The water is also filtered through an automated, self-cleaning filtration system which uses filter paper to remove small particles. Following the filtering of the wash water, the water is pumped and stored in holding tanks and pumped or transported by truck to the brine mixing area. TDOT has installed high pressure, low volume washing facilities in order to both reduce the amount of water needed for washing and to avoid overloading the holding tanks. Moreover, the wash pads are under cover to prevent precipitation from entering the drains. [TDOT, (5)]
4.2 WASTE MANAGEMENT

4.2.1 Hazardous Waste Management

Summary of Hazardous Waste Management BMPs			
	BMP Selected Due To:		
	Cost	Time	
BMP (Implementing DOT)	Savings	Savings	Effectiveness
Use tracking logs for waste generation and disposal (ODOT)		~	\checkmark
Upgrade management practices to include those required of a larger			
quantity generator status, despite actual smaller quantity generator		\checkmark	\checkmark
status (MDTA, MaineDOT)			
Frequently inspect facilities for compliance with regulations and			
pollution prevention techniques which manage hazardous wastes			\checkmark
(MaineDOT)			
Centralize vehicle maintenance activities (TDOT)	\checkmark		\checkmark
Reach an agreement with state environmental protection agency to			
allow transport of used material to centralized facilities where	\checkmark		\checkmark
hazardous waste determinations are performed (TDOT)			

Hazardous wastes are defined as wastes that exhibit one or more of the characteristics associated with corrosivity, reactivity, ignitability, and toxicity. Hazardous wastes may also be specifically listed in the Resource Conservation and Recovery Act (RCRA) as a hazardous waste. Typical hazardous wastes generated at maintenance facilities include, but are not limited to the following:

- Non-"RCRA empty" aerosol cans
- Hazardous waste contaminated-petroleum products
- Vehicle fuels (gasoline, and diesel)
- Fuel filters
- Used rags contaminated with hazardous materials
- Pesticides (not otherwise defined as universal wastes)
- Oil-based paints
- Solvents (e.g., acetone, mineral spirits, parts cleaner, toluene, xylene)
- Carburetor cleaner.

Hazardous waste management—which includes labeling, storage, handling, transporting, disposal, and minimization of hazardous waste—is highly regulated by the federal government and, in many cases, by states as well. As such, few opportunities exist for DOTs to adopt alternate management practices. However, some DOTs exceed these regulations by practicing management techniques above and beyond those required by law. Improper management of hazardous waste may lead to potential health hazards and significant environmental degradation given the hazardous nature of these wastes. In addition, non-compliance with regulations may result.

4.2.1.1 Transport and Handling of Hazardous Waste

Regulations associated with the transportation of hazardous wastes are extensive and, therefore, only two of the survey respondents transport their own wastes or used material (TXDOT and TDOT); DOTs typically rely on licensed hazardous waste transporters to haul wastes to treatment, storage, or disposal facilities. ODOT maintenance facilities complete Waste Generation and Waste Disposal logs for all wastes generated at the facility to track hazardous waste shipments from the facility to the disposal site [ODOT (1)].

4.2.1.2 Generator Status

Most maintenance facilities fall under the RCRA Conditionally-Exempt Small Quantity Generator (CESQG) status or a state's equivalent status. To maintain this status, a facility must generate no more than 100 kilograms (approximately 220 pounds) of hazardous waste monthly per federal regulations. The benefit of maintaining CESQG status is that these facilities are allowed to abide by fewer federal requirements compared to larger waste generators. An example of a hazardous waste regulation which applies to larger generators, but not CESQGs, is the requirement to use a manifest for shipments of hazardous waste: for CESQG, these are not required per RCRA.

MDTA attempts to maintain the CESQG status of its maintenance facilities and generally manages its facilities as CESQGs. However, MDTA has proactively implemented formal RCRA generator training, Contingency Plans, and other measures required of large quantity generators. As a result, in the event a particular shop exceeds the CESQG threshold due to an unforeseen generation event and is thus considered a fully regulated small quantity generator for that calendar year, the shop remains in compliance with regulatory requirements.

MaineDOT gives responsibility to each of the regional managers to maintain the CESQG status for those facilities with this status [MaineDOT (6)]. This practice is accomplished by regularly shipping hazardous wastes offsite versus accumulating the wastes and shipping larger quantities at one time. MaineDOT, however, manages each facility *as if* the facility were a small quantity generator (per federal regulations) and, therefore, abides by the requirements for this generator status. This practice serves two primary purposes. First, the hazardous waste practices performed at the facilities do not need to be altered if the facility exceeds the standards for CESQGs. Second, MaineDOT ensures that its hazardous wastes are managed to the highest standard allowed by law.

Through an aggressive waste reduction campaign, TDOT has been able to either obtain a CESQG status or eliminate the generation of hazardous wastes at many facilities which were previously listed as Small Quantity Generators (SQGs) or Large Quantity Generators (LQGs). In 2001, TDOT had approximately 102 facilities with a SQG or LQG status; however, by 2004, only 22 of the facilities were categorized as SQG or LQG. TDOT's success is due to three measures:

- 1. TDOT ceased performing vehicle maintenance activities at some facilities and centralized vehicle maintenance, thereby reducing the quantities of wastes generated associated with vehicle maintenance at many shops.
- 2. TDOT signed an agreement with the state environmental protection agency that allowed centralized waste determinations of certain types of used material at specific shops. This measure, in effect, allows used material to be transported by TDOT to these locations for waste determination and disposal (if the material was determined to be waste).
- 3. TDOT drastically reduced the volume of waste generated through product substitution, eliminating the use of materials, or changing material management techniques: in 2000, TDOT generated 80,000 kilograms of hazardous waste; however, in 2008, TDOT generated 10,000 kilograms.

For example, in 2000, parts washers solution was regularly disposed as hazardous waste (the solution contained F-listed hazardous wastes). New parts washers were obtained to replace the older washers. The new parts washers were self-distilling, meaning that parts cleaner solution (still a hazardous material) is recycled by the parts washer mechanism. As a result, TDOT generates from approximately 1 quart to 0.5 gallons of waste per month statewide from these new parts washers, instead of many gallons per month using the old non-recycling parts washers. (Other examples of pollution prevention techniques can be found in Section 4.10, Pollution Prevention.)

From 2000 to 2003, TDOT eliminated the generation of the following common hazardous waste streams via increased recycling efforts, prohibition of the use of hazardous materials, or substitution of hazardous substances with non-hazardous substances:

- Carburetor cleaner
- Spray tip solvent
- Waste adhesives/glues
- Toluene solvent
- Contaminated used oil
- Radiator flush waste
- Methyl ethyl ketone
- Mixed fuel waste
- Herbicides
- Rags
- Aerosol cans

- Rust inhibitor
- Road flares
- Waste explosives
- Denatured alcohol
- Antifreeze
- Epoxy paint cleanup solvent
- Tire weights
- Oil filters
- Vehicle lamps
- Circuit boards
- Mercury lamps.

4.2.1.3 Inspections

Hazardous waste storage areas are required to be inspected on a regular basis. Inspection frequency can be based on either federal or state regulations with state regulations being more stringent than federal. This requirement is to help ensure that the wastes are not accumulated

longer than the allowed accumulation time, to allow for inspection of the condition of containers and storage area, as well as identify any deficiencies. For CESQG, these inspections are not required; however, for facilities which generate greater than 100 kilograms of waste per month, inspections are required to be performed on a weekly basis. MaineDOT has increased the inspection frequency at its facilities and performs inspections of storage areas at facilities with the CESQG status weekly and all others daily [MaineDOT (6)].

4.2.2 Universal Waste Management

Summary of Universal Waste Management BMPs				
	BM	BMP Selected Due To:		
	Cost	Time		
BMP (Implementing DOT)	Savings	Savings	Effectiveness	
Treat universal wastes as universal waste (versus hazardous wastes)	1	1	1	
(MDT, MaineDOT)	•	•	•	
Use a bulb crusher (MDT)	\checkmark		\checkmark	
Carefully pack universal waste to avoid breakage (MaineDOT)	\checkmark		\checkmark	
Dispose of universal wastes earlier than the maximum 1-year storage			1	
time allowed by federal law (MaineDOT)			·	
Obtain and store receipt of universal waste disposal (MaineDOT)			✓	
Transport universal waste to central facilities for packaging and	1			
storage in preparation for collection by hauler (TDOT)	÷			

Universal Waste management relates to the collection, disposal, handling, and labeling of the following wastes:

- Florescent light bulbs, including those containing mercury
- Some types of batteries, including lead-acid batteries
- Mercury and polychlorinated biphenyl-containing electronic equipment
- Recalled pesticides.

Universal wastes are a subcategory of hazardous wastes for which streamlined hazardous waste management standards apply. For example, these streamlined standards allow greater accumulation times of universal waste and lesser documentation and reporting requirements, among other differences, compared to other hazardous wastes. States can modify the universal waste rule and add additional universal waste(s) in individual state regulations. For example, some state regulations include within the definition of universal wastes televisions, computers, and other types of electronic equipment (Nebraska) and non-empty waste aerosol cans (California). Universal wastes still pose a threat to the environment if a release occurs and, therefore, careful implementation of regulatory requirements must be performed.

All maintenance facilities generate Universal Wastes, often in small enough quantities to be considered a Small Quantity Handler of Universal Waste, defined as the accumulation of less than 5,000 kilograms at any one time. Universal wastes can be generated by roadside activities, such as road lamp bulb exchanges, or generated at maintenance facilities, such as lead acid batteries from vehicle maintenance activities. Regardless of the location of generation, most of these waste products end up at the maintenance facility for temporary accumulation until a hauler can transport the wastes offsite. Often, these materials are recycled where materials from universal wastes are recovered and reused.

Universal Waste regulations (40 Code of Federal Regulations [CFR 270]) require specific management techniques to be employed. As a result, these regulations do not allow for the development of a wide range of management techniques. However, some DOTs, such as MDT and MaineDOT, have established BMPs to help manage universal wastes and help ensure that personnel meet the regulations. MDT uses bulb crushers for fluorescent light bulbs. The crushers minimize the amount of storage space required and diminish the need to carefully handle bulbs, thereby preventing unintended bulb breakage. These machines crush light bulbs into small fragments and compact the shards into 55-gallon drums. Filtration systems within the crushers remove mercury vapor from the air inside the drums. Manufacturers estimate that crushing light bulbs can save DOTs anywhere from \$0.10 to \$1.00 per bulb in recycling costs.

MaineDOT requires careful packaging of universal waste, specifically requiring that the waste items are packed with packing material in order to prevent breakage during storage, handling, and transport. The container holding the waste must be stored in a secured area where the container and contents are protected from damage, such as indoors in a garage or warehouse. All full containers must be shipped offsite within 90 days; this requirement exceeds the federal requirement of shipping waste offsite within 1 year of the date of generation. In order to prove proper shipping and recycling, MaineDOT requires that the supervisor in charge of universal waste at the facility obtain a Certificate of Recycling from the transporter. The Certificate of Recycling or other similar receipt also can be used to prove a maintenance facility's waste handler status [MaineDOT (6)].

In an effort to reduce costs of collection and disposal, TDOT collects universal waste at facilities throughout the state and brings the waste to a central location for pickup by a vendor permitted to haul universal wastes. TDOT has an agreement with the state environmental protection agency to allow small quantities of universal waste from specific locations to be transported by TDOT staff.

Summary of Animal Carcass Management BMPs				
	BMP Selected Due To:			
BMP (Implementing DOT)	Cost Savings	Time Savings	Effectiveness	
Compost carcasses and reuse compost (Multiple	~		\checkmark	
DOTS)				
Incinerate carcasses (MDSHA)			\checkmark	
Haul carcasses to disposal facilities (MaineDOT)		✓	\checkmark	
Natural disposal (MaineDOT)	\checkmark	✓	\checkmark	

4.2.3 Animal Carcass Management

Animal carcass management, particularly in regards to large animal disposal, has become an increasing concern in many states due to the health risks associated with improper management. In addition, animal carcasses may degrade water quality, a particularly important issue in watersheds used for drinking water. Animal carcasses are commonly managed in several ways: hiring a contractor to pick up the carcasses and transport to a disposal facility, pulling carcasses further off the roadside and allowing natural decomposition, burying the carcasses off the roadside, or composting or incinerating the carcasses. However, these traditional methods of carcass management have often been problematic:

- In Maryland, for example, burying more than two carcasses together qualifies as a landfill which requires solid waste permits.
- Many landfills restrict the number of carcasses they will accept or have stopped allowing carcass disposal altogether.
- The fees associated with collecting and transporting carcasses to disposal facilities are often high.
- Stringent environmental regulations and public disapproval prohibits facilities from disposing of most carcasses off of the road, as decomposing carcasses may be detrimental to human health, other animals, and potentially water quality.

Since not all animal carcass management techniques can be implemented in all situations, DOT districts with urban areas may need to rely on composting, incineration, or landfilling carcasses whereas districts in rural areas can rely on the less labor intensive "let it lay" technique. The largely rural districts of MaineDOT rely on a unique practice for carcass disposal [MaineDOT (6)]. MaineDOT relies on written agreements between the state agency in charge of wildlife management and private land owner. These agreements allow MaineDOT to transport carcasses to these remote areas of private land and dispose of carcasses.

As an alternative to landfilling carcasses, some DOTs have explored alternative methods of animal carcass management: ODOT, MDT, MDSHA, and NYSDOT have all implemented programs for animal carcass composting. Animal carcasses are collected from the road and placed on covered palates with a supplemental carbon source like straw or hay. The carcasses then decompose by natural microbial processes. Compost piles are idle for 4-6 months after the last carcass is added. Animal carcass compost can then be used for re-vegetation efforts or as a soil amendment.

Many NYSDOT maintenance facilities implement composting to manage animal carcasses with the assistance of several helpful tools. The NYSDOT provides facilities with a Road-Kill Deer Carcass Composting Operations and Maintenance Manual to assist in the establishment and maintenance practices associated with these activities [NYSDOT (7)]. In addition, NYSDOT is collaborating with the Cornell Waste Management Institute for further research into this technique, including health risk assessments and most effective methods. A

composting road kill fact sheet has been published [Bonhotal et al. (8)]. Using these tools, facilities can safely and properly manage animal carcasses.

NYSDOT management techniques address carcass pile location, coverage, and other techniques. Compost piles are located in well-drained areas at least 200 feet from surface waters, and composting bins are placed on hard surfaces with sufficient carbon additions (straw, hay, or wood chips) to prevent fluid seepage. Carcasses are placed back to back in a single layer. Carcasses are completely surrounded and buried by at least 6 inches of damp wood chips. These layers are repeated until the bin is full. The final layer to cap the bin is 24 inches of wood chips or recycled deer compost, and piles are not higher than 6 feet. Piles are left idle for several months and the internal temperature must be between 120 and 150 degrees for the process to work, with 131 degrees maintained for more than 3 days for pathogen reduction. Once the material is composted, the maintenance environmental coordinator oversees sampling for various pathogens, including *e. coli*, total coliform, fecal coliform, salmonella, cryptosporidium, total carbon, and total nitrogen. The pathogens present determine the purpose for which the compost may be used. Animal carcass compost is used in roadside construction and maintenance, facility re-vegetation efforts, or as a carbon amendment for new compost piles.

NYSDOT compost piles are located in isolated areas, separate from facility operations, farming activities, or highly trafficked areas. Detailed records of compost piles are kept and include information such as the number of carcasses in the pile and the date the last carcass was added. Temperature and odor readings are recorded daily. Before using the compost, the temperature and odor logs are reviewed. Temperature logs will reveal whether the compost pile reached the temperature adequate to kill pathogens. In addition to the publication of a health and safety manual, the Highway Maintenance Supervisor at the yard ensures all employees are made aware of the compost pile and the publications. Employees are trained on the contents of the publications, including safety and composting techniques, in a classroom or field setting.

Summary of Waste Aerosol Can Disposal BMPs			
	BMP Selected Due To:		e To:
	Cost	Time	
BMP (Implementing DOT)	Savings	Savings	Effectiveness
Drain all aerosol cans using a depletor system (ODOT, MDSHA, TDOT)	\checkmark		\checkmark
Remove tips from aerosol cans before placing in storage containers (VDOT)			~

4.2.4 Waste Aerosol Can Disposal

Every DOT maintenance shop uses aerosol products. Brake cleaners, lubricants, paints, and other common products are often purchased in aerosol form. While many of these products are non-hazardous when no longer usable, some qualify as hazardous, requiring careful management during use and disposal. Waste aerosol cans with contents that meet the definition of hazardous waste and are not empty must be managed as hazardous waste. However, if cans are "RCRA empty," as described in 40 CFR 261.7, facilities can manage waste aerosol cans as solid waste. Situations in which a container is deemed empty are described in 40 CFR 216.7.

For example, a container less than 119-gallon capacity may have less than 1 inch of residue within or less than 3 percent by weight of the total capacity of the container and be considered empty. Aerosol cans with hazardous waste must also reach atmospheric pressure prior to being considered "empty." State regulations may be more rigorous than these federal requirements, in which case state regulations would take precedence.

Many DOTs manage all waste aerosol cans as hazardous waste in order to avoid incorrectly disposing of hazardous waste aerosol, thereby avoiding non-compliance. In some cases, this means collecting waste aerosol cans in labeled drums at satellite accumulation areas and disposing as hazardous waste. VDOT also requires that the tips of all aerosol cans be removed before placement inside the accumulation drums to prevent accidental discharges during storage.

In other cases, DOTs rely on another method to ensure that cans are "RCRA empty." Aerosol can depletors, also known as "can poppers," are equipment that can be used onsite by facility personnel to render a can "RCRA empty." Waste cans are placed in the device and punctured. Residual chemical is collected in a drum attached to the machine and VOCs are captured by a coalescing carbon cartridge filter. Waste aerosol cans are then managed as solid waste for landfill disposal or recycled. A good example of this practice occurs at ODOT and MDSHA facilities. Both DOT facilities utilize depletors if available. Depletors can cost approximately \$700. Depletor manufacturers estimate that a can depletor system can hold the contents of approximately 4,200 cans. This yields a cost savings of approximately \$25,000 per drum compared to the cost to manage drums of aerosol cans as hazardous waste.

Summary of Line Striping Paint Waste Management BMPs			
	BMP Selected Due To:		
	Cost	Time	
BMP (Implementing DOT)	Savings	Savings	Effectiveness
Use water-based instead of oil-based paints (ODOT, TDOT)			✓
Hire a contractor to perform painting (TXDOT, DelDOT)			✓
Characterize paint wastes to identify proper management techniques			1
(ODOT)			•
Use paint totes (MDSHA, MDT, ODOT)			✓
Use a washing solution of dish soap and ammonia (WYDOT)			✓
Collect paint vehicle wash rinsate, allow liquid to evaporate, and			
dispose of solids in landfill (MDSHA)			v

4.2.5 Line Striping Paint Waste Management

Maintenance, repair, and storage of line striping vehicles and paint containers occurs at maintenance facilities. The vehicles contain the common vehicle fluids as described in Section 4.1.1, and hold the line striping paint. Upon completion of line striping activity, this paint is cleaned from the vehicle and paint containers, often with water. Because the paint itself may be a hazardous material or chemicals used for cleaning may be hazardous, rinsate from washing procedures may be hazardous waste. Most DOTs, like ODOT and TDOT, use non-hazardous paint, such as latex-based paint, allowing for any paint waste or rinsate to be managed

as non-hazardous waste. If not hazardous, however, the waste is still considered a pollutant that must not be released to the environment.

Due to the potentially negative impacts on the environment from paint wastes, DOTs must manage rinsate generated from the flushing of equipment tanks and lines appropriately. ODOT maintenance facilities characterize paint waste prior to disposal, and EMS Waste Generation and Waste Disposal logs are completed for all paint waste. MDSHA has dedicated drums to collect hazardous waste paint wash water. NHDOT has detailed instructions on managing line striping paint waste that identifies employee responsibilities based on labor categories, procedures for work activities, and training and documentation requirements. NYSDOT collects paint wash water in a holding tank, which is later picked up by a contractor and disposed of as hazardous waste.

MDSHA has SOPs implemented that provide procedures for management of paint totes, bulk paint stored in tanks, and drums which store paint waste. When non-hazardous paint waste is generated, MDSHA facilities may store this rinsate in an open container until the paint solids solidify and dispose of the paint solids as solid waste. MDSHA flushes paint lines in trucks and the rinsate is collected and disposed of as non-hazardous waste through a contractor. ODOT uses low-VOC paint, but any unusable paint is treated as hazardous waste and is stored in a closed container until disposal by a contractor. TDOT constructed paint waste collection pits to capture rinsate generated during the cleanout of painting equipment—this rinsate is captured in sumps which is later pumped to drums and managed as "special waste.

As mentioned above, line striping vehicles are traditionally equipped with built-in vessels that contain line striping paint and require routine cleaning. However, some DOTs have begun using line striping vehicles capable of carrying totes of paint. These self-contained paint totes do not require cleaning by maintenance personnel following use. Totes are delivered to the facility by a vendor and, when empty, the totes are returned to the vendor and recycled for future use. For line striping operations, MDT and ODOT have begun retrofitting vehicles to accommodate paint totes. MDSHA has been using totes in several districts for several years.

Note that some DOTs, including TXDOT and DelDOT, do not perform line striping, but contract the task to private companies, thereby avoiding issues related to line striping paint waste management (note that the contractors are not allowed to wash or store these vehicles at TXDOT maintenance facilities and are held responsible for managing any resulting wastes). WYDOT avoids generation of hazardous waste rinsate by using latex paint and a cleaning solution made from dish soap and ammonia.

4.2.6	Street Sweeping Waste Storag	e and Disposal

Summary of Street Sweeping Waste Storage BMPs			
	BMP Selected Due To:		
	Cost	Time	
BMP (Implementing DOT)	Savings	Savings	Effectiveness
Reuse sweeping materials for roadside projects (MDT, ODOT,			
MassHighway, WSDOT)	v		v
Screen and test sweeping wastes to ensure proper disposal (WSDOT)			✓
Use dewatering/drying beds to ensure capture of all contaminants			1
(MDOT, HDOT)			v
Segregate sweepings with the potential to be contaminated with			
hazardous wastes from "clean" sweepings and reuse clean sweepings	\checkmark		\checkmark
(HDOT)			
Avoid triggering solid waste facility status by regularly disposing of			1
street sweepings (MaineDOT, MassHighway)			v
Develop a statewide profile for street sweeping and similar wastes in			
order to eliminate the need to profile the waste prior to each disposal	✓	✓	
(TDOT)			

Wastes generated from street sweeping activities are usually stored onsite at maintenance facilities. Sweeping wastes generally contain litter, debris, and dirt collected from the road surface; however, depending on the circumstances, street sweepings can also contain various hazardous and non-hazardous chemical pollutants as well. Some waste management techniques can help protect the environment by reducing or eliminating runoff of the waste into the surrounding environment.

A common practice among DOTs is to temporarily store these sweepings at maintenance facilities in designated areas. During storage, the facility may then test for the presence of hazardous pollutants and, dependent upon the testing results, appropriately dispose of the wastes. For non-hazardous wastes, DOT personnel may transport the material to a disposal site, such as a landfill; however, for street sweepings designated as hazardous, the waste must be transported to an appropriate disposal facility. Transport is usually done by a waste disposal contractor.

Street sweepings often contain large amounts of reusable material like sand and gravel. Therefore, some DOTs screen street sweepings for pollutants such as litter, debris, and smaller particles which may contain contaminants in order to reuse the sweepings for fill and other purposes. Reuse of this material can save costs on the purchase of new material. For example, MDT, ODOT, MassHighway, and WSDOT have implemented projects to reuse street sweeping wastes.

• MDT uses street sweeping waste combined with native grass seed for roadside revegetation efforts. A contractor is hired to screen the sweepings for litter. After screening, the sweepings are combined with grass seed and compost and then spread along the highway.

- ODOT also reuses street sweepings, but refrains from use of this material in environmentally sensitive areas since sweepings can contain high levels of pollutants like heavy metals and other hazardous waste.
- MassHighway allows reuse of sweepings, but restricts their use to areas outside of wetland and river buffer zones and ground or drinking water supply areas, under road surfaces or as fill, above the level of groundwater, and non-residential areas [MassHighway (2)]. MassHighway allows use of sweepings as an additive to compost.
- WSDOT has 12 sites where street sweepings and other materials collected roadside (e.g., from catch basins) are screened and reused. The recycled material is used in roadside medians.

Other DOTs also perform practices that help reduce costs, save time, or improve the effectiveness of pollution prevention and environmental compliance activities. MDOT partners with municipalities when possible to share waste storage bays. The MDOT funded the rehabilitation of the City of Munising's street sweeping drying bed, in exchange for shared use of the bed. A drying bed is used to separate solids in street sweepings from liquids. The beds are constructed on impervious surfaces and contain a filtering system through which liquids pass into a catch basin and are then discharged to a sanitary sewer system or holding tank. This process ensures that runoff is properly managed. The solids are then disposed of in a landfill or reused as fill, as appropriate.

HDOT utilizes a system similar to MDOT's. Sediment and debris collected from HDOTs' highway catch basins, pipes, and other locations are brought to designated dewatering areas located at maintenance facilities. Each of these dewatering facilities include a material and debris settling basin, filter beds, collection and transport pipes, an oil intercept pit, and an area for post-dewatering debris and dry storage. Waste water from the material and debris pile in the settling basin is collected and pre-treated in the filter beds and oil interceptor pits, and conveyed to a local municipal sewer system for treatment. The remaining material may be stored onsite temporarily in designated areas or sent directly to a solid waste landfill.

The stockpiling of large quantities of waste material can trigger solid waste disposal facility requirements. To ensure that this does not occur, MaineDOT and MassHighway require annual removal of solid waste stockpiles [MaineDOT (6) and MassHighway (2)].

Street sweeping waste and any petroleum-contaminated soils collected from TDOT sumps, catch basins, ditches, or streets, is considered "special waste." This waste was formerly profiled for hazardous materials each time such waste required disposal and TDOT was required to obtain an approval from the state environmental agency for disposal. Each request cost \$250. To eliminate this cost, TDOT developed one comprehensive statewide profile for special wastes. Through an agreement with state regulators, this one statewide profile replaced the need for each facility to generate an individual profile for the waste they generated, resulting in savings of more than \$25,000/year.

4.3 EMPLOYEE TRAINING

Summary of Employee Training BMPs			
	BMP Selected Due To:		
	Cost	Time	
BMP (Implementing DOT)	Savings	Savings	Effectiveness
Use interactive/self guided software (NHDOT, MDT)	\checkmark	\checkmark	\checkmark
Use contracted trainers (MDSHA)	\checkmark		\checkmark
Incorporate training with other topics (i.e., safety) (MaineDOT,		1	
MDSHA)		•	v
Use formal and informal training techniques (NHDOT, NYSDOT,			1
MDSHA)			•
Use written reference guides and other material and post on the			
DOT's intranet for trainee reference (MDSHA, MaineDOT,			\checkmark
NYSDOT)			
Use a mix of media to train staff: poster boards, newsletters, email,			 ✓
etc. (HDOT Multiple DOTs)			•
Develop training content based on audit/inspection findings (VDOT,			✓
TDOT)			2

DOTs rely universally on training to relay information to DOT staff about new or revised environmental procedures. These procedures must change as new or modified federal, state, or local regulations are promulgated and as new or modified internal DOT policies are adopted. Due to the frequency at which regulations and policies change and also taking into account employee turnover rates, training must be performed frequently (not to mention that some laws, such as RCRA, require periodic training of personnel). Furthermore, various types of training are employed by DOTs, depending upon the complexity of the material.

The typical audiences for environmental procedure training sessions are the maintenance personnel, since these personnel are ultimately charged with appropriately executing these regulations and policies. Training content may include discussions of documented environmental procedures or the use of new technology which helps protect the environment. Training of personnel is intended to prevent pollution by informing personnel of proper management techniques and is intended to ensure personnel perform activities in compliance with regulations.

Based on the BMP Survey results and personal communications, DOTs use a mix of classroom-style training and informal "on the job" methods for training maintenance personnel. This mix helps keep the training interesting, increasing the effectiveness of the training. For example, NHDOT utilizes a suite of training methods, including the use of interactive software, classroom-style PowerPoint presentations, and hands-on or on-the-job training. MDT also provides training via the internet using a software application which allows trainees to participate in recorded trainings at their own pace and without the need to travel to training. The training applications have yielded cost savings for MDT through the elimination of travel-related expenses. The following overly simplified calculation is an example of the potential cost savings. A popular internet training software program costs approximately \$50 per month for one license. If this training method was used in place of sending 10 staff to a training center,

assuming 30-minute travel time for the employees at average of \$50 per hour per employee (total = \$250), the agency would save \$200 per training.

Most DOTs rely on in-house staff to perform trainings. For example, NYSDOT's Regional Maintenance Environmental Coordinators perform periodic training sessions for maintenance personnel. Only one of the survey respondents (MDSHA) identified the use of non-DOT trainers. The use of outside trainers for annual training reduces the need for a larger in-house staff.

Some DOTs hold annual trainings for key maintenance personnel in formal settings as a means to describe applicable DOT environmental policies and procedures. For example, MaineDOT puts on a "Safety Day" for each of its districts annually, aggregating staff in one location per district. The "Safety Day" includes topics in the areas of worker safety and environmental protection. MaineDOT environmental staff use these opportunities to review environmental practices identified in its "Greenbook." Similarly, MDSHA performs annual environmental awareness training. Topics include proper compliance and pollution prevention procedures associated with RCRA, hazardous waste, transportation safety, and hazardous communications. The training lasts only 2 hours in order to minimize the impact on shop operations. Training is performed at each shop in order to tailor the training to the unique needs of the shops. Training session topics may be specific to one aspect of environmental compliance or pollution prevention or may encompass multiple media areas, depending upon the duration or purpose of the training.

In addition to annual formal training, MDSHA's Environmental Coordinators facilitate ongoing training sessions during monthly "town hall" meetings. Town hall meetings occur at each individual maintenance facility and address new topics that impact the facility. Environmental coordinators use these meetings to discuss new environmental topics with maintenance personnel. MDSHA training also incorporates job-specific SOP training, like spill response and vehicle fueling.

MaineDOT holds monthly safety meetings during which the shop's safety manager is assigned a section of the "Greenbook," such as hazardous waste management, to review with staff. The safety manager is encouraged to show staff how to perform the particular practice by, for example, walking over to the hazardous waste storage area with trainees and describing proper hazardous waste storage techniques.

VDOT provides routine training programs for maintenance facilities on the topic of Waste Management, including training on BMPs, internal policies, and good housekeeping. Routine training also includes topics related to Spill Prevention, Containment, and Countermeasures (SPCC) for hazardous materials. VDOT and TDOT also links periodic compliance assessments performed at maintenance facilities with training by incorporating discussions of the assessments findings within the training.

NYSDOT trains employees in all aspects of environmental stewardship. The Environmental Handbook for Transportation details training regimens such as emergency preparedness and spill response [NYSDOT (4)]. Pesticide Management training is also provided to NYSDOT staff. Currently, a petroleum bulk storage training program is in development and will include training topics related to inspections and documentation.

DOTs also identified useful mini reference guides to reinforce training topics. HDOT, MDSHA, and MaineDOT all provide these guides.

- HDOT developed a field manual for use by maintenance personnel in the field. The brief manual provides tips on how to prevent pollution and steps to take in the event of a chemical release to the environment and other measures. The Manual is included in Appendix E.
- MDSHA has developed small flip cards that summarize training topics and can be used as a quick reference for maintenance personnel in the field and handy for storage in a vehicle. The flip cards are provided in Appendix F.
- MaineDOT provides its "Environmental Practices Guide," also called the "Greenbook," in a 5-inch by 7-inch booklet with laminated pages. See Appendix G for a few example pages from the Greenbook.

The intent of distributing these items to staff is that staff are more likely to keep these mini reference guides nearby during the course of the day and reference the guides versus a larger manual of SOPs.

NHDOT regularly distributes environmental alerts to their employees to ensure employees are up to date on the latest environmental issues. These alerts are emailed to personnel and posted on bulletin boards at each facility so that employees can easily access them. NDDOT also distributes a newsletter periodically to its five districts. The newsletter is called the "BMP Newsletter" and highlights the BMPs being practiced at one or more of the districts. The intent of the newsletter is to foster the sharing of good ideas between the relatively autonomous districts and encourage the adoption of these ideas throughout all the districts as applicable. A practice that DelDOT performs, in addition to its regular training program, is the distribution of "maintenance bulletins," poster size, on a quarterly basis to all maintenance facilities. The bulletins describe in simple terms relevant topics as a means to train or retrain personnel. Some bulletins have an environmental focus.

4.4 DOCUMENTATION AND RECORDKEEPING

Summary of Documentation and Recordkeeping BMPs			
	BMP Selected Due To:		
	Cost Time		
BMP (Implementing DOT)	Savings	Savings	Effectiveness
Develop written guidance on record keeping (ODOT, MDSHA,		1	1
MaineDOT)		•	·
Use electronic databases for record retention and document			1
tracking ((Multiple DOTs)			·
Use color-coded hard copy filing system (MDSHA, TDOT)		\checkmark	\checkmark

In order to be compliant with federal and state environmental regulations, DOT maintenance facility personnel are required to document various environmental practices and retain documentation for a given amount of time, depending on the regulatory requirements. The frequency, amount, and type of paperwork differ for certain tasks. Maintenance personnel may be required to fill out paperwork for activities such as hazardous waste disposal and tank inspections. The challenge for many DOTs is to ensure that documentation is filled out properly, in a timely manner, and retained for the required duration.

A best practice of ensuring documents and records are managed properly is through the use of documented SOPs or work instructions. These types of documents instruct personnel on how to appropriately complete paperwork and provide guidelines on the topics of documentation, storage, and retention. For example, ODOT EMS includes detailed instruction on proper documentation and record retention for each aspect of environmental compliance, including logs, instructions on how to complete the paperwork, and time periods for retaining documentation [ODOT (1)].

Other DOTs have automated systems to document activities such as inspections. At MDT and MDSHA facilities, tanks have automated gauging systems that take daily readings and document any leaks or abnormalities. MDT prints out monthly reports and retains these reports onsite.

MDSHA developed an SOP that describes hard copy filing. The SOP describes a colorcoded filing system for hard copies of documents and records at the maintenance shops. The hard copy filing system acts as a quick reference tool for maintenance personnel during daily operations. The files are color coded based on media area; for example, air (green), waste (red), water (blue), storage tanks (orange), pesticides (yellow), and environmental-related inspections (purple). Documents like training records, receipts, monitoring records, and permits are located in the files in chronological order. Each facility keeps the files in a locked cabinet to prevent mismanagement and loss of files, with keys distributed to key facility personnel who are responsible for managing and maintaining the files, as well as to the district office who oversees the shop, so that at any time the files can be accessed. Similarly, TDOT also has a color-coded system of filing to simplify the storage process of important environmental documents.

A growing number of DOTs are developing electronic databases to maintain and track environmental data. Electronic databases keep documents and records organized and easily accessible. Documentation stored in the databases can be grouped according to media area. For example, NYSDOT and NHDOT maintain databases that manage environmental compliance data elements. Specifically, NHDOT uses a web-based database, known as the Inventory of Managed Properties, to manage data at all operations facilities. All facilities also retain the NYSDOT maintains the Maintenance Asset required hard copies onsite as necessary. Management Information System, which contains data elements that measure and track environmental issues. MDSHA has its own electronic information management system, State Highway Administration Regulatory Compliance System (SHARCS), which is a centralized, web-based database that stores multi-media compliance data. SHARCS is currently accessible to limited facility personnel as it is still under development, but access is being expanded. Screen shots of SHARCS are provided in Appendix H. Finally, HDOT utilizes an Asset Management System (AMS), which closely mirrors the systems described above in that the AMS can be used as an information repository capable of real-time tracking of program activities and to analyze data, manage activities, and create reports.

While SOPs and work instructions can provide guidance to maintenance personnel about proper documentation and recordkeeping techniques, the SOPs themselves have proven to be excellent forms of documentation of approved work practices. MDSHA has currently developed 15 SOPs, including:

- Environmental Risk Ranking/Prioritization
- Vehicle Fueling
- Hazardous Waste Management
- Roadside Waste Collection and Management
- Biennial Hazardous Waste Report and Recordkeeping
- Hazardous Materials Management
- Compressed Gas Cylinder Handling, Storage, and Transport
- Spill Notification and Emergency Management for Maintenance Shop and Mobile Road Crew Personnel
- Spill Notification and Emergency Management for State Highway Administration's Environmental Compliance Division
- Spray Booth and Painting Operations
- Route Inspections Monthly

- Pesticide Management and Recordkeeping
- Routine Inspections Weekly
- Wash Bay Use and Maintenance
- Standardized Hard Copy Environmental Record Filing System.

MaineDOT has a similar method of documentation, calling the work instructions "procedures," and documenting the procedures in the *Environmental Policies and Procedures* manual. Within the manual, each of 13 procedures is detailed. The standard content used by MaineDOT for each of the procedures includes the following:

- Procedure Objective
- Procedure Applicability
- Target Audience
- Definitions and Abbreviations (as found within the procedure)
- Responsibility (of those affected by the procedure)
- Requirements (to correctly implement the procedure)
- Communication and Training
- Evaluation
- References
- Approval (of the procedure, including an approval date and list of approvers).

As a companion to this manual, MaineDOT has published its "Environmental Practices Guide" or "Greenbook," which is intended to provide a quick reference for supervisors and crew personnel when questions arise about environmental issues. The Greenbook is printed on 5-inch by 7-inch paper and laminated for convenience of the supervisors and crews.

4.5 OIL/WATER SEPARATOR MANAGEMENT

Summary of Oil/Water Separator Management BMPs			
	BMP Selected Due To:		
	Cost	Time	
BMP (Implementing DOT)	Savings	Savings	Effectiveness
Use non-emulsifying soaps during washing operations to improve			1
the capture of oils in oil/water separators (TDOT)			•
Regular inspections of oil/water separator systems (ODOT,	1		1
MDSHA, MassHighway, MaineDOT)	v		•
Use absorbent materials in oil/water separators (ODOT, NHDOT,			1
MaineDOT)			•
Rankfloor drain effluent based on operations (MaineDOT)			\checkmark

Oil/water separators are one of the most common pollution prevention devices at DOT maintenance facilities. Oil/water separators separate oils and solids from wastewater effluent by chemical or physical separation, including the use of gravity, filters, coagulants, and flotation. Generally, the oil/water separators allow waste oil to float on the water's surface while allowing solids to settle to the bottom of the separator. Waste oil can then be skimmed from the surface for disposal while sediment can be scraped from the bottom. The remaining wastewater is then discharged according to the practices at the facility. Some facilities, such as those managed by NDDOT, use oil/sand separators at some of their maintenance facilities. These devices work similarly to oil/water separators; however, sand is utilized as an additional means to filter out oils.

Oil/water separators may be used in a number of locations at maintenance facilities, including in wash bays (as discussed in Section 4.5), maintenance bays, and petroleum storage tank areas as means to prevent inadvertent releases into the environment. For oil/water separators used in wash bays, some DOTs, such as TDOT, use non-emulsifying soaps so that oil does not stick to soap molecules and pass through the oil/water separator and into the storm drain system, septic system, or to the sewer system.

DOT maintenance facility personnel typically rely on the manufacturer's specifications for the proper maintenance techniques of these devices. When manufacturers' specifications are not available, or when oil/water separators have been modified to provide additional benefits, some DOTs, such as ODOT, require monthly inspections until an appropriate maintenance schedule is developed. Disposable filters are used in some of these separators and ODOT requires these to be replaced monthly, and any petroleum-contaminated booms used in the separators are disposed of as solid waste [ODOT (1)]

MDSHA also has an oil/water separator inspection and maintenance schedule, and performs routine system cleanings of grit chambers as well. MDSHA personnel inspect oil/water separators at least monthly to ensure that they are clean and functioning properly. Initially, oil/water separators were cleaned out on a quarterly basis. However, after reviewing the number of cleanings required versus the amount of maintenance required, the schedule was revised to three times a year or even twice year at some shops (depending on usage). MDSHA has also contracted "emergency services" so that a contractor is available for immediate oil/water separator maintenance, such as an emergency cleanout. MassHighway also performs inspections of these areas that include a requirement to manually self-test the oil/water separator alarm systems as equipped to ensure that the alarms are properly functioning, thereby reducing the likelihood that an improperly functioning alarm could result in an environmental release [MassHighway (2)]

A common approach to enhance the function of oil/water separators is to use absorbent pads or socks in oil/water separators. NHDOT uses this technique to provide additional pollution prevention. Absorbent pads are placed in the top of the oil/water separator and collect excess petroleum, which prevents overflow and decreases the frequency of necessary pump outs. The absorbent pads are recycled and reused again after the used oil is removed. MaineDOT incorporates many of the management techniques described above [MaineDOT (6)]. In addition, MaineDOT requires that a risk ranking of floor drain effluent is performed (all floor drains in maintenance facilities are required to lead to oil/water separators with fill alarms). The risk ranking process applies a ranking of high risk effluent or low risk effluent. Effluent that is generated through the following activities is considered high risk due to the materials used during these activities:

- All vehicle maintenance
- Any location with the potential for pollutants to drip, leak, spill, or wash into the oil/water separator system
- Areas where heavy equipment liquids are stored
- Areas where the steam cleaning of engines occurs.

All other activities are considered low risk because they are deemed to generate low risk effluent. High risk effluent is managed using more stringent procedures given the greater possibilities that this effluent is contaminated. Therefore, high risk effluent may only be managed in one of three ways:

- 1. Discharged directly to a sanitary sewer system with permission from the municipality,
- 2. Captured in a holding tank and transported for disposal, which may include analytical testing, or
- 3. Collected within the facility on an impervious surface where there exists no potential for release into the environment.

Low risk effluent may also be managed in these ways, but may also be allowed to infiltrate into the ground. As a result, activities which generate high risk and low risk effluent must be separated physically so that high risk effluent does not mix with low risk effluent.

Regardless of the effluent risk ranking, all floor drains, oil/water separators, and other effluent holding tanks must have oil-only absorbent socks in them at all times. These absorbents are to be changed when saturated or nearly saturated.

4.6 STOCKPILE AND BULK MATERIALS MANAGEMENT

Summary of Stockpile and Bulk Materials Management BMPs			
	BMP Selected Due To:		
	Cost	Time	
BMP (Implementing DOT)	Savings	Savings	Effectiveness
Use designated storage areas (MaineDOT)			✓
Risk rank stockpiles to ensure proper management (MDSHA, MDT,		1	
ODOT)		•	v
Inventory stockpiles regularly (MaineDOT)			✓
Preventative weed control (MDT)		\checkmark	✓
Use covered storage buildings (MDT, INDOT, NHDOT)			✓
Use other forms of covering of stockpiles (i.e., tarps) (MDT)			✓
Store stockpiles on impervious surfaces (MaineDOT, MDSHA,			
ODOT)			•
Perform roadway analysis to determine effectiveness of de-icing	1		<i>\</i>
operations (NYSDOT)	·		•
Assess secondary containment needs for deicing chemical bulk tanks			 ✓
and install secondary containment where necessary (ODOT)			•
Slope entrances at storage buildings to prevent run-off (MDOT,			 ✓
TDOT)			•
Capture and reuse of salt-containing runoff (VDOT)	✓		\checkmark
Use of a mobile reverse osmosis/ultrafiltration system to treat	1		 ✓
captured storm water runoff from salt transfer areas (VDOT)	•		•
Establish salt "lay back" distances within salt storage structures			 ✓
(TDOT)			•

Highway maintenance facilities stockpile various materials for onsite use or roadside operations, or temporary collection of waste material. Stockpiles can be sand, salt/deicing chemicals, gravel, fill, roadway millings, and other materials used frequently and in large quantities by highway maintenance personnel. They may also include woody debris, roadside barriers, and street sweepings. Proper management of stockpiles can ensure fewer environmental complications for the DOT at both onsite maintenance facilities and on the roadside. Onsite complications can include wind or precipitation erosion, while roadside issues can include excessive weed growth, as described below.

The proper management of material stockpiles provides a cost savings to facilities by preventing the loss of materials. Actual cost savings may vary depending upon the purchase cost of the raw material and the amount of material potentially lost due to improper storm water controls.

In order to better manage stockpiles and minimize environmental impacts, MaineDOT requires the use of designated areas for the storage of stockpiles. Areas are designed through the use of signage, site plans, or fencing. Some stockpile materials require more management in order to reduce pollution and, therefore, designating material locations makes it easier for personnel to manage the material if the material is in one location. As a means of good housekeeping, MaineDOT also requires that all stockpiles of construction materials, such as culverts, guardrails, catch basins, and other items be inventoried annually if these items will be

stored longer than 1 year. Following the inventory, unusable materials are offered to other regions or state agencies for reuse.

Stockpile erosion due to wind and precipitation can be a major environmental issue. At MaineDOT sites, stockpiling of sand, dirt, topsoil, or gravel materials, which are prone to erosion, must have erosion or sediment controls incorporated at the stockpile sites. In addition, no bulk or waste material storage is allowed to be within 100 feet of a body of water, only 3 acres or less of storage is permitted at each facility, and stockpiles must be set back 25 feet or more from a property boundary. To control stockpile erosion and sediment at MDSHA facilities, staff organized a task force called the Stock Pile Management Team. The team developed a stockpile management matrix based on the type of material stockpiled and the environmental exposure at the site. Stockpiles are assigned a number from one to four based on the type of material. Stockpiles receiving a score of One (1) requires storm water protection; a score of Two (2) requires storm water and wind protection; Three (3) requires storm water and soil protection; and Four (4) requires storm water, wind, and soil protection. Interim measures have been developed to manage stockpiles while uniform, permanent procedures are developed based on the rating system.

MDT implements aggressive noxious weed control on sand piles at the facility in order to decrease future pesticide treatments on the roadside. New sources of aggregate stockpiles are evaluated for the presence of weed seeds and must be approved by MDT before crushing of the aggregate into finer material begins. If a stockpile contains a substantial amount of weed seeds, a clean source of aggregate is found. This proactive approach results in cost savings for MDT due to fewer pesticide applications along the roadways.

4.6.1 Storage and Handling of Deicing Salts and Chemicals

Without proper maintenance, deicing salts and chemicals can be detrimental to the surrounding environment. Runoff contaminated with deicing chemicals can cause areas to become denuded of vegetation, thus accelerating erosion, and impact bodies of water. In response, DOTs are taking precautions that prevent salt and chemical leaching from storage areas. Common examples include storage of salt in salt barns, sheds, or other covered locations. Where a storage structure is not available, some DOTs require salt piles to be covered with tarps. Also, DOTs are minimizing the amount of salt applied on road surfaces, thereby reducing the quantity of material required to be stockpiled.

NYSDOT performs post-storm analyses to determine adequate application rates for road salt. This knowledge is used to help determine appropriate quantities to purchase and stockpile—keeping stockpile quantities in adequate amounts (versus stockpiling too much) will help reduce the environmental impacts of the stockpiled salts or the space needed to store the material (space is often in short supply at DOT maintenance facilities). The use of salt brine may reduce the need for salt piles. For example, NYSDOT and MDSHA also use salt brine extensively in addition to solid chemical. The agencies have found salt brine to increase the adherence of salt to the road, preventing scattering and decreasing total amount of chemical applied, thereby reducing stockpiled quantities of salt.

While the state of Montana does not require salt/sand piles to be stored in covered facilities, MDT has experienced environmental ramifications for storing the chemical uncovered, including contaminated wells and vegetation kills in adjacent sites. Therefore, MDT has begun rating stockpile sites based on potential environmental risk, similar to MDSHA's rating program. Unlike MDSHA, however, MDT's criteria include proximity to neighboring wells and the presence of surface waters, such as streams and drainage areas. If risk is determined to be high, the facility will implement additional controls to prevent leaching, either by covering the piles or constructing asphalt pads on which the material can be stored. The additional controls benefit the facility by reducing environmental impact and preventing financial losses due to the loss of product caused by weather and any potential remediation or legal costs. If the solid chemical is left uncovered and there are no alternatives, the quantity stockpiled is limited to the average annual usage. During salt/sand blending operations, salt is temporarily covered to prevent leaching.

ODOT only uses liquid deicing chemicals stored in tanks to reduce runoff or other detrimental results associated with the storage of salt. ODOT performs risk assessments at maintenance facilities to determine the need for secondary containment needs of chemical tanks. A risk assessment is based on site conditions such as rainfall, topography, and the likelihood of tanks to fail. Sites are then rated high, medium, or low and high priority sites receive secondary containment [ODOT (1)].

At new facilities, INDOT has constructed "coverall" structures which are large enough to house salt piles and loading activities to trucks, thereby significantly reducing salt residue remaining from the loading activities exposed to precipitation. For facilities which do not have structures large enough to cover salt loading activities, other DOTs, such as MDOT and NHDOT facilities, salts are stored in smaller concrete and timber covered buildings to protect the salt from precipitation. Some salt domes maintained by MDSHA are equipped with spring-loaded corral gates to keep salt inside. Gates are waist high and have dusters on the bottom. MDSHA also performs weekly housekeeping of all salt storage areas, including sweeping and visual inspections of salt storage areas to ensure that salt remains in the buildings. The entrances to MDOT and TDOT salt domes are sloped toward the structure to reduce the likelihood of discharge of salt to the environment during a precipitation event.

TDOT requires that all salt piles are housed within a covered structure (usually a salt dome) and requires specific salt "lay back" distances from the structure entrances. These distances are 15 feet or, if the salt is further protected by a tarp or other covering, 5 feet. The lay back distance of 15 feet is demarcated within the structure with a line painted on the wall and accompanying signage. The layback distance of 15 feet allows salt loading operations to occur fully within the structure, thereby helping to avoid salt from falling outside of the structure and potentially contaminating storm water.

DelDOT requires that the facility is swept for salt debris after every snow or ice event during which salt is collected from the storage structure for use. Similarly, MassHighway requires this practice, requiring that sand and salt which falls outside of the storage areas be swept within 48 hours of the activity to minimize contaminated runoff [MassHighway (2)].

VDOT captures salt containing runoff in engineered ponds or tanks from loading operations and re-uses the brine in the mixing of de-icing chemicals. This allows for a cost savings by allowing for minimizing the use of chemicals and/or salt in the de-icing mixture. This also prevents salt of chemical-laden runoff from affecting vegetated areas or entering nearby surface waters.

In an effort to better manage salt-contaminated storm water runoff from VDOT's salt storage facilities, VDOT commissioned a study in 2004 [Fitch (9)]. The objectives of this study were to assess the quantity and quality of salt-contaminated water generated from storm water runoff due to salt loading activities at VDOT's salt storage facilities and to evaluate management/treatment alternatives to reduce costs and better protect the environment. VDOT found approximately 30 million gallons of contaminated runoff water being generated during the 5-month winter maintenance season.

The study also compared the cost to collect, pump, and transport the contaminated runoff to a POTW system (VDOT's common practice) against alternative methods of treatment. The estimated cost to perform the common practice was \$0.13 per gallon of runoff. The alternative methods assessed and the estimated costs are as follows:

- Ion exchange treatment: \$0.002 0.003 per gallon
- Reverse osmosis: \$0.00064 \$0.00075 per gallon
- Reverse osmosis/ultrafiltration: \$0.047 per gallon.

Electrodialysis was also considered; however, it was ruled out because of the technical infeasibility of this option. (Electrodialysis is used for large applications and a smaller system was not available for VDOT's use.) Reverse osmosis was infeasible as a stand-alone process due to the sensitivity of the process to total suspended solids in the runoff. However, reverse osmosis combined with ultrafiltration was feasible, and it was a process that could be transported on truck between maintenance facilities.

4.7 CONTAINER MANAGEMENT

Summary of Container Management BMPs			
	BMP Selected Due To:		
	Cost Time		
BMP (Implementing DOT)	Savings	Savings	Effectiveness
Develop written guidance on reuse of containers (MaineDOT)	\checkmark	\checkmark	\checkmark

The management of containers which contain hazardous and non-hazardous materials and wastes encompasses activities such as container transport, selection, and storage. Federal regulations associated with the Occupational Safety and Health Act and RCRA, for example,

require that containers are in good condition and are compatible with the contents. State regulations may also affect container management but must be more stringent than the federal regulations.

Recognizing the potential for release of a material or waste into the environment without instructions to maintenance personnel, MaineDOT developed guidelines for container management [MaineDOT (6)]. These guidelines detail topics associated with container reuse, cleaning, labeling, disposal/recycling, and purchasing. MaineDOT only allows reuse of containers which previously contained the following material:

- Motor oil
- Hydraulic oil
- Gear oil
- Transmission oil
- Grease
- Antifreeze
- Soap/detergents.

Containers which previously held other materials may be reused; however, consent must be obtained from the Regional Manager. This requirement is an attempt to ensure compatibility with the former container contents and future contents and compatibility between the future contents and container.

Cleaning of drums may be performed by MaineDOT staff or by an outside company. When empty, MaineDOT requires empty containers to be labeled as such or stored in an area marked with similar signage. Alternatively, metal containers may be recycled as scrap metal.

4.8 MATERIALS INVENTORY CONTROL

Summary of Materials Inventory Control BMPs				
	BMP Selected Due To:			
	Cost Time			
BMP (Implementing DOT)	Savings	Savings	Effectiveness	
Use a centralized purchasing unit (ODOT)	\checkmark	\checkmark	\checkmark	
Minimize purchases of hazardous materials (MDOT, NHDOT)	\checkmark		\checkmark	
Share excess materials between facilities (MDOT, NHDOT)	\checkmark	✓	\checkmark	
Purchase products from an approved list (TXDOT, MaineDOT,			1	
TDOT)			•	

Inventory control is not a federal regulatory requirement; however, hazardous and nonhazardous material inventory control represents a means for DOT maintenance facilities to control the types of materials brought to a facility and control the use and management of the materials. In addition, inventory control may be used as a tool for DOT maintenance facilities to control the management of the material once the material becomes waste. Most DOTs have instituted basic levels of inventory control, such as procuring products through a central purchasing unit or tracking remaining stored quantities and ordering additional materials as supplies run low. Some DOTs, however, have additional material inventory controls in place for the following three major reasons. First, a system to control the types of materials used onsite can help ensure that a DOT complies with hazardous communication requirements, that is, collecting and making material safety data sheets available to maintenance personnel. Second, by controlling the quantities of hazardous materials purchased and stored onsite, there may be less chance of expired hazardous materials requiring disposal. Third, space is often a premium at maintenance facilities and, therefore, stockpiling unused non-hazardous materials, such as gravel or sand, may take space away from other primary activities.

There are several techniques to control material inventory. One control technique is not allowing large bulk purchases. Purchasing materials on an as-needed basis eliminates the potential for material to expire before being used. However, in some instances, bulk purchases of materials may be necessary, for example, when purchasing salt, sand, gravel, or other stockpile materials.

MDOT and NHDOT no longer purchase hazardous materials in bulk for long-term storage. Hazardous materials are shared state-wide at maintenance facilities. MDOT, NYSDOT, and ODOT continually monitor their inventory and eliminate products that are past the manufacturers' expiration date. Continuous monitoring prevents the accumulation of hazardous materials and, consequently, reduces the disposal frequency and amount and therefore can lead to cost savings.

Another control technique includes the requirement to use a central purchasing unit to obtain materials for the DOT. As part of this system, maintenance personnel are not allowed to purchase materials without prior approval from the central purchasing unit, reducing purchase of unnecessary materials or excessive quantities.

Some DOTs have developed an "approved products list" or, alternatively, a list of products not allowed to be purchased. Prior to purchase, maintenance personnel must consult this list. TXDOT uses an approved products list that includes erosion and sediment control devices which have been tested for effectiveness. Similar to TXDOT, MaineDOT also has developed an approved products list; MaineDOT's list contains a list of approved spill control material for purchase and use at all MaineDOT sites (maintenance facilities, highways, bridges, and others) [MaineDOT (6)].

4.9	RELEASE RESPONSE	, CONTAINMENT,	AND CLEANUP
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Summary of Release Response, Containment, and Cleanup BMPs			
	BMP Selected Due To:		
	Cost Time		
BMP	Savings	Savings	Effectiveness
Ensure readily accessible spill kits (MDOT, ODOT)			✓
Use rolling carts for easy transport of cleanup materials (TXDOT)		\checkmark	✓
Establish and enforce absorbency requirements for the purchasing of			
new spill response materials (MaineDOT)			v
Perform spill response training (ODOT)			✓
Develop written emergency response plans or SOPs (MaineDOT,			<i>\</i>
TDOT)			•
Maintain a spill log (for all spills regardless of size) (MaineDOT)			\checkmark

A release to the environment is an unfortunate, but common occurrence at maintenance facilities given the quantities of liquids and gases stored at these locations or contained within vehicles and equipment that are used or stored at the facility. Federal, and in many cases state regulations and local regulations, often dictate a minimum level of response capabilities to be maintained at the facilities. Facilities with applicable permits, such as storm water discharge permits, may have special requirements when responding to incidental releases.

A common practice among DOTs is to ensure that maintenance personnel have access to spill response products, such as the absorbent booms, pads, grate covers, and dikes to contain spills. These products are usually stored in locations at the facility where spills are most likely to occur and are easily accessible. For example, MDOT and ODOT have spill kits which include a combination of different absorbent types (mats, pillows, etc.) as well as applicable personal protective equipment within a container that may be used for the disposal of cleanup material. Spill kits are readily available at maintenance shops to prevent any spills from reaching floor drains and storm drains. Similarly, ODOT also requires spill kits to be placed in locations where maintenance activities occur, and requires these to be stored in areas protected from precipitation. TXDOT keeps absorbent products on spill containment carts capable of being rolled to the location where a spill occurs or where the potential exists for a spill to occur, for example, at a vehicle maintenance bay while changing vehicle fluids.

MaineDOT personnel can purchase absorbents if those absorbents are on an approved list created by MaineDOT; this approved list allows MaineDOT to purchase and use only absorbent products that have met MaineDOT standards for absorbency [MaineDOT (6)].

Since training is an important component of release response, DOTs usually provide spill response training to maintenance personnel. For example, ODOT personnel are trained to stop or contain the release when possible, and to promptly clean up or contain releases with absorbents. Training includes clear definition of the nature and extent of spills that employees may respond to without outside assistance. If it is beyond the capabilities of the ODOT employee to respond to fluid releases, the ODOT First Responder Guide to Highway Incident Response is consulted for appropriate actions [ODOT (10)]. To ensure that spill containment

material is usable in the event of a release, ODOT stores absorbent materials in areas protected from precipitation.

Maintenance facilities with large quantities of oil products—greater than 1,320 gallons of oil in aboveground storage tanks or greater than 42,000 gallons of oil in underground storage tanks—have procedures that must be implemented per federal regulations in the event of an oil spill. These procedures are documented in a federally required SPCC Plan. For the facilities not required to develop SPCC Plans, the contents of an SPCC Plan can provide a useful guideline regarding spill control. For example, SPCC Plans can document DOT requirements for the use of secondary containment for containers of petroleum product to help prevent releases of product to the environment.

MaineDOT requires that each maintenance facility has an emergency preparedness and response plan, regardless of any regulatory requirement [MaineDOT (6)]. To ensure that maintenance personnel can implement the plan in the event of a release, MaineDOT's policy requires that each district tests one facility plan at least annually through the use of a staged emergency incident or drill. If a spill does occur, a spill report form must be completed for all larger spills and sent to the state Department of Environmental Protection. The spill types requiring notification include:

- 1. All spills on roadways and field sites
- 2. All petroleum spills greater than 5 gallons which occur at maintenance facilities
- 3. All other non-petroleum spills (hazardous material or waste) at maintenance facilities.

In addition, a spill log must be completed when any spill occurs, regardless of whether the spill meets any of the criteria above, allowing MaineDOT to review, track trends, and improve preventative measures.

TDOT has written spill responses for the five most common releases. These releases constitute approximately 80 percent of all releases.

4.10 POLLUTION PREVENTION

Summary of Pollution Prevention BMPs				
	BMP Selected Due To:			
	Time			
BMP (Implementing DOT)	Cost Savings Savings Effectiveness			
Use alternative 'green' products (i.e., cleaners)			1	
(Multiple DOTs)			•	
Recycle materials (Multiple DOTs)	✓		✓	
Reduce water and energy usage (HDOT, TDOT)	✓		✓	
Use bulk storage systems (DelDOT)	\checkmark	\checkmark	\checkmark	

Pollution prevention is any activity, process, or mechanism that successfully and costeffectively avoids, prevents, or reduces the sources of pollutant discharges or emissions other than the traditional pollution treatment methods at discharge points (e.g., end of stack, pipe, or process). Examples include the practice of reducing or minimizing waste at the source by using non-toxic or less-toxic substances, using fewer materials, promoting the use of recyclable products, and conserving resources, such as water and energy. Pollution prevention techniques represent efforts to decrease the amount of potential pollutants disposed by the facilities and ease the burden on facilities to regulate the waste they generate.

A common practice among many maintenance facility personnel includes the use of alternatives to chemical-based detergents and cleaners for activities onsite. These green products decrease the amount of hazardous waste generated at the facility and are safer for personnel to handle and store. MDT, NYSDOT, ODOT, and NHDOT use biodegradable wash products during vehicle washing or general facility cleaning activities that are made from non-hazardous ingredients. (In some cases, the use of these types of products may be required in water discharge permits.) Similarly, MDSHA uses "environmentally friendly" detergents during vehicle washing that are low in phosphorus. In some cases, ODOT maintenance crews do not use soap, detergents, steam, or chemicals if untreated wash water flows into a body of water or a storm water conveyance system.

Another common practice performed by DOT personnel at maintenance facilities is recycling. Many products that were once disposed as solid waste are also now collected for recycling. Some examples of common materials that DOTs are recycling include:

- Waste oil products
- Diesel filters
- Gas filters
- Antifreeze
- Oil absorbents
- Empty aerosol cans
- Oil/water sludge
- Gas/diesel mixtures
- Lead wheel weights
- Bulbs
- Tires
- Batteries
- Scrap metal
- Concrete
- Shop rags
- Oil filters
- Circuit boards and other electronic wastes
- Vehicle lamps and other universal wastes
- Hydraulic fluid.

Recycling these products help to divert wastes from landfills.

Both the use of more environmentally friendly products and recycling tactics are examples of efforts to decrease the amount of potential pollutants disposed by the facilities and ease the burden on facilities to regulate the waste they generate. Most of the respondents to the BMP survey indicated that they recycle materials at the maintenance facilities.

Many transportation agencies use parts washers in maintenance shops. Waste liquid from parts washers may need to be managed as hazardous waste if solvents are present in the liquid; however, many agencies have eliminated the use of solvents in parts washers. For example, INDOT and MDOT have replaced the traditional, solvent-based parts washers with water-based or citrus-based parts washer liquids. Citrus and water-based liquids are non-flammable, biodegradable, and dissolve in water. Both DOTs have found that these cleaners are as effective in cleaning as solvent-based parts washers. Some parts washers also have a washer-fluid filtering system to help avoid frequent disposal of washer fluid.

Some DOTs reclaim waste products prior to disposal for reuse. For example, TXDOT reclaims asphalt by reconditioning the asphalt at maintenance facilities. Once reconditioned, the asphalt is put to beneficial reuse such as at construction sites as fill material. The reconditioned asphalt is also given to county agencies for beneficial reuse. Where asphalt reconditioning is practiced, the asphalt disposal costs are eliminated as well as the purchase cost for new fill.

HDOT recently began tracking its water and energy use at each maintenance facility. Once enough data are available to show trends, HDOT intends to implement measures to reduce water and energy demand. Major water use at maintenance facilities typically comes from bathroom/locker room use and vehicle washing. Low flow fixtures and fixtures that have automatic shutoff devices can help to reduce water use. Lighting constitutes a significant portion of a maintenance facility's energy demand. Low wattage lighting, such as high efficiency T-8 fluorescent lamps, can help cut energy consumption and also reduce utility bills. TDOT has installed high pressure, low volume vehicle washing equipment at wash bays to reduce water consumption.

Some DOTs have switched to overhead bulk oil systems. For DelDOT, the system had a pollution prevention benefit. DelDOT used to store drums of oil outside for lack of space inside the maintenance areas. The drums would collect small amounts of water from precipitation, rendering the drum contents useless for its intended purpose of oil changes and topping off the oil in vehicle engines. DelDOT purchased and installed an overhead bulk oil system which stores oil in a large aboveground drum and, through a series of overhead pipes and a pump, allows staff to easily fill engines with oil. The pollution prevention benefit includes the elimination of waste oil drums and reduction in the potential for a spill given the numerous times the drums of oil were handled by maintenance shop personnel.

4.11 STORM WATER MANAGEMENT

Summary of Storm Water Management BMPs			
	BMP Selected Due To:		
	Cost	Time	
BMP (Implementing DOT)	Savings	Savings	Effectiveness
Inspect vegetated areas for erosion (Caltrans)	\checkmark		\checkmark
Use vegetated areas for filtering and slowing storm water runoff			
(ODOT, NYSDOT, MDT)	\checkmark		\checkmark
Use detention basins to reduce pollutant loading in nearby			
waterways (ODOT, NYSDOT)			\checkmark
Use catch basis sumps to trap sediments from storm water runoff			
(ODOT)			\checkmark
Use absorbent materials at storm water drains to capture pollutants			
(NHDOT, HDOT)			\checkmark

Storm water from maintenance yards is classified as point source pollution and requires a National Pollutant Discharge Elimination System permit for discharge. Many DOTs have implemented BMPs to reduce the amount of storm water runoff to remain in compliance with permit conditions or to prevent pollution. Transportation agencies rely on several means to manage storm water, including erosion and sediment control measures, vegetation, detention basins, catch basin sumps, and preventative practices.

4.11.1 Erosion and Sediment Control

Erosion increases the amount of sediment in storm water runoff. To decrease the amount of sediment in runoff, identifying and addressing areas of erosion is essential. Caltrans maintenance facility personnel regularly inspect unpaved areas of the facility for signs of erosion. Signs can include deficient vegetation or a lack of devices to keep the soil in place. Caltrans implements erosion and sediment control practices by maintaining vegetation; using ditches, berms, dikes, or swales to protect the area from run-on from outside the facility; not over-irrigating landscape vegetation; and protecting slopes or exposed vegetation areas with various materials such as wood chips, mulch, or gravel [NCHRP (11)].

4.11.2 Vegetation

Many facilities route storm water through vegetation as a management technique, including grasses, trees, and shrubs. Vegetation acts a natural filter for storm water runoff, enhancing evaporation, taking up nutrients, and promoting biological processes that break down pollutants in storm water. ODOT, NYSDOT, and MDT maintain diverse plant communities at maintenance facilities to help break down pollutants.

4.11.3 Detention Basins

Detention basins can provide effective storm water management solutions to address storm water quantities. Detention basins are components of facility storm water systems. The purpose of the basin is to protect against flooding, erosion, and sedimentation by temporarily detaining large amounts of storm water during storm events and allowing storm water to infiltrate into groundwater. Several DOTs employ basins for this purpose, including ODOT and NYSDOT. At an NYSDOT facility in Warwarsing, a detention basin was constructed to capture runoff from the pavement areas before runoff enters an adjacent stream. The basin is frequently inspected and maintained by NYSDOT to ensure proper functioning. For facilities in New York's environmentally sensitive watersheds that are under more stringent storm water related regulation, personnel are partnering with Municipal Separate Storm Sewer Systems to determine other ways to reduce pollutant loading from the maintenance facilities. Facility representatives are considering possible storm water reduction or protection techniques and the effectiveness of these techniques in reducing storm water impact from the sites.

4.11.4 Catch Basin Sumps

At some maintenance facilities, catch basin sumps are used. A sump is a low-lying area that acts as a reservoir for storm water runoff and conveys storm water to detention basins, outfalls, or other storm water components assisting in the collection of debris, trash, sediment. Sediment deposits in the sumps should be characterized as hazardous or non-hazardous prior to disposal. ODOT's catch basin sumps are inspected for sediment accumulation monthly. Sumps are cleaned at least annually or more frequently if large amounts of deposits are noted. ODOT's regular cleanings are intended to decrease the amount of pollutants in the system and receiving water bodies. Catch basin sumps and the outlet locations are noted on all ODOT site drawings. Outlets are inspected monthly and undergo maintenance as needed. Booms and filters that have been used for additional pollution prevention in catch basins are disposed of as solid waste if contaminated with petroleum. If the basins contain solvents, they are disposed of as hazardous waste; if they are dripping wet with petroleum, the "free oil" is drained prior to disposal [ODOT (1)].

4.11.5 Preventative Practices

Good housekeeping at facilities can prevent pollutant loading in storm water and decrease the impact on storm water BMPs. Often, the practices at maintenance facilities are required practices and identified in the facilities' storm water pollution prevention plans. An example of a proven preventative practice is grounds sweeping: MDOT regularly sweeps facility grounds and areas surrounding stockpiles. By ensuring that the grounds are well kept, fewer amounts of debris and pollutants are carried into storm water conveyances during storm events. In case contaminants are introduced into storm water, NDDOT's and HDOT's measures to prevent these contaminants from entering local waterbodies include the use of socks and mats around all storm drains. MassHighway requires the use of these materials or silt sacks around catch basins or storm drains within wetland areas [MassHighway (2)].

4.12 VEGETATION MANAGEMENT

Summary of Vegetation Management BMPs			
	BMP Selected Due To:		
	Cost	Time	
BMP (Implementing DOT)	Savings	Savings	Effectiveness
Use secondary containment for pesticide storage (ODOT)			✓
Use approved herbicides only (MDSHA)			✓
Transfer excess materials between facilities to ensure product	√		×
turnover (MDSHA)	•		•
Research into product impacts and effectiveness (TXDOT)	\checkmark		~
Use carcass composting material for re-vegetation efforts (NYSDOT)	✓	✓	✓
Clean mowing equipment at each mowing site to reduce the spreading of invasive species between mowing sites (NHDOT)	\checkmark	~	~

4.12.1 Vegetation Management Techniques

Vegetation management includes controlling undesirable vegetation, such as invasive species, and managing existing desirable vegetation through cutting, pruning, and other techniques. While most vegetation management performed by DOTs occurs along roadsides, vegetation management also occurs at maintenance facilities and includes weed control, turf/grass management, and brush/tree control. Furthermore, the equipment and chemicals used for vegetation management may be stored at maintenance facilities; chemicals may be mixed, handled, and prepared for disposal at these sites; and associated equipment may be repaired at these locations. Equipment for non-chemical vegetation management includes, but is not limited to, mowers, weedwackers, and hand held tools such as pruners and saws. If chemical vegetation management is performed through the use of herbicides, spraying equipment may be used on small scales, such as with hand held sprayers, or on larger scales, such as on vehicles with high volume sprayers.

The use of herbicides for vegetation management is subject to federal and, in some instances, state and local regulations. Those states with more stringent pesticide regulations may require extensive training and certification of pesticide applicators in addition to strict storage requirements of pesticides and detailed record retention of pesticide applications.

Many herbicides can negatively impact the environment since most are water-based chemicals. If herbicides enter waterways or other environmentally sensitive areas, such as wetlands, they can quickly spread beyond their intended targeted control area. As such, DOTs recognize the need to adopt practices which help prevent pollution and comply with associated regulations.

In response to environmental concerns, many DOTs have begun implementing a variety of BMPs associated with vegetation management activities at maintenance facilities.

• MDT stated that chemicals approved for use near aquatic resources are used when spraying near sensitive areas, and that spraying activities are prohibited on structures adjacent to streams or wetlands.

- To ensure personnel are abiding by policy and regulation, MDSHA provides annual training sessions in vegetation management. MDSHA also has a centralized purchasing program in the Landscape Operation Division to ensure that materials purchased are done so from an approved list. Materials are shipped one time at the beginning of the season to decrease shipping costs and prevent over purchasing. Any excess materials are able to be transferred between facilities, thus ensuring product turnover and preventing materials from exceeding their expiration date. Since herbicides come directly from the MDSHA Landscape Depot, pesticide contractors are able to use only MDSHA-approved chemicals during pesticide application.
- TXDOT has a rigorous pesticide research program which evaluates the efficacy of pesticides, but also considers worker safety issues and the environmental impact of the use of the pesticide. At a minimum, the environmental impact considerations include an evaluation of pesticide application on native wildflower populations. Specifically, pesticides with residue extending beyond 90 days are not selected for use. Pesticides must undergo 3 years of evaluation prior to storage and use at TXDOT maintenance facilities and use along roadsides.
- As a means to reduce emergence of weeds, NYSDOT uses deer compost at its facilities at sites being re-vegetated: NYSDOT has found that deer compost is free of weed seeds, reducing the need for pesticide application. This practice also provides an outlet for the DOT's robust animal carcass composting program, potentially saving the DOT costs associated with purchasing topsoil and/or fill material.
- NHDOT has developed and documented procedures to control invasive species. One technique that has been implemented is the cleaning of mowing machinery at the site where the mowing occurs. This cleaning practice helps prevent the spreading of invasive species to other non-affected areas. In turn, NHDOT's costs to control invasive species and time needed to control invasive species may decrease as a result of this procedure.

4.12.2 Integrated Vegetation Management

Integrated Vegetation Management (IVM) is a management tool to encourage the research, development, and implementation of optimal procedures for maintaining vegetation and controlling weeds. IVM represents a long-term approach to vegetation management that incorporates sustainable, environmentally friendly practices like minimizing pesticide spraying, utilizing pesticides that have been approved for use near aquatic resources, and diversifying vegetation at facilities to decrease pest infestations.

Several transportation agencies have adopted IVM programs, including ODOT, MDSHA, and NYSDOT. NYSDOT's IVM managers facilitate meetings between local vegetation managers to compare the effectiveness of alternative management techniques. Alternatives to common management techniques are regularly field tested and evaluated, such as non-traditional herbicides based on ascorbic and acetic acids, vegetation barriers, and deer carcass compost. Vegetation managers coordinate to evaluate the frequency of mowing, necessity of herbicides, alternative vegetation, invasive species management, and other concerns.

4.13 AIR POLLUTION REDUCTION

Summary of Air Pollution Reduction BMPs				
	BMP Selected Due To:			
	Time			
BMP (Implementing DOT)	Cost Savings	Savings	Effectiveness	
Use VOC-free paints and adhesives (NYSDOT)			\checkmark	
Use alternative fuels and high mileage vehicles such as			.(
hybrid vehicles (Multiple DOTs)	v		v	
Encourage carpooling of employees (MDT)	\checkmark		\checkmark	

Air pollutants are generated from a variety of sources at maintenance facilities including vehicle operations and fueling, the maintenance of air conditioning equipment, vehicle painting, and the use of oil burners for heating.

4.13.1 Painting Operations

Paint spraying operations are a major source of air pollutants. During painting operations, VOCs can be released into the atmosphere if not properly managed. To decrease air pollution onsite, and the associated expense of maintaining spray booths and required permits, MDSHA outsourced paint spraying operations for some facilities. To avoid the release of VOCs altogether, NYSDOT's paint contractors are required to use VOC-free paint. In addition, all epoxy used at NYSDOT facilities is VOC-free.

4.13.2 Alternative Fuels and Hybrid Vehicles

Many DOTs have begun transitioning their fleet to alternative fuels in an effort to decrease air pollution. Much of NYSDOT's fleet is powered by fuels like compressed natural gas and biodiesel in response to a new state law that directs agencies to retrofit diesel equipment for cleaner air. Teleconferencing is also encouraged by the agency in order to decrease employee travel and therefore eliminate emissions from the use of transportation. MDOT's new vehicles, other than trucks, use flex fuel. Vehicles contain placards reminding drivers to use flex fuel when it is available. ODOT uses alternative fuels at locations where it is available. Several lessons were learned when transitioning to alternative fuels, like routinely cleaning filters and ensuring that tanks are cleaned before changing to alternative fuels. MODOT has begun purchasing hybrid vehicles and incorporating them into the fleet.

MDSHA has implemented the Clean Diesel Program, which is an aggressive program to replace older diesel vehicles with newer, cleaner equipment. MDSHA's new light duty fleet vehicles use flex fuels. Flex fuels are blends of gasoline and ethanol and are a greener alternative to pure gasoline due to reduced emissions of certain pollutants from the combustion process. An E85 tank has been installed at MDSHA's Hanover Complex and there are plans to install several more tanks at other locations. MDTA has also installed an E85 tank at one of its Baltimore facilities.

4.13.3 Other Air Pollution Reduction Practices

- Some practices by transportation agencies are simple to implement, such as encouraging carpooling. For example, in order to reduce air pollution, MDT employees are encouraged to carpool to training sessions.
- For purposes of air quality protection and worker safety, MaineDOT does not allow open burning of any material at MaineDOT maintenance facilities [MaineDOT (6)].
- DelDOT evaluated the costs associated with centralizing the locations where vehicle washing could occur in order to better manage wash water. DelDOT considered allowing vehicle washing at only four maintenance facilities in the state; however, the cost of \$2 million did not justify the additional wear and tear on DelDOT vehicles traveling to and from these facilities and would have increased air emissions generated due to significant travel times to and from these locations.

Summary of Other BMPs			
	BMP Selected Due To:		
	Cost	Time	
BMP (Implementing DOT)	Savings	Savings	Effectiveness
Use internal environmental committees (Multiple DOTs)	\checkmark	✓	~
Implement an EMS or similar program (HDOT, Multiple DOTs)	✓	✓	✓
Allow no more than two unserviceable vehicles to be stored at a			
maintenance facility at one time (MaineDOT)			·
Perform environmental assessments of activities to identify			1
environmental impacts (TXDOT)			·
Centralize vehicle maintenance repair facilities to reduce the			1
regulatory burden (HDOT)			·
Perform annual audits of environmental practices, including waste	1		1
audits, EMS audits, or compliance audits (INDOT, TDOT)	v		•
Develop easy-to-use environmental guidance manuals (NDDOT)			\checkmark
Develop and implement a green buildings program (NYSDOT)	\checkmark		✓

4.14 OTHER BEST MANAGEMENT PRACTICES

The BMP survey gave survey respondents an opportunity to identify BMPs implemented in other media areas not addressed in the survey. The following transportation agencies took the opportunity to describe the use of internal environmental committees, development of EMS, and a reliance on SOP to document procedures.

4.14.1 Internal Environmental Committees

Hosting internal environmental committees or fostering relationships with shop representatives can be useful for environmental program managers. For example, such committees can perform formal or informal cost/benefit analyses on potential environmental initiatives, gain consensus and buy-in among departments affected by environmental initiatives, and provide unique perspectives regarding the methods to institute initiatives. Several DOTs have employed the use of committees for a variety of purposes, as described below. Shop representatives can also provide insight into the impact of initiatives and help craft initiatives using their experience of what works within their shop.

- MDT
 - MDT has assembled a Storm Water Steering Committee that manages the Storm Water Management Plan and an Environmental Steering Committee that addresses environmental concerns, involving runoff, drainage, and proper storm water management. The committee is composed of personnel from various departments in the DOT.
- MDSHA
 - MDSHA has several internal environmental groups. The Environmental Compliance Steering Committee consists of personnel from all levels of management which provides direction on environmental policy and procedures and development of a Compliance Focused EMS. The Environmental Council is composed of senior management personnel. The Environmental Compliance Division of MDSHA, a standalone division outside of the facility reporting structure, participates in Monthly Maintenance Council meetings to discuss current environmental issues that affect facility operations.
 - District Environmental Coordinators (DECs) act as liaisons to the shops to ensure that shop personnel are up to date on all environmental issues. DECs also are responsible for periodic inspections at maintenance facilities to identify and promote compliance issues and environmental awareness.
- NYSDOT
 - Each NYSDOT management region also has at least one Maintenance Environmental Coordinator that serves as a resource for environmental issues.
• VDOT

- VDOT relies on a Research Council to assess the economic and environmental impacts of proposed practices. The Research Council is supported by the Environmental Research Advisory Committee which reviews, prioritizes, and recommends potential studies to be performed by the Research Council.
- NHDOT
 - NHDOT has established a Tank Management Strategic Planning group to develop policies and procedures associated with the management of underground and aboveground storage tanks. The group addresses agency-wide issues and sitespecific issues. NHDOT also has an Environmental Coordinator at each of its Operations' Districts or Bureaus.

4.14.2 Environmental Management System Implementation

EPA defines an EMS as a set of processes and practices that enable an organization to continually strive to reduce its environmental impacts and increase its operating efficiency. There are a variety of EMS guidelines which DOTs may use to develop an EMS, such as the International Standards Organization 14001 (2004), EPA's Compliance-Focused EMS based on guidance published by the National Enforcement Investigation Center, and AASHTO's Practitioners' Handbook 08.

Elements common to EMS include:

- Environmental policy
- Environmental aspects
- Legal and other requirements
- Objectives, targets, and programs
- Resources, roles, and responsibilities
- Competence, training, and awareness
- Communication
- Documentation
- Control of documents and records
- Operational control
- Emergency preparedness and response
- Monitoring and measuring
- Compliance evaluation
- Nonconformity, corrective action, and preventative action
- Internal auditing
- Management review.

Critical to the success of EMS implementation are: (1) a commitment from upper level management to adhere to and promote the tenets of an EMS; and (2) the setting of goals which are specific, measurable, attainable, realistic, and timely. Managements' commitment comes in the form of approval of the EMS policy, committing the resources necessary to implement the EMS, and participating as needed in the EMS process (i.e., management review process). Goal setting is an important step in EMS development and occurs during the development of objectives and targets.

The process of EMS development is ongoing as DOTs strive to continually improve upon past practices. Improvements come in the form of minor or major changes to EMS procedures, such as updating the internal auditing process, and modifying "on the ground" procedures, such as retraining staff or improve the steps associated with aerosol can disposal to incorporate the recycling of empty cans.

The benefits of implementing an EMS may include cost savings, time savings, and improved effectiveness of practices. EMS engenders these benefits by requiring a systematic and comprehensive approach to developing new practices or revising existing practices. For example, a DOT implementing an EMS must perform periodic assessments of that agency's impacts on the environment. Impacts which are deemed detrimental by the agency to the environment must be managed. A process is initiated to identify a suite of practices which may be used to manage the agency's impact. The agency then must consider how each of these practices will affect agency resources and the environment. The agency will then select those practices which best meet these criteria. This EMS process should result in the selection of practices which are efficient and effective.

DOTs which implement EMS also benefit because an EMS requires proactive measures to be implemented which *prevent* pollution. Proactive measures will likely save DOT resources (time and money) and protect the environment. For example, DOT personnel who are trained in oil spill response will have the knowledge to be able to quickly respond to these types of emergency incidents (as opposed to waiting for instructions) and will have the tools readily available to assist during response. The trained staffs' quick actions and use of available tools can prevent a spill from contaminating a larger area than it would have otherwise which means less cleanup costs and reduced impacts upon the environment.

Some DOTs have adopted formal EMS or adopted individual elements of an EMS. Below are those DOTs which informally or formally utilize an EMS and elements of EMS to help manage the DOTs' impacts upon the environment and environmental compliance.

• ODOT

— ODOT has implemented an EMS at its facilities. EMS-related documents are available online, and each maintenance facility has a hard copy of these documents onsite. The EMS documents BMPs, documentation guidelines, training requirements, storage techniques, handling techniques, disposal requirements, and background information for all aspects of environmental compliance. For each section of the EMS document, there is instruction on how long documentation must be retained onsite. In addition to the complete EMS, maintenance personnel have access to abridged versions of EMS documentation that can act as quick reference tools while in the field. Answers to frequently asked questions are provided for various activities like the proper procedures for vehicle washing given site conditions (e.g., sites that discharge to a sanitary sewer versus sites that discharge to surface water) [ODOT (1)].

- NHDOT
 - NHDOT is in the process of developing an EMS for its operations and maintenance facilities.
- MDSHA
 - MDSHA is currently implementing an EMS. As part of the auditing element of its EMS, MDSHA has a detailed inspection program at each facility. Weekly inspections are performed by facility personnel and monthly inspections are performed by environmental coordinators. These regular inspections have decreased the number of out-of-compliance findings at the facilities. Environmental practices are being incorporated into local and agency-wide business plans. Through the EMS process, formal roles and responsibilities have been identified to help ensure that tasks with environmental importance are performed.
 - To help fulfill the operational control requirement of an EMS, MDSHA has provided a book of applicable facility SOPs to each of the 29 primary maintenance facilities for use by its employees. SOPs are reviewed with facility personnel during annual awareness training and updated trainings are done by the Environmental Compliance Division during routine town hall meetings at individual facilities. Recognizing the need to make the SOPs more widely accessible to the facility personnel, flip cards were developed for routine operations and attached to a ring that can be kept on a person's body for quick use and reference throughout the day. This has been well received by maintenance employees and is helping to ensure consistency with MDSHA procedures [MDSHA (3)].
 - MDSHA also developed internal SOPs for its Environmental Compliance Division operations including spill reporting, hazardous waste recordkeeping and reporting, and risk ranking to ensure that practices are kept consistent amongst division personnel, both present and future.
- HDOT
 - HDOT is in the process of establishing a formal EMS based on EPA's National Enforcement Investigations Center model for its Highway Division, which includes its baseyards (i.e., maintenance facilities). HDOT published an EMS Manual and can be found in Appendix I.

- As part of its EMS auditing component, HDOT Operations and Maintenance staff performs formal in-house environmental compliance audits quarterly. Findings from these audits are immediately addressed through HDOT's formal Corrective and Preventative Measure procedure (see Appendix J) and documented in a corrective action form (see Appendix K).
- MassHighway
 - As part of MassHighway's EMS, staff have developed an inspection program of its maintenance facilities [MassHighway (2)]. When first instituting its EMS, MassHighway performed annual inspections of its maintenance facilities. Given the number of inspections and follow-up corrective actions to manage, MassHighway scaled back its formal inspection program. Currently, each facility is inspected once every 5 years. In the interim, less formal inspections are performed to ensure that the facilities are adhering to environmental regulations and pollution prevention procedures. MassHighway's inspection report is provided in Appendix L. The inspection entails an assessment of activities in the categories of:
 - Hazardous waste
 - Hazardous materials
 - Solid waste
 - Underground and above ground storage tanks
 - Water quality
 - Natural resources.

4.14.3 Other

- In an effort to ensure good housekeeping techniques at maintenance facilities, MaineDOT allows no more than two unserviceable vehicles onsite at any one time. A secondary benefit of this policy includes reducing the chances of vehicle fluid leaks since few of the vehicles are allowed to be stored onsite [MaineDOT (6)].
- TXDOT has performed environmental assessments of 11 of its environmental activities performed at its maintenance facilities. The assessments identify the potential for these activities to pollute and address potential safety issues. (The process is similar to the aspects and impacts process performed during development of an EMS per ISO 14001 [2004].)
- HDOT has centralized vehicle maintenance and repair, including fluid changes, to one facility per district. One of the advantages of centralizing this activity to one location is that there are fewer locations which must abide by regulations applicable to vehicle fluid wastes management. TDOT has also centralized vehicle maintenance for this same reason.

- In order to track waste disposal quantities and recycling efforts, INDOT performs an annual waste audit at each maintenance facility. The audit includes a review of disposal and recycling practices relative to INDOT's standards of materials to be recycled. The audit tracks annual waste quantities, compares these quantities against other facilities, and compares aggregated facilities' quantities by district. These results are posted on INDOT's intranet site and recognition is given to facilities that have significantly improved recycling practices over time and those that recycle significant quantities relative to other facilities or districts.
- NDDOT has combined environmental and safety topics into one document [NDDOT (12)]. The Safety Manual describes common waste products and proper disposal techniques, provides instructions on spill response and cleanup, and discusses Material Safety Data Sheets as tools to identify proper material handling techniques. The portion of the Manual devoted to environmental topics is short—only 14 pages—and written simply, making the Manual accessible to a greater number of personnel and thereby increasing the likelihood that the Manual will be used as a reference guide.
- NYSDOT has implemented the GreenLITES Program, funded through the Green and Blue Highway Initiatives. The GreenLITES Program is a state program that encourages environmental stewardship of state agencies by crediting facilities for sustainable maintenance and operations activities [NYSDOT (13)]. As part of this program, NYSDOT is mandating that each new building or rehabilitation meet or exceed Leadership in Energy and Environmental Design standards.
- TDOT performs periodic self-audits of its facilities. The audits are based on environmental compliance and conformance to TDOT policies and procedures. Initially, all facilities were audited annually. As the facilities' environmental performances have improved, TDOT has reduced the number of audits such that each facility will be audited once every two or three years. MDSHA also has implemented a similar inspection program which occurs to include an abbreviated weekly inspection and more comprehensive quarterly inspections.
- Many DOTs identified the use of contractors to perform tasks that would have otherwise been performed by DOT personnel. This practice can represent a significant time or cost savings for DOTs and improve the efficiency of the DOT. However, DOTs should ensure that contractors implement BMPs during the performance of their work for the DOTs through legally binding contracts or other means. In this manner, DOTs will ensure that they reap the maximum benefits associated with contracting work and continue to prevent pollution and remain in compliance with regulatory requirements.

4.14.4 Best Management Practices with Multiple Environmental Benefits

Many BMPs have multiple environmental benefits as well as contribute to a cost or time savings or result in improved effectiveness. These BMPs are presented throughout this BMP Compendium, but are summarized here for reference.

	Primary	Secondary Environmental	Cost	Time	
BMP	Environmental Benefit	Benefits	Savings	Savings	Effectiveness
Compost	Natural means of	Compost, which is typically			
animal	disposal	free of weed seeds, may be	✓		\checkmark
carcasses		applied to roadsides			
Filter street	Separates larger	Sweepings may be used as			
sweepings	contaminants from	a replacement for fill or	✓		\checkmark
	reusable material	added to compost			
Use of a bulb	Minimizes volume of	Reduces the risk of			
crusher to	universal waste	accidental breakage and			
crush		release of mercury into the	\checkmark		\checkmark
Universal		environment			
Waste bulbs					
Reduce water	Reduces consumption of	Reduces air emissions			
and energy	finite resources: coal, oil,	(from the processes needed	1		✓
consumption	natural gas, water, etc.	to produce or convey water	-		
		and energy)			
Recycle or	Pollution reduction	Reduced consumption of			
reclaim wash	(waste water)	finite resource: fresh water			\checkmark
water					
Use of an	Reduce the volume of	Empty cans may be			
aerosol can	hazardous waste	recycled	\checkmark		\checkmark
depleter					
Purchase and	Pollution reduction in	Reduced consumption of			
use of	the form of reduced air	finite resource: oil			
alternative fuel	emissions per mile		✓		✓
or high	driven		, , , , , , , , , , , , , , , , , , ,		
mileage					
vehicles					

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Appendix A: BMP Survey Participation Request Email

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Jubjee	 Renar 25/20/10/ N. Compension of Sex Fractice for Environmental compliance and Security of Hangoreation maintenance 	-
Dea	r SCOE Members:	Â
NCH facil	IRP and its consultant team are performing a research project requested by AASHTO that involves a survey of environmental stewardship practices implemented at state highway maintenance ities. The survey will include compliance with environmental regulations and will result in a compendium of successful environmental compliance and stewardship practices.	
We	would like to know whether or not your agency is willing to participate.	
Plea for a	use take a look at the topics below and after sharing the list with appropriate colleagues, let us know if your agency will participate, and if so, the individual(s) we may interview for each topic. Response any one or more of these topics will be appreciated. If you can only respond to a few, or even just one of these topics, that will still be helpful.	s
Surv	vey topics:	=
	 Maintenance of vehicles and equipment Vegetation management Road debris management Facility maintenance and construction Painting Facility layout and site design 	
The	survey can be done electronically at the convenience of the responder. In total, it should require about 30 minutes to complete.	
Aga topi	in, please let us know either way if you will participate. If you do participate, please provide contact information (name, phone, and email) for your representative(s) in connection with the appropriate cs to Tim Henkle, a member of our consultant team, at <u>thenkle@eaest.com</u> or (410) 771-4950.	
We be.	look forward to hearing from at your earliest convenience (but not later than March 31, 2009 if at all possible) about whether or not you can participate, and if so, which topics and who the contacts will	
mar	in you.	-
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Appendix B: BMP Survey

1. Survey Introduction and Instructions

The American Association of State Highway Transportation Officials (AASHTO), through the National Cooperative Highway Research Program (NCHRP) Project 25-25 Task 46, is currently conducting a survey to identify best management practices (BMPs) implemented at state highway agencies' maintenance facilities. The survey focuses on BMPs that promote compliance with federal, state, and local environmental regulations, for example the Clean Water Act, Resource Conservation and Recovery Act, and others.

The survey results will be compiled and published by AASHTO as a compendium of successful environmental compliance and stewardship practices at highway maintenance facilities. The purpose of the compendium is to provide a starting point for agencies that are developing or restructuring compliance activities and will provide benchmarks for agencies that are seeking ways to improve existing practices. Moreover, the compendium will also serve as a planning resource for use in setting environmental performance goals.

ABOUT THE SURVEY

The survey questions identify common activities which occur at state highway agencies' maintenance facilities. When completing the survey, please include both formally and informally-adopted BMPs that are implemented at any of your agencies' maintenance shops. Do not include BMPs implemented at other locations such as road construction sites or rest areas.

For the purposes of this survey, BMPs are defined as any program, technology, process, operational method, measure, or device, which controls, prevents, removes, or reduces pollution in a manner which has been shown to meet regulatory requirements and save time, reduce costs, or improve effectiveness. When documenting your BMPs in the survey, please focus on activities that meet this definition and describe how each BMP has saved time, reduced costs, or improved effectiveness. Please describe the BMP in as much detail as possible. Estimated survey completion time is 30 minutes. Please complete the survey by Wednesday, April 22, 2009 (Earth Day).

Please direct survey-related questions to Tim Henkle, a member of the consultant team performing the survey. In addition, you may submit supporting documentation regarding any BMPs to Mr. Henkle via email or mail. His contact information is:

Tim Henkle EA Engineering, Science, and Technology 15 Loveton Circle Sparks, MD 21152-9201 410-771-4950 x5228 aashtobpsurvey@eaest.com

AASHTO thanks you for your participation in this important survey.

2. Background Information

1. Name of your organization (e.g. "Maryland Department of Transportion, State Highway Administration")

2. Your Name (list multiple respondants, if applicable)

Primary Respondent	
a)	
b)	
c)	
d)	
e)	
f)	
g)	
h)	
i)	

3. Your Title

Primary Respondent	
a)	
b)	
c)	
d)	
e)	
f)	
g)	
h)	
i)	

4. Your Phone Number

Primary Respondent	
a)	
b)	
c)	
d)	
e)	
f)	
g)	
h)	
i)	

5. Your e-mail address					
Primary Respondent					
a)					
b)					
c)					
d)					
e)					
f)					
g)					
h)					
i)					

6. Number of facilities (i.e. maintenance shop areas) in your organization

7. Estimated total mileage of roadway managed by your facility

8. If your organization operates under unique circumstances that may positively or negatively affect implementation of best management practices, please describe those here (e.g. unique environmental circumstances or unique regulatory environment).

3.

9. To what extent has your facility implemented BMPs related to the prevention of inadvertent vehicle fluid releases?

Not applicable/no practices implemented

Only common practices implemented.



10. To what extent has your facility implemented BMPs related to vehicle and equipment washing (including wash bay operations)?

Not applicable/no practices implemented

Only common practices implemented.

jn Potentially best management practices in place at one or more locations (please list and provide details of those initiatives you would like to share, including cost savings, time savings, increased effectiveness)



11. To what extent has your facility implemented BMPs related to waste aerosol can collection and disposal?

- Not applicable/no practices implemented
- Only common practices implemented.



12. To what extent has your facility implemented BMPs related to line striping paint waste management?

Not applicable/no practices implemented

Only common practices implemented.

jn Potentially best management practices in place at one or more locations (please list and provide details of those initiatives you would like to share, including cost savings, time savings, increased effectiveness)

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13. To what extent has your facility implemented BMPs related to universal waste management (collection, disposal, handling, labeling)?

- Not applicable/no practices implemented
- in Only common practices implemented.



14. To what extent has your facility implemented BMPs related to employee training?

Not applicable/no practices implemented

Only common practices implemented.

jn Potentially best management practices in place at one or more locations (please list and provide details of those initiatives you would like to share, including cost savings, time savings, increased effectiveness)

	*

4.

15. To what extent has your facility implemented BMPs related to documentation/record-keeping?

- Not applicable/no practices implemented
- Only common practices implemented.



16. To what extent has your facility implemented BMPs related to oil/water separator management?

Not applicable/no practices implemented

Only common practices implemented.

jn Potentially best management practices in place at one or more locations (please list and provide details of those initiatives you would like to share, including cost savings, time savings, increased effectiveness)



17. To what extent has your facility implemented BMPs related to fluid changes waste management?

- Not applicable/no practices implemented
- Only common practices implemented.



18. To what extent has your facility implemented BMPs related to the storage and handling of deicing salts and chemicals?

Not applicable/no practices implemented

Only common practices implemented.

jn Potentially best management practices in place at one or more locations (please list and provide details of those initiatives you would like to share, including cost savings, time savings, increased effectiveness)

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19. To what extent has your facility implemented BMPs related to bulk materials stockpile storage (millings, sand, and aggregate)?

- Not applicable/no practices implemented
- Only common practices implemented.



20. To what extent has your facility implemented BMPs related to animal carcass management and disposal?

Not applicable/no practices implemented

Only common practices implemented.

jn Potentially best management practices in place at one or more locations (please list and provide details of those initiatives you would like to share, including cost savings, time savings, increased effectiveness)

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5.

21. To what extent has your facility implemented BMPs related to hazardous waste management (labeling, storage, handling, disposal, and minimization)?

Not applicable/no practices implemented

Only common practices implemented.



22. To what extent has your facility implemented BMPs related to transportation, handling, selection, and storage of containers holding hazardous and non-hazardous waste and materials?

Not applicable/no practices implemented

Only common practices implemented.

jn Potentially best management practices in place at one or more locations (please list and provide details of those initiatives you would like to share, including cost savings, time savings, increased effectiveness)



23. To what extent has your facility implemented BMPs related to street sweeping waste storage and disposal?

- Not applicable/no practices implemented
- Only common practices implemented.



24. To what extent has your facility implemented BMPs related to hazardous and non-hazardous material inventory control?

Not applicable/no practices implemented

Only common practices implemented.

jn Potentially best management practices in place at one or more locations (please list and provide details of those initiatives you would like to share, including cost savings, time savings, increased effectiveness)



25. To what extent has your facility implemented BMPs related to environmental release response, containment, and clean up?

- Not applicable/no practices implemented
- Only common practices implemented.



26. To what extent has your facility implemented BMPs related to pollution prevention (recycling, non-toxic materials, etc)?

Not applicable/no practices implemented

Only common practices implemented.

jn Potentially best management practices in place at one or more locations (please list and provide details of those initiatives you would like to share, including cost savings, time savings, increased effectiveness)

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6.

27. To what extent does your facility implement BMPs related to stormwater management (e.g. infiltration systems such as infiltration basins and porous pavement; maintenance practices such as catch basin cleaning, street and parking lot cleaning)?

Not applicable/no practices implemented

Only common practices implemented.



28. To what extent does your facility implement BMPs related to vegetation management (e.g. pesticide mixing, handling, storage, and/or disposal; weed control; brush/tree control; turfgrass management)?

Not applicable/no practices implemented

Only common practices implemented.

jn Potentially best management practices in place at one or more locations (please list and provide details of those initiatives you would like to share, including cost savings, time savings, increased effectiveness)



29. To what extent does your facility implement BMPs related to the reduction of air pollutants (e.g. capture of ozone depleting substances, purchase of efficient vehicles, control of paint spray booth emissions)?

Not applicable/no practices implemented

Only common practices implemented.



30. Please describe any other BMPs that were not identified in the previous questions that you believe other agencies would benefit from knowing about. For example, consider BMPs developed to meet state requirements related to LEED certification, Environmental Management System implementation, purchasing policies, or other types of BMPs.



Appendix C: Compilation of Survey Results

Question Number 1	Question	Question	Question Number 8	Question Number 9	Question Number 10	Question Number 11	Question Number 12	Question Number 13
Name of your organization	Number 6 Number of facilities (i.e., maintenance shop areas) in your organization	Number 7 Estimated total mileage of roadway managed by your facility	If your organization operates under unique circumstances that may positively or negatively affect implementation of best management practices, please describe those here (e.g., unique environmental circumstances or unique regulatory environment).	To what extent has your facility implemented BMPs related to the prevention of inadvertent vehicle fluid releases?	To what extent has your facility implemented BMPs related to vehicle and equipment washing (including wash bay operations)?	To what extent has your facility implemented BMPs related to waste aerosol can collection and disposal?	To what extent has your facility implemented BMPs related to line striping paint waste management?	To what extent has your facility implemented BMPs related to universal waste management (collection, disposal, handling, labeling)?
Delaware Department of Transportation (DelDOT)	28	12,000	DeIDOT and New Castle County jointly manage a NPDES program for roadway runoff and facilities SW management, based on a consent decree with Delaware DNR, the county, and EPA.	Each facility has a Pollution Prevention Plan (PPP) and an SPCC. The PPP requires wet and dry weather quarterly inspections of the facility to look for evidence of pollution. Each facility also has equipped its catch basins with oil booms, has one or more spill kits, features above-ground storage tanks with secondary containment, and has "treatment train" BMPs (concrete wash pads, vegetated swales, stormwater ponds) to address vehicle wash water.	See previous response	No Response	All striping is contracted.	Waste oil is contained and disposed of in accordance with state & federal requirements.
Georgia DOT – Office of Property and	10	No response.	Only common practices implemented.	Only common practices implemented.	Only common practices implemented.	Only common practices implemented.	Only common practices implemented.	Only common practices implemented.
Hawaii DOT, Highways Division (HDOT)	19	2,400 lane miles	Under a Consent Decree from EPA; Under MS4 permit requirements	Drip Pans: Drip pans are widely used for parked vehicles and equipment with leak potential as a temporary measure. Leaked vehicles/equipment, once observed, will be serviced. Spill Kits: Spill kits are required in each shop and on each fueling trucks.	Vehicle Washing facilities are constructed at several base yards. Wash rack at Keehi Base yard serves most base yards on Oahu.	Only common practices implemented.	An Authorized Use List (AUL) is being compiled. The future plan is that only materials on the list could be ordered with limited quantity (say, three months supply). The benefit of this includes: (1) Environmental friendly products will be considered first. (2) Chemicals will be better managed. (3) Hazardous wastes will be tracked from cradle to grave. (4) Large quantity of expire products/wastes will be avoided.	Only common practices implemented.
Indiana Department of Transportation (INDOT)			None	The Indiana Department of Transportation is responsible for the construction and maintenance of Indiana Interstates, Highways and State Roads. Through these efforts the department also has to maintain vehicles and equipment which in turn creates large quantities of vehicle waste at the department's multiple maintenance garages which are located throughout the state of Indiana. Properly recycling and final disposal of vehicle and equipment waste streams has become a priority of INDOT and the department's Greening the Government efforts. The Indiana Department of Transportation has implemented a very comprehensive shop waste program to address these concerns and help set a benchmark for other State of Indiana agencies to follow. Vehicle waste streams created at the INDOT maintenance garages include waste oil, transmission fluid, hydraulic fluid, power steering fluid, antifreeze, oil filters, diesel filters, gas filters, oil absorbents, light bulbs, aerosol cans, oil/water sludge, gas/diesel mixtures, leaded wheel weights, waste tires and scrap metal. These materials range from hazardous to non-hazardous and regulated to unregulated wastes but all have to be properly managed through recycling or disposal according the state and federal regulations. The department's comprehensive program is tailored to meet the needs of material recycling and disposal at the maintenance garages. It was developed by establishing a Quantity Purchase Agreement (QPA) through state protocol to properly handle the waste material. Then the program was further developed through an education campaign with the INDOT maintenance shop foremen and mechanics where the information was reviewed and procedural manuals were provided as a reference tool to each participating facility. The final item in the implementation process was the delivery of the DOT approved storage containers by the licensed vendor to the various INDOT maintenance Recycled 4 drums Gi Absorbents Recycled/Disposed 40 drums Gas Filters Recycled 4 forums Cas Recycled 19 drums Ant	INDOT facilities are now designed to effectively deal with salt water after snow related events. The vehicle wash facility is designed with high pressure car wash type wands with two wands on each side positioned at the floor level and two additional wands on each side positioned at the platform level. The wash facility also employs a high pressure under-body pressure washer to reduce the adverse effects of salt on the underside of the department's fleet of salt trucks. The Underbody wash system produces 300 psi and 30 gallon per minute. The system is comprised of two 15 gallon per minute stainless steel spinners. The system has a 500 gallon above ground storage tank fed by a 2" fresh water lines and the washbay pit holds 1500 gallons of water. All washbay water goes through the Highland above ground oil/water separator which can produce a maximum of 28 gallons per minute of 10 ppm or less oil/grease water. The clean water is drained from the oil/water separator into an underground sump pit with a duplex grinder pump system. Each pump is rated at 3-5 hp capable of delivering 50 gpm. The duplex pump system sends the clean wash water over to the salt building to be stored in an aboveground 10,000 gallon storage tank tells the pumps in the pit when to stop once the level in the tank reaches approximately 80% capacity. If INDOT personnel continue to wash trucks when the tank is full, the clean wates is discharged to the sanitary sewer system. The wash water is stored in the 10,000 gallon tank until it is needed in the brine making process. What's more is that the wash facility employs single or dual catwalks that allow for a more thorough washing with the wash water washer and the to use washing process is collected in a sump and then is pumped through an oil/water separator and then to the wash water holding tanks that are located in the Coverall salt storage building. The wash water (when needed) is pumped from the holding tanks to the brine maker and is utilized as feed water for the salt brine that is sprayed o	All INDOT Subdistrict and Unit facilities target waste aerosol cans as part of the shop/hazardous waste program. The empty aerosol cans are collected at the subdistrict facilities in a 30 gallon drum and shipped to a registered disposal facility. The cans are evacuated and then shredded for recycling.	Only common practices implemented.	INDOT has focused on recycling all waste light bulbs including fluorescent, incandescent as well as all vehicle bulbs from facilities state wide. In addition INDOT facilities also target waste household batteries, mercury containing devices and ballasts as part of the universal waste disposal practices. A procedural manual was developed in an effort to help employees understand the various materials that are being targeted for proper disposal through the department's Universal Waste Disposal Program.
Maine DOT (MaineDOT)	34 About 120	About 8000 centerline miles	None	Only common practices implemented.	Maine DOT installs wash bays in all new garages. Wash water is either captured or disposed of through a local sewer district connection.	Waste aerosol cans with product remaining in them are handled as hazardous waste.	Only common practices implemented.	Procedures are implemented at all facilities to collect, document and properly dispose of all universal waste.

Question Number 1	Question	Question	Question Number 8	Question Number 9	Question Number 10	Question Number 11	Question Number 12	Question Number 13
Name of your organization	Number of facilities (i.e., maintenance shop areas) in your organization	Estimated total mileage of roadway managed by your facility	If your organization operates under unique circumstances that may positively or negatively affect implementation of best management practices, please describe those here (e.g.,. unique environmental circumstances or unique regulatory environment).	To what extent has your facility implemented BMPs related to the prevention of inadvertent vehicle fluid releases?	To what extent has your facility implemented BMPs related to vehicle and equipment washing (including wash bay operations)?	To what extent has your facility implemented BMPs related to waste aerosol can collection and disposal?	To what extent has your facility implemented BMPs related to line striping paint waste management?	To what extent has your facility implemented BMPs related to universal waste management (collection, disposal, handling, labeling)?
Maryland DOT, State Highway Administration (MDSHA)	29 primary and 16 satellite	5,140 miles; 19 movable bridges	State Highway Administration (SHA) has 4 critical area shops; the Chesapeake Bay Watershed has more stringent environmental regulations.	Use drip pans during vehicle maintenance and in storage areas (indoor and outdoor).	All vehicle washing occurs in a wash bay with an oil/water separator. An oil/water separator is connected to a storm sewer if they have a NPDES permit. Engines are not cleaned in bays and grit chambers are used to filter out the solids. SHA has a standard operating procedure for vehicle washing.	Some facilities utilize a can depleter prior to disposal.	SHA has an SOP for line striping paint waste management. It gives them options on how to manage the waste. Two districts have begun using paint totes. Paint lines in trucks are flushed and waste water is collected and disposed of as nonhazardous through a contractor.	Only common practices implemented.
Michigan DOT (MDOT)	44	4,448	None	Large quantities are stored in secondary containment to prevent large spills from entering drains. Pollution Incident Prevention Programs guide employees as to the steps to follow in the event of a large spill. Garages participate in voluntary audit conducted by MDOT staff every three years to assess safety and environmental practices. Recommendations are made and environmental remediation funds are used to address any deficiencies. ASTs with built in secondary containment and corrosion proof exposed aggregate perimeter. USTs have been removed at all facilities save one. Prior to removal all UST's had annual tank tightness testing. The floor drains inside the facilities do not discharge to a direct water source. Drains either implement an oil/water separator, lagoon, holding tank or discharge to a sanitary sewer system. Spill kits are readily available to prevent any fluids from reaching such drains. All facilities have Pollution Incident Prevention Plan (PIPP) and follow the proper guidelines in the event of a spill. The floor drains inside the facilities do not discharge to a sanitary sewer system. Spill kits are readily available to prevent any fluids from reaching such drains. All equipment containing hydraulics is stored in the parking lot with hoses tied up to prevent any spillage during the offseason (i.e. snow plows).	The Atlanta Maintenance Facility utilizes a Wash Bay Reclamation System that collects all wash water and then runs it through an aeration tank containing bacteria that feeds off oil, grease, soap and grime. This water is cleaned through this process and recycled for use on the next wash. The system claims to achieve a 90% reduction in freshwater usage.	Only common practices implemented	Only common practices implemented	All old mercury switches that result from signal operations are stored in the Central Maintenance Facility to ensure proper documentation and disposal of mercury containing items.
Missouri Department of Transportation (MODOT)	300	32,340	None	Only common practices implemented.	Only common practices implemented.	Only common practices implemented.	Only common practices implemented.	Missouri DOT is using a system to incinerate road kill in one district.
Montana DOT (MDT)	132	24,500 lane miles	Montana is faced with several environmental factors associated with air and water quality. Several BMPs have been developed for maintenance activities to accommodate the balance between environmental stewardship and provide a high level of service that is cost effective for customers. Total Maximum Daily Loading of Montana watersheds and PM 10 and 2.5 non- attainment areas have been identified throughout the state. There has been an ongoing effort to reduce the quantity of sanding material used for winter maintenance without sacrificing level of service or creating new problems such as chloride loading.	Only common practices implemented	Only common practices implemented.	Only common practices implemented.	Montana DOT uses paint striper trucks that are equipped to handle totes. Empty totes are returned to the paint supplier. Montana DOT does not need to manage any paint wastes involving those totes. Montana DOT uses water borne and non-lead paint for striping operations. A portion of the line striping is contracted and eliminates direct involvement with waste management.	For Montana DOT, universal waste includes light bulbs, batteries and used antifreeze. For bulbs, Montana DOT utilizes three Bulb Eaters located at various offices to crush the bulbs and absorb the mercury. Batteries and antifreeze are recycled.

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New Hampshire DOT – Office of Stewardship and Compliance (NHDOT) New York State DOT (NYSDOT)	250	9,200 +/-	None The New York State DOT operates in a state with strong environmental protections. In addition to the generally strong protections, stronger protections exist in particular regions of the State, such as the Adirondack and Catskill Parks, which have special protection in the State Constitution, reservoirs in the New York Citu	There are pre-trip vehicle inspections and scheduled maintenance for vehicles. There are pre-trip vehicle inspections and scheduled maintenance for vehicles. 1. Secondary containment and other preventive controls at petroleum bulk storage areas. 2. Spill Prevention Control and Countermeasures (SPCC) planning as per USEPA regulations 3. Spill response readiness and spill kits at facilities and in vehicles 4. Oil/water separators with floor drain systems inside facilities 5. Demonstrating biodegradable product technology 6. Memorandum of Understanding with the New York State Department of Environmental Conservation to clarify roles and responsibilities with spills along the roadside.	Use biodegradable wash products that are approved by the state environmental agency. We do not wash the undercarriage of vehicles, to avoid oil and grease contamination Use wash bays that collect and filter pollutants and discharge to municipal wastewater treatment facilities, as available.	Some facilities utilize a can depleter prior to disposal.	Our Bureau of Traffic, which conducts paint striping activities, has developed detailed work instructions for paint waste management, paint truck flushing and paint line flushing. These work instructions identify responsibilities by employee labor category, outline specific procedures for these work activities (to minimize environmental impacts), designate training requirements and denote documentation requirements. These work instructions are complemented by flow diagrams. The Bureau of Traffic has a paint waste treatment system, where non-hazardous waste latex paint is diluted with water and deposited in a 500-gallon holding tank and mixed with a flocculent to coagulate the paint solids. The pH of the mixture is adjusted and the paint solids are filtered from the liquid using a filter press. The paint solids are disposed of as solid waste at a local facility and the liquid portion is discharged to a 3,000-gallon holding tank, before it is finally discharged to a municipal sewer system.	Following state environmental regulations, we collect and store universal wastes in labeled containers that are dated and disposed of (or recycled) within one year, and picked up by contractors or self-transported to recycling facilities.
North Dakota Department of Transportation (NDDOT)	80	16,938 lane miles	None	NDDOT has installed floor drain holding tanks for run off from trench drains and has installed sand oil separators. For waste oil, NDDOT has installed secondary containment around 55 gallon drums.	Only common practices implemented.	Each district is to have a disposal plan for materials that could be considered hazardous materials. Materials are to be disposed of according to printed procedures that details the exact steps for proper disposal. If no printed procedure is available, NDDOT consults the North Detact Incolt December for proper	Same as number 11.	Same as number 11.
						Dakota Health Department for proper disposal procedures. NDDOT has written a manual to assist the districts call the Department's Hazardous Waste Disposal Manual. NDDOT has centralized all MSDS sheets on the department's intranet page for quick easy access.		

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Oregon DOT (ODOT)	Approximately 100	Approximately 7,500 center line	None	Spill kits are located throughout each yard; some equipment has drip collection systems; walk around and monthly audits identify vehicle leaks; secondary containment is provided for bulk fluids. The EMS includes requirements for managing bulk fluids. Drip collectors are placed at some pieces of equipment; all areas have spill kits; the EMS includes seasonal storage and fluid management.	ODOT has a complete Environmental Management System implemented at all yards. Included are 25 procedures, with BMPs for the storage, handling, use and disposal of materials typically used in the day to day maintenance of the highway. There are several procedures for equipment, including washing of vehicles and clean out of striping trucks. The BMPs include cold water wash, limiting the wash areas to gravel areas, developing sediment containment for pretreat, etc. the program includes a monthly yard audit to ensure the practices are being implemented.	All facilities either have can poppers or track/count aerosol cans. Tracking and counting is documented on monthly waste generation and disposal forms. Each facility that has a can popper has instructions, the EMS provides cheat sheet on how to manage aerosol cans.	The EMs includes procedures for managing and disposing of traffic paint and washouts. The primary focus is prevent releases to the environment; there is a safety standard for indoor air quality; job hazard analysis for PPE	The EMS includes universal wastes (batteries/mercury switches, waste pesticides) with procedures for the storage, handling and use, and disposal. State contracts provide for recycling. Lead acid batteries are returned to vendors, including those off the highway. The monthly documentation includes description o generation and disposal of universal wastes, how much and where disposed.
Tennessee Department of Transportation (TDOT)	108	87,000 Total Highway Miles	a) Facility maintenance and construction activities were regulated under judicial consent orders imposing additional environmental inspection and reporting requirements from 2002 through 2008. Requirements of all orders have been satisfied and are no longer in effect. b) Individual MS4 Permit that imposes additional inspection, documentation, research and reporting requirements on the TDOT facilities beyond the typical scope of a MS4 General Permit.	a) Sealed all floor drains in maintenance bays that discharged to septic systems to eliminate Class V injection well issues. b) Vehicles and equipment now stored under cover and on paved surfaces c) Stormwater treatment systems installed at 4 facilities, and stormwater retention basins in place at 3 Regional Facilities to reduce potential for releases to the external environment. d) Quarterly facility inspections implemented at all facilities e) SOP implemented for standardized spill cleanup at all facilities f) Dry methods used for all floor cleaning at all facilities	a) Washing allowed only on designated wash pads at designated facilities b) 65 wash pads installed in past 8 years c) OWS used to treat wastewater from all wash pads d) Controls on what soap may be used e) SOP for vehicle wash operations includes pre-wash checks, post-wash checks, and maintenance for wash bay components.	 a) Mandated waste collection at all facilities b) Regions and District facilities have can puncture and crush units c) MOU with regulator to sell empty cans as recyclable scrap metal d) MOU with regulator allows shipment from county to district facilities e) Purchasing controls on what aerosol products may be used. 	a) Changed from oil-based to latex- based paints to reduce toxicity b) Development of specific SOPs for road painting equipment cleanout and management of waste paint/cleanout water c) Constructed special paint waste collection pits for cleanout of painting equipment at two major painting facilities	a) Proceduralized system to collect, label, and recycle lamps, batteries and bulbs at all facilities a) Utilized Regional and District facilities as central collection points for universal waste generated at county, weigh station, and rest area facilities.
Texas DOT (TXDOT)	304	80,000	None	Containers with absorbent pads and socks are in place near vehicle fill station. Spill containment carts are kept in shops for emergency spill response. Containers of kitty litter absorbent are kept in shops to contain small spills.	Contaminated equipment are not allowed to be cleaned in wash bays. Large equipment and sweepers are washed in an area surrounded by berms. Run-off is collected in an adjacent evaporation pit. Enclosed wash bays have been constructed where expected rainfall exceeds evaporation rates. The enclosure keeps rainfall from overfilling the collection pit. The water is treated and recycled for reuse using a bioremediation system. Bioremediation systems digest both oil and organic degreasers.	Only common practices implemented.	All striping is contracted to private industry. Striping contractors are held responsible for managing striping paint waste.	All universal waste is contained separately, labeled and disposed of according to classification. Hazardous waste is collected by Hazmat contractors. Material collected by sweepers is stockpiled at the maintenance facilities in areas surrounded by berms and is analyzed by an environmental contractor prior to pick-up and disposal.
Utah Department of Transportation (UDOT)	98	6,000	None	Not applicable/no practices implemented.	Only common practices implemented.	No Response	No Response	No Response

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Name of your organization	Number 6 Number of facilities (i.e., maintenance shop areas) in your organization	Estimated total mileage of roadway managed by your facility	If your organization operates under unique circumstances that may positively or negatively affect implementation of best management practices, please describe those here (e.g., unique environmental circumstances or unique regulatory environment).	To what extent has your facility implemented BMPs related to the prevention of inadvertent vehicle fluid releases?	To what extent has your facility implemented BMPs related to vehicle and equipment washing (including wash bay operations)?	To what extent has your facility implemented BMPs related to waste aerosol can collection and disposal?	To what extent has your facility implemented BMPs related to line striping paint waste management?	To what extent has your facility implemented BMPs related to universal waste management (collection, disposal, handling, labeling)?
Virginia DOT (VDOT)	Approximately 300	57,867	None	Statewide BMPs were developed and implemented to address responses to vehicle fluid releases and also for the storage of vehicle fluids such as diesel, motor oil, gasoline, etc. Periodic statewide training programs also cover this topic and periodic compliance audits review individual facility practices. Regarding the actual prevention of vehicle fluid releases, Virginia DOT has a comprehensive vehicle maintenance schedules which are performed by trained and certified vehicle technicians.	Statewide BMPs were developed and implemented to address vehicle washing. A standard vehicle wash pad was designed for facilities with no publicly-owned treatment works access and such units have been installed at many facilities. Periodic statewide training programs also cover this topic and periodic compliance audits review individual facility practices.	BMPs were developed and implemented for collection and disposal/recycling of aerosol cans. Periodic statewide training programs also cover this topic and periodic compliance audits review individual facility practices.	BMPs were developed and implemented for waste paint management and disposal. Virginia DOT only employs water-based pavement marking paints. Periodic statewide training programs also cover this topic and periodic compliance audits review individual facility practices.	BMPs were developed and implemented for universal waste collection, management and disposal/recycling. Periodic statewide training programs also cover this topic and periodic compliance audits review individual facility practices.
Washington State Department of Transportation, HQ Maintenance and Operations (WSDOT)	61	7,000	None	Only common practices implemented.	Only common practices implemented.	Only common practices implemented.	Waterborne paint is used. Only used paint and/or water residues are returned to empty tote and then to manufacturer. Time and expense is saved in the clean-up and disposal of	Florescent tubes are recycled as well as mercury vapor lamps and batteries. It is a more expensive practice but it is required by state order.
Wyoming DOT (WYDOT)	35	16,193	District 2: There is an MS4 permit in the Casper Urban Area. District 3: WYDOT follows all guide lines set forth in our N.P.D.E.S. manual, that was approved by D.E.O. District 5: WYDOT has roads within 3 National Forests and 2 State Parks.	District 2: Daily inspections are performed by vehicle operators. Preventative Maintenance inspections are performed by the mechanic shop - frequently. District 3: Only common practices implemented. District 5: All of the shops have sumps that we place petroleum collection pillows in. Each shop has floor dry that is to be used to soak up any spills and our employees are taught not to wash petroleum production into the sumps.	District 2: All maintenance shops are to wash equipment and vehicles in areas that have sediment and petroleum product controls such as wash sumps and absorbent pillows for petroleum products. District 3: Only common practices implemented. District 5: Only common practices implemented.	District 2: Waste aerosol cans are punctured and drained in a sealed apparatus mounted on a 15 gallon drum that contains floor dry to absorb any remaining product. The floor dry is disposed of and replaced frequently. District 3: Only common practices implemented. District 5: Only common practices implemented.	District 2: Water base paint is the only product used at this time. Each striping crew has a lined drying pit that allows clean-up of the equipment. Any paint deposited in those areas is allowed to dry out completely and disposed of at the local landfill. District 3: Only common practices implemented. District 5: District 5 has gone to using water base paint only for our striping.	District 2: All waste oils are collected and placed in a waste oil vault which is pumped out and hauled away quarterly by a licensed waste oil contractor who takes the material to a licensed recycling facility. All waste facilities are labeled and reported on annual Tier Two reports. District 3: Only common practices implemented. District 5: All waste products except our oil products are hauled to county/city landfills. Waste oil is sent to a recycler.

Question Number 1	Question Number 14	Question Number 15	Question Number 16	Question Number 17	Question Number 18	Question Number 19	Question Number 20	Question Number 21	Question Number 22
Name of your organization	To what extent has your facility implemented BMPs related to employee training?	To what extent has your facility implemented BMPs related to documentation/record-keeping?	To what extent has your facility implemented BMPs related to oil/water separator management?	To what extent has your facility implemented BMPs related to fluid changes waste management?	To what extent has your facility implemented BMPs related to the storage and handling of deicing salts and chemicals?	To what extent has your facility implemented BMPs related to bulk materials stockpile storage (millings, sand, and aggregate)?	To what extent has your facility implemented BMPs related to animal carcass management and disposal?	To what extent has your facility implemented BMPs related to hazardous waste management (labeling, storage, handling, disposal, and minimization)?	To what extent has your facility implemented BMPs related to transportation, handling, selection, and storage of containers holding hazardous and non-hazardous waste and materials?
Delaware Department of Transportation (DeIDOT)	Staff are required to annually attend training on facility and vehicle maintenance; stormwater and spill prevention; vegetative control and pollution prevention on highways; SPCC requirements; spill response and emergency procedures; roadside issues.	Training is offered to records management staff.	Two facilities have oil/water separators.	Proper management and disposal of waste oil.	Salt is stored under cover, per NPDES permit; facilities are swept immediately following snow or ice events to remove excess salt.	Only common practices implemented.	Only common practices implemented.	All flammables are stored in approved cabinets; inventories are stored in marked, segregated areas in shops.	Only common practices implemented.
Georgia DOT – Office of Property and Equipment	Only common practices implemented.	Only common practices implemented.	Only common practices implemented.	Only common practices implemented.	Only common practices implemented	Only common practices implemented.	Only common practices implemented.	Only common practices implemented.	Only common practices implemented.
Hawaii DOT, Highways Division (HDOT)	Training: Storm water pollution control and BMP training classes are given annually. Chemical Applications (CA) training classes are given annually. Hazardous/solid waste training classes are given every few years.	EMS specified requirements of documentation. All records and documents will be kept for at least 5 years. Records include but not limited to: - Permits - SWPCP, CA, EMS documents - MSDS - Inspections - Training - Reports - releases/incidents - revision of documents	Vehicle Wash: Wash rack with oil water Separator is required for regular vehicle wash. Vehicle wash is to be conducted at designated location only. Wash water is to be discharged into City Sewer system.	Waste management is conducted on at one centralized base yard (Kakoi Base yard).	Liquid Storage: All liquid storage are required to be under cover, with secondary containment.	Construction Materials storage: Wattles, fiber rolls, sausage, gravel berms, triangle dikes, jersey barriers, and other types of barriers are applied around construction materials storage area. Fiber rolls and triangle dikes are especially good at the entrance as they allow vehicles to drive on and pass without damage to the barrier. Other types of BMP devices had been damaged as drivers were reluctant sometime to remove the BMPs before loading/unloading.	Only common practices implemented.	An EMS program has been established for Highways Division. The program covers hazardous wastes management. EMS internal inspections are conducted semiannually. An open end contract has been established with a licensed Hazardous waste specialist for hazardous waste removal from roadway as well as base yards. An Authorized Use List (AUL) is being worked on. Only materials on the list could be ordered with limited quantity (three months supply).	Transport of hazardous wastes are done by only hazardous waste contractors. Storage of hazardous wastes follow EMS requirements. CESQG status is established for each base yard. Roadway cleaning, once the quantity is over, will use a general hazardous waste ID from local Department of Health. Storage of non-hazardous wastes is for only short period (act as a transfer station) to prevent solid waste normit requirements
Indiana Department of Transportation (INDOT)	INDOT focuses training activities in several areas that include asbestos and lead awareness, safety training and 24 hour hazmat first responder training. Additional training and information is shared with specific employees related to shop and universal waste materials and recycling activities that are part of daily operations at INDOT facilities.	INDOT focuses training activities in several areas that include asbestos and lead awareness, safety training and 24 hour hazmat first responder training. Additional training and information is shared with specific employees related to shop and universal waste materials and recycling activities that are part of daily operations at INDOT facilities.	Over the past 10 years, INDOT has installed over 20 oil/water separators at various facilities and all new INDOT facilities are constructed with the most up to date oil/water separator unit available to ensure that the facilities are discharging clean water to the municipal sewer system.	By Executive Order, the state of Indiana has a process which mandates that the waste oil produced at INDOT facilities (as well as all other state facilities) is picked up by a contractor and is rerefined and sold back to the state for use in state vehicles. INDOT utilizes rerefined oil, transmission fluid and hydraulic fluid in its fleet of vehicles and equipment.	All salt is stored under cover to minimize salt runoff from INDOT facilities. All new salt facilities constructed at INDOT sites are the coverall type buildings which allow for under roof loading, secondary containment for deicing chemicals and room for a brine maker to keep the operation enclosed from adverse weather conditions. All interior runoff in the coverall building drains to a sump and is pumped to a washwater holding tank to be used as brine feedwater. In new sites our wash bay runoff water is run through an oil/water separator and pumped to a washwater holding tank in the salt building to be used for making brine.	Only common practices implemented.	INDOT utilizes the following methods for disposal of animal carcasses: 1. Composting 2. Incineration 3. Limited contract pick up by rendering company 4. Transporting carcass to wildlife preserve for use as a feedstock	INDOT utilizes a comprehensive program for the proper management of the department hazardous waste. Thus ensuring that materials are properly handled and disposed in reference to government regulations.	As part of the structured shop/hazardous waste disposal program INDOT utilizes contracted services for the handling and proper disposal of any hazardous waste substance produced from an INDOT facility or operation.
Maine DOT (MaineDOT)	Monthly and Annual training is in place in all locations	[Maine DOT] will share a copy of the "Green Book" that addresses all of these items.	See Green Book	See Green Book	All salt is under cover in buildings.	See Green Book	Maine DOT has a lot of wooded areas that allow the carcass to be dragged there. Otherwise, there are sites identified by the state wardens for such disposal.	See Green Book	See Green Book
Question Number 1	Question Number 14	Question Number 15	Question Number 16	Question Number 17	Question Number 18	Question Number 19	Question Number 20	Question Numb	
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Name of your organization	To what extent has your facility implemented BMPs related to employee training?	To what extent has your facility implemented BMPs related to documentation/record-keeping?	To what extent has your facility implemented BMPs related to oil/water separator management?	To what extent has your facility implemented BMPs related to fluid changes waste management?	To what extent has your facility implemented BMPs related to the storage and handling of deicing salts and chemicals?	To what extent has your facility implemented BMPs related to bulk materials stockpile storage (millings, sand, and aggregate)?	To what extent has your facility implemented BMPs related to animal carcass management and disposal?	To what extent has your facility imp hazardous waste management (la disposal, and minir	
					-		-		
Maryland DOT, State Highway Administration (MDSHA)	General environmental awareness training occurs annually, including RCRA, DOT, and HAZCOM. Combines RCRA Universal Waste and RCRA Hazardous Waste. Incorporates job-specific SOP training (spill response, vehicle fueling). Developed flip-cards for quick reference to SOPs in the field. Training has been condensed to a 2- hour period to minimize impact on shop operations. Inspection trainings (performed by environmental coordinators) cover new topics. New SOPs or BMPs are discussed during monthly town hall meetings.	SHARCS and color-coded standardized hard copy filing system at the shops. There's a hard copy color coded filing system SOP.	Use Grit chambers to filter out solids from wastewater prior to discharge to oil/water separator.	Only common practices implemented.	Some salt domes are equipped with spring-loaded corral gates to keep salt in the domes. Gates are waist- high with a duster on the bottom. Weekly housekeeping inspections of salt storage areas. All salt piles are covered. MgCl and salt brine are used in some districts.	SHA has a task force (Stockpile Management. Team) for stockpile management. Developed a rating system based on quantity, facility layout/location, space, with the primary intent being to minimize environmental impact Have developed interim measurements to manage stockpiles until permanent procedures are developed.	Deer carcasses are composted in District 4 and District 7.	Weekly and monthly hazardous waste insp mixing of substances with used oil so that	
Michigan DOT (MDOT)	Only common practices implemented	Only common practices implemented	Only common practices implemented	Only common practices implemented	Salt and deicing chemicals are stored in concrete and timber covered buildings. The building contain impermeable concrete flooring with approaches sloped toward the shed. Chemicals are typically stored inside the buildings within secondary containment. Those chemicals stored outdoors are surrounded by concrete secondary containment and protected with a coverall system.	Only common practices implemented	Only common practices implemented	All facilities consistently check their invento past shelf life or no longer used through a no longer "buying bulk" and storing items sharing materials on a statewide basis to e facilities are required to maintain satisfact the storage of hazardous wastes. The Divis for facility improvements related to the cor containment, storage buildings, flammable improvements related to environmental rer	
Missouri Department of Transportation (MODOT)	Only common practices implemented.	Only common practices implemented.	Only common practices implemented.	Only common practices implemented.	Only common practices implemented.	Only common practices implemented.	Missouri DOT is using a system to incinerate road kill in one district.	Only common practices implemented.	
Montana DOT (MDT)	Car Pooling is one of the biggest changes Montana DOT has made in its training program. People who are coming into the training will pick up other attendees that are along the way. Another big cost savings was using the Go-To-Meeting. Instead of people traveling to training by using the Go-To- Meeting application, the phone and the computer are used to reach the audience. Montana DOT has also been using the Webinar which is an automated teleconferencing Both the Webinar and the Go-To-Meeting has saved Montana DOT a lot of money since the people don't have to travel, which means they do not have to pay hotel expenses or pay any per diem.	Montana DOT has prepared SPCC plans at approximately 55 of the maintenance sites. Montana DOT personnel fill out monthly checklists documenting BMPs (secondary containment, etc.). Montana DOT has nine locations where they operate underground storage tanks. These systems have automatic tank gauging systems. Monthly strip charts are maintained documenting any leaks or abnormalities with the tank systems.	Only common practices implemented.	Montana DOT has installed waste oil heaters in most division head quarters. Waste oil from the outlying sections is transported to the head quarters facility for disposal and doubles as a heat source during the winter months.	As winter maintenance practices evolve, Montana DOT has programmed in additional covered storage buildings for solid chemical. Montana DOT has also rated stockpile sites base potential environmental risk and uses that rating scale to justify additional facility improvements. If solid chemical is uncovered and no reasonable alternatives are available, they limit the quantity to average annual usage. During salt sand blending operations, all salt is temporarily covered to protect against leaching. Using "hotter" blends and light application rates per lane mile has gained them additional truck range, allowed smaller covered storage buildings and increased level of service in most locations. Montana DOT is planning secondary containment on all future liquid chemical storage and planning on upgrading current site with elevated risk	Montana DOT has implemented aggressive noxious weed control on current sand piles. New aggregate sources must be approved by Montana DOT forces prior to crushing operations. Taking a proactive approach to noxious weed control on sand piles will pay the Montana DOT back in the long run by requiring less treatments on roadsides in the future.	Several years ago Montana DOT started a composting program to assist with animal carcass management and disposal. This program has saved costs associated with lengthy travel and landfill disposal fees. The permitting process was challenging at first but has turned out to be a platform for additional sites through out the state. Montana DOT has yet to receive the okay to use the compost for revegetation efforts on roadsides due to the potential for spreading chronic wasting disease.	Generation of hazardous waste has greatly years. In many locations, solvent-based par by citrus-based parts washers. Montana D based highway striping paint to water-born the paint in totes rather than bulk. These e generation of hazardous waste.	

n Number 21	Question Number 22
lity implemented BMPs related to ent (labeling, storage, handling, d minimization)?	To what extent has your facility implemented BMPs related to transportation, handling, selection, and storage of containers holding hazardous and non-hazardous waste and materials?
ste inspections are performed. Prevent so that used oil remains nonhazardous.	Some districts puncture and recycle pesticide containers.
inventory and eliminate all products ough a licensed contractor. Facilities are i tems on the shelf. Facilities are sis to eliminate disposal costs. All tisfactory secondary containment for he Division of Operations has a budget the construction of secondary mmable cabinets and other initial remediation and compliance.	All trucks contain MSDS information when transporting materials. All materials are stored in the proper secondary containment area or cabinet.
d.	Only common practices implemented.
greatly diminished over the past 15 based parts washers have been replaced tana DOT has switched from alkalide- ter-borne paint. Montana DOT also get These efforts have greatly reduced	Only common practices implemented.

Question Number 1	Question Number 14	Question Number 15	Question Number 16	Question Number 17	Question Number 18	Question Number 19	Question Number 20	Question Num
Name of your organization	To what extent has your facility implemented BMPs related to employee training?	To what extent has your facility implemented BMPs related to documentation/record-keeping?	To what extent has your facility implemented BMPs related to oil/water separator management?	To what extent has your facility implemented BMPs related to fluid changes waste management?	To what extent has your facility implemented BMPs related to the storage and handling of deicing salts and chemicals?	To what extent has your facility implemented BMPs related to bulk materials stockpile storage (millings, sand, and aggregate)?	To what extent has your facility implemented BMPs related to animal carcass management and disposal?	To what extent has your facility in hazardous waste management (I disposal, and min
New Hampshire DOT – Office of Stewardship and Compliance (NHDOT)	Our Office of Stewardship and Compliance, was formed to conduct environmental awareness and compliance training & auditing, with a focus on the Operations units. We provide or oversee on-going training using a broad array of training tools and methods, including interactive software, PowerPoint, hands-on training, etc. We are developing self- taught modules for the Intranet and we regularly distribute best management practices (BMPs), frequently asked questions, environmental alerts and newsletters. In each of the Operations units there is a Safety & Environmental Coordinator that regularly conducts orientation training for new employees or refresher training for veteran employees. The Office of Stewardship and Compliance also coordinates with other state agencies to conduct certification training.	We have developed an Inventory of Managed Properties database to collect and manage data relative to environmental compliance activities at all Operations facilities. This includes inspection requirements and a notification system for impending inspections. We are also developing a separate training database that documents training requirements and actual training conducted. Inspection and other required documentation are also maintained at each facility.	We use absorbent pads within our oil/water separators to capture any petroleum contaminants.	Used oil filters are punctured and hot drained for a minimum of 12 hours before disposal or recycling. Oil from oil changes is recycled and, as appropriate, we use self-transport to consolidate used oil pickups for recycling. At some locations we have used-oil furnaces that burn used oil.	We have constructed separate covered structures to protect salt from rain and to contain it and prevent leaching. We monitor the moisture content of delivered salt and penalize vendors for exceeding standards.	Only common practices implemented.	We do not transport animal carcasses to our facilities. They are removed from the road and disposed in appropriate locations.	We distribute best management practices updates to clarify and emphasize state an management regulations. We conduct r waste management best practices and reg and federal requirements for labeling, stor integrate health & safety requirements wi
New York State DOT (NYSDOT)	1. Petroleum bulk storage training in development 2. Have a program to train all equipment operators, including environmental stewardship issues 3. Have pesticide management training underway for new and existing applicators and technicians 4. Train maintenance staff in environmental issues in facilities as part of spring and fall safety meetings 5. Regional Maintenance Environmental Coordinators provide training as issues arise or as part of other programs 6. Environmental Handbook for Transportation Operations provides a training reference.	1. Developing more user-friendly forms and reports for petroleum bulk storage management and other programs 2. The Maintenance Asset Management Information System (MAMIS) is a work accomplishment tracking system. MAMIS includes data elements that measure and track environmental issues. 3. Regions and Residencies (front line maintenance organization) maintain pesticide application records 4. Evaluating GIS and GPS to help improve record keeping and program management.	1. Manage wash water by washing inside the facility and collecting water through floor drains and then treating through a grit collector and oil/water separator 2. Developing guidance procedure for operating and maintaining oil/water separators 3. Have a standard clean-out contract available.	Only common practices implemented.	1. Guidelines for the storage and handling of salt and deicing chemicals from their arrival at the facility to their application on the road 2. Offer extensive training in storing and applying snow and ice control materials 3. Maintenance personnel are diligent about proper, environmentally safe covering and storage of materials 4. Conduct post storm analysis to determine adequate application rates 5. Some regions use Road Weather Information System to manage salt use in selected areas 6. Some regions use engineered and living snow fences to reduce blowing and drifting snow which reduce snow and ice control materials applications 7. Extensive use of salt brine to reduce road salt use.	Only common practices implemented.	New York State DOT is a national leader in animal carcass management and disposal with its deer composting program. We have established deer composting using wood chips at over 20 maintenance facilities. Mature compost material is used to protect and improve roadside vegetation or shoulders. New York State DOT has developed a Safety Bulletin regarding carcass handling and composting.	 Since 1984, USEPA has required agence 2. Agency has a policy to consider produce minimize amounts of hazardous wastes; a within projects and operations 3. Use rec in abrasive paint removal on bridges before and the paint removal on b
North Dakota Department of Transportation (NDDOT)	Disposal training was conducted with the assistance of the North Dakota Health Department during the annual safety meetings. More guidance can be found in the Department's Hazardous Waste Disposal Manual.	Each section has developed a log book as part of their Spill Prevention Containment and Control plan (SPCC). Each district is responsible for updating the plan and performing and recording inspections.	Only common practices implemented.	NDDOT has installed secondary containment shelters for waste oil.	NDDOT has constructed salt buildings for raw salt. NDDOT is beginning to construct buildings for treated salt/sand stockpiles. Where they don't have buildings, they have been covering the treated stockpiles with tarps.	Only common practices implemented.	Only common practices implemented.	Same as number 11.

Number 21	Question Number 22
y implemented BMPs related to nt (labeling, storage, handling, minimization)?	To what extent has your facility implemented BMPs related to transportation, handling, selection, and storage of containers holding hazardous and non-hazardous waste and materials?
tices, frequently asked questions and e and federal hazardous waste uct regular training on hazardous d regulations. We follow all state , storage, handling and disposal. We is with respect to handling of wastes.	Only common practices implemented.
Jencies to minimize hazardous wastes. Jducts purchased with intent to es; agency uses recycled materials recycled steel grit to minimize waste before painting them.	Only common practices implemented.
	Same as number 11.

Question Number 1	Question Number 14	Question Number 15	Question Number 16	Question Number 17	Question Number 18	Question Number 19	Question Number 20	Question Number 21	Question Number 22
Name of your organization	To what extent has your facility implemented BMPs related to employee training?	To what extent has your facility implemented BMPs related to documentation/record-keeping?	To what extent has your facility implemented BMPs related to oil/water separator management?	To what extent has your facility implemented BMPs related to fluid changes waste management?	To what extent has your facility implemented BMPs related to the storage and handling of deicing salts and chemicals?	To what extent has your facility implemented BMPs related to bulk materials stockpile storage (millings, sand, and aggregate)?	To what extent has your facility implemented BMPs related to animal carcass management and disposal?	To what extent has your facility implemented BMPs related to hazardous waste management (labeling, storage, handling, disposal, and minimization)?	To what extent has your facility implemented BMPs related to transportation, handling, selection, and storage of containers holding hazardous and non-hazardous waste and materials?
Oregon DOT (ODOT)	All Maintenance staff is trained in spill prevention and clean up on the yards and on the highway; plug and patch training, first responder training; when to complete the forms, when to report etc. Managers and coordinators perform monthly inspections of the yards.	The EMS is a comprehensive program that includes training on identifying wastes, managing wastes, inspecting the yards, completing paper work required for CEG status, etc.	In the EMS, there is a section on managing and cleaning oil/water separators that includes monthly audits on condition, need for cleaning, etc. The EMS encourages connection to sanitary system where appropriate, and includes monthly audits for inspection and cleaning.	The ODOT EMS has extensive BMPs in managing equipment and automotive fluids and parts. The Oregon Department of Environmental Quality has served as a technical advisor in the program. All ODOT yards are Conditionally Exempt Generators, monthly audits evaluate how well the program is on the ground; oil, antifreeze, solvents, other excluded fluids are recycled and tracked. The major equipment shops have achieved 'Green Business' status by DEQ.	The EMs includes a Risk assessment for secondary containment based on site condition; purchasing guidelines for tanks; monthly inspections for tanks and containment; guidelines for managing tanks.	Providing sediment control where appropriate; The EMS includes storage and disposal of excluded wastes including emulsion; r	Pilot program on composting carcasses	All hazwaste is managed according to law, ODOT is a CEG, with documentation at each yard on waste generated and waste disposed. The EMS identifies state and federal laws and provides recommendations such as using biosolvents instead of chlorinated solvents, and recycling where appropriate.	All tanks (including poly winter maintenance chemical tanks) have an inspection program either through Fleet or through monthly yard audits; secondary containers are inspected as well. A risk assessment has been developed for the purpose and siting of stationary tanks. the Risk assessment determines, based on site condition, need for secondary containment. the EMS is intended for the storage, handling and use of all materials, including all containers.
Tennessee Department of Transportation (TDOT)	Mandatory annual refreshing training for all TDOT facility personnel responsible for waste management related activities. Training highlights new SOPs and any problem areas uncovered during prior year's inspections.	a) All SOPs, forms, compliance plans and other regulatory documentation are maintained on a website accessible to all facilities to ensure that the latest versions are always accessible throughout the TDOT system. b) All facility inspections are tracked by centralized organization and reviewed with facility staff during refresher training c) All waste management records are maintained by central organization d) Specified locations identified for record-keeping at facilities. Some facilities utilize special colored file folders so that records can be easily located. e) SOP for the transfer of chemicals from county garages to districts with accumulation areas includes documentation requirements for accountability	a) OWS units installed for all wash pad wastewater discharge whether it is discharged to a POTW or captured for re-use. b) OWS units installed for discharge from maintenance garage floor drain discharge during facility renovations c) Paper filtration units added to OWS systems to removed sediments and allow wash pad discharge to be recycled as salt brine make-up water	a) Fluid changing, previously performed at 102 facilities, currently allowed only at 28 facilities to improve control over waste management b) Generated SOP for handling of spent anti-freeze. Having eliminated waste mixing, TDOT obtained regulatory classification of spent anti-freeze as non-hazardous in 2001. Estimated savings = \$12,000 annually in treatment costs.	a) Imposed salt layback requirement at all storage facilities b) Custom design of salt and brine layout at each facility c) Implemented chloride analytical monitoring of stormwater discharge at selected facilities d) Extended curbing and berming around storage facilities to minimize stormwater run-on e) Implemented regular facility inspections of salt management	s a) Developed and implemented SOP for management of material stockpile at all facilities including what materials may be stockpiled, size of stockpiles, and placement of stockpiles. b) Implemented regular facility inspections of bulk material stockpile management c) Establish vegetation for topsoil and fill materials d) Structural fill maintained within storage bins or covered e) Limited site regrading and movement of onsite stockpiles to control runoff to adjacent properties/drainage pathways	a) Development of procedure for carcass management in accordance with TN state regulations b) SOP – carcasses are buried, sent to landfill, or incinerated c) Roadside waste management teams controls debris and carcass management and disposal	a) SOPs developed and implemented at all facilities for: • 90-Day/180-Day Accumulation Areas - Setup and Operation • Antifreeze management • Hazardous waste management - record keeping • Hazardous waste - shipment and disposal • Satellite Accumulation Areas - Setup and Operation • Universal Wastes management • Used Oil accumulation and management • Waste Characterization • Discarded Automotive Fuel Tanks management • Roadside Wastes management • Fuel Wastes management • Ship-Up Materials management b) Waste minimization through product substitution of less hazardous replacement chemicals (e.g., solvents, cleaners, etc). Specific chemicals include solvent containing aerosol parts cleaners, detergents and parts washer solvents. c) CESQGs transfer wastes to District and Regional facilities to ensure consistent management across TDOT of all wastes. Resulted in an overall reduction of facilities subject to Subtitle C regulations by 86 or a net volume reduction of 80%. d) Implementation of recycling at District and Regional facilities to minimize waste generation. Materials include antifreeze, hydraulic fluid and parts washer solvents through in house recycling equipment often integral to the unit. e) Product evaluations done to minimize use of hazardous materials and SOPs created to allow materials to be recyclable wherever possible (i.e use of laundered rags, recycled antifreeze (see question 17), parts washer solvent). These efforts have resulted in a decrease of hazardous waste generated on an annual basis from over 80,000 kg (in 2000) to less than 10,000 kg (current). f) Further reduction of wastes generated at the existing 22 regulated generator facilities resulted in all except one of the facilities resulted in a net decrease of regulated hazardous waste generating facilities by 99% over a 9 year period.	SOPs developed and implemented at all facilities for: • Labeling and storage of empty container management • Shipment and disposal of special and hazardous wastes from county and satellite facilities to District/Regional facilities. This was conducted through an agreement with TDEC. Allowed all disposal and waste pickup for disposal to occur at 22 facilities rather than requiring pickup at all 108 TDOT brick and mortar locations. Transportation occurred in limited quantities and only materials not subject to DOT shipping requirements were allowed at satellite locations. • Established receiving logs for all materials shipped from satellite facilities at District/Regional facilities to ensure no unallowable materials were being utilized at the satellite locations.
Texas DOT (TXDOT)	All maintenance employees are required to have Hazardous Material Awareness training every 3 years. All maintenance employees have Hazardous Material Communication training every 5 years. Selected employees at each maintenance facility have Hazardous Material Small Quantity Spill Response training. Herbicide truck operators must be licensed with the Texas Department of Agriculture and have refresher training each year.	Records are kept on all hazardous material spills. Training records are kept on each employee during their employment with TxDOT. Hazardous material clean-up is kept on employees time sheets. Pesticide records are kept on all pesticide application on all applications for a period of 2 years.	Not applicable/no practices implemented.	Used oil and anti-freeze are placed in tanks at each facility and picked up regularly by a recycling contractor.	Pesticides are stored in a locked area of the warehouse with limited access granted. Dry deicer is stored separately in the maintenance yard ii large storage containers that are well labeled. Liquid deicer is stored in tanks surrounded by berms. Tanks are well labeled. Goggles, gloves, masks and appropriate safety gear are required when handling these materials.	Bulk materials are stored in a fenced area at the maintenance facility and often contained with berm or n concrete structures.	Policies are in place for urban and rural areas. In rural areas, remains should be removed from the roadway and buried on the roadside away from adjacent homes. By-products or rendering companies are contacted for large animal remains. In urban areas, dead animal remains should be taken to an approved sanitary landfill or municipal solid waste facility. Department employees should be sensitive to the feelings of pet owners. Proper safety gear should be worn when handling dead animals.	All hazardous waste must be labeled and properly stored in a restricted area. Contracted Hazmat companies are contacted for removal and disposal.	TxDOT does not transport hazardous waste or materials. That is all contracted to Hazmat companies. Maintenance facilities store hazardous waste and materials separately in well labeled areas with limited access.
Utah Department of Transportation (UDOT)	No Response	No Response	No Response	No Response	No Response	No Response	No Response	Only common practices implemented	Only common practices implemented.

Question Number 1	Question Number 14	Question Number 15	Question Number 16	Question Number 17	Question Number 18	Question Number 19	Question Number 20	Question Number 21	Question Number 22
Name of your organization	To what extent has your facility implemented BMPs related to employee training?	To what extent has your facility implemented BMPs related to documentation/record-keeping?	To what extent has your facility implemented BMPs related to oil/water separator management?	To what extent has your facility implemented BMPs related to fluid changes waste management?	To what extent has your facility implemented BMPs related to the storage and handling of deicing salts and chemicals?	To what extent has your facility implemented BMPs related to bulk materials stockpile storage (millings, sand, and aggregate)?	To what extent has your facility implemented BMPs related to animal carcass management and disposal?	To what extent has your facility implemented BMPs related to hazardous waste management (labeling, storage, handling, disposal, and minimization)?	To what extent has your facility implemented BMPs related to transportation, handling, selection, and storage of containers holding hazardous and non-hazardous waste and materials?
Virginia DOT (VDOT)	No specific BMP regarding training has been developed however, Virginia DOT provides routline training programs for maintenance facility staff related to: (1) Waste Management; (2) Spill Prevention Control and Countermeasures (SPCC); and (3) U.S. DOT Hazardous Materials (HM-121). The SPCC and HM-121 training are required by regulation as well as the Waste Management Training for meeting the RCRA training requirements at certain Virginia DOT facilities. The waste management training is comprehensive in nature and covers other regulatory requirements, BMPs, Internal Policies, and good housekeeping practices.	Virginia DOT does not have a specific BMP for facility environmental record- keeping although those requirements are made part of each issue-specific BMPs.	No specific BMP has been developed for oil/water separators, however, this issue is covered in our periodic Waste Management training programs and evaluated through our environmental compliance audits.	Virginia DOT has BMPs related to vehicle fluid changes and provides periodic training and periodically audits compliance.	Virginia DOT has BMPs for deicing salts and chemical storage, as well as waste storage and disposal (related to salt-laden facility stormwater collection). Likewise, Virginia DOT conducts training sessions and periodic audit to evaluate adherence to the BMPs.	Only common practices implemented.	Virginia DOT has prepared BMP guidance documents detailing animal carcass management and disposal. Virginia DOT is also exploring non- traditional management options through our Research Council. Virginia DOT provides periodic training and performs periodic compliance audits.	Virginia DOT has BMPs and training programs and performs periodic audits of compliance.	Virginia DOT covers the container management requirements under the materials specific BMPs (e.g., oily rags, aerosol cans, etc). Virginia DOT also has a specific BMP for empty containers. Virginia DOT provides periodic training and compliance audits for each specific issue.
Washington State Department of Transportation, HQ Maintenance and Operations (WSDOT)	All mechanics and maintenance workers are trained on spill response, hazardous materials handling, and storm water protection. It requires more time and is more expensive.	Only common practices implemented.	Oil/water separators are inspected and maintained on an annual basis, but there is no cost savings.	Only common practices implemented.	Salt storage is regulated under the NPDES permit and the area is cleaned up accordingly. There are no cost savings.	Only common practices implemented.	Two deer compost sites are being used and others are being developed. There are no savings.	All state regulations are being met, but there are no savings.	All state requirements are being met, but there are no savings.
Wyoming DOT (WYDOT)	District 2: All supervisors have been trained to utilize pertinent BMPs at their maintenance locations and have been instructed to train their subordinates. District 3: WYDOT trains employees as needed for their area. Water well testing. Underground tank storage. District 5: WYDOT has started a yearly review of each shop's MSDS manual to ensure it is up-to-date and also training of employees on what is contained on an MSDS sheet. WYDOT has done annual reviews of the District 5 shop to ensure they are in compliance with OSHA regulations.	District 2: All industrial sites are listed under the District 2 Industrial Permit. Bi-annual inspections are completed along with regular inspections after 1/2" of moisture or more. All documentation is kept on site in a 3-ring binder. District 3: District 3 keeps N.E.P.D.S Records. District 5: Only common practices implemented.	District 2: Absorbent pillows, PIGS, etc. are used in the sumps of all locations to absorb any petroleum products that are present. District 3: Only common practices implemented. District 5: All our shops have sumps with sump pits in them and in the pits we have sump pillows to catch any petroleum production before they leave the facility.	District 2: All waste oils and fluids are collected and recycled through a licensed waste oil contractor. District 3: Only common practices implemented. District 5: All our waste oil is collected and stored until it can be picked up by a recycler.	District 2: All liquid de-icing material: are stored in plastic storage tanks within a bermed area to contain any leaks or spills. All ice slicer and salt are stored in a covered facility to prevent moisture from coming into contact with them. District 3: WYDOT follows all N.P.D.E.S. applications. District 5: WYDOT has two salt/sand buildings and a raw salt shed within the district. All of the salt/sand piles are bermed as well as the chemical storage sites. WYDOT covers any raw salt or ice slicer that is exposed to the elements.	District 2: All salt/sand stockpiles are bermed to prevent any leaching of salt off site. All stockpile sites are bermed to prevent sediment from leaving WYDOT property. Existing vegetation and erosion control logs are used in some areas to prevent erosion and control sediment. District 3: Only common practices implemented. District 5: Only our salt/sand piles are bermed. District 5 doesn't do anything special for their other piles. District 5 has storm water control devices installed at the Pits area to keep any sediments from leaving the area.	District 2: WYDOT currently disposes of animal carcasses that are found in urban areas at the local landfill. District 3: When applicable, all animal carcasses are disposed of at the County Landfill. District 5: Almost every carcass is hauled to the landfill. Carcasses are only left on the ground in remote locations that are out of sight and away from any active drainage. This is rare.	District 2: WYDOT currently disposes of all hazardous waste at the City of Casper Hazardous Waste Facility or hires a hazardous waste contractor to clean up spill areas and dispose of any hazardous materials. District 3: Only common practices implemented. District 5: Only common practices implemented.	District 2: All materials are labeled and MSDS sheets are on file at each location. District 3: All hazardous materials are handled by Professional Contractor. District 5: Only common practices implemented.

Question Number 1	Question Number 23	Question Number 24	Question Number 25	Question Number 26	Question Number 27	Question Number 28	Question Number 29	
Name of your organization	To what extent has your facility implemented BMPs related to street sweeping waste storage and disposal?	To what extent has your facility implemented BMPs related to hazardous and non-hazardous material inventory control?	To what extent has your facility implemented BMPs related to environmental release response, containment, and clean up?	To what extent has your facility implemented BMPs related to pollution prevention (recycling, non-toxic materials, etc)?	To what extent does your facility implement BMPs related to stormwater management (e.g. infiltration systems such as infiltration basins and porous pavement; maintenance practices such as catch basin cleaning, street and parking lot cleaning)?	To what extent does your facility implement BMPs related to vegetation management (e.g. pesticide mixing, handling, storage, and/or disposal; weed control; brush/tree control; turf grass management)?	To what extent does your facility implement BMPs related to the reduction of air pollutants (e.g. capture of ozone depleting substances, purchase of efficient vehicles, control of paint spray booth emissions)?	Pleas not id you from BMPs relate Ma purch
Delaware Department of Transportation (DeIDOT)	Street sweepings are typically stockpiled for 30-days prior to landfill disposal. Jersey barriers used at some facilities to contain sweepings.	Only common practices implemented.	Many facilities have SPCCs. DelDOT has developed training videos that include proper prevention and use of equipment; regulatory requirements; policies/procedures; and specific provisions of SPCC plan	Delaware operates a ferry at Woodland, DE and requires use of B20 biodiesel.	All catch basins have oil booms: sweeping performed immediately after snow/ice events; wash water is treated as previously noted; sand filter maintenance program and PM/inspection programs for ponds and stormwater systems; specialized equipment used to minimized idling emissions at toll plaza.	All weed control performed by contractors.	Routine scheduled work is reviewed for potential deferral during "red" ozone level action days. B20 fuel used for heavy duty vehicles. New heavy duty vehicles purchased with Tier III emission controls.	None re
Georgia DOT – Office of Property and	Only common practices implemented.	Only common practices implemented.	Only common practices implemented.	Only common practices implemented.	Only common practices implemented.	Only common practices implemented.	Only common practices implemented.	Only co
Equipment Hawaii DOT, Highways Division (HDOT)	Vacuum trucks with water spray are used to reduce dust. Wet slurry will be dried at dewatering facility (under construction) before going to the landfill.	An Authorized Use List (AUL) is being compiled. Only materials on the list could be ordered with limited quantity. The list will help with hazardous wastes inventory, tracking and disposal.	EMS specifies details for response to releases, and follow up documentation. SWPCP specifies detailed response and clean up procedures. One central office will handle all the notifications (EPA, DOH, NRC, HFD, USCG, etc).	P2 is covered in the EMS.	AMS system is being established for all drainage structures. All drainage structures are rated and documented in the system. Permanent BMPS has been installed island- wide. Gravel berms or sausage filters have been constructed at most outfalls. Street sweeping is conducted at least semiannually. Drain cleaning work will be scheduled according to the AMS and rating.	Chemical Application program has been established. All contractors and maintenance employees are required to be trained before working on state highways projects.	Only common practices implemented.	EMS pro Division conduct AMS dai structur
Indiana Department of Transportation (INDOT)	Only common practices implemented.	Only common practices implemented.	Only common practices implemented.	The department has been under the Executive Order "Greening the Government" for the past 10 years. Based on this order, the department has developed several programs to help with the recycling of various waste streams as well as the encouragement in the reuse of materials in construction and administrative activities. The department has implemented an annual program that reviews the waste diversion and recycling activities at each facility to ensure that the required activities are occurring as they should. Significant improvement has been accomplished by the facilities since the program was implemented in 2006.	Only common practices implemented.	Only common practices implemented.	Only common practices implemented.	No resp
Maine DOT (MaineDOT)	Only common practices implemented.	Only common practices implemented.	See Green Book	See Green Book	Only common practices implemented.	See Green Book	Only common practices implemented.	No resp
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Question Number 30

ase describe any other BMPs that were identified in the previous questions that u believe other agencies would benefit n knowing about. For example, consider 9s developed to meet state requirements ted to LEED certification, Environmental Management System implementation, chasing policies, or other types of BMPs.

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ommon practices implemented.

rogram has been established for Highways n. Semiannual internal audits/inspections are cted for all base yards.

atabase has been established for drainage ires.

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Question Number 1	Question Number 23	Question Number 24	Question Number 25	Question Number 26	Question Number 27	Question Number 28	Question Number 29	T
Name of your organization	To what extent has your facility implemented BMPs related to street sweeping waste storage and disposal?	To what extent has your facility implemented BMPs related to hazardous and non-hazardous material inventory control?	To what extent has your facility implemented BMPs related to environmental release response, containment, and clean up?	To what extent has your facility implemented BMPs related to pollution prevention (recycling, non-toxic materials, etc)?	To what extent does your facility implement BMPs related to stormwater management (e.g. infiltration systems such as infiltration basins and porous pavement; maintenance practices such as catch basin cleaning, street and parking lot cleaning)?	To what extent does your facility implement BMPs related to vegetation management (e.g. pesticide mixing, handling, storage, and/or disposal; weed control; brush/tree control; turf grass management)?	To what extent does your facility implement BMPs related to the reduction of air pollutants (e.g. capture of ozone depleting substances, purchase of efficient vehicles, control of paint spray booth emissions)?	Pleas not id you from BMPs relate Ma purch
Maryland DOT, State Highway Administration (MDSHA)	Only common practices implemented.	Only common practices implemented.	Training includes spill standard operating procedures and reference cards. Inspections look to see if spill kits are stocked. All reporting goes through the Assistant Chief at the ECD.	Only common practices implemented	Only common practices implemented	SHA has an Integrated Vegetation Management system. Annual training sessions. Centralized purchasing (Landscape Operation Division) so that materials are purchased from an approved list. Materials are shared among the districts. One-time, beginning of season shipment of materials. Pesticide comes from SHA Landscape Depot so they have control over vendor products also.	SHA has a policy of only buying flex fuel vehicles. Clean Diesel program - aggressive replacement of older diesel vehicles with newer, cleaner diesel equipment.	SHA has Environi all levels Council currentl program facility p environi inspecti Inspecti Inspecti Inspecti Inspecti Inspecti at the fa meeting current Coordin alone E0 structur complyi are inco
Michigan DOT (MDOT)	The majority of street sweeping is contracted out with the waste being disposed of at a type II landfill. For those areas of the State that still conducts street sweeping we are partnering with municipalities to share their waste storage bays to ensure waste is covered and any runoff flows to sanitary sewer.	All facilities consistently check their inventory and eliminate all products past shelf life or no longer used through a licensed contractor. Facilities are no longer "buying bulk" and storing items on the shelf. Facilities are sharing materials on a statewide basis to eliminate disposal costs. All facilities are required to maintain satisfactory secondary containment for the storage of hazardous wastes. The Division of Operations has a budget for facility improvements related to the construction of secondary containment, storage buildings, flammable cabinets and other improvements related to environmental remediation and compliance.	All facilities are required to maintain satisfactory secondary containment for the storage of hazardous wastes. The Division of Operations has a budget for facility improvements related to the construction of secondary containment, storage buildings, flammable cabinets and other improvements related to environmental remediation and compliance.	See other responses.	MDOT conducts regular catch basin cleaning and street sweeping to keep storm systems functioning normally.	Only common practices implemented	The new vehicles other than trucks are flex fuel. Placards in the vehicles remind the drivers to use flex fuel when available to support Michigan products and protect the environment.	MDOT f manage protect with ou Environ all envir compos areas of employy environ
Missouri Department of Transportation (MODOT)	Missouri DOT does have a sifting process that removes trash and large debris, the fines can then be used as fill.	Only common practices implemented.	Only common practices implemented.	Missouri DOT has an extensive recycling program including hot and cold mix asphalt, concrete, roofing shingles into asphalt, cardboard, and aluminum cans.	Only common practices implemented.	Only common practices implemented.	Vapor recovery on fuel dispensers in large metropolitan areas. Hybrid or alternative fuel vehicles are used.	Increase from roa
Montana DOT (MDT)	Several years ago, Montana DOT had a pilot project to use reclaimed sweeping blended with native grass seed for revegetation efforts on our roadsides. They have a current research project on the effectiveness of recycling sanding material from sweeping and ditch cleaning efforts.	Only common practices implemented.	Only common practices implemented.	Only common practices implemented.	It is common practice to design and build erosion control features into our highway systems. Montana DOT strives to establish a healthy diverse plant community that will act as a natural filter. When conditions do not permit or during the establishment period, common practices are used in the interim (slit fence, ditch blocks, sediment basins).	BMPs include: Eliminating spray acclivities on structures located over stream or adjacent to wetlands Using chemicals approved for use near aquatic resources whenever spraying Using herbicide in accordance to USEPA labels Hand spray around structures over water or within riparian area that require chemical vegetation control Within 25 feet of riparian area, boom spray no far than eight feet from the road edge. Within 25 ft of an active stream, stop all boom spraying unless specific herbicide permits.	Only common practices implemented.	Only cor

Question Number 30

se describe any other BMPs that were dentified in the previous questions that believe other agencies would benefit knowing about. For example, consider developed to meet state requirements ed to LEED certification, Environmental anagement System implementation, hasing policies, or other types of BMPs.

as several internal environmental groups: nmental Compliance Steering Committee with els of management and the Environmental il comprised of senior management. SHA is titly implementing an EMS. Detailed inspection mat the facilities (weekly inspection by personnel; monthly inspections by nmental coordinators). Weekly/monthly titions at primary maintenance facilities. titions have decreased the number of findings facilities. Monthly Maintenance Council ngs with participation from the ECD to discuss it environmental issues. Environmental inators act as liaisons to the shops. Stand-ECD outside of the facility's reporting ure. The facilities have committed to ying with the ECD. Environmental practices corporated into local and agency-wide ss plans.

has a Storm Water Steering Committee that es the Storm Water Management Plan to ground and surface waters in accordance ur Statewide DEQ permit. MDOT also has an mental Committee committed to addressing ironmental concerns. This committee is sed of many subteams to address specific of the Department. This system gives yees a place to bring any issues involving mental topics.

e of recycling efforts of materials collected adway vs. landfill disposal.

mmon practices implemented.

Question Number 1	Question Number 23	Question Number 24	Question Number 25	Question Number 26	Question Number 27	Question Number 28	Question Number 29	
Name of your organization	To what extent has your facility implemented BMPs related to street sweeping waste storage and disposal?	To what extent has your facility implemented BMPs related to hazardous and non-hazardous material inventory control?	To what extent has your facility implemented BMPs related to environmental release response, containment, and clean up?	To what extent has your facility implemented BMPs related to pollution prevention (recycling, non-toxic materials, etc)?	To what extent does your facility implement BMPs related to stormwater management (e.g. infiltration systems such as infiltration basins and porous pavement; maintenance practices such as catch basin cleaning, street and parking lot cleaning)?	To what extent does your facility implement BMPs related to vegetation management (e.g. pesticide mixing, handling, storage, and/or disposal; weed control; brush/tree control; turf grass management)?	To what extent does your facility implement BMPs related to the reduction of air pollutants (e.g. capture of ozone depleting substances, purchase of efficient vehicles, control of paint spray booth emissions)?	Pleas not id you from BMPs relate Ma purch
New Hampshire DOT – Office of Stewardship and Compliance (NHDOT)	Only common practices implemented.	We minimize bulk purchasing to reduce the storage of hazardous materials.	Only common practices implemented.	In some instances, we purchase green products as substitutes for less environmentally friendly products. We recycle used oil.	We follow NPDES Phase II stormwater requirements, as applicable, particularly in MS4 areas.	Only common practices implemented.	We have state of the art paint spray control booths at our Mechanical Services facility where vehicles are painted.	We are Manage units. to conse mercury patrol sl
New York State DOT (NYSDOT)	Only common practices implemented.	 MAMIS provides some inventory capability 2. Agency is emphasizing inventory control and improvements will also benefit hazardous and non- hazardous material control in general 3. Agency's GreenLITES for Operations will credit facilities for innovative chemical inventory methods. 4. New York State Executive Order 4 mandates consideration of procuring least hazardous, least impacting products; Statewide specifications are in development. 	 Have a Memorandum of Understanding with the New York State Department of Environmental Conservation regarding spill response on the right of way: DEC has standby emergency contractors available for spill response 2. Have SPCC plans to help prevent and respond to spills. 	 The Environmental Handbook for Transportation Operations helps with pollution prevention. The GreenLITES initiative encourages innovative pollution prevention methods Other pollution prevention BMPs are addressed in prior questions. 	 The subresidency in Warwarsing (in our lower Hudson valley region) has a detention basin to capture run-off from pavement area, especially around the salt storage facility. The basin us constructed by in- house forces at the subresidency. The benefit of this practice on site is that it can be easily and frequently inspected and maintained. 2. Secondary containment systems are inspected for stormwater accumulations and stormwater is released if free from pollutants 3. Some locations use vegetation to reduce run-off 4. Regions partnering with others in watersheds to reduce pollutant badings of facility stormwater 5. GreenLITES for Operations initiative encourages the use of catch basin inserts and other measures to reduce and improve stormwater. 	1. Agency has an Integrated Vegetation Management Program which helps local vegetation managers compare risks and benefits of herbicides and other vegetation management techniques. 2. Regularly evaluate and field test alternatives to herbicides such as weed suppressive groundcovers, vegetation barriers, non-traditional herbicides based on ascorbic and acetic acids and new/innovative boom and over- the-rail mowers 3. Developing a purchasing specification to obtain pesticides in refillable/recyclable containers 4. Piloting a plan to use eBay to dispose of waste wood from hazardous tree operation 5. Mowing reduction program in place. Program includes general instruction to reduce, reductions to protect wildlife/ground nesting birds and reductions to allow revegetation of right of way where safety permits 6. Testing low and no mow grasses at several locations in the State 7. Partner with New York State Department of Environmental Conservation on CleanSweep program where farmers and the general public may bring unused/obsolete pesticides in for safe disposal.	 A significant percentage of the New York State DOT vehicle fleet is powered by compressed natural gas. 2. Agency starting to use biodiesel in some vehicles and developing plans to comply with a new state law to retrofit diesel equipment for cleaner air 3. Maintenance policy directs staff to minimize vehicle use, when safe and operationally possible on Air Quality Action Days 4. Mowing reduction program has an air quality and energy conservation benefit 5. Teleconferencing encouraged to reduce employee travel 6. Federally funded research is analyzing emissions and energy use of tractors and other vegetation management control equipment. 	1. New Mainter to enco sustaina operatic initiative steward could an as plant screen 1 manage building LEEDS organizi Environ address or deve Departr
North Dakota Department of Transportation (NDDOT)	Only common practices implemented.	Same as number 11.	Only common practices implemented.	Only common practices implemented.	NDDOT constructs earthen or concrete dikes around treated sand stockpiles and salt brine storage tanks. NDDOT constructs earthen dikes and fence around road oil tanks. They install fiber roles or leach blankets (PIGS) in areas of disturbed soil and around inlets where infiltration may take place.	NDDOT complies with the North Dakota Agriculture's requirements for certified chemical applicator.	NDDOT has purchased some hybrid vehicles.	No Resp

Question Number 30

ase describe any other BMPs that were identified in the previous questions that u believe other agencies would benefit n knowing about. For example, consider s developed to meet state requirements ted to LEED certification, Environmental lanagement System implementation, chasing policies, or other types of BMPs.

e developing and implementing Environmental gement Systems for all of our Operations We use fluorescent lamps in our buildings serve energy and eliminate disposal of ry. We are replacing refrigerators at our sheds with energy efficient models.

w York State DOT is implementing a enance and Operations GreenLITES program courage environmental stewardship and nable practices in agency maintenance and tions activities 2. Green and Blue Highway ive encourages and funds environmental rdship and sustainability activities along the ide. Some of the activities in this program arise from addressing facility concerns, such nting vegetation to minimize run-off and n the facility 3. Agency is developing energy gement and budgeting systems. Each new ng or rehabilitation project meets or exceeds 6 guidelines 4. Each regional maintenance pomental Coordinators who can help facilities ss immediate environmental needs at a facility velop systematic improvement plans 5. tment is developing new purchasing coding n that identifies recycled/green purchases.

sponse

Question Number 1	Question Number 23	Question Number 24	Question Number 25	Question Number 26	Question Number 27	Question Number 28	Question Number 29	
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Oregon DOT (ODOT)	The EMS has direction for all road waste including reuse of street sweeping and vactors. Haven't closed the loop on this as the DEQ is determining types of permit/reuse allowed.	Only common practices implemented	Secondary containment during bulk transfer is provided at appropriate yards, alarms are installed; tanks are inspected monthly	See other responses.	At this time, storm water is managed by sheet flow, routing through vegetation or ditches.	The EMS provides guidance and direction, however, staff that mix and handle pesticides are licensed to handle pesticides. Mix away from water courses; cover drains, etc. Pesticide storage is discussed in the EMS; secondary containment; venting/heating containers, keeping low inventory, etc. Each district has an integrated vegetation management plan that includes how/when/with what to manage all vegetation. The EMS discusses the requirements of managing waste pesticides, how to dispose: return containers to vendor, crush/dispose of empties; etc.	the EMS includes painting equipment and managing paint booths. ODOT uses alternate fuels at any location that is appropriate (availability). Lessons learned include cleaning filters, ensuring tanks cleaned before changing out to alternate fuels.	Luminar as are V changed
Tennessee Department of Transportation (TDOT)	Developed one comprehensive statewide profile for special wastes including sump cleanout and street sweeping wastes to allow for expeditious disposal within TN. Note that this type of waste is regulated as a "special waste" within the state. Through agreement with state regulators, this one statewide profile replaced the need for each county/municipality to generate an individual profile for the waste they generated. Resulting savings are estimated to be more than \$25,000/year.	a) Established approved product list for control of materials allowed for use in TDOT facilities thereby controlling wastes generated. b) Monthly waste accumulation area inventory forms are used to coordinates waste pickups on a statewide basis, eliminating pickups of only one or two containers and reduce total number of waste pick- ups runs throughout the state	a) Established procedure for notification and points of contact in the event of a release at TDOT facilities or in the event a release on TDOT right of way is discovered by TDOT employee. b) Specific responses developed for the five most common spills address approx. 80% of incidents. c) Established emergency response support for events requiring TDOT response though a third party subcontract. d) MOU with state regulator allows transport of incident-generated waste to a secure facility for characterization	a) Waste minimization through product substitution of less hazardous replacement chemicals (e.g., solvents, cleaners, etc) b) Aggregation of chemicals from CESOGs at District and Regional facilities to ensure consistent management across TDOT of all wastes. c) Implementation of recycling at District and Regional facilities to minimize waste generation. Materials include antifreeze, hydraulic fluid and parts washer solvents through in house recycling equipment often integral to the unit.	TDOT sponsored an investigation of commercially available stormwater treatment systems to determine which types of units would be most applicable to managing stormwater discharges from its facilities. Five different types of stormwater treatment systems were installed to treat stormwater outfall discharges at 10 facility locations to provide TDOT first hand information on the ease of installation, cost of installation, maintenance requirements, and effectiveness in preventing pollutant discharges from the facilities. In the past six years, several potential releases of petroleum products have been mitigated by the presence of these units.	a) Eliminated herbicide and pesticide mixing at facilities b) Facilities and contractors must only use herbicides from approved products list.	a) Eliminated sign screen-printing and vehicle painting at facilities b) Replaced oil-based paints with latex-based paints c) 85% of gasoline fueled vehicle fleet has been converted to flex-fuel vehicles d) One of four Regional facilities fuel supply has been converted to E85 fuel. Fuel supplies at the three other regions will follow	No resp
Texas DOT (TXDOT)	Material collected by sweepers is stockpiled at the maintenance facilities in a restricted area surrounded by berms and is analyzed by an environmental contractor prior to pick-up and disposal. Hazmat companies are contracted to haul the material to a hazardous waste landfill.	Records are kept on all hazardous materials at each of our facilities. These records are kept separate from non-hazardous materials because they are not to be destroyed.	TxDOT will handle small spills that occur on the roadway. Occasionally, berns are constructed to contain larger spills. Large spills that happen on the highway right-of-way are handled by Hazardous Waste Management Companies under contract.	Recycling containers are present at al facilities for dry and liquid materials.	Stormwater management practices are designed into each construction and maintenance project. Erosion and sediment control materials must come from TxDOT's Approved Products List for erosion and sediment control materials. TxDOT funds the TxDOT/TTI Hydraulics, Sedimentation and Erosion Control Laboratory that evaluates erosion control on a performance basis. TxDOT has completed building a facility to performance test sediment control suff sediment control socks. TxDOT is using porous pavement catch basins, vegetation basins, and filtration systems.	TxDOT conducts its own pesticide research program which evaluate pesticides for vegetation management on performance, worker safety, and environmental impact for three years before stocking the product. Herbicide truck operators must have a Texas Department of Agriculture license to apply pesticides. They must attend annual refresher training on pesticide recommendations, mixing, storage and disposal. Pest control (weeds, brush & trees) recommendations are in the Herbicide Operator's Manual.	A percentage of TxDOT's vehicle fleet is hybrid vehicles. Paint booths have filtering systems.	Most of hazardo are liste Counter environr mainten stateme manage
Utah Department of Transportation (UDOT)	Only common practices implemented.	Only common practices implemented	Only common practices implemented.	Only common practices implemented.	Only common practices implemented.	Only common practices implemented.	Only common practices implemented.	No Resp

Question Number 30

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ares are being changed out to LEED lighting VMS, ethylene glycol attenuators have been ed out foam/compressions.

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of the guidelines and policies for managing dous waste and pollutants at TxDOT facilities ted in the "Spill Prevention Control and ermeasures Plan." TxDOT has completed onmental assessments of most of the enance activities. An environmental impact nent has been completed on the vegetation gement program.

