NCHRP 25-25, Task 111

Environmental Management System Perspectives for State DOTs


February 26, 2019
What We Will Cover Today

- Describe the 25-25 111 EMS Study
- Define EMS
- Present Findings and Applications
- Demonstrate the EMS Information Array
- Questions & Answers
OBJECTIVE: The objective of this research is to provide practical examples of how transportation agencies created and are using EMS to address their operational issues and goals in the context of an ISO-compliant system.
Project Team

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- Douglas Parker, Louis Berