Environmental Management System Implementation Update

American Association of State Highway
and Transportation Officials

Standing Committee on Highways
Subcommittee on Construction
Environment and Human Resources Section

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Environmental Management System
Implementation Update

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Exhibits

Attachment 1 - Case Studies

1.0 Introduction

The American Association of State Highway and Transportation Officials (AASHTO) Standing Committee on Highways, Subcommittee on Construction, Environment and Human Resources Section continues to investigate the utility of EMS as a strategic planning tool for implementation of an organization's environmental priorities.

This report describes the current status of EMS development in the State DOT's, the AASHTO and FHWA EMS Technical Assistance Program, and the subcommittee's recommendations for continuing to advance the use of EMS in improving the environmental performance and program delivery.

AASHTO has defined Environmental Management Systems (EMS) as the organizational structure, associated responsibilities, and procedures to integrate environmental considerations and objectives into the ongoing management decision making processes and operations of an organization.

EMS records, tracks, monitors, and closes out environmental compliance commitments and mitigation measures from transportation project initiation through completion of the constructed facility.

The EMS constitutes an institutional roadmap for the responsible operation and maintenance of the constructed facility within the environmental constraints of the original project.

EMS employs total quality management principles that are most effective when integrated into organizational learning objectives.

2.0 2003 AASHTO EMS Implementation Guide and Survey

The 2003 AASHTO EMS implementation guide titled "Using an Environmental Management System to Meet Transportation Challenges and Opportunities included a benchmark survey report that characterized the national status of EMS development and implementation. The survey established an EMS knowledge base and implementation primer regarding:

- Considerations that affect DOT EMS decisions and implementation efforts,
- Benefits realized or expected from EMS implementation,
- Lessons learned, and
- EMS development and information that would benefit state transportation professionals.

2.1 Environment and Human Resources Section EMS Survey Activities

At the 2005 annual AASHTO meeting; the human resources and environmental work group commissioned this follow up survey to the 2003 AASHTO EMS benchmark survey.

The 2006 EMS survey was divided into two phases. Phase 1 is general survey of State Departments of Transportation (DOT) to measure EMS awareness, consideration, and implementation. Phase 2 is a focused interview of selected AASHTO members that have implemented or are in the process of implementing EMS.

2.2 AASHTO and FHWA EMS Technical Assistance Program

In August 2003, the AASHTO Center for Environmental Excellence (Center) in partnership with the Federal Highway Administration (FHWA) formally launched its EMS technical assistance program with a national EMS workshop and the release of its EMS implementation guide. Since that time, the Center has been supplying EMS technical assistance and training to the AASHTO member organizations through on-site technical assistance, AASHTO meeting EMS orientation presentations, a national web cast, and the publication of 2 EMS Handy Guides.

In July 2005 to March 2006, the Center expanded its EMS technical assistance program with 3 EMS technical assistance pilot projects in North Carolina, Utah, and Colorado. Through the pilot program, the Center assisted the 3 states in advancing the use of EMS concepts in improving environmental commitment tracking, environmental compliance, and environmental stewardship.

In May 2006, the Center and the FHWA conducted an EMS Technical Assistance Program Development Workshop to review the effectiveness of the pilot technical assistance program and to identify how to best provide assistance to the AASHTO member organizations and the FHWA Offices. As an outcome of the workshop, the Center and FHWA will be further expanding EMS technical assistance activities by offering EMS orientation training, EMS work plan development technical assistance, and EMS development mentoring. In the near future, an AASHTO letter soliciting interests and applications from the AASHTO member organizations in applying for EMS technical assistance on a cost-share basis will be distributed. Also, in the same time frame, an FHWA letter encouraging FHWA Office participation in and support of State DOT EMS development will be distributed.

The AASHTO and FHWA EMS Technical Assistance Program is being guided by a steering group comprised of AASHTO staff, AASHTO EMS Consultant Experts, FHWA Headquarters and Resource Center, and AASHTO member organizations.

3.0 2006 Phase 1 EMS Survey

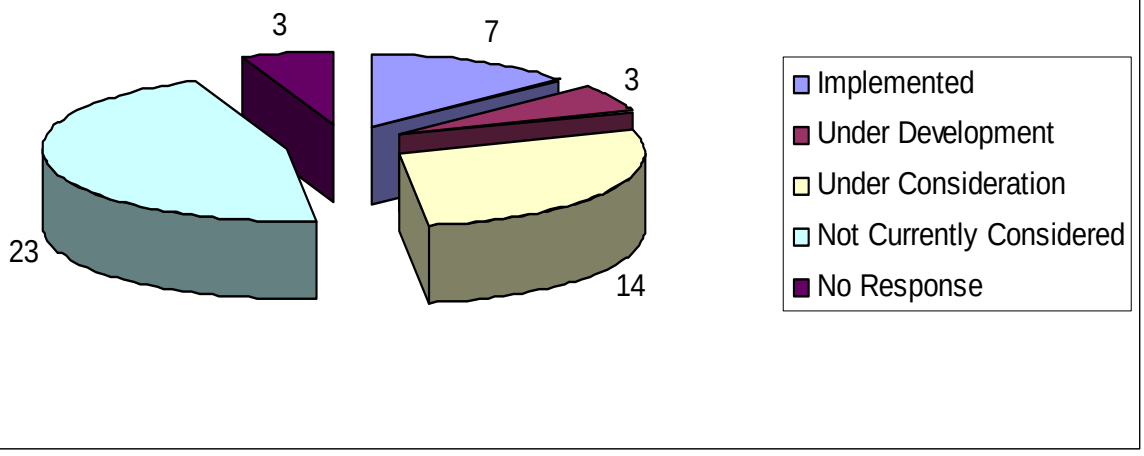
A comparison of the 2006 Phase 1 EMS survey was made to the 2003 EMS survey to test the status of development efforts and level of implementation, the level of EMS awareness, and whether the AASHTO DOT is considering implementation of EMS in their organization.

3.1 2003 State DOT EMS Survey

The 2003 Implementation Status survey indicated that 15% of the respondents had implemented an EMS, 36% were considering or implementing an EMS, and 49% were not considering implementation of an EMS.

Exhibit 3-1 shows the status of DOT EMS development and implementation efforts in the Spring of 2003.

Exhibit 3-1.1 2003 State DOT EMS Implementation Status



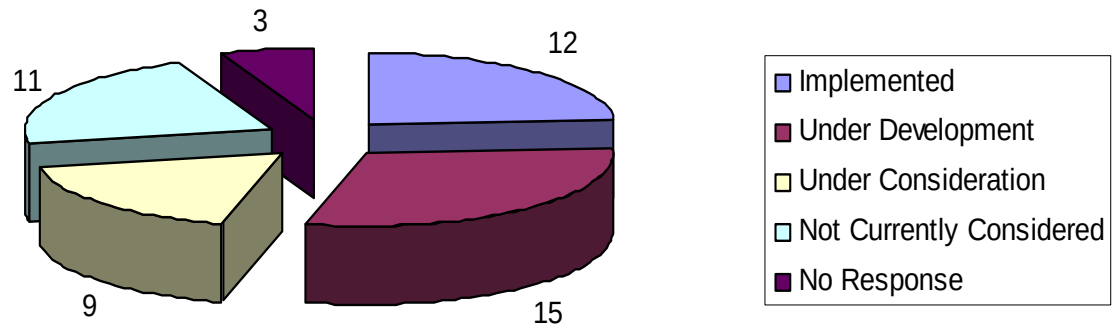
3.2 2006 State DOT EMS Development and Implementation Status

The 2006 implementation status survey measured the level of implementation using both telephone and email surveys asking the questions "Have you considered implementing an EMS in your organization?" and "Do you plan to implement EMS?"

The 2006 Implementation Status survey indicated that 26% of the respondents have implemented an EMS, 51% are considering or implementing an EMS, and 23% are not considering implementation of an EMS.

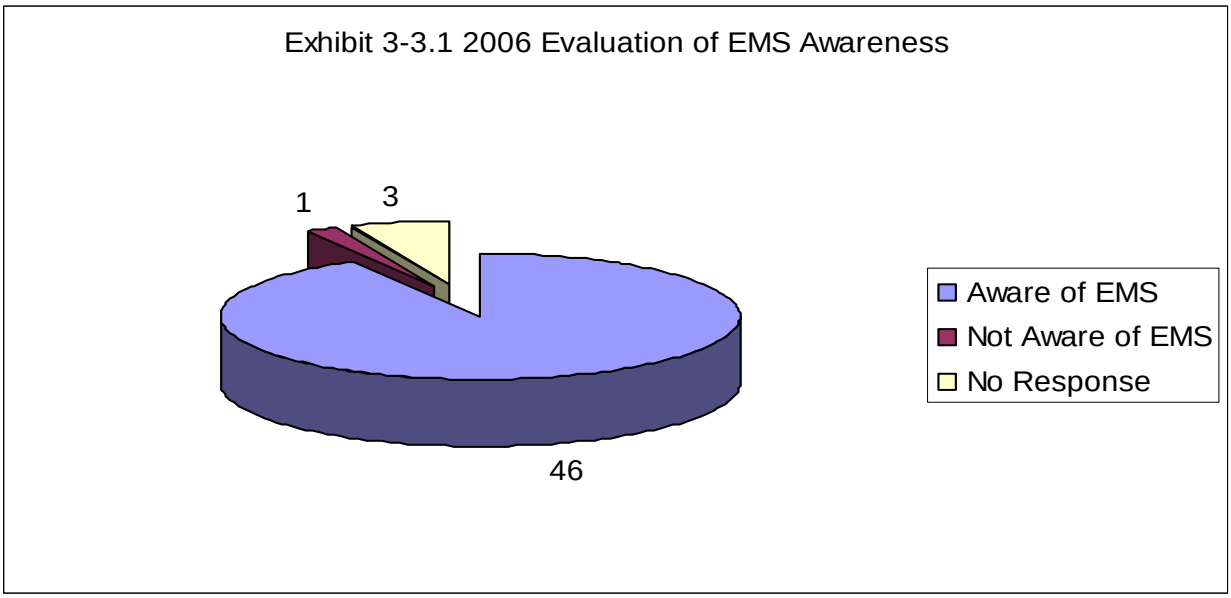
Exhibit 3-2.1 shows the status of DOT EMS development and implementation effort through Spring of 2006.

Exhibit 3-2.1 2006 State DOT EMS Implementation Status

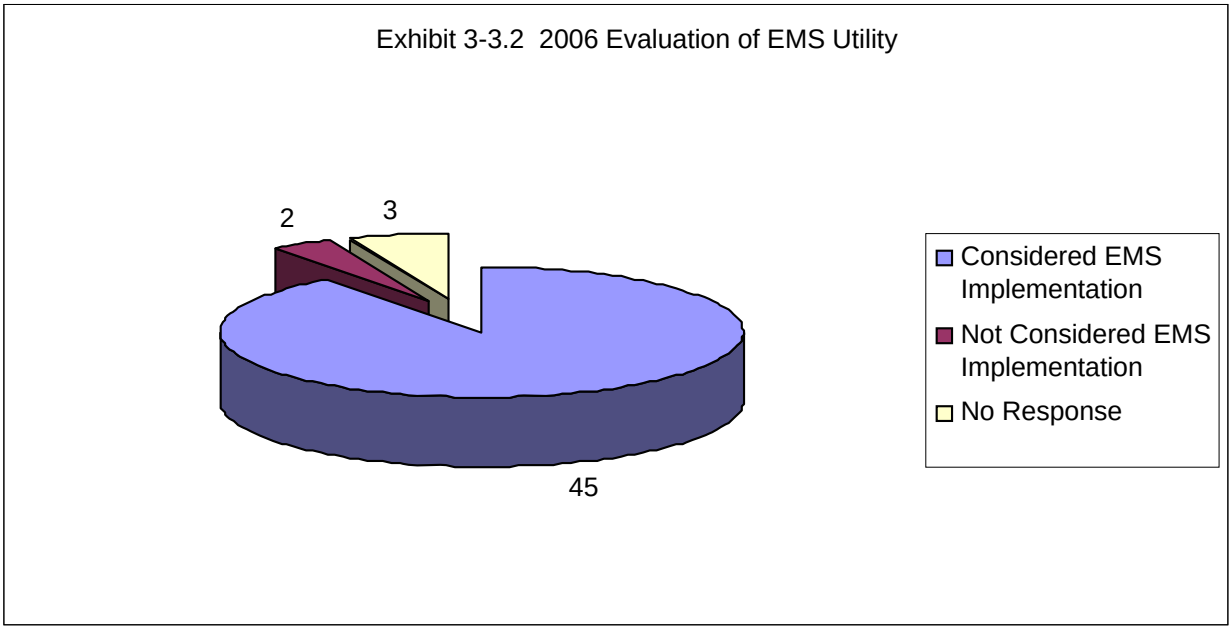


3.3 2006 EMS Feasibility Evaluation

The 2006 EMS survey measured the level of EMS awareness of the AASHTO membership with the simple yes/no question of "Are you aware of EMS principles, practices, and potential benefits?" A total of 98% of respondents are aware of EMS. When EMS was explained to the non-aware respondent, that person said he agreed with the EMS principles, practices, and benefits. This suggests that AASHTO efforts to promote EMS have been effective. Many respondents mentioned they had discussed EMS with other state DOTs. One DOT coordinated an FHWA peer exchange regarding EMS. These types of informal, word-to-mouth promotion efforts are both positive and encouraging. The findings are depicted by Exhibit 3-3.1



Next, the 2006 EMS survey measured the utility of the 2003 EMS Implementation Report and Benchmark Survey by asking if the AASHTO respondent had considered implementing an EMS in their organization. The findings are designated by Exhibit 3-3.2.



Comparison of the 2003 and 2006 implementation survey results are shown in exhibits 3-3.3 Implementation Comparison Chart and 3-3.4 EMS Phase I Survey - Implementation Findings suggests a positive trend towards the understanding of EMS systems, their utility, and general acceptance.

Exhibit 3-3.3 Implementation Comparison Chart

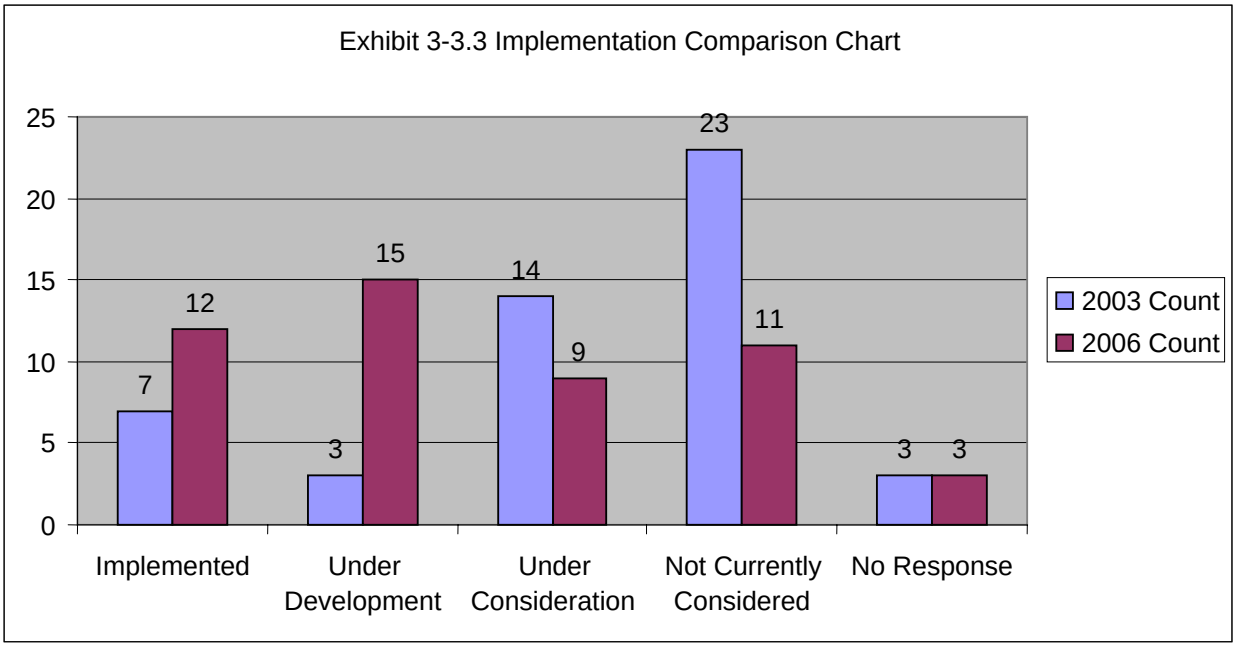


Exhibit 3-3.4 EMS Phase 1 Survey - Implementation Findings

Comparison >>>>>	2003		2006		2003-2006 Changes	
Category (Best Fit)	Count	Percent	Count	Percent	Count	Percent
Implemented	7	14%	12	0.24	5	10%
Under Development	3	6%	15	0.3	12	24%
Under Consideration	14	28%	9	0.18	-5	-10%
Not Currently Considered	23	46%	11	0.22	-12	-24%
No Response	3	6%	3	0.06	0	0%

The findings of this 2006 EMS survey are that implementation improved 8% and development improved 10%. The consideration metric was reduced by 10 percent and the not currently considered metric was lowered 24%. This trend can probably be explained because many respondents moved from these phases to the EMS development and implementation phases over the past three year period. These are affirmative indicators of overall EMS utility and acceptance among the AASHTO membership.

3.4 2006 Phase I Survey Observations and Recommendations

During the course of interviewing 46 states about EMS, the following observations were noteworthy:

Finding One: Many respondents define EMS differently and have different ideas about what an EMS is. Respondents associated EMS with resource management systems, maintenance management systems, environmental compliance for project delivery, design and construction function of project delivery, and hazardous materials functions.

Recommendation One: Expand and refine the definition of EMS. Communicate its meaning more effectively.

Finding Two: Some States expressed concern about the United States Federal Highway Administration's (FHWA) lack of a clear position on EMS.

Recommendation Two: A clear FHWA position on EMS, determination of funding eligibility for development of EMS, and national FHWA leadership regarding EMS could facilitate more widespread implementation.

Finding Three: Most States are implementing EMS into their current organizational structures and business practices. Developing an EMS independently and reorganizing the organization around that EMS is rare.

Recommendation Three: Develop your EMS with your current business practices in mind. This facilitates a smooth transition to EMS. It also allows EMS to be implemented incrementally.

Finding Four Most states are familiar with the EMS Implementation Guide. They regularly mention terms like: "Roadmap", "Fence Lines", and the "Plan-Do-Check-Act" frame work.

Recommendation Four: Retain the EMS Implementation Guide and continue to make it readily available to AASHTO members. The focus of the guide is on the process of implementing an EMS. The guide could be expanded to include recommended functional elements ranked by effectiveness for an EMS tailored to the DOT's organizational objectives and priorities.

Finding Five Many states agree that the "check" step of the "Plan-Do-Check-Act" framework is an essential total quality management and continuous quality improvement element. Many states suggested that ISO 14001 registration is "overkill", while others questioned the utility of ISO 14001 registration to public agencies and entities.

Recommendation Five: Consider relaxing emphasis of ISO 14001 registration and interject simplified total quality management and continuous quality improvement standards, tools, and training into EMS.

Finding Six: Successful implementation of an EMS depends on the current administration, their views, and priorities.

Recommendation Six: Timing of EMS implementation can be an important success factor.

Finding Seven: Small DOTs have "value" issues with EMS as currently defined. Many pointed out that the costs of implementing, operating, and maintaining an EMS greatly out weigh the perceived benefits of an EMS system to the small DOT. This is the primary reason why DOTs have not implemented or are not considering implementation of an EMS.

Recommendation Seven: Since all states agree with the utility of the EMS concept, the Environment and Human Resources Section should support implementation of simplified or partially implemented EMS; through recommended prioritization, establishment of best practices, and sharing of success stories.

Finding Eight: Planning, design, and implementation of EMS are growth markets for the consulting industry. A few DOTs reported engaging consultants for EMS work. Many organizations reported attending informational sessions or being approached by consultants regarding EMS.

Recommendation Eight: AASHTO may want to consider partnering with consulting firms to assure best practices are identified and integrated into EMSs that are implemented by State DOTs.

Finding Nine: There are opportunities for the AASHTO Subcommittee on Construction to work with the Center and FHWA to address the technical assistance needs of highway construction.

Recommendation Nine: Include a representative of the AASHTO Subcommittee on Construction on the AASHTO and FHWA EMS Technical Assistance Program steering group.

3.5 2006 - 2003 EMS Survey Results Summary and Contact Update

The data and contact information for both the 2003 EMS survey and the 2006 Phase 1 survey are tabulated on the following Exhibits 3-5 and 3-6.

The 2006 Phase One survey data and updated the EMS contact information for each responding member state is tabulated in Exhibit 5-5. This survey data is the basis for

exhibits 5-2 through 5-4. Exhibit 5-6 represents the information collected in 2003 and is the basis for exhibit 5-1.

To help DOT personnel develop a network to exchange EMS information, exhibit 3-5 presents state DOT EMS contacts identified through the 2006 Phase 1 Survey. The AASHTO respondent may want to use the information provided in exhibit 3-5 to develop, tailor, and implement your own EMS information network. The objective of the contact information is to establish a network of EMS contacts to exchange information and facilitate sharing of lessons learned. This information may be useful to AASHTO members that are contemplating implementation of an EMS for their organization.

Exhibit 3-5 2006 Phase 1 EMS Survey Details and Contact Listing

State	Status					Contact Information			
						Name	Title	Phone	e-mail
	Are you aware of EMS?	Have you considered implementing EMS?	EMS Implementation (See Key at Bottom)	Why did you choose partial implementation or not to implement an EMS?	When did/will EMS be implemented in your organization?				
Alabama	Yes	Yes	I	Implemented	2004	Jim Bearrentino	Hazardous Material Coordinator	334.206.2284	bearrentinej@dot.state.al.us
Alaska	Yes	Yes	UC	N/A	N/A	Bill Ballard	Environmental Coordinator	907.465.6954	bill_ballard@dot.state.ak.us
Arizona	Yes	Yes	NCC	Costs / Lack of resources	N/A	Richard Duarte	Environmental Group Manager	602.712.7760	rduarte@dot.state.az.us
Arkansas	Yes	Yes	NCC	Not needed	N/A	Mike Webb	Section Head - Assessments	501.569.2521	
California	Yes	Yes	UD	Implementing selectively	2005	Jay Norvell	Division Chief	916.653.7136	jay_norvell@dot.ca.gov
Colorado	Yes	Yes	UC	Research complete	2006	George Gerstle	Manager	303.757.9795	george.gerstle@dot.state.co.us
Connecticut			NR			Gregory Dorosh	Transportation Supervisory Engineer	860.594.3404	gregory.dorosh@po.state.ct.us
Delaware	Yes	Yes	NCC	Not needed	N/A	Terry Fulmer	Manager	302.760.2095	tfulmer@mail.dot.state.de.us
Florida	Yes	Yes	I	Implemented	2003	Josh Boan	Environmental Research	850.410.5893	josh.boan@dot.state.fl.us
Georgia			NR			Buddy Gratton	State Maintenance Engineer	404.656.5314	buddy.gratton@dot.state.ga.us
Hawaii	No	No	NCC	Agree with principles	N/A	Ronald Tsuzuki	Head Planning Engineer	808.587.1830	ronald.tsuzuki@hawaii.gov
Idaho	Yes	Yes	UC	ISO 14001 Std. too much	N/A	Dennis Clark	Manager	208.334.8203	dclark@itd.state.id.us
Illinois	Yes	Yes	UD	N/A	2007	Barbara Stevens Jenel Viele	Section Chiefs	217.782.4770 217.558.4752	stevensb@nt.dot.state.il.us
Indiana	Yes	Yes	UD	Selectively implemented	2004	Tom Duncan	Section Manager	317.232.5512	tduncan@indot.state.in.us
Iowa	Yes	Yes	NCC	Costs / Lack of resources	N/A	Jim Rost	Director, Office of Environment	515.239.1798	james.rost@dot.state.ia.us
Kansas	Yes	Yes	NCC	Low priority	N/A	Mike Fletcher	Environmental Scientist	785.296.0853	fletcher@ksdot.org

Key: I-Implemented, UD-Under Development, UC-Under Consideration, NCC-Not Currently Considered, NR-No Response

Exhibit 3-5 2006 Phase 1 EMS Survey Details and Contact Listing (cont'd)

State	Status					Contact Information			
	Are you aware of EMS?	Have you considered implementing EMS?	EMS Implementation (See Key at Bottom)	Why did you choose partial implementation or not to implement an EMS?	When did/will EMS be implemented in your organization?	Name	Title	Phone	e-mail
Kentucky	Yes	Yes	I	Implemented	1995	David Waldner	Director	502.564.7250	david.wldner@mail.state.ky.us
Louisiana	Yes	Yes	UD	Selectively implemented	2004	Noel Ardoin	Environmental Engineer Administrator	225.242.4501	nardoin@dot.state.la.us
Maine	Yes	Yes	I	Implemented	1994	Christine Olson	Training and Environ-mental Management	207.624.3082	christine.olson@maine.gov
Maryland	Yes	Yes	I	Implemented	2003	Charlie Adams	Director	410.545.8641	cadams@sha.state.md.us
Massachusetts	Yes	Yes	I	Implemented	1994	Steve Miller	Supervisor	617.973.8248	smiller@mhd.state.ma.us
Michigan			NR			Scott Wheeler	Roadside Operations Specialist	517.322.3314	wheelers@michigan.gov
Minnesota	Yes	Yes	UD	Implementing in stages	2006	Brian Kamnikar	Supervisor	651.284.3768	brian.kamnikar@dot.state.mn.us
Mississippi	Yes	Yes	UC	Undecided	N/A	Claiborne Barnwell	Environmental Division Engineer	601.359.7920	cbarnwell@mdot.state.ms.us
Missouri	Yes	Yes	UC	Discussions ongoing	N/A	Mark Kross Brad Carter	Assistant to Director of Project Development	573.751.4606 573.526.5646	krossm@mail.modot.state.mo.us
Montana	Yes	Yes	UC	Implementing selectively	N/A	Cora Helm	Hazardous Materials Coordinator	406.444.7659	chelm@state.mt.us
Nebraska	Yes	Yes	UD	Implementing selectively	2005	Cynthia Veys	Manager	402.479.4410	cveys@dor.state.ne.us
Nevada	Yes	Yes	NCC	Negligible benefit	N/A	Daryl James	Chief	775.888.7686	djames@dot.state.nv.us
New Hampshire	Yes	Yes	I	Implemented	2003	Paul Sanderson	Hearings Examiner	603.271.1698	psanderson@dot.state.nh.us
New Jersey	Yes	Yes	UD	Implementing informally	1995	Jack McQuillan	Section Chief	609.530.2833	johnmcquillan@dot.state.nj.us
New Mexico	Yes	No	NCC	Management decision	N/A	Steve Reed	Environmental Program Manager	505.827.5254	
New York	Yes	Yes	I	Implemented	2003	Debbi DeLisle	Administrative Assistant	518.485.5672	
North Carolina	Yes	Yes	UD	In process	2005	Julie Hunkins Becky Clark	Director EMS Specialist	919.733.1175 919.733.6258	jhunkins@dot.state.nc.us bluceclark@dot.state.nc.us

Key: I-Implemented, UD-Under Development, UC-Under Consideration, NCC-Not Currently Considered, NR-No Response

Exhibit 3-5 2006 Phase 1 EMS Survey Details and Contact Listing (cont'd)

State	Status					Contact Information			
	Are you aware of EMS?	Have you considered implementing EMS?	EMS Implementation (See Key at Bottom)	Why did you choose partial implementation or not to implement an EMS?	When did/will EMS be implemented in your organization?	Name	Title	Phone	e-mail
North Dakota	Yes	Yes	NCC	Value lacking for small DOT	N/A	Francis Ziegler	Director	701.328.2598	fziegler@state.nd.us
Ohio	Yes	Yes	UD	Implementing Selectively	2008	Tim Hill	Environmental Liaison	614.644.0377	tim.hjll@dot.state.oh.us
Oklahoma	Yes	Yes	UC	Under Consideration	2006	John Hartley	Branch Manager	405.521.3050	jhartley@odot.org
Oregon	Yes	Yes	UD	Pilots Ongoing	2004	Geoff Crook	Structures Project Delivery	503.986.3425	geoff.crook@odot.state.or.us
Pennsylvania	Yes	Yes	I	Implemented	2003	Kenneth Thornton	Director	717.787.0459	kethornton@state.pa.us
Rode Island	Yes	Yes	UD	In process	2004	Edward Szymanski	Associate Chief Engineer	401.222.2023	eszymanski@dot.state.ri.us
South Carolina	Yes	Yes	UD	Informally	1997	Barry Still	Environmental Manager	803.737.9967	bstill@dot.state.sc.us
South Dakota	Yes	Yes	NCC	Discussions ongoing	N/A	Dave Graves	Environmental Engineer	605.773.5727	dave.graves@state.sd.us
Tennessee	Yes	Yes	UD	In process	2005	Doug Delany	Director	615.741.2612	doug.delany@state.tn.us
Texas	Yes	Yes	I	Implemented	2003	Duncan Stewart	Section Director	512.416.3014	dstewart@dot.state.tx.us
Utah	Yes	Yes	I	Implemented	2005	Brent Jensen	Director of Environmental Services	801.965.4327	brentjensen@utah.gov
Vermont	Yes	Yes	UC	Priorities	N/A	Dennis Benjamin	Environmental Supervisor	802.828.3978	dennis.benjamin@state.vt.us
Virginia	Yes	Yes	UC	Implementing selectively	2001	Ed Wallingford	Hazardous Materials Program Manager	804.786.4559	e.wallingford@virginiadot.org
Washington	Yes	Yes	I	Implemented	2002	Tony Warfield	EMS Lead	360.705.7492	warfield@wsdot.wa.gov
West Virginia	Yes	Yes	UD	Implementing Informally	2001	Norse Angus	Transportation Analyst Manager	304.558.2885	nangus@dot.state.wv.us
Wisconsin	Yes	Yes	UD	Implementing Informally	2003	Kevin Gehrmann	Manager	608.266.0705	kevin.gehrmann@dot.state.wi.us
Wyoming	Yes	Yes	NCC	Value lacking for small DOT	N/A	Tim Stark	Environmental Services Engineer	307.777.4379	timothy.stark@dot.state.wy.us

Key: I-Implemented, UD-Under Development, UC-Under Consideration, NCC-Not Currently Considered, NR-No Response

Exhibit 3-6 2003 EMS Survey Details and Contact Listing

State	Status					Contact Information				
	Implemented (at least in part)	Under Development	Under Consideration	Not Currently Considered	No Response to Date	Name	Title	Unit	Phone	e-mail
Alabama				X		Alfredo Acoff	Environmental Coordinator	Environmental Section	334.242.6143	
Alaska				X		Bill Ballard	Statewide Env. Coordinator	HQ Environmental	907.465.6954	bill_ballard@dot.state.ak.us
Arizona			X			Richard Duarte	Environmental Group Manager	Environmental Planning Group	602.712.7760	rduarte@dot.state.az.us
Arkansas					X	Mike Webb, Marion Butler		Environmental Division	501.569.2521	
California			X			Gary Winters	Division Chief	Div. of Env. Analysis	916.653.7136	gary_winters@dot.ca.gov
Colorado			X			George Gerstle	Manager	Transportation Planning	303.757.9795	george.gerstle@dot.state.co.us
Connecticut				X		Gregory Dorosh	Transportation Supervisory Engineer	Environmental Compliance Unit	860.594.3343	gregory.dorosh@po.state.ct.us
Delaware				X		Terry Fulmer	Manager	Environmental Studies	302.760.2095	tfulmer@mail.dot.state.de.us
Florida	X					Josh Boan	Environmental Research	Ecological Resources Management Section	850.410.5893	josh.boan@dot.state.fl.us
Georgia				X		(1) Jerry Hobbs, (2) Buddy Gratton	(1) Operations Manager, (2) State Maintenance Engineer	(1) Environmental Management Group, (2) Office of Maintenance	404.699.4457 and 404.656.5314	buddy.gratton@dot.state.ga.us
Hawaii				X		Ronald Tsuzuki	Head Planning Engineer	Planning Branch, Highways Division	808.587.1830	ronald.tsuzuki@hawaii.gov
Idaho			X			Dennis Clark	Manager	Environmental Section	208.334.8203	dclark@itd.state.id.us
Illinois				X		(1) Larry Piche, (2) David Johnson	Section Chiefs	(1) Bur. Of Design and Env., (2) Maintenance Operations	217.782.4770 and 217.782.2985	(1) pichell@nt.dot.state.il.us (2) johnsondb@nt.state.il.us
Indiana				X		Tom Duncan	Section Manager	Env., Planning and Engineering Div.	317.232.5512	tduncan@indot.state.in.us
Iowa				X		Jim Rost	Director, Office of Location and Env.	Highway Division	515.239.1040	james.rost@dot.state.ia.us
Kansas				X		Mike Fletcher	Environmental Scientist	Env. Services Section	785.296.0853	fletcher@ksdot.org

Exhibit 3-6 2003 EMS Survey Details and Contact Listing (cont'd)

State	Status					Contact Information				
	Implemented (at least in part)	Under Development	Under Consideration	Not Currently Considered	No Response to Date	Name	Title	Unit	Phone	e-mail
Kentucky			X			David Waldner	Director	Environmental Analysis	502.564.7250	david.wldner@mail.state.ky.us
Louisiana			X			Vincent Russo	Environmental Engineer Administrator	Environmental Section	225.248.4190	vrusso@dotd.state.la.us
Maine	X					Christine Olson	Manager	Water Resources and Haz. Waste	207.624.3082	christine.olson@maine.gov
Maryland		X				Charlie Adams	Director	Office of Env. Design	410.545.8641	cadams@sha.state.md.us
Massa-chusetts	X					Steve Miller	Supervisor	Haz. Materials Section	617.973.8248	smiller@mhd.state.ma.us
Michigan				X		Scott Wheeler	Roadside Operations Specialist	Pavement and Roadside Section	517.322.3314	wheelers@michigan.gov
Minnesota				X		Bruce Johnson	Supervisor	Materials Analysis Unit, Env. Services	651.284.3768	bruce1.johnson@dot.state.mn.us
Mississippi				X		Claiborne Barnwell	Environmental Division Engineer	Environmental Division	601.359.7920	cbarnwell@mdot.state.ms.us
Missouri			X			Mark Kross	Assistant to Director of Project Development	Design Unit	573.751.4606	krossm@mail.modot.state.mo.us
Montana			X			Dave Hill	Bureau Chief	Environmental Services	406.444.7632	dhill@state.mt.us
Nebraska					X	Cynthia Vais	Manager	Environmental Section	402.479.4410	
Nevada				X		Daryl James	Chief	Environmental Services Division	775.888.7686	djames@dot.state.nv.us
New Hampshire	X					Paul Sanderson	Hearings Examiner	Commissioner's Office	603.271.1698	psanderson@dot.state.nh.us
New Jersey				X		Jack McQuillan	Section Chief	Bureau of Environmental Services, Technical Section	609.530.2833	johnmcquillan@dot.state.nj.us
New Mexico					X	Steve Reed			505.827.5254	
New York	X					Debbi DeLisle	Administrative Assistant	Environmental Analysis Bureau	518.485.5672	
North Carolina			X			Julie Hunkins	Director	Office for Env. Quality	919.715.1175	jhunkins@dot.state.nc.us

Exhibit 3-6 2003 EMS Survey Details and Contact Listing (cont'd)

State	Status					Contact Information				
	Implemented (at least in nart)	Under Development	Under Consideration	Not Currently Considered	No Response to Date	Name	Title	Unit	Phone	e-mail
North Dakota				X		Francis Ziegler	Director	Project Development	701.328.2598	fziegler@state.nd.us
Ohio			X			Tom Linkous	Environmental Liaison	Office of Environmental Services	614.466.5075	thomas.linkous@dot.state.oh.us
Oklahoma				X		John Hartley	Branch Manager	Env. Studies Branch	405.521.3050	jhartley@odot.org
Oregon			X			Donna Kilber	Policy and Program Coordinator	Environmental Services Section	503.986.3493	donna.l.kilber@odot.state.or.us
Pennsyl-vania	X					Kenneth Thornton	Director	SEM Program Office	717.787.0459	kethornton@state.pa.us
Rode Island				X		Edward Szymanski	Associate Chief Engineer	Environmental Programs Office	401.222.2023, Ext. 4253	eszymanski@dot.state.ri.us
South Carolina				X		Blanche Sproul	Environmental Manager	Environmental Office	803.737.1395	sproulbs@dot.state.sc.us
South Dakota			X			Dave Graves	Environmental Engineer	Env. Program	605.773.5727	dave.graves@state.sd.us
Tennessee				X		Jim Bryson	Director	Env. Planning and Permits Div.	615.741.2612	james.bryson@state.tn.us
Texas	X					Duncan Stewart, P.E.	Section Director	Env. Affairs Division	512.416.3014	dstewart@dot.state.tx.us
Utah			X			Brent Jensen	Director of Env. Services	Environmental Services	801.965.4237	brentjensen@utah.gov
Vermont				X		Dennis Benjamin	Environmental Specialist Supervisor	Program Development Division, Env. Section	802.828.3978	dennis.benjamin@state.vt.us
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4.0 EMS Lessons Learned

Lessons learned have been summarized to help focus the EMS consideration and implementation efforts of DOT personnel.

4.1 2006 Phase 2 Lessons Learned Matrix

Exhibit 4-1 summarizes the key considerations, trends, and comments gathered during collection of case studies for Phase II of the 2006 EMS survey.

Exhibit 4-1
2006 Lessons Learned Matrix

Key Consideration	Comments
Communication	Good communication, documented implementation plans, alignment of performance expectations, and written performance agreements facilitate an effective EMS.
Integrity	Conducting business with a high level of integrity and maintaining trust between the DOT, FHWA, and resource agencies is critical to build stakeholder support and participation.
Mitigation Measure	Some regulators are using EMS as a mitigation measure for regulatory action against the DOT. Accepting these conditions can motivate the organization for a successful EMS implementation; fighting them will likely detract from EMS implementation and complicate delivery.
Compliance Focus	There is a trend towards a compliance focused total quality management check mechanism rather than adoption of ISO 14001 certification.
Consultants	Consultant support for EMS development in your DOT can add value to your process when utilized correctly. Don't expect the Consultant's turnkey systems to meet the individual needs of the DOT. You must actively engage the entire organization in the development of an EMS that meets your business needs while leveraging the expertise of the consultant to optimize EMS delivery.
Costs / Benefits	Benefits of the EMS are difficult to quantity since they focus on cost avoidance. Development costs for consultants and information technology systems are quantifiable. Operational costs are absorbed into day to day operating expenses.
Scale	Larger scale projects tend to have higher levels of compliance than some small sized projects; when analyzed on a programmatic basis. Mega projects tend to have the highest level of EMS scrutiny and often enjoy the highest level of environmental compliance.
Adaptability	The EMS must be dynamic and adaptive to regulatory, operational, and functional needs of the DOT.

4.2 2003 Lessons Learned Matrix

The lessons learned from the 2003 update have also been included in Exhibit 5-2 for the purpose of comparison. These previous lessons learned are applicable to current EMS efforts.

Exhibit 4-2
2003 Lessons Learned Matrix

Key Consideration	Comments
Management Commitment	Most important, get initial buy-in from top management. Senior management commitment shows to all levels, in particular middle management, that the organization is committed to environmental improvement. Management commitment ensures that resources will be made available.
Employee Ownership	Provide procedures and training that encourage environmental "ownership" by employees.
Employee Involvement	Bring all employees, regardless of level, who may be involved in the EMS into the process through training, briefings, etc. Involve the whole organization, top to bottom, on any issue involving environmental documentation, processes, or compliance.
Communication	Use brief, frequent communications (e.g., newsletters or posters) to inform employees of EMS objectives, goals, plans, and activities. Keep the EMS message fresh and relevant. Maintain communications – don't assume one or two briefings are all that's needed. You cannot communicate enough what initiatives are underway.
Integration with existing Efforts	Build on existing efforts. Don't force feed environmental stewardship or EMS. Fit EMS into what is already there; don't make what is there fit into EMS. Use existing methods and procedures to accomplish what you want to do.
Check on Yourself	Use internal audits to find and fix issues that arise within the system.

5.0 2006 Phase 2 Detailed Case Studies

The 2006 EMS Status Survey included focus interviews of select DOTs with an EMS in-place (at least in part). Each was interviewed in an effort to provide current status information and lessons learned information for events occurring after the 2003 EMS Benchmark survey was completed. This information could be of value to other AASHTO parties interested in developing and implementing an EMS.

Exhibit 5-1 - 2006 Phase 2 Detailed Case Studies

A summary of the 2003 EMS Benchmark Survey interviews was compiled, discussed with each interviewee (sometimes corrected) and subsequently included as a part of each 2006 case study. The summarized information presented in these case studies was originally designed to include:

- EMS Objectives,
- EMS Functional Focus (Planning, Design, Construction, or Maintenance),
- Status of EMS efforts,
- EMS accomplishments and benefits,
- Implementation needs for the EMS,
- Keys to EMS development and implementation success.

Case Study A - California Department of Transportation (Caltrans)

2006 Update of EMS Activities

EMS Objectives

Caltran's EMS efforts are divided into three distinct areas:

1. Environmental Commitments Record (ECR) - Effectively track and document the completion of environmental commitments throughout the Project Delivery Process. The purpose of the ECR is to ensure Caltrans meets it's environmental commitments by: 1) recording each environmental mitigation, compensation, and enhancement commitment made for an individual project; 2) specifying how each commitment will be met; 3) documenting the completion of each commitment.
2. Preliminary Environmental Analysis Report Tool (PEAR) - Automate the currently manual process of collecting and reviewing data for the environmental review process. These tasks include: project initiation, preliminary review, budgetary estimation, and project management.
3. Standard Tracking and Exchange Vehicle for Environmental System (STEVE) - Create a library of current and historical environmental documentation.

EMS Functional Focus

ECR - Planning, Design, Project Management, Construction

PEAR - Planning, Environmental, Design, Project Management, Construction

STEVE - Planning, Environmental, Design, Project Management, Construction, Maintenance

Status of EMS efforts

ECR - Implemented June 10, 2005

PEAR - Implemented in Part - Business process review completed, feasibility study report completed, Funding under consideration by legislature.

STEVE - Implemented in Part - Same status as PEAR.

EMS Accomplishments

ECR - Provides a project record of environmental commitments that follows a project from planning through construction contract acceptance. This record is used by the design engineer to integrate environmental restrictions into the project plans, specifications, and cost estimates. The resident engineer uses this summary of environmental commitments to understand environmental contract provisions and to work with contractors and regulators to ensure environmental promises made are promises kept.

PEAR - Creates a data where house of environmental resources and constraints using a Geographic Information System (GIS). This information is then used to

comply with current and future environmental requirements for project delivery, highway operations, and highway maintenance.

STEVE - Will automate the storage and retrieval of environmental related data as needed for current and future work, thus avoiding redundancy in effort and streamlining the many portions of the environmental review process.

Implementation needs for the EMS

ECR - is a policy document that standardizes the type, format, and organization of environmental documentation through the project delivery process. These costs are absorbed into project delivery support staff costs.

PEAR - is an information technology project that is expected to cost $351,600 to implement and $342,000 annually to operate and maintain.

STEVE - is an information technology project that is expected to cost $338,780 to implement and $159,330 annually to operate and maintain.

Keys to EMS development and implementation success

Business Process Review - identifies and documents current business practices and associated issues, identifies best internal and other state's best management practices, develops new conceptual designs for environmental practices, and recommends changes in organization, process, and technology.

Project Management - appoint a project manager to each EMS initiative to assure the project delivered is congruent with the project as planned, scoped, scheduled, and budgeted.

Communications Plan - define the roles and responsibilities of each EMS project stakeholder in a written communication plan.

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Summary of 2003 EMS Case Study

No case study prepared in 2003.

Case Study B - Florida Department of Transportation (FDOT)

2006 Update of EMS Activities

Status of EMS efforts

Since December 2001, which marked the signing of a joint agency Memorandum of Understanding (MOU), FDOT has been working closely with resource agencies, FHWA, and internal FDOT stakeholders to streamline the environmental compliance process for project delivery. These efforts have resulted in development and approval of 19 agreements covering 23 agencies which have established Florida's streamlining program and process commonly called Efficient Transportation Decision Making (ETDM). These ETDM agreements were mutually developed with each agency, discussions were conducted online through FDOT's internet website, and final agreements are posted online.

A total of 36 positions have been funded among federal, state and regional agencies to help expedite FDOT's project delivery, and streamline environmental compliance and permitting. The ETDM agreements contain performance measures agreed to by the resource agencies to review and comment on transportation projects within Florida's Environmental Screening Tool (EST) within 45 days with an agreed upon option for a 15 day extension for extenuating circumstances, which must be requested. These ETDM agreements have been instrumental in establishing stakeholder process acceptance, program participation, and performance expectations between the resource agencies, FDOT, and FHWA.

Regarding EMS activities, in 2004 FDOT assembled a working group composed of FDOT District staff and resource agency personnel to develop ETDM performance measures. The group published a final Performance Management Report in 2005.

FDOT's current EMS activities are focused on implementing the final Performance Management Report's recommendations into an integrated, internet based information technology system that a part of the EST. Some of the key elements of this program will include: (1) Level of participation of the agency by % involvement (2) Amount and extensiveness of each individual review, (3) Status report benchmarked against agreed upon time frames under the ETDM agreements. A consultant is developing a functional prototype of the Performance Management System that will be integrated into FDOT's ETDM system (described below). Once complete, the Performance management System will be used to generate quarterly performance reports, identify outstanding issues, and list action items for internal FDOT units, individual resource agencies, and FHWA usage.

Managing 19 agreements with 24 separate entities has generated a significant administrative burden. FDOT is working to develop an internet based billing and

reporting system to reduce errors, reduce paperwork, and enhance performance reporting. A prototype is expected to be complete by July 2006.

Future EMS efforts will focus on posting environmental documents and National Environmental Protection Act information on line through FDOT's ETDM system.

The Key to FDOT's continued success appears to be written performance agreements, good communication, alignment of performance expectations, conducting business with a high level of integrity, and maintaining trust between the FDOT, FHWA, and resource agencies.

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Summary of 2003 EMS Case Study

EMS Objectives

The efficient transportation decision-making process (ETDM) objective is to achieve better environmental outcomes and improve the efficiency of the transportation decision making process.

EMS Functional Focus

ETDM restructured FDOT's planning, programming, and environmental review process into an integrated information technology system.

ETDM Accomplishments

ETDM process links land use, transportation, and environmental land use planning through interactive early agency involvement.

Resource agencies agree to permits at a much earlier stage in the planning process.

Project Management has access to information it needs to more efficiently scope services and conduct technical studies in a more focused manner.

Keys to EMS development and implementation success

Florida geographical data library facilitates input from resource agencies, public access, performs GIS analysis, track commitments, and records recommendations through the environmental review and decision making process.

Information technologies help to coordinate, economize, and streamline manual documentation and paper trail activities.

Case Study C - Maine Department of Transportation (MDOT)

2006 Update of EMS Activities

Status of EMS efforts

MDOT applied for and received a grant to develop an information technology (IT) system to track EMS performance and compare performance with internally developed benchmark measures.

MDOT's compliance audit processes have been refined and packaged into checklists to improve consistency. These checklists will be integrated into this IT system to compare actual performance against designated benchmarks and to generate annual reports.

EMS compliance audits are conducted routinely. Fewer issues are identified by the audits, suggesting the MDOT EMS performance is aligned with expectations.

Current MDOT EMS efforts are to expand the system to the MDOT ferry service and terminal system.

The future MDOT EMS effort will probably expand into the planning, environmental compliance, and project delivery processes.

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Summary of 2003 EMS Case Study

EMS Objectives

Provide the means to ensure environmental stewardship and safety for MDOT employees, through establishment of training, communication, guidance, and procedures. Program performance is measured and verified using extensive internal audits.

EMS Functional Focus

Maintenance and operations were the initial focus of the EMS in order to ensure and enhance waste stream management at general highway, rest area, and moveable bridge facilities.

Testing and chemistry labs are operated under the EMS in an effort to improve safety and environmental compliance.

Ferry terminals were added to the EMS without significant modification of concepts and processes.

EMS Accomplishments

EMS compliance audits improved and maintained performance.

Environmental protection administration enforcement staff conducted compliance inspections at maintenance and testing lab facilities.

Employee "ownership" and pride in their facilities have greatly improved. The level of compliance achieve is much higher than with prior initiatives.

EMS positioned MDOT managers and supervisors to more efficiently manage their materials and waste; thus providing cost savings.

More efficient materials management minimizes the amount of space necessary to manage materials and control facility operations. Less space translated to lower direct operational costs and exposure to non-compliance risk and cost liability.

Keys to EMS development and implementation success

Senior management commitment ensured that resources needed for implementation were made available, all those involved in EMS stayed focused and involved, reinforced the notion that all MDOT employees are stewards of their environment.

Ensure employees understand that their day to day actions can have a positive or negative effect on the environment.

Training, communication, guidance, and procedures must be easily understood and applied to related day to day activities.

Case Study D - Maryland State Highway Administration (MDSHA)

2006 Update of EMS Activities

Status of EMS efforts

An internal effort to develop an enterprise wide strategic environmental management plan is underway. This effort will first focus on construction and maintenance. Both AASHTO EMS model and EPA's compliance focused EMS model (CFEMS) are being used in this effort.

A single, fully integrated EMS for the entire administration is probably not feasible due to the unique complexities of each functional area. Interconnectivity between various EMS components will be ensured.

MDSHA is implementing a complete EMS on all its facilities and operations. MDSHA uses the Plan-Do-Check-Act model for its EMS efforts. This EMS is a compliance based program rather than ISO 14001 certified program.

A management system NPDES permitting for surface water and industrial discharges is complete. This effort is about 20% complete.

Environmental commitments are tracked from planning, through design, and into construction. Mega projects are tightly controlled and monitored with the use of environmental tracking systems. Non-mega projects are processed using a programmatic environmental compliance approach by tracking commitments from NEPA phase into design and construction for each project.

A systematic approach to EMS implementation provides for the effective programming and utilization of funds and staff resources.

Mega projects have the highest level of EMS scrutiny and are enjoying the highest level of compliance. Larger scale projects tend to have higher levels of compliance than some small sized projects. This is being addressed through a new Erosion/Sediment Control rating program, more aggressively supplementing the existing environmental quality assurance staff with independent environmental monitors, and the use of a new training and certification program.

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Summary of 2003 EMS Case Study

EMS Objective

Implement an enterprise wide environmental strategic plan to fulfill the administration's stewardship commitments.

EMS Functional Focus

Storm water management program that addresses Construction and Maintenance Operations.

Enterprise wide environmental strategic plan that will address planning, design including: permitting, environmental review, and project development, construction, operations, and maintenance.

EMS Accomplishments

Structured continuous quality improvement has been implemented by MDSHA since 1988.

Documented environmental policies, procedures, quality assurance, training, and staffing improvements were implemented between 1988-2002.

Agency wide environmental stewardship strategic plan was under development to examining, prioritize, and establish goals.

NPDES activity strategic implementation plan and program was established for inspection, maintenance, remediation, and enhancement of storm water management facilities for functional, structural, and visual quality aspects.

Storm water field inspection data collection tools and protocols were established.

Mapped the entire state for opportunities to retrofit best management practices for pollution prevention and stream restoration.

Established partnerships with local jurisdictions involving watershed assessments and restoration efforts.

Performed storm water retrofits and enhancements.

Received a NPDES Municipal Separate Storm Sewer System (MS4) permit, one of the first issued to a state transportation agency.

MDSHA's NPDES team received the AASHTO pathfinder award from the Standing Committee on Quality.

Maryland Department of the Environment considers MDSHA as a "national leader in the control of storm water" that has done a commendable job in implementing a successful NPDES storm water program".

Environmental stewardship ethic and leadership have been established within the organization.

Enterprise wide permit tracker database has been developed.

Multidisciplinary teams are leading the nation in developing state of the art environmental protection, mitigation, restoration, and enhancement techniques.

Reduced wetland and stream impacts through use of an independent environmental monitor.

Keys to EMS development and implementation success

Skilled professionals in environmental science and engineering.

Responsibilities must be clearly assigned.

Commitment to environmental stewardship and continuous quality improvement.

Comprehensive systems that are flexible enough to accommodate organizational changes.

Environmental stewardship is a key performance area.

Case Study E - Massachusetts Highway Department (MassHighway)

2006 Update of EMS Activities

Status of EMS efforts

MassHighway worked closely with internal stakeholders and regulators to complete an independent audit during 2004 and 2005 per the "check" step of the 2003 EMS Manual. A total of 128 maintenance depot facilities were reviewed using a predetermined audit workplan and checklist. Each maintenance foreman, EMS Compliance Coordinator, and the auditor conducted these reviews jointly. MassHighway's progress in environmental regulatory compliance is remarkable when comparing the findings of the independent audit to the original 1995 audit. EMS was an instrumental tool to achieve this progress and helped foster a collaborative relationship with the regulators.

MassHighway's EMS program is designed to comply with State and Federal regulations. It contains the most of the elements of the ISO 14001 standard and functions properly using the Plan-Do-Check-Act cycle; and does ensure continuous improvement. The EMS fence line encompasses the activities occurring as each individual maintenance depot.

Since 1994 MassHighway has identified compliance violations, created programs and procedures to come back into compliance, designed and implemented an EMS to ensure compliance, and reported progress to the regulators. The EMS has been instrumental in the identification and coordination of regulatory compliance efforts such as permitting underground fuel storage tanks, industrial wastewater and septic system discharges, hazardous waste and hazardous material management, solid waste and wetland/natural resource protection. The EMS has helped the MassHighway raise the standard for compliance with these regulations beginning in 1995; by focusing the organization on more refined and detailed levels of compliance as the program matured.

Though MassHighway was required to implement the EMS at the depot facilities, efforts are underway to expand or create another EMS for Highway/Roadside Maintenance. Also due to the agencies commitment to compliance and sustainability, future EMS efforts are expected to be directed toward Construction as well. The first area of emphasis will likely be to develop procedures and contract language that ensure proper characterization, storage, transport and disposal of lead contaminated waste from bridge painting and construction projects in accordance with Federal Resource Conservation and Recovery Act (RCRA) regulations. For large bridge projects, 40,000 pounds of lead contaminated debris can be generated in a one month period. This amount of

manifested hazardous waste will trigger large quantity generator status and strict requirements under RCRA. Designers will be involved to assure these contract provisions are included in the proper contracts to ensure regulatory compliance.

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Summary of 2003 EMS Case Study

EMS Objectives

Increase environmental awareness helps Mass Highway to minimize and prevent environmental problems to reduce compliance costs for potential fines, mitigation, and corrective actions.

EMS Functional Focus

Six major compliance programs were identified and EMS procedures, processes and tools developed for: Hazardous Waste, Wetlands, Hazardous Materials, Underground Storage Tanks, Water Quality, and Solid Waste.

EMS Accomplishments

Increased environmental awareness in the substantial majority of maintenance employees.

Improved relations with regulatory authorities; thus easing oversight scrutiny, permitting burden, and delays. This has helped Mass Highway to preserve its mission.

Keys to EMS development and implementation success

Executive management support included the Secretary of the Executive Office of Transportation and Construction (EOTC), the Commissioner of Mass Highway, and senior management by declaring the EMS as a goal through the Massachusetts Managing for Results Initiative Program

EMS must be dynamic and adaptive to regulatory and operational changes.

Continued environmental compliance is dependent upon the development of clear lines of authority, responsibility and accountability for environmental management and identification and allocation of adequate funding.

Involve personnel (including managers and staff) from across the organization and the state in efforts.

Communication of expectations, goals, requirements, and procedures to all involved employees ensures that personnel know what is expected and builds consistency. “You cannot communicate enough…”

Use existing methods and procedures as much as possible, with minor modifications as needed, to accomplish what you want to do. This builds acceptance and reduces the need to create new processes. Many people do not accept change readily.

Develop programs to achieve compliance in advance of adopting the formal EMS. This was in part due to regulatory pressure but also allowed the EMS to encompass already existing programs that employees had been using.

Case Study F - New Hampshire Department of Transportation (NHDOT)

2006 Update of EMS Activities

Status of EMS efforts

A committee was established to review EMS feasibility of expanding EMS within NHDOT.

The Bureau of Traffic has implemented many of the initiatives identified by the 2003 AASHTO Case Study.

Further expansion of EMS within NHDOT is under consideration but not immediately contemplated at this time.

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2003 Summary of EMS Case Study

EMS Objectives

Comply with a consent decree to address the management of hazardous wastes generated in pavement marking/traffic line painting activities. The EMS lessons learned are being used in other NHDOT units to support continuous quality improvement efforts.

EMS Functional Focus

Bureau of Traffic

EMS Accomplishments

Evaluated 32 operational activities within the Bureau of Traffic to identify significant aspects of their operations.

Use water based pavement marking paints and clean equipment with water. EMS supported investment in equipment that separates paint waste from the wash water, and allows the remaining water volume to be lawfully discharged into the municipal sewer system. The removed solids are recycled into plastic products. This has resulted in savings of over $25,000 annually in material.

Sheeting materials are hydro stripped from worn aluminum traffic signs by a contractor, and the aluminum sign blanks are returned to the Bureau for reuse. This has resulted in lower resource use, and lower cost to deploy signing, since the reused blanks are 40% less costly than new material.

National Pollutant Discharge Elimination System (NPDES) Phase II compliance at maintenance sites within the Division of Operations was developed using EMS.

Keys to EMS development and implementation success

Combine EMS deployment with health and safety program deployment to minimize the impact on productivity and increase the linkage between the two functions. As a result of these efforts, several important elements of department activities (environment, health, and safety) to be addressed in one operational document.

Top management “buy-in” to support the goals and purposes of EMS and the continuous quality improvement.

Sufficient initial training to understand the ISO 14000 standard and principles of continuous improvement management systems.

Appreciation of the cultural changes required to move from a hierarchical “top down” management system to a team driven system using continuous quality improvement principles.

Development of internal performance auditing capability to “find-and-fix” issues that arise within the system; as opposed to traditional compliance audits which assign blame for non-compliance.

Start the EMS effort in a manageable area to gain experience.

Involve staff at all levels in the process of identifying environmental aspects and developing the EMS.

Case Study G - New York State Department of Transportation (NYSDOT)

2006 Update of EMS Activities

Status of EMS efforts

NYSDOT has integrated environmental stewardship into its strategic planning process. EMS principles will be used to position the organization to achieve this goal. One priority will be the institutionalization of an environmental stewardship ethic within the NYSDOT.

An EMS peer exchange to identify opportunities to improve the NYSDOT EMS was coordinated with the Florida Department of Transportation and Pennsylvania Department of Transportation. This was a productive effort that resulted in many ideas to improve NYSDOT's EMS. FHWA was instrumental to resource this exchange of ideas of best practices between the three DOTs.

NYSDOT's ETRACK database to record, monitor, and check environmental commitments has been refined and improved. Efforts to promote more widespread use of ETRACK are underway.

Maintenance residencies evaluate opportunities for environmental enhancement through their blue-green highway initiative. Segments of highway are inventoried for ideas to improve environmental resources and quality. Funds have been earmarked for this grass roots approach to environmental enhancement. Performance objectives are established, progress is measured, and report cards are shared.

NYSDOT is attempting to establish an environmental stewardship ethic where employees think beyond minimal compliance. Ideas for environmental enhancement are shared throughout the organization. Ideally, each person will regularly ask himself "what can I do to improve the environment?" These objectives will be developed using a pilot approach which upon refinement will be implemented incrementally throughout the organization.

This stewardship approach would form the check phase of the EMS Plan-Do-Check-Act model. ISO 14001 certification in not under consideration due to the cost of certification and burden of administrating independent audits.

EMS efforts take a lot of time and resources to implement. Senior management buy in has been essential during EMS implementation. EMS implementation priorities focus of addressing well established needs with high probability of success.

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Summary of 2003 EMS Case Study

EMS Objectives

Foster a new ethic through transformation of a policy of simple regulatory compliance to one where NYSDOT continually improves its operational and environmental performance, and works with agencies and the public to enhance the State's environment.

EMS Functional Focus

ETS is applied to planning, design, construction, operations, and maintenance.

EMS Accomplishments

New York State won the first AASHTO environmental best practices competition and the AASHTO President's Award. These awards have resulted in increased awareness within the Department and the involvement of more personnel in stewardship activities.

NYSDOT routinely includes specific environmental elements in its project and activities, has developed programmatic approaches to ensure compliance and meet environmental objectives, and has instituted a cultural change throughout the Department to adopt an environmental ethic.

Programmatic approaches to address significant environmental aspects of NYSDOT operations include New York’s Ozone Action Days program NYSDOT historic bridge inventory and management plan, context sensitive solutions, environmental research, Adirondack Park non-native invasive plant species initiative, and alternatives to herbicides demonstration project.

Change within the Department is demonstrated by management support and executive leadership in conveying the environmental ethic, supporting it through environmental staffing resources, including the regional landscape/environmental units and regional environmental staff in operations (maintenance and construction), and embracing a multidisciplinary approach, as evidenced by interagency meetings and committees, partnering efforts with agencies, contractors and communities, the Department-wide erosion and sediment control task force, and the agency recycling team.

NYSDOT has gained stronger, more positive working relationships with external agencies, citizens, local municipalities and other environmental groups, which in turn and have avoided costs by reducing delay, litigation, and frustrating rework, as well as wasted effort arguing contentious issues.

NYSDOT developed ECOPAC (Environmental Commitments & Obligations Package for Construction) (EB 99-055) as a systematic, simple and standardized form to highlight and transfer environmental commitments made during project design to construction staff, to provide an environmental audit tool for construction projects, and to serve as an environmental awareness tool for planning, design and construction staff.

NYSDOT reports and tracks compliance with state regulations in an annual state environmental audit that uses the New York State Department of Environmental Conservation (NYSDEC) automated database. This system generates and self reported audit violation reports to NYSDEC regulators.

NYSDOT developed the ETRACK database, a Microsoft application linked to NYSDOT's Program Support System that tracks projects and their major milestones. The ETRACK database details specific aspects of the project such as environmental, landscape architecture, and social impacts.

NYSDOT created and filled construction and maintenance environmental coordinator positions in each of the NYSDOT eleven regions.

Keys to EMS development and implementation success

Commitment of senior management, beginning with the Governor, over several years ensures that resources to implement the Environmental decisions.

Employees recognize and practice environmental stewardship in their day-to-day activities.

The success of environmental stewardship efforts relies on building a strong team with partners that share the vision. Internal partners include managers and staff from all the program areas. External partners include federal and state agencies, local municipalities, community groups, environmental organizations, and the public.

Communicate results to the public, leaders in government, and regulatory agencies and to recognize employee achievements. This helps build employee "buy-in" and input and provides a foundation for enhanced relationships (and shortened review schedules and costs) with external parties.

The Department's environmental ethic integrates and progresses other concepts such as context sensitive solutions, quality communities, and public outreach.

Case Study H - Pennsylvania Department of Transportation (PennDOT)

2006 Update of EMS Activities

Status of EMS efforts

All maintenance districts have achieved ISO 14001 certification as of 2006.

The costs of operating the EMS are absorbed into regular workload, so they are not tracked and reported separately.

The focus areas of the 2003 case study have not changed.

An independent internal aspects and impacts analysis is conducted annually. ISO 14001 registration requires an annual independent third party audit. Managers of each engineering district provide quality control. It is a challenge to reconcile all three perspectives on the same issue and reach agreement on applicable corrective actions.

DOTs might consider developing their EMS for the entire organization rather than implementing one district or function at a time. It has proven difficult to administrate eleven separate ISO 14001 certifications that expire on different schedules under a three year rotation.

PennDOT has held off implementing changes to the EMS program until all engineering districts have received their first ISO 14001 registration because of complications these changes could affect on ISO 14001 registration in process.

A waste stream management for operations component is under consideration for PennDOT's Engineering District Maintenance Units EMS. All facets of the waste stream would be included: storage, disposal, spill prevention, and cleanup.

Current efforts are underway to refine spill response plans; especially for maintenance paving operations and work that requires a portable fuel tank used at site of work.

PennDOT has a consultant on board evaluating the quantification of EMS costs and benefits. Costs and benefits are difficult to quantify because cost savings realized by implementing an EMS generally results in cost avoidances such as reduced fines or reduced repeat work; resulting in increased productivity. The biggest challenge will be establishing of baseline information that would serve as the basis for measurement and reporting.

PennDOT coordinates annual maintenance project reviews with their local Soil Conservation Service (SCS) Districts for E&S Plans on a programmatic basis. Cross training of PennDOT and SCS has proven useful to resolve technical problems that come up in the field; to measure understanding, and build trust between regulator and regulated.

Costs expended by PennDOT for ISO 14001 EMS development and certification are as follows:

Consultant Assistance with Development & Implementation- $2.3 million over first 5 yrs.

Consultant Assistance with Program Maintenance: - ~$300,000/yr

ISO 14001 3rd-party certification and semi-annual surveillance audits:

District 10 (2002-2005) - ~$27,700 (Initial registration, surveillance, re-registration at 36 mos.)

Districts 4,5,11, & 12 (2003-2005) - ~$46,500 (contract value) (registration and surveillance)

Districts 1-3, 6, 8-9 (2005-present)- ~$74,800 (Registration of 6 district offices and semiannual surveillance audits for all districts)

Projected FY06-07:Re-register 4 districts and surveillance audits for all 11 districts: - ~ $70,812.

Grand Total = $2.8M (FYs 2000-2006) FY06-07 planned expenditures $371K for maintenance & re-registrations

An additional $1.1 million/year/5-yrs was programmed for their 11 Engineering District Office Maintenance Units for stockpile improvements and/or environmental projects (Green Plan Projects), in support of this initiative. Total for SEMP Green Plan projects: $ 4.63M over 5 yrs (does not include additional funding for stockpile "green" capital improvements (salt buildings, salt storm water mgmt. ponds, etc.) administered by our Faculties Mgmt. Division ($17M through FY03).

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2003 Summary of EMS Case Study

EMS Objectives

Pursue ISO 14001 certification for maintenance activities in each 11 Engineering Districts, covering 67 counties, and involving more than 5000 employees.

EMS Functional Focus

Maintenance units in engineering districts since they are the key link between the Department and its stakeholders, customers, and regulators. Maintenance compromises more than 75% of a District's work force and utilizes a vast majority of the Department's operating budget.

Maintenance is viewed as providing the greatest opportunity to achieve consistency in compliance and overall environmental performance.

EMS Accomplishments

Obtained ISO 14001 certification in 2004 for Engineering District 10 in December 2002.

Materials usage control practices helped extend the life of road salt inventory by as much as 3 weeks during the 2002-3 winters.

EMS procedures and processes in Districts 10, 11, and 12 were recognized by Pennsylvania Department of Environmental Protection as a best management practice that resulted in streamlined oversight, monitoring, and permitting needs.

EMS control procedures, practices, and training extends work crew and equipment productivity by up to two weeks at no additional cost, resulting in a cost avoidance benefit of $25,000/year for district labor and equipment.

Keys to EMS development and implementation success

Pilot EMS implementation in one district before full scale implementation. District 10 EMS implementation pilots took about 18 months. This allows rollout to other Districts to build on existing successes and programs.

District management teams met every 3 weeks for 2-3 hours to plan implementation procedures, processes, and tools. Due to pilot programs, EMS implementation for the final 6 Districts resulted in reducing amount of hours for management team meetings.

District process owners lead day to day EMS implementation in each District.

Visible commitment of senior management, particularly in each District cannot be emphasized enough.

Involve the workforce including organized labor, especially in development and training activities.

Fit EMS to your existing procedures and processes; not the other way around.

Communicate goals, objectives, plans, and successes.

Implementation isn't the end. The program must be maintained.

Case Study I - Texas Department of Transportation (TxDOT)

2006 Update of EMS Activities

Status of EMS efforts

TxDot has expanded the scope and scale of it's EMS system. An internal environmental compliance analysis was completed in January 2006. The findings were rolled into an expanded EMS implementation plan. These new efforts have lead to a compliance focused EMS system that includes planning, environmental compliance, design, and construction (with special emphasis on field operations).

This focus on construction is divided into six areas of emphasis:

1. Development of an EMS policy statement,
2. identification of environmental requirements, Communicate environmental commitments and restrictions,
3. define roles and responsibilities of staff and stakeholders,
4. training and development of competency standards
5. monitor environmental compliance measures and implement assurance controls. and
6. establish document control process.

The expanded EMS emphasis on construction has five year roll out plan. The program will be piloted in three TxDOT Districts; one rural, urban, and metropolitan area. When the expanded EMS program is perfected it will be rolled out to the remaining 22 districts over the next 2 year period.

Though an information technology system will be implemented to support these expanded efforts; it is not the current area of emphasis.

Senior management support and buy in have been critical to project success thus far. Oversight by high level executives has helped the project manager resolve differences and power struggles within TxDOT.

Benefits of the EMS are difficult to quantity since they are based on cost avoidance. Development costs for consultants and information technology systems are generally quantifiable. Operational costs are absorbed into day to day operating expenditures.

Consultant support for EMS development in your DOT can add value to your process when utilized correctly. To implement a successful EMS you cannot rely on the consultant to implement a turn key system for you. Successful EMS development requires active participation by all levels of DOT employees and management.

Some regulators may be using EMS as a mitigation measure for regulatory enforcement action against a DOT. Accepting these conditions can align the organization for a successful EMS implementation, fighting these conditions will likely delay and complicate delivery of your EMS.

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Summary of 2003 EMS Case Study

EMS Objectives

The TxDOT's EMS objective is to provide an environmentally sensitive transportation system that is integrated into TxDOT's need to provide a comfortable, safe, durable, cost-effective, and aesthetically appealing state transportation system.

EMS Functional Focus

Project planning and development process was established to plan projects in a more timely, accurate, and environmentally sensitive way.

Construction and facility operations were targeted to comply with environmental requirements and commitments, and to avoid regulatory fines, penalties, and construction delays.

EMS Accomplishments

Environmental tracking system (ETS) monitors projects through the planning process to ensure NEPA issues are addressed and environmental permits are coordinated before the project is constructed.

Construction and maintenance personnel use ETS to access this information to identify environmental constraints and to comply with environmental rules, laws, and requirements.

ETS estimates process time to deliver environmental compliance, ROW, and PS&E. The entire organization can identify critical paths that are not always obvious; thereby delivering plans more efficiently and effectively. This system creates a paperless work environment where documents are reviewed and circulated electronically.

Environmental permits, issues, and commitments (EPIC) is used by Designers to confirm environmental permits, issues, and commitments are integrated into the project plans.

Keys to EMS development and implementation success

District Environmental Coordinators have been assigned to perform environmental performance reviews for construction and maintenance projects as follows:

EPICS identified for a project are addressed properly in construction and maintenance.

Comprehensive review of at least one project with permits, formal consultation, or other mitigation requirements.

Storm water and other permit project reviews are conducted to ensure compliance and documentation efforts are sufficient.

Case Study J - Tri-County Metropolitan Transportation District (TriMet)

2006 Update of EMS Activities

Status of EMS efforts

TriMet is committed to environmental management system principles with the organizational goal of implementation throughout the agency.

The current emphasis for EMS is on maintenance facilities and operations with the objectives of improved environmental compliance and avoidance of adverse regulatory actions.

Most recently, a sustainability team was created to evaluate ongoing EMS efforts to expand them beyond the maintenance facility fence line and incorporate sustainable practices throughout the agency.

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2003 Summary of EMS Case Study

EMS Objectives

By providing efficient transportation alternatives and taking cars off our roads, TriMet helps preserve the regions quality of life, keeps air clean, and is recognized as one of America's best transit systems.

EMS Functional Focus

The fence line for EMS establishment is TriMet's 5 maintenance facilities benefiting about 580 maintenance employees. Future plans include the maintenance right of way department and purchasing/procurement department.

EMS Accomplishments

Implemented EMS for TriMet's 5 maintenance facilities benefiting about 580 maintenance employees.

Established a core EMS team is made up of three members of the EMS steering committee with the EMS project manager designated as the environmental management representative, 7 employees from maintenance, maintenance of way, facilities management and safety departments make up the remainder of the EMS Core Team.

Keys to EMS development and implementation success

Internal drivers that offered similar benefits for the environment:

- Improved employee participation in the facility's environmental performance.
- Improved overall environmental performance.
- Improved facility compliance with environmental regulations; and an opportunity to use employee creativity to move beyond regulations.
- Increased support from environmental professionals including EPA, DOE, DEQ.
- Executive order from Governor mandating sustainable state offices by 2025.

Regulatory benefits and enhanced relationships with regulators from EPA's performance track to Oregon DEQ's green permits.

EMS is an ideal framework to transition easily into green building initiatives, LEED certification and energy star buildings.

Case Study K - Utah Department of Transportation (UDOT)

2006 Update of EMS Activities

Status of EMS efforts

UDOT has developed an EMS implementation work plan jointly with the AASHTO Center for Environmental Excellence. The following status is based on the executive summary of the work plan, as prepared by Brent Jenson and his team of UDOT employees.

EMS Focus

The focus of the UDOT EMS is primarily based on the findings and recommendations presented in the Joint UDOT/FHWA environmental commitments process review dated June 2005.

Expected Goals and Benefits

Improved communication of environmental commitments is expected when EMS procedures and processes are designed to improved communication of commitments across UDOT units. EMS training will be provided for all personnel who could ensure fulfillment of commitments.

An EMS is visible evidence of a commitment to and the means to achieve environmental compliance and improvement. This EMS' structure and products address five of the UDOT/FHWA process review recommendations. The EMS also provides the means to reduce or eliminate the commitments fulfillment percentages noted in the process review – 23% of the commitments could not be verified, and 6% of the commitments were not implemented.

EMSs are recognized by FHWA, AASHTO, and other organizations as keys for stream-lined project delivery. EMS provides a basis for improved relationships with State and Federal partnering agencies. Commitments verification and documentation address the perception that additional commitments are needed because of past performance; resulting in minimization or elimination of such permitting delays.

Improved relationships with partnering agencies have been shown to reduce the time and cost of project reviews and approvals (such reductions can save months and thousands of dollars). This avoids retrofit costs and delays.

Resource Requirements

It is estimated that development and implementation (including product development, reviews, implementation, and training) would require 936 hours of personnel time in this fiscal year and $2,000 for travel and miscellaneous expenses.

Implementation efforts would be performed in the normal course of operations. Development would be led by Bent Jensen and the Central Environmental Unit.

Other central office units involved in development and implementation include: preconstruction, maintenance, planning, consultant services, construction, right of way, and project management. Regional office involvement include: design, construction, maintenance, environmental, right of way, and directors.

EMS Schedule

Development efforts would be completed by June 2006 pending receipt of management approval to proceed by February 2006. Implementation, with determinations of success and initial modifications to ensure continued use and success, could be completed by February 2007.

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Summary of 2003 EMS Case Study

No case study prepared in 2003.

Case Study L - Washington Department of Transportation (WSDOT)

2006 Update of EMS Activities

Status of EMS efforts

Significant progress has been made to implement EMS and efforts are continuing.

WSDOT is continuing to focus is on implementing EMS basic features without full blown adoption of ISO 14001 standards and terminology.

WSDOT is doing a good job tracking environmental commitments using a database matrix system.

The EMS database matrix system is used to:

- Measure status of environmental commitment by tracking each commitment from project initiation through construction.
- Provide a check list to assure commitments are kept and to avoid having commitments overlooked.
- Plan and track internal work.
- Assure quality by cross checking that contract documents include specification and plan details for each environmental commitment. Including bid items helps control costs since performing with work by contract change orders; a more costly way of doing business.

WSDOT is currently working with regulators to reduce overlap of environmental requirements between agencies, to better comply with regulatory conditions, and to improve the consistency of regulatory requirements placed on the Department.

WSDOT is trying to improve regulatory agencies understanding of WSDOT work through perhaps using/references contract specifications in their permits. Though these efforts are just beginning, regulators have been receptive.

EMS is being implemented so that the processes and principles are transparent and no one thinks about them specifically as the "EMS effort". The strategy is to integrate EMS into current business operations without a separate system. Since the pieces of the EMS are integrated into and spread throughout the organization's business operations, EMS must be described through reference to independent IT systems, manuals, policies, contracts, and day to day business practices.

WSDOT's EMS does not emphasize recyclable materials and products integration and tracking. This was a misunderstanding in the earlier 2003 EMS Case Study.

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Summary of 2003 EMS Case Study

EMS Objectives

Integrate environmental issues into program and project delivery.

Support the Department's regulatory compliance obligation, demonstrate environmental stewardship, improve credibility regarding environmental issues, and streamline internal environmental processes.

EMS Functional Focus

Initial focus will be on construction, maintenance, operations, and the State ferry system.

EMS Planned Accomplishments

WSDOT’s plans it's EMS accomplishments to avoid or minimize the effects of non-compliance, save money, and improve relationships include:

- Establish beneficial dialogue between core business activities and the environmental unit.
- Clarify roles and responsibilities.
- Establish systematic performances measurement.
- Identify quantifiable measures of environmental performance.
- Develop a clear path for reporting environmental performance.
- Implement compliance assurance procedures.

EMS Expected Benefits

Achieve consistent compliance and an ability to demonstrate compliance.

Measure recyclable materials and the use of recycled products.

Demonstrate improved environmental performance.

Improve credibility with public and regulatory agencies.

Keys to Planned EMS development and implementation success

Integrate the EMS into existing business systems, creating as little new programs as possible.

Ensure good communication between and through senior management to the EMS office.

Avoid the use of ISO terminology. Use familiar terms to describe the effort.

Develop “mock-ups” that describe how an EMS would function and what it would look like are very beneficial to senior management.

Visible and strong commitment from senior management is key to continuing efforts.

Build on existing successes and programs.

Continually identify and evaluate opportunities to expand the EMS throughout all departments.

Routinely (frequent as opposed to lengthy) communicate goals, objectives, plans, and successes.

Stress program maintenance along with implementation.