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Question Number 1	Question Number 23	Question Number 24	Question Number 25	Question Number 26	Question Number 27	Question Number 28	Question Number 29	
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Virginia DOT (VDOT)	Only common practices implemented.	Only common practices implemented.	Virginia DOT has BMPs for release response, containment and cleanup and provides training programs and performs periodic audits of compliance.	Only common practices implemented.	Only common practices implemented.	Virginia DOT has BMPs for management of the materials and provides training programs and performs periodic audits of compliance.	Only common practices implemented.	Only coi
Washington State Department of Transportation, HQ Maintenance and Operations (WSDOT)	Sweepings are delivered to management sites for screening and reuse. There are no savings.	Only common practices implemented.	Only common practices implemented.	Only common practices implemented.	Only common practices implemented.	Only common practices implemented.	Only common practices implemented.	No Resp
Wyoming DOT (WYDOT)	District 2: Street sweeping operations are scheduled as needed to reduce sediment build-up that could impact stormwater drains or watershed areas. WYDOT's goal is to eliminate all sediment from entering the storm sewer system or waters of the state. District 3: Only common practices implemented. District 5: Only common practices implemented.	District 2: WYDOT maintains the lowest possible level of hazardous material in inventory. WYDOT tries to use as many bio-degradable products as possible. District 3: Only common practices implemented. District 5: Inventory control for non- hazardous material would be all of the stockpile. ERP to track usage and annual stockpile measurements and audit to ensure quantities are correct. WYDOT doesn't have any stockpile of hazardous materials.	District 2: WYDOT has an SPCC Spill Prevention Control and Countermeasure Plan that is designed to aid our personnel in response and containment along with guidelines of who to contact when emergencies arise. District 3: Handled by Contractor. District 5: There is a basic policy to cover this. There is a local environmental contractor that is called if a site needs to be cleaned up.	District 2: WYDOT continues to use silt fence, erosion control logs of re- vegetation for pollution prevention measures. Recycled asphalt pavement is used on stockpile sites and shoulders to provide dust and vegetation control. Bio-degradable are used as well. District 3: Only common practices implemented. District 5: WYDOT recycles paper and petroleum products.	District 2: WYDOT currently has a schedule for cleaning catch basins, drop inlets, street drains and sweeping highways in urban areas. Multiple vac truck contracts are maintained throughout the district for cleaning these facilities. District 3: Only common practices implemented. District 5: WYDOT has stormwater control plans for all shops and pit sites. WYDOT uses wearing course in urban areas and higher volume areas. WYDOT sets aside money in the budget annually for stormwater repairs.	District 2: Noxious weed control is handled by the local County weed and pest in most areas. Growth regulation and broadleaf control is provided by area contractors for specified counties and road sections as stated in each contract. Chemicals are provided and stored by each Contractor. District 3: Handled by Contractor. District 5: WYDOT contracts with the local weed and pest to do spraying for weed control. WYDOT contracts with local Contractor such as Green Turf to fertilize and spray building sites. Pest control problems are also contracted.	District 2: WYDOT strives to use environmental friendly products. District 3: Only common practices implemented. District 5: Only common practices implemented.	No resp

Question Number 30
se describe any other BMPs that were entified in the previous questions that believe other agencies would benefit knowing about. For example, consider developed to meet state requirements ed to LEED certification, Environmental inagement System implementation, asing policies, or other types of BMPs.
mmon practices implemented.
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Appendix D: Participant Contact List

DOT Agency Contacts								
State	Agency	Contact Name	Contact Phone					
Delaware	Delaware Department of							
Delawale	Transportation (DelDOT)	Terry Martin, P.E.	302-222-5599					
Georgia	Georgia Department of							
Georgia	Transportation (GDOT)	Jimmy Stevens	770-484-3201					
Намай	Hawaii Department of							
nawali	Transportation (HIDOT)	Lance Zhai	808-587-2625					
Indiana	Indiana Department of							
IIIuiaiia	Transportation (INDOT)	Matthew Frazer	317-233-3981					
Maina	Maine Department of							
Walle	Transportation (MaineDOT)	Brian Burne	207-624-3571					
	Maryland State Highway							
Manuland	Administration (MDSHA)	Greg Keenan	410-771-4950					
iviar ylanu	Marylant Transportation							
	Authority (MdTA)	Paul Truntich	410-537-8373					
	Massachusetts Department of							
Massachusetts	Transportation, Highway							
	(MassHighway)	Steve Miller	617-973-8248					
	Michigan Department of							
Michigan	Transportation (MDOT)	Corey Rogers	517- 322-3320					
	Missouri Department of	Gayle Unruh	573-526-6676					
Missouri	Transportation (MODOT)	Kevin Widerman	573-526-4171					
	Montana Department of	Stan Sternberg	406-444-7647					
Montana	Transportation (MDT)	Tom Martin	406- 444-7245					
	New Hampshire Department of							
New Hampshire	Transportation (NHDOT)	Bill Hauser	603- 271-3734					
	New York Department of							
New York	Transportation (NYSDOT)	Elisabeth Kolb	518-457-2787					
	North Dakota Department of							
North Dakota	Transportatin (NDDOT)	Mike Kisse	701-328-4410					
	Oregon Department of							
Oregon	Transportation (ODOT)	Sue Chase	503-986-3008					
	Tennessee Department of							
Tennessee	Transportation (TDOT)	Barry C. Brown	615-741-4732					
	Texas Department of							
Texas	Transportation (TXDOT)	Dennis Markwardt	512-416-3093					
	Utah Department of	Ira Bickford (Vegetation						
Utah	Transportation (UDOT)	Management)	801- 580-6637					
	Virginia Department of							
Virginia	Transportation (VDOT)-							
	Environmental Division	Ed Wallingford	804-371-6824					
	Washington Department of		0010710021					
Washington	Transportation (WSDOT)	Doug Pierce	360-705-7812					
	Wyoming Department of		000,00,012					
Wyoming	Transportation (WYDOT)	Mark Anderson	307-777-4743					
			30, ,,, 4,43					

Appendix E: HDOT Field Manual















Clipticities Cl	and Fed-OSHA torm water if proper alls, paint and vamish uits, paint and vometer ormation on structure	operly carried out are sire that painting affolding to hang drop erspiray also helps. Remove excess fiquid	rop cloth to collect most M fan, it is considered a posignificant erosions. 6 effective. Drind paints, fer based paints, clean if in a containment area if they are to be kept for	nt Pradices for Storm ontrol Program 1992. a Sites in Honolulu*
STION AND PAINTING datisb backm water from datisb backm water from datisb backm water from pool to coverage of the general generalization and the generalization and the participation. Remove detricts in a timely fraction. det to the maximum extert with local air quality and OSHA with local air quality and OSHA endles generated from the activity and appropriate provides of all by the maximum extert and appropriate provides of the diposed of at historical by CLP and date proprietation and the diposed of at historical by CLP and the provides of provided of at historical provided of a trackity.	rowniance, suntatore, or entective in dio recyclish must be disposed the dior quality are consistent with Static dior quality are consistent with Static contaminants in the second second contaminants in the second best sont bearing. More specific ful best sont precific nil	celly painling procedures which if pr celly, These auguations may requere real to avoid drift. Use temporary ac cation equipment that minimizes or it, roods, etc., quickly dean up spills.	timg of the existing surfaces, use a d by. If the paint contains lead or thou or in flat unpaved area not subject (examp of a fail) will never the 9003 solution area by summa. If using were sconnected to the semilary server or orout. Properly store leftover paints over 4. Properly store leftover paints	teleted Industries: Best Manageme Valley Nonpoint Source Pollution C olulu BMP Manuel for Construction
STUTUTS: STRUCTURE SECRATION DESC	 sere animumer produces may prove our every care. Preservation and the relation of by a factors things to the relation of the preservation and painting activities the and air optability activities the proven care is not labora. The sources of these removers, finishing residues and data methods, setting residues and data construction practices is listed below. 	Painting State DOH pollution regulations may spe State DOH pollution regulations may spe operations by protect strumt cover control of the protect strumt cover of data or drapping to prevent indit. Apil Miten taing seataints on wood, pavement with absorbent mathink or rogs.	It painting mapiles scraping or sand blas (the chick). Dispose the residue proper trazendous seals. Mis paint indoors, in a containment are a Mis robit from sloped suffers and the and endo from sloped suffers and the mine the residur and real paint can be readily rem where the residur support.	REFERENCES Biteprofit for a Clean Bay-Construction-F Mater Pollution Prevention: Santa Clara Mater Pollution Prevention: Santa Clara Excerpts from "City & County of Hon















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Try: SPILL PREVENTION TOW TOW TOW TOW TOW TOW TOW TOW TOW TOW	DUE SADE LOUI DEM LICES OF STREETING IN BOILDER DE POROL	 record and used register of polititation to security water it off theses and aducting the chance for spills, stopping the source of spills. 	and cleaning up spills, properly disposing of spill materials.	A mitwokees.	cumagement practice covers only spul prevention and control. CA10 (Material Delivery and Storace) and CA11 (Material Use).	in useful information, particularly on spill prevention.	CH for stars will haln and on the efform water increases of leader and online	ers ersporter i respiradout une succi mater i rigeata un toara ana spres. Antificant Solit"	haterials pollute in different amounts. Make sure that each knows what a "agniticant spail" is for each material they use, and	e exprovaem response tor significant and insignificant spils. Receives	s maleries and wastes should be stored in covered containers	control warvansii. octopie of spill clearup materials where it will be readily accessible.	royees in spill prevention and cleanup. responsible individuals.	na maman a spuresponse plan al me project sile.	eaks and spills immediately. surfaces, clean up spills with as little water as possible. Use a rag	pais, a damp mop for general cleanup, and absorbent material for s. If the spilled material is hazardous, then the used cleanup	18 also hazardous and must be sent to either a certified laundry terrocart of as hazardous weeks	e down or bury dry meleral spalls, clean up as much of the	s boossis and advag of biological.	milicant spills to the U.S. Coast Guard, State HEER Office, and sits, such as the Fire Department; they can assist in cleanue.	gutations require that any significant oil spill into a water body adoining scinnelina be reported to the National Response Center	00-424-0002 (24 nour). Dowing measures related to specific activities:	d Equipment Maintenance	ance must bocur on-site, use a designated and/or a secondary nit, bocked away from drainage courses, to prevent the runon of storm wa	repect on-site vehicles and equipment for leafs, and repet immediately. whing vehicles and equipment (including delivery trucks, and	ind subcontractor vehicles) for feaking oil and fixids. Do not allow leaking w a secondary contrainment, such as a drain pan or drop cloth, to calch	ir changing thucs. Parts of elsectrent meterials under paving equipment when not in us board models on the radio states that is not a state of the states of	e absorbent materials promptly and dispose of property.	ansfer used fluids to the proper waste or recycling drums. A full drip pans or other open containers lying eround.	esposed of in trash cans or dumpsters can leak oil and pollute storm. It fitter in a fumet over a waste oil recycling drum to drain excess oil	un also de techoso. Has your ori suppleir or recycler acour recycling ted balteries in a roon-beaking secondary container. Do this with all o all the acid has drained out. If you drop a baltery, treat it as if it is crar	ai arcei unai you are sure il is not leaking. I Equilament Fuelina	ust boour on-sile, use designated areas, located away from drainage orm water and the runoff of spills.	 "topping off" of fuel tanks. secondary containment, such as a drain pan, when fueling to catch 	MENTS Mail OBM)	n of leads and spils is interpensive. Treatment and/or disposal of conta spensive. 28	e supplies of spill control and descrup meterials on-site , near storago, unicediny I spill prevention and control pian and stock obsarup meterials as changes coorri	NS y, use a private spill cleanup company.	CES of Diame Bray Provincedion Building Industrian Provi Hamman C	Tervention of the control memory involution on the programmer of the control Programmer of the Cara Valley Nonpoint Source Pollution Control Program, 1992.	Frienderment for Construction Activities. Developing Pollution Prev perient Practices, EPA 832-R-92005, USEPA, April 1992.	ity & County of Honolulu BMP Manual for Construction	

Appendix F: MDSHA Flip Cards

Pocket Reference for

Roadside Waste

Take Precautions to Protect Your Health and Safety and the Health and Safety of Motorists

- 1. Determine if the Roadside Waste is hazardous. (what to look for is listed on other side)
 - A. If you can't tell consider it hazardous.
 - i. Move yourself and your vehicle to a safe distance.
 - ii. Immediately call your RME.
 - B. If item is in the roadway, place cones or signs to alert motorists.
- 2. If the waste is not hazardous, place waste in your vehicle and bring back to the shop for proper disposal.

A. If not sure how to dispose of the material, ask your RME.

GU

Before Fueling

Vehicle Fueling

Pocket Reference for

- Extinguish flames and other ignition sources (cigarettes etc.)
- Turn off vehicle
- Look for damage or leaks on nozzle, hose, or pump
- Report issues to RME, ARME or Shop Supervisor
- Obey SHA Ozone Action Day

- Carefully remove nozzle to prevent dripping
- Replace nozzle and hose on dispenser
- Place absorbent material on any drips or spills and allow it to soak up before disposing
- Report spill to RME/ ARME/Shop Supervisor

Pocket Reference for

Hazardous Waste

Satellite Accumulation Area (SAA)

- All containers in the SAA must be labeled 'Hazardous Waste' and with their contents (ex. Waste Paint).
- Each waste must have its own container. DO NOT MIX!
- Keep containers tightly closed, except when adding HW.
- No more than 26 gallons of hazardous waste may be stored in a SAA (regardless of the # of containers). Move HW to Designated Accumulation Area.

Designated Accumulation Area (90-day Area)

- Container label must ALSO include the accumulation start date (date moved to 90-Day Area).
- All containers must be stored with secondary containment, in a locked and labeled area, with appropriate response equipment and emergency contact information posted.
- Inform RME of all HW placed in Designated Accumulation Area. RME will arrange for disposal within 90 days.

ALL DISPOSAL WILL BE HANDLED THROUGH A CONTRACTOR. DO NOT DISPOSE OF HAZARDOUS WASTE YOURSELF!

Pocket Reference for

Spill Notification

Record the Following on the Spill Response Form:

- Date & time of discharge
- Location of discharge
- Source of discharge (tank, truck, etc.)
- Cause of discharge
- Type of materialQuantity of material

CALL ONE OF THE FOLLOWING IN THIS ORDER:

ECD 410-582-5541

reporting

If assistance was required

and types of injuries

Any threats or dangers

Contact info of person

Weather conditions

Pocket Reference for Hazardous Material

Examples Of Hazardous Materials Found At SHA Shops Gasoline • Diesel • Motor Oil • Antifreeze • Transmission & Brake Fluids Paint and Thinners • Aerosol Cans • Brake Cleaner • Cleaning Solvents

Heating Oil • Pesticides

Store Hazardous Materials

- Indoors or under cover
- Away from floor and storm drains
- On an impervious surface (i.e. concrete) free of cracks
- In a secured and lockable area (i.e. flammables locker)
- With adequate aisle space between rows of containers (≥ 2 feet)
- On a spill containment pallet or other means of secondary containment
- With all appropriate labels (NFPA, hazardous material, common name)
- With a fire extinguisher and spill response kit nearby
- In tightly closed compatible containers (when not being used)
 With compatible materials never store incompatible materials together

Pocket Reference for

Roadside Waste

Ways to Identify a Roadside Waste

- Can you clearly identify the material (i.e. litter/trash/debris, animal carcass)?
- Does the container have a label? Look for the word 'hazardous' or other markings that would indicate the contents are dangerous.
- Can you determine where the material came from (business name or ID number)?
- Is the container open, damaged or leaking? Can you see the contents?
- Is there an odor coming from the roadside waste? Can you identify it?

Examples of hazardous materials/hazardous wastes:

- Petroleum products
- Batteries
- Medical wastes; human waste
- Corrosive, Flammable, Ignitable, or Reactive chemicals

IF YOU CANNOT TELL—ASSUME THE MATERIAL IS HAZARDOUS!

Pocket Reference for

Vehicle Fueling

During Fueling

Diesel / Unleaded

- Only fuel authorized vehicles and containers
- Containers shall be placed on the ground prior to filling
- · Remain outside vehicle
- Keep contact between nozzle and container/vehicle
- Do not top off!

- CNG Only fuel-authorized vehicles
- Secure CNG nozzle to fuel port
- Turn dispenser valve to 'on'
- Do not top off!
- Turn valve to 'off'
- Report discharges to RME/ARME/Shop Supervisor

Pocket Reference for

Hazardous Waste

Generating Hazardous Waste (HW)

- Do not mix different types of hazardous waste. Each waste MUST have its own container.
- When performing an operation that creates hazardous waste, the waste shall be taken to the Satellite Accumulation Area (see other side) as soon as the operation is done. DO NOT LET IT SIT!
- Wear the appropriate PPE when handling hazardous waste. Consult MSDS.

Pocket Reference for Spill Response

1. CONTAIN

3.CLEAN

2. CALL Spill response shall be performed only if it is safe to do so SHA Policy: Spills of unknown materials are treated as hazardous spills

- Assist any injured persons (if you can do so safely)
- If there are serious injuries or fire, call 911 immediately
- Stop the spill (i.e. close container, turn off fuel pump, etc.)
- Contain the spill to prevent it from spreading using absorbent material (Speedi-Dri) or items from the spill kits (i.e. absorbent pads or booms)
- Obtain info about the spill and report to supervisors immediately (see other side)
- Allow absorbent materials to soak up spilled materials (let them sit for a little while / add absorbent as necessary)
- Clean-up and collect used absorbent material and dispose of properly (containerize for removal by Hazardous Waste Contractor)
- Follow any additional instructions given by ECD

Pocket Reference for Hazardous Material

Handling Hazardous Materials

- Read the MSDS before handling any hazardous material.
- Wear Personal Protective Equipment, as specified in MSDS (section 8)
- Use designated equipment appropriate for handling the type of

Transporting Hazardous Materials

- Use a hand truck or forklift to move 55-gallon or larger containers.
- Secure hazmat containers to any vehicle before moving.
- Ensure spill kit and fire extinguishers are aboard all transportation
- vehicles. Ensure that each container has appropriate label and each vehicle has proper placards when transporting.

Finished? Dispose of Hazardous Materials as Hazardous Waste.

Questions??? Ask Your RME!!!

- - hazardous material. Know where the closest spill response kit is located.
 - Use common sense, work carefully!

Appendix G: Maine DOT "Greenbook" Example

OIL AND EQUIPMENT MAINTENANCE WASTE

APPLICABLE WASTES	This chapter applies to managemen commonly generated by MaineDOT	t of oily wastes and related waste materials maintenance crews.
USED OIL	> These wastes are toxic to huma	ins and the environment.
	 Never dispose of oil or other wastes on facility grounds I Collect used oil in designated drums or tanks labeled: USED OIL. Materials that can be put in used oil tanks include: motor oil hydraulic oil brake fluid transmission fluid diesel fuel kerosene 	Oil and equipment maintenance waste Oily Absorbents Oily or Greasy Rags Used Antifreeze Used Brake Fluid Used Motor/Lubricating Oil Used Hydraulic Oil Used Transmission Fluid Batteries (not cracked or leaking)* Tires Metal Scrap * Waste gasoline and cracked or leaking batteries are managed as <u>hazardous</u> waste
<i>MaineDOT Recycles Its Used Oil</i>	MaineDOT burns used oil in speciall maintenance facilities.	y designed furnaces located at some of its
	Fleet routinely picks up use	d oil.
	Do not mix waste oil with gas thinners, solvents or any other	coline, parts cleaners, paint, paint contaminant I
Protect Used Oil Containers	Protect used oil tanks and drums fro	om damage by vehicles or equipment.
	Keep containers closed unless waste tank or drum openings when not in	e is being added. Funnels shall not be kept in use
	To prevent corrosion, used oil conta	iners should not be in contact with the ground.
	Always lock any used oil tank that of	can be accessed by the public.
	I Notify your supervisor if you contaminated by gasoline or	u suspect used oil has been other contaminants I

OIL FILTERS

Drain used oil filters for 24 hours then crush.

Place crushed filters in designated containers for recycling or disposal.

OIL& GREASE RAGS & ABSORBENTS

Place used oily rags, absorbent pads and other absorbents in a covered, leak proof, waste container.

USED OIL TANKS MUST BE LABELED AND PROTECTED FROM DAMAGE

- > Label the container "Used Absorbents" or "Oily Waste."
- > Do not put spent absorbents in regular trash cans or dumpsters.

Collect used antifreeze in drums labeled "USED ANTIFREEZE."

- > Keep drums tightly closed when material is not being added to the drum.
- > Funnels shall not be kept in tank or drum openings when not in use.
- When used antifreeze drum becomes full, call the Hazardous Waste and Groundwater Unit for pickup (624-3103).

USED AEROSOL Empty aerosol cans may be thrown in the regular trash or the metal recycle bin.

CANS

USED

ANTIFREEZE

Aerosol cans that are broken, clogged or otherwise unusable must be brought to the nearest Fleet Services facility for repair or reuse. Aerosol cans that cannot be repaired or reused and contain product must be disposed of as hazardous waste. They must be stored in a small container with a tight fitting lid and a hazardous waste label that includes a start date and identification of the waste as aerosol cans. The container should be stored in the same area as other hazardous wastes.

OIL AND EQUIPMENT MAINTENANCE WASTE

OTHER WASTES Spent batteries and tires are picked up by Fleet and recycled, exchanged, or properly disposed of.

Store these materials on pallets and under cover.

I Contact Fleet for pick up of spent batteries and tires at least every month I

Spent parts cleaner and parts cleaner filters are disposed of as **hazardous waste** (flammable liquids).

Cracked Batteries Cracked or leaking batteries must be handled as **hazardous waste**.

- > Leaking acid and lead are toxic to humans and the environment.
- Store cracked or leaking batteries in a covered, acid-resistant, leak-proof container (such as heavy-duty plastic).

I Contact the Hazardous Waste and Groundwater Unit for the disposal of cracked/leaking batteries I

Place metal scrap in designated dumpsters, roll-offs or other location for recycling.

> Fleet has arranged for routine pick-up and recycling of scrap metal.

MANY MaineDOT FACILITIES ARE EQUIPPED WITH DUMPSTERS FOR COLLECTION OF RECYCLABLE SCRAP METAL

FOR MORE

Metal Scrap

Refer to Maintenance and Operations' Environmental Policies and Procedures Manual under: "**Oil and Equipment Maintenance Waste Procedure.**"

Fleet's Transportation Maintenance Manager can also help answer any questions you may have (287-3302).

Appendix H: MDSHA "SHARCS" Screen Shots

Multi-Media Regulatory Requirements

- Access to Environmental Regulations
 - Detailed information on Federal and State Environmental Regulations
 - Includes Agency's Program or Procedure for complying with each regulation

Multi-Media Regulatory Requirements

- Access to Environmental Regulations
 - Linked to the environmental inventory for the media area

Environmental Inventories

 Environmental inventories for elements such as tanks, wells, boilers and permits

Anyland State Highway Administration	n Regulatory Complianc	e System (SHARCS) -	Microsoft Internet E	xplorer provided by E	A Engine		_8×
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All Guardy Inventory Asbestos Inventory	2	Keyser's Ridge	Underground	Active	Fueling	Gasobol (F10)	
🗉 🎆 Lead Based Paint Inventory	-	negser s nuge	Storage Tank	Active	Tucing	Gusonor (E10)	
🗄 🎆 Permit Inventory	1	Keyser's Ridge	Storage Tank	Active	Fueling	Biodiesel	
Secticide Inventory Section Inventory Section Inventory	3	Keyser's Ridge	Underground Storage Tank	Active	Fueling	Biodiesel	
🗉 🎆 Waste Inventory	4	Kowsor's Pidgo	Underground	Activo	Heating	Heating Oil #2	
Waste Water Inventory	4	Neyser's Nuge	Storage Tank	Active	neating	neating on #2	
Water Supply Inventory Well Inventory	5	Keyser's Ridge	Storage Tank	Active	Heating	Heating Oil #2	
	6	Keyser's Ridge	Underground Storage Tank	Active	Generator	Diesel - Low Sulfur	
SHA Facilities	1	Frostburg	Underground Storage Tank	Active	Fueling	Gasoline	
Documents 😵	2	Frostburg	Underground Storage Tank	Active	Fueling	Diesel	
Task Tracking	3	Frostburg	Underground Storage Tank	Active	Heating	Heating Oil #2	
User Profile	3	Golden Ring	Underground Storage Tank	Active	Fueling	Gasohol (E10)	
	-	C 11 P	Underground	A		Dr. P. J.	T

Environmental Inventories

- Every inventory contains detailed information for each individual element
- Example Tank Inventory
 - Registration number, Agency Identification Number
 - Contents, Size & Primary use
 - System components and their test/inspection records & history

Environmental Inventories

Each inventory linked to Document Repository

Organization and Operations

- Track organization specific information
- Track Agency's organizational structure
 - Departments
 - Department Managers
 - Key Department Staff
 - Organization Reporting Lines

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	rer nopectoris inte	Edit Facil	ity Details
SHA Facilities	Facility Details		
🗉 🎆 Facilities	Facility Name	Cambridge	
🗉 📑 Facility Issues	District	District 1	
🗷 📑 Compliance Inspection	County	Dorchester County	
	Facility Type	Primary	
Documents	Address 1	2954 Old Route 50	
	Address 2		
	Address 3		
	City	Cambridge	
User Profile	State	Maryland	
	Zip Code	21613	
System Administration	Phone Number	410-228-4977	
	Fax Number Drinking Water Well Informatic	n	
	Are there immediate neigbors on	well water?:	Yes
	Are there drinking water wells wit	thin half mile of the facility?:	Yes
	Drinking Water Comments	·	
	The area surrounding this facility is co adjacent to the SHA property. The pro personnel.	mprised of residential and commercial properties. At least one propery is in perties surrounding this facility use well water for their domestic needs per	mediately SHA
	Warth Information		

Centralized Document Repository

- Functions as centralized source for all compliance documentation
 - Improves user's ability to access environmental reports and documents (as opposed to retaining voluminous hard copies)





Integrated Inspection Applications

Encili

- Facility Compliance Inspection Tool
 - Converted existing paper questionnaire to handheld application
 - Runs on ruggedized tablet PC which
 - Web service provides connectivity to central SHARCS database from remote locations

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Planned Future Modules

Compliance Task Tracking

- Lists all upcoming and outstanding compliance tasks
- Contains details for each task including location, description, required completion date and agency personnel responsible for completing the task.
- Tracks affirmation of task completion including required documentation during closeout

GIS Mapping

 Users will be able to navigate through the GIS, perform a number of mapping and querying functions, and print custom maps displaying desired information



Appendix I: HDOT EMS Manual

ENVIRONMENTAL MANAGEMENT SYSTEM MANUAL STATE OF HAWAII DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION

Prepared by: STATE OF HAWAII DEPARTMENT OF TRANSPORTATION Highways Division 869 Punchbowl Street Honolulu, HI 96813-5907

> August 2008 Version 2.0

CONTROLLED DOCUMENT

RECORD OF REVISION

Revision Date	Description	Sections Affected
April 4, 2008	Version 1.0 – Initial Release	All
August 1, 2008	Version 2.0	All

Chris Takeno, EMS Project Manager State of Hawaii Department of Transportation

Lance Zhai, Division EMS Coordinator State of Hawaii Department of Transportation Highways Division

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ACRONYMS & ABBREVIATIONS

BMP	Best Management Practices
CFEMS	Compliance-Focused Environmental Management System
DAGS	Department of Accounting and General Services
EF EMS EP EPA EWP	Environmental Form Environmental Management System Environmental Procedure United States Environmental Protection Agency Environmental Work Practice
HDOH HDOT	State of Hawaii Department of Health State of Hawaii Department of Transportation
ISO	International Standards Organization
MS4	Municipal Separate Storm Sewer System
NEIC	National Enforcement Investigation Center
P2	Pollution Prevention
SPCC SWMP SWPCP	Spill Prevention Control and Countermeasure Storm Water Management Program Storm Water Pollution Control Plan

1.0 INTRODUCTION

1.1 Purpose

The State of Hawaii Department of Transportation – Highways Division's environmental program seeks to promote pollution prevention, maintain compliance with environmental laws and regulations, and continually improve its policy and procedures to support environmentally sound practices. A January 30, 2006 Consent Decree between the United States Environmental Protection Agency (EPA), State of Hawaii Department of Health (HDOH), and the State of Hawaii Department of Transportation (HDOT) ("Consent Decree") requires HDOT to develop and implement a Environmental Management System (EMS). The HDOT views the EMS as an opportunity to formalize and expand its environmental program.

HDOT developed this EMS Manual (Manual) to communicate HDOT's commitment to develop, implement, maintain, and improve its EMS. This Manual defines the scope of HDOT's EMS and describes how HDOT addresses the twelve elements central to the EMS; these twelve elements are based on the EPA's National Environmental Investigative Center (NEIC) EMS model, which incorporates the globally-recognized EMS specifications of International Standards Organization (ISO) 14001. The twelve EMS Elements are:

- 1. Environmental Policy
- 2. Organization, Personnel, and Oversight of EMS
- 3. Accountability and Responsibility
- 4. Environmental Requirements
- 5. Assessment, Prevention, and Control
- 6. Environmental Incident and Noncompliance Investigations
- 7. Environmental Training, Awareness, and Competence
- 8. Environmental Planning and Organizational Decision-Making
- 9. Maintenance of Records and Documentation
- 10. Pollution Prevention / Best Management Practices Program
- 11. Continuing Program Evaluation and Improvement
- 12. Public Involvement / Community Outreach

Based on the "Plan-Do-Check-Act" process (Figure 1), this EMS Manual emphasizes the importance of establishing critical components of policy, organization, oversight, and responsibilities to support implementation of processes and procedures outlined in this manual. This Manual provides a roadmap of how HDOT will specifically address the twelve EMS elements. Once EMS processes and procedures are implemented, the use of self-auditing activities and checklists will be used to monitor progress and performance, and will help to ensure compliance with regulatory requirements and Best Management Practices. Periodic reviews of the EMS shall be conducted to establish new goals and priorities.

Figure 1: <u>Plan-Do-Check-Act Model</u>



The long-term success of the EMS will depend heavily on HDOT's ability to dedicate adequate resources to accomplish the goals and objectives of the EMS within the Department, Division, and at every maintenance baseyard facility throughout the State. This size, scale, and geography require senior administration commitment from HDOT at multiple levels. Each of the organizations involved in EMS implementation must be kept informed of the progress of the EMS, as well as the expected benefits to be gained. An effective communications strategy to disseminate information concerning the EMS is vital to facilitating the understanding and importance of the EMS. The HDOT Highways Division's EMS provides a mechanism for environmental management throughout its Maintenance Baseyard facilities.

This Manual is also a point of reference, tying together HDOT's EMS-related documents. Major documents referenced in this Manual include the Environmental Compliance Guide; Standard Operating Procedures; Work Instructions; and media-specific planning documents (hazardous waste, storm water management, asbestos, etc.). Figure 2 graphically depicts a hierarchy of the categories of documents and records HDOT uses to ensure a proper-functioning EMS.

Figure 2: EMS Document and Record Hierarchy Pyramid



As shown in Figure 2, HDOT's Environmental Policy sits atop the hierarchy pyramid as a Level 1 document. The policy sets the tone and general direction for HDOT's environmental activities and is included in Appendix A. The EMS Manual is a Level 2 document. Level 3 documents provide more detail about environmental program functions and include EMS procedures and management plans, such as Storm Water Pollution Prevention Plans, Spill Prevention Control and Countermeasure Plans, Hazardous Waste Management Program, Solid Waste Management Program, and a POL program which provide direction to meet media-specific regulatory requirements. Level 4 documents include records and other documents not listed in Levels 1 through 3. These records and documents are specific to a particular activity or condition and include items like work instructions, inspection checklists, and audit reports.

1.2 Applicability

The scope of this EMS includes all planning, operations, and maintenance activities conducted at the Highways Baseyards that have the potential to impact the environment. The Highways Baseyard facilities include:

- 1. Hawaii District, Hilo Baseyard
- 2. Hawaii District, Honokaa Baseyard
- 3. Hawaii District Waimea Baseyard
- 4. Hawaii District, North Kona Baseyard
- 5. Hawaii District, South Kona Baseyard
- 6. Hawaii District, Kau Baseyard
- 7. Kauai District, Lihue Baseyard
- 8. Kauai District, Waimea Baseyard
- 9. Oahu District, Kakoi Street Baseyard
- 10. Oahu District, Keehi Baseyard
- 11. Oahu District, Kaneohe Baseyard
- 12. Oahu District, Hauula Baseyard
- 13. Oahu District, Wahiawa Baseyard

Environmental Management System Manual State of Hawaii Department of Transportation Highways Division

- 14. Oahu District, Waianae Baseyard
- 15. Oahu District, Pearl City Baseyard
- 16. Oahu District, H-3 Tunnel Maintenance Shop
- 17. Maui District, Kahului Baseyard
- 18. Maui District, Keanae Baseyard
- 19. Maui District, Lanai Baseyard
- 20. Maui District, Molokai Baseyard

1.3 Issue and Update

The control of this Manual is in accordance with HDOT's Document Control Procedure (EP-003). A record of revision may be found on page ii. All copies of this Manual not marked "CONTROLLED DOCUMENT" are uncontrolled and should be used for reference purposes only.

Amendments to this manual will be issued by the Division EMS Coordinator or designee.

1.4 Manual Organization

This Manual is divided into three sections. Section 1.0 Introduction, provides the purpose and scope of HDOT's EMS. Section 2.0, HDOT EMS Roadmap, references a roadmap depicting the relationship between HDOT's twelve EMS Elements and HDOT's associated programs/procedures. Section 3.0, Requirements, is subdivided into twelve subsections, each representing (in order) one of the twelve EMS Elements. In these twelve subsections, HDOT describes how it satisfies the associated elements' requirements. In most cases these descriptions include a reference to one or more EMS procedures. This Manual also includes Appendices of tools that have been developed as part of HDOT's EMS.

In addition, there are twenty attachments to this Manual. Each attachment contains information specific to a particular Highways Baseyard. The attachments are as follows:

Attachment I:	Hilo Baseyard
Attachment II:	Honokaa Baseyard
Attachment III:	Waimea Baseyard
Attachment IV:	North Kona Baseyard
Attachment V:	South Kona Baseyard
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2.0 HDOT EMS ROADMAP

Appendix B provides HDOT's EMS Roadmap. This Roadmap depicts the relationship between the twelve EMS Elements and HDOT's procedures and supporting documentation that have been developed to meet the requirements of the twelve EMS Elements.

Copies of HDOT's Environmental Procedures are also included in Appendix B.

3.0 REQUIREMENTS

The HDOT has developed a EMS that conforms to the specifications and requirements of the HDOT Environmental Policy and the EPA's NEIC EMS model.

3.1 Environmental Policy

A formal policy is proof of the HDOT's commitment, reflects the commitment of top administration, will be periodically reviewed and revised, and will be consistent with the organizational goals and mission.

On May 5, 2008 HDOT Director of Transportation, Brennon Morioka, signed HDOT's Environmental Policy (Appendix A). This Policy serves as the overarching organizational statement of HDOT's commitment to the EMS and continual improvement. The Policy was issued to all HDOT employees on May 2, 2008 by Memorandum.

The Policy will be periodically reviewed by HDOT's senior administration through the Management Review procedure (EP-008) and revised as necessary to ensure that it remains appropriate to the nature and scope of HDOT's EMS. Methods used to disseminate the Policy to employees and others include:

- Posting in select locations throughout HDOT facilities
- Email/handout to employees and tenants
- Posting on the internet and intranet
- Distributing policy written on a wallet-sized, laminated card
- EMS training

These and similar communication methods will also be employed in the future as the policy is revised.

Applicable or Related Procedures & Forms

EP-007:	Communication
EP-008:	Management Review

3.2 Organization, Personnel, and Oversight of EMS

HDOT and the Highways Division have an established EMS organizational hierarchy which is presented in Figure 3.





Each unit is briefly described below:

Director of Transportation - The Director of Transportation is the Senior Administration representative responsible for EMS management performance across HDOT. The Director of Transportation also chairs the EMS Executive Committee.

EMS Executive Committee - The EMS Executive Committee is established and appointed by the Director. The committee meets periodically to review and manage overall EMS implementation and sustainment. The EMS Executive Committee is principally responsible for guiding the development of HDOT's EMS and preparing HDOT's Manual and EMS implementation guidance.

EMS Project Manager - Management of the EMS starts with the EMS Project Manager. The EMS Project Manager is the key individual overseeing the development, implementation and administration of the EMS for the entire HDOT. The EMS Project Manager will provide status reports to the Director, develop and maintain the EMS with the EMS Working Group, and be the liaison between the EMS Executive Committee and the EMS Working Group.

EMS Working Group - A standalone EMS Working Group(s) is appointed by the Executive Committee and endorsed by the Director as required, to address specific issues such as developing document templates and SOPs, conducting internal assessments, and reviewing key processes with environmental aspects associated with HDOT's activities and operations. The EMS Working Group is composed of the Division EMS Coordinators and the EMS Project Manager.

EMS Training Group - An EMS Training Group will be appointed by the Executive Committee and endorsed by the Director as required, to broadly categorize and define training requirements for HDOT staff. Specific responsibilities include categorizing and defining training requirements for all levels of HDOT staff, creating a Training Plan for HDOT staff, periodically reviewing training requirements, and updating the Training Plan as appropriate.

Division EMS Coordinator – The Division EMS Coordinator carries out the functions associated with EMS management for the Highways Division. The Division EMS Coordinator is also a member of the EMS Working Group

Section/Unit Supervisors – Section/Unit Supervisors manage the daily operations of the Highways Baseyards and oversee a number of programs, activities, and processes such as waste handling, fuel management, facility maintenance, etc. As such, the Supervisors play an integral role in effective maintenance and sustainability of the EMS.

Highways Employees - All Highways employees will be responsible for:

- Understanding the Environmental Policy;
- Assisting in the identification of aspects and impacts of activities and operations;

- Participating in EMS process evaluation and improvement efforts at the Highways Division;
- Understanding their role in the EMS;
- Receiving appropriate training;
- Reporting nonconformances or problems to supervisors.

The organizational structure within HDOT and the Highways Division allows information to flow up from Districts and the Division EMS Coordinator, through the EMS Project Manager, and to the Director of Transportation, as necessary. Information can include recommendations for improvement to the EMS and periodic reports on environmental performance. These and other roles, responsibilities, and authorities afforded these key positions and groups are identified in HDOT's Management Structure Procedure (EP-002).

Applicable or Related Procedures & Forms

EP-002: Management Structure

EP-007: Communication

3.3 Accountability and Responsibility

Each HDOT employee will be accountable for their respective environmental responsibilities. Currently, the Highways Division relies on several means of keeping employees accountable. The Highways Division has assigned, through formal or informal means. The employees' successes at meeting these responsibilities will be evaluated during the annual EMS audit as a means of maintaining accountability. One formal method HDOT is developing in order to ensure EMS accountability is the assignment of tasks identified through Environmental Work Practices (EWPs) to manage significant aspects. The Identification of Aspects and Impacts procedure (EP-005) and the Development of Objectives and Targets procedure (EP-006) describes this method.

HDOT is in the process of reviewing this and other formal means to ensure accountability related to environmental management and compliance by delineating specific roles and responsibilities for HDOT employees. These roles and responsibilities will be documented in HDOT's Management Structure procedure (EP-002). Annually, employees' ability to meet these responsibilities will be assessed during an annual audit, which is defined in the EMS Audit procedure (EP-010). This audit will be used to identify deficiencies. Where deficiencies are identified, the Highways Division will employ a Corrective and Preventative Action procedure (EP-011) which provides a mechanism for corrective action. Through this process, the Highways Division will be able to hold employees accountable to responsibilities.

Accountability extends to HDOT's tenants and contractors since these groups have the potential to impact the environment. As such, HDOT has established lease agreements that hold tenants accountable for adhering to environmental regulations. In addition, HDOT uses contractual language that requires contractors to comply with environmental regulations.

Future EMS training of HDOT employees will describe the consequences of nonconformance to HDOT's environmental procedures and non-compliance with environmental regulations. The purpose of this is to ensure that those trained are fully aware of their potential impact to the environment and associated legal liabilities. HDOT's training procedure is described in EP-009, Training, Awareness, and Competence.

Applicable or Related Procedures & Forms

EP-002:	Management Structure
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- EP-005: Identification of Aspects and Impacts
- EP-006: Objectives and Targets
- EP-009: Training, Awareness and Competence
- EP-010: EMS Audit
- EP-011: Corrective and Preventive Action
- EF-001: Aspects and Impacts Form
- EF-002: Objectives and Targets Summary
- EF-003: EMS Audit Checklist
- EF-004: Nonconformance Documentation Form
- EF-005: Nonconformance Summary Form

3.4 Environmental Requirements

Regulatory requirements include environmental regulations administered by the EPA, HDOH, and/or county agencies.

The Division EMS Coordinator is responsible for identifying regulatory requirements applicable to the Highways Baseyard facilities, and for ensuring that pending regulatory requirements including federal, state, and local requirements are identified in a timely manner. This responsibility includes the interpretation of regulatory requirements affecting facility operations and the effective communication of those requirements to facility personnel.

Procedures for ensuring current information with respect to environmental requirements are established in HDOT's Environmental Requirements procedure (EP-004).

HDOT also uses a number of specialty vendors and consultants to address environmental issues such as waste handling and disposal, training, and related services.

Element 4, Environmental Requirements, of the EMS requires HDOT to utilize a compliance checklist to conduct routine compliance audits. The requirements addressed by HDOT's Compliance Checklist are based on the Clean Water Act (including compliance with Storm Water and Spill Prevention, Control, and Countermeasure [SPCC] requirements), the Resource Conservation and Recovery Act, and the Emergency Planning and Community Right-to-Know Act. The Compliance Checklists (Appendix C) will be completed on a quarterly basis, by the Maintenance Baseyard Supervisor or appointed alternate.

HDOT communicates with regulatory agencies on an as-needed basis. Communication is usually performed by the EMS Project Manager or Division EMS Coordinator. However other HDOT employees have the authority to communicate with these agencies as well. HDOT will formalize the communication procedure in a Communication procedure (EP-007).

Applicable or Related Procedures & Forms

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- EP-007: Communication
- EP-012: Internal Compliance Auditing
- EF-006: Compliance Checklist
- EF-007: Noncompliance Documentation Form

3.5 Assessment, Prevention, and Control

Continual environmental improvement is achieved by implementing specific procedures to prevent and control releases, ensure environmental protection, and maintain compliance with statutory and regulatory requirements. Specifically, HDOT will monitor and measure for sustained compliance, identify operations and waste streams where equipment malfunctions and deterioration, operator error, and discharge or emissions may lead to: a) releases of hazardous waste or other pollutants to the environment, b) a threat to human health or the environment, or c) violations of environmental regulations.

Additionally, HDOT uses several methods to assess its operations on an on-going basis for the purpose of preventing, controlling, or minimizing environmental releases and maintaining compliance. For example, the Highways Division identifies and ranks environmental aspects and impacts associated with Highways Baseyard operations. Those aspects deemed to have, or to potentially have, significant environmental impacts will be selected for management through the EMS process. This procedure is documented in the Identification of Aspects and Impacts procedure (EP-005) and Objectives and Targets, procedure (EP-006). Also, through the process of identifying environmental aspects and impacts, the Highways Division will develop Environmental Work Practices (EWPs) to control and prevent environmental pollution and maintain environmental compliance. These SOPs will serve as a means of preventing non-compliance and pollution by describing specific work instructions designed to avoid practices harmful or potentially harmful to the environment.

The Highways Division performed an EMS gap assessment and environmental audit in 2006 of activities, products, and services in order to characterize the degree to which these adhere to environmental regulations. The Highways Division will expand its assessment efforts by instituting an EMS Audit procedure (EP-010) and Internal Compliance Audit procedure (EP-012). These audits will serve as a means to check for environmental compliance, conformity to EMS standards, and conformity to best management practices.

Routine self-inspections are an important component of the EMS program. The Highways Division will conduct quarterly audits, using HDOT's Compliance Checklist (Appendix C), to evaluate the maintenance baseyard facilities for compliance with the Clean Water Act (including compliance with Storm Water and SPCC requirements), the Resource Conservation and Recovery Act, and the Emergency Planning and Community Right-to-Know Act.

Applicable or Related Procedures

- EP-005: Identification of Aspects and Impacts
- EP-006: Objectives and Targets
- EP-010: EMS Audit
- EP-011: Corrective and Preventive Action
- EP-012: Internal Compliance Auditing
- EP-013: Monitoring and Measurement
- EF-001: Aspects and Impacts Form
- EF-002: Objectives and Targets Summary
- EF-003: EMS Audit Checklist
- EF-004: Nonconformance Documentation Form
- EF-005: Nonconformance Summary Form
- EF-006: Compliance Checklist
- EF-007: Noncompliance Documentation Form

3.6 Environmental Incident and Non-Compliance Investigation

Various environmental management preparedness plans and programs available at the Highways Division include their Hazardous Waste Management Program, Solid Waste Management Program, a POL Program, Spill Prevention, Control, & Countermeasure Plan, Storm Water Pollution Prevention Plans, and a multitude of plans developed as part of their Storm Water Management Program.

Supplementing and expanding the utility of any environmental incident and/or noncompliance investigation, HDOT will perform a "root cause analysis" of the release and/or non-compliance as described in a Corrective and Preventative Action procedure (EP-011). The Highways Division will also rely on the Measuring and Monitoring procedure (EP-013) as a means of monitoring activities and conditions in order to verify the effectiveness of corrective action plans developed in response to an environmental incident. The Highways Division EMS Coordinator will communicate the results of the incident investigation and corrective actions to the EMS Working Group.

Applicable or Related Procedures & Forms

- EP-008: Management Review
- EP-011: Corrective and Preventive Action
- EP-013: Monitoring and Measurement
- EP-015: Emergency Incident Response
- EF-009: Emergency Incident Response Form

3.7 Environmental Training, Awareness, and Competence

The Highways Division relies on its Supervisors and Division EMS Coordinator to ensure maintenance baseyard employees maintain levels of competency through formal (e.g. classroom-like setting) or informal (e.g. on-the-job) training. To accomplish this, the Division EMS Coordinator will establish a training matrix for maintenance baseyard employees that will identify training requirements for each employee class. The Supervisor will use the matrix to ensure that baseyard employees receive current training.

Employees are also regularly provided opportunities to attain increased levels of competency through Highways Division-sponsored trainings. For example, in 2007, the Highways Division held an array of training to address various storm water management matters. These trainings will continue on annual basis as required per the Highway's Storm Water Management Program. Additional trainings will also be developed to incorporate additional environmental media.

The Highways Division will expand these existing efforts by assessing the various activities performed by staff, or those acting on behalf of the Highways Division, to build and implement a comprehensive "training, awareness, and competency" program. The program will include a matrix similar to the one described above. Once developed, the program will be documented in the Training, Awareness, and Competence procedure (EP-009).

Applicable or Related Procedures

EP-009: Training Awareness and Competence

3.8 Environmental Planning and Organizational Decision-Making

The Highways Division will annually establish and revise environmental objectives and targets for each significant environmental aspect and impact. The Baseyards will be responsible for meeting the objectives and targets established. These objectives and targets will be established to assess the efficacy of programs, projects, and activities performed by Highways Division employees or contractors. For further information, refer to HDOT's Objectives and Targets procedure (EP-006).

Applicable or Related Procedures

EP-006: Objectives and Targets

EF-002: Objectives and Targets Summary

3.9 Maintenance of Records and Documents

HDOT has established an environmental procedure for controlling documents related to the EMS (EP-003). This procedure describes where documents can be located and how and when they are reviewed. The procedure ensures that current versions are available and that obsolete documents are promptly removed from use or are suitably identified. Controlled documents are managed by and obtainable from the Division EMS Coordinator. Relevant and up-to-date controlled documents shall be maintained at each Highways Baseyard. A master list of controlled documents will be maintained by the Division EMS Coordinator.

Applicable Procedures

- EP-001: Formatting Environmental Procedures, Work Practices & Forms
- EP-003: Document Control
- EP-014: Record Keeping
- EF-008: Records and Documents List

3.10 Pollution Prevention

The Highways Division will develop a Pollution Prevention team (P2 Team). The P2 Team will work to identify pollution prevention opportunities, define specific objectives and targets, and perform annual assessments of Baseyard facility work areas to further identify processes and products that could be modified to reduce pollution and waste generation. Findings of the P2 Team will be incorporated into the EMS through the program review process and integrated with appropriate tools such as the Compliance Checklist (EF-006, Appendix C).

Pollution prevention also includes the establishment and use of Environmental Work Practices (EWPs). During the development of EWPs, P2 opportunities will be incorporated. Through the development of the EMS, the Highways Division will identify and institute more approaches to pollution prevention.

Applicable or Related Procedures

- EP-005: Identification of Aspects and Impacts
- EP-006: Objectives and Targets
- EP-011: Corrective and Preventive Action
- EP-013: Monitoring and Measurement
- EF-001: Aspects and Impacts Form
- EF-002: Objectives and Targets Summary
- EF-006: Compliance Checklist
- EF-007: Noncompliance Documentation Form

3.11 Continuing Program Evaluation and Improvement

The Highways Division will develop evaluation procedures that will include an audit of the EMS at least annually to ensure continued conformance to the Environmental Policy and overall environmental compliance. This review is described in HDOT's EMS Audit procedure (EP-010). Non-conformance findings will be managed through the Corrective and Preventative Action procedure (EP-011) to ensure that solutions are identified and implemented.

Additionally, an audit by an independent auditor will be conducted every four years. Completion of the annual EMS Audit will not be affected by the independent audit. Applicable or Related Procedures

- EP-008: Management Review
- EP-010: EMS Audit
- EP-011: Corrective and Preventive Action
- EF-003: EMS Audit Checklist
- EF-004: Nonconformance Documentation Form
- EF-005: Nonconformance Summary Form

3.12 Public Involvement/Community Outreach

In its Storm Water Management Program Plan, the Highways Division describes its plan with respect to Public Education, Public Participation, and Community Outreach. The plan includes storm water training for contractors and tenants, public service announcements, print advertisements, brochures, a public website, informational meetings, and various other opportunities. The Highways Division has completed some of these programs and is working towards completing other programs.

Applicable or Related Procedures & Forms EP-007: Communication

Appendix J: HDOT Corrective and Preventative Measure Procedure

STATE OF HAWAII DEPARTMENT OF TRANSPOI HIGHWAYS DIVISION	RTATION	ENVIRONMENTAL PROCEDURES FOR STANDARD MAINTENANCE OPERATIONS, HIGHWAYS ENVIRONMENTAL MANAGEMENT SYSTEM (EMS)		
procedure no. EP-011	SUBJECT	CORRECTIVE AND PREVENTIVE ACTION PROCEDURES		VE ACTION
issue date 3/31/2008	REVISION I	DATE	REVISION NO.	APPROVED BY

human health or the environment, senior management will be informed. In this case, senior management includes, at a minimum, the District Engineer and Deputy Director of Transportation – Highways Division.

The Nonconformance Documentation Form (EF-004) will specify the individual responsible for eliminating the nonconformance. The specified individual will provide weekly reporting via electronic mail on progress of the corrective and preventive action measures to the Division EMS Coordinator or EMS Project Manager. Tracking of the nonconformance shall be kept on the Nonconformance Summary Form (EF-005). Once the nonconformance has been corrected the Division EMS Coordinator or the EMS Project Manager will sign the form indicating that the nonconformance has been corrected. A copy of the signed form must be kept in accordance with EP-014 (Record Keeping Procedure).

The Division EMS Coordinator and EMS Project Manager will determine, based on evaluation of the nonconformance, if a change to an EMS component (e.g., procedure, objective, target) is necessary. If a change to EMS documentation is required, the process found in the EP-003 (Document Control Procedure) will be implemented. If a change in objective, target or policy is suggested as a corrective and preventive action, the necessity for such a change will be discussed during the Management Review meeting.

The annual Management Review meeting will include a discussion of nonconformances and the corrective and preventive actions taken.

Record of Revisions

Revision Date	Description	Reason for Revision

Appendix K: HDOT Corrective and Preventative Measure Action Form

STATE OF HAWAII DEPARTMENT OF TRANSPORTAION HIGHWAYS DIVISION		ENVIRONMENTAL FORM FOR STANDARD MAINTENANCE OPERATIONS, HIGHWAYS ENVIRONMENTAL MANAGEMENT SYSTEM (EMS)			
FORM NO. SUBJECT EF-005		NONCONFOR	RMANCE SUMM	ARY FORM	
ISSUE DATE	REVISION DA	ATE	REVISION NO.	APPROVED BY	

The following log will be utilized to track that stauts of all nonconformance and corrective actions, to ensure all closure of all actions.

Nonconformance documentation will be developed for any failure to meet the requirements of the EMS, any deviation from the procedures contained within the EMS, or any situation which, if not corrected, could lead to an environmental impact that is inconsistent with the environmental management policy.

Identification No.	Status	Identification Date	Location	Problem Description	Proposed Implementaion Date	Verified and Closed Date

Appendix L: MassHighway Inspection Report

MASSACHUSETTS HIGHWAY DEPARTMENT FACILITY ENVIRONMENTAL COMPLIANCE INSPECTION REPORT

Routing of Completed Inspection Report:	Date
District EMS Compliance Coordinator District Maintenance Engineer Area Supervisor/Facilty Foreman EMS Section Supervisor/Boston Environmental Room 4260	
INSPECTOR:	DATE:
FACILITY NAME & FACILITY NUMBER:	FACILITY FOREMAN IN CHARGE:
HAZARDOUS WASTE GENERATOR ID. NUMBER:	

PLEASE ESTIMATE THE QUANTITIES OF WASTE THAT HAVE ACCUMULATED AT THIS FACILITY.

HAZARDOUS WA	STE:	SOLID WASTE:			
TYPE OF WASTE	/ ESTIMATED QUANTITY:	TYPE OF WASTE	/ ESTIMATED QUANTITY:		
	1	ABC	/ CY		
	/	C&D	/ CY		
	1	Catchbasin Cleanings	/ CY		
	1	Street Sweepings	/ CY		
	1	Scrap Metal	/ CY		
UNIVERSAL WAS	TE	Tires	/ CY		
TYPE OF WASTE	/ ESTIMATED QUANTITY	Tree Waste	/ CY		
	1	White Goods	/ CY		
	1	Treated Timbers	/ CY		
	1	Bulky Waste	/ CY		
	/				

HAZARDOUS WASTE

	COMPLIANCE POINT	Γ	COMMENTS	CORRECTIVE ACTIONS	COMP.
1	ARE WEEKLY INSPECTIONS BEING COMPLETED	Y/N			DATE
2.	ARE ALL CONTAINERS CLOSED, LABELED, AND STORED IN A DESIGNATED ACCUMULATION AREA?	Y/N			
3.	ARE THE WASTES COMPATIBLE WITH THE CONTAINERS AND/OR LINERS?	Y/N			
4.	ARE WASTE CONTAINERS LOCATED AT LEAST 50 FEET FROM THE PROPERTY LINE?	Y/N			
5.	IS THE ACCUMULATION AREA DELINEATED, POSTED WITH A SIGN AND IS SECONDARY CONTAINMENT PROVIDED?	Y/N			
6.	IS THE ACCUMULATION AREA CLEAR OF MATERIAL OTHER THAN HAZARDOUS WASTES?	Y/N			
7.	IS HAZARDOUS WASTE STORED OUTSIDE THE ACCUMULATION AREA?	Y/N			
8.	IF IN USE, ARE SATELLITE ACCUMULATION AREA REOUIREMENTS BEING MET?	Y/N			
9.	ARE EMERGENCY CONTACTS POSTED BY FACILTY PHONE ?	Y/N			
10.	ARE SPILL ABSORBENTS AVAILABLE?	Y/N			
11.	ARE ACCUMULATION VOLUME LIMITS EXCEEDED FOR THE GENERATOR STATUS?	Y/N			
12.	<u>FOR SQGs</u> : ARE HAZARDOUS WASTES BEING STORED FOR LONGER THAN 180 DAYS?	Y/N			
13.	IF APPLICABLE, ARE ALL SELF- TRANSPORTING TWO PART RECEIPTS ON FILE?	Y/N			

HAZARDOUS MATERIALS

	COMPLIANCE POINT		COMMENTS	CORRECTIVE ACTIONS	COMP.
					DATE
1.	ARE HAZARDOUS MATERIALS	Y/N			
	STORED IN APPROPRIATE				
	LOCATIONS?				
2.	ARE HAZARDOUS MATERIALS	Y/N			
	STORED IN PROPER CONTAINERS?				
3.	ARE ALL HAZARDOUS MATERIAL	Y/N			
	CONTAINERS CLOSED AND				
	LABELED?				
4.	ARE MSDSs AND RIGHT-TO-KNOW	Y/N			
	INFORMATION PROMINENTLY				
	POSTED?				
5.	ARE ALL COMPRESSED GAS	Y/N			
	CYLINDERS PROPERLY STORED				
	(LABELED, CAPPED, CHAINED, OR IN				
	RACK)?				
6.	ARE THERE ANY LEAKING	Y/N			
	VEHICLES/EQUIPMENT PRESENT?				

SOLID WASTE

	COMPLIANCE POINT		COMMENTS	CORRECTIVE ACTIONS	COMP.
					DATE
1.	ARE SOLID WASTES STORED IN	Y/N			
	DESIGNATED STORAGE BINS OR				
	SEPARATED BY TYPE?				
2.	ARE DUMPSTERS AND TRASH CANS	Y/N			
	FREE OF HAZARDOUS WASTES,				
	REGULATED RECYCLABLES, AND				
	UNIVERSAL WASTES & ARE				
	CLOSEABLE?				
3.	ARE THERE ANY DECOMMISSIONED/	Y/N			
	ABANDONED VEHICLES OR				
	EQUIPMENT PRESENT?				

UNDERGROUND/ABOVEGROUND STORAGE TANKS

	COMPLIANCE POINT		COMMENTS	CORRECTIVE ACTIONS	COMP. DATE
1	ARE WEEKLY STAGE II VAPOR RECOVERY INSPECTIONS BEING PERFORMED?	Y/N			
2	ARE FUEL INVENTORY AND RECONCILITATION RECORDS BEING MAINTAINED IN ACCORDANCE WITH APPLICABLE REGULATIONS?	Y/N			
3	ARE FUEL LOSS/GAINS WITHIN ACCEPTABLE LIMITS	Y/N			
4.	IS THERE ANY EVIDENCE OF MAJOR SPILLS/LEAKS AROUND TANK FILL PORTS OR DISPENSING PUMPS?	Y/N			
5	ARE THERE ANY VEEDER-ROOT ALARMS ACTIVATED OR NOT FUNCTIONING PROPERLY?	Y/N			
6	ARE REQUIRED TANK PERMITS/REGISTRATIONS CLEARLY POSTED AT THE FACILITY AND NOT EXPIRED?	Y/N			
7	FOR ABOVEGROUND STORAGE TANKS (INCLUDING PETROLEUM, PROPANE, AND CALCIUM CHLORIDE TANKS): ARE THE TANKS IN GOOD CONDITION, LOCATED ON A PROPER SURFACE, LABELED WITH THEIR CONTENTS AND NFPA RATINGS?	Y/N			

WATER QUALITY

	COMPLIANCE POINT		COMMENTS	CORRECTIVE ACTIONS	COMP.
					DATE
1.	ARE GARAGE FLOOR DRAINS CLEAR OF OBSTRUCTIONS, FUNCTIONING PROPERLY, AND DO NOT REQUIRE SEDIMENT REMOVAL?	Y/N			
2	IS THE OIL/WATER SEPARATOR (OWS) FUNCTIONING PROPERLY?	Y/N			
	ARE OWS PERMIT CONDITIONS BEING COMPLIED WITH?	Y/N			
3.	IS THERE EVIDENCE OF HAZARDOUS MATERIALS ENTERING A FLOOR DRAIN OR CATCH BASIN OR SAND/SEDIMENT ENTERING <u>ANY</u> DRAINAGE STRUCTURES AT THE FACILITY?	Y/N			
4.	FOR WASTEWATER RECYCLING SYSTEMS: ARE THE SYSTEMS FUNCTIONING PROPERLY?	Y/N			
5.	FOR WASTEWATER TIGHT TANKS OR RECYCLING SYSTEMS: DOES THE TANK OR SYSTEM NEED TO BE PUMPED?	Y/N			
	ARE THE HIGH WATER ALARMS FUNCTIONING PROPERLY?	Y/N			
	ARE WASTEWATER TANK PERMIT CONDITIONS BEING COMPLIED WITH?	Y/N			
6.	IS SAND CONTAINED WITHIN A CONTAINMENT AREA & LABELED	Y/N			
7	IS SALT CONTAINED INDOORS OR UNDER COVER AND LABELED?	Y/N			
8	ARE ACCESSIBLE GROUNDWATER MONITORING WELLS IN GOOD CONDITION?	Y/N			
NATURAL RESOURCES

	COMPLIANCE POINT		COMMENTS	CORRECTIVE ACTIONS	COMP. Date
1.	ARE THERE ANY REGULATED WETLAND RESOURCE AREAS OR WATERWAYS ON OR ADJACENT TO THE FACILITY? (I.E. VEGETATED WETLANDS, BANKS, FLOODPLAINS, LAND UNDER WATER, AND THE RIVERFRONT AREA) NOTE: REFER TO THE FACILITY PLAN	Y/N			
2.	<i>FOR CONFIRMATION.</i> ARE THERE ACTIVITIES WHICH ARE RESULTING IN <u>DIRECT IMPACTS</u> TO A WETLAND RESOURCE AREA OR RIVERFRONT?	Y/N			
	NOTE: DIRECT IMPACTS INCLUDE FILLING, EXCAVATING, SOLID WASTE, OR ALTERING.				
3.	ARE THERE ACTIVITIES WHICH ARE RESULTING IN <u>INDIRECT IMPACTS</u> TO A WETLAND RESOURCE AREA OR RIVERFRONT?	Y/N			
	NOTE: INDIRECT IMPACTS INCLUDE EROSION, SEDIMENTATION, OR SILTATION.				
4.	ARE THERE ACTIVITIES WITHIN THE BUFFER ZONE WHICH ARE RESULTING IN <u>DIRECT OR INDIRECT</u> <u>IMPACTS</u> TO ANY VEGETATED WETLAND OR BANK TO A RIVERFRONT AREA?	Y/N			
	NOTE: Activity = Non-routine maintenance work.				

ADDITIONAL COMMENTS AND CORRECTIVE ACTIONS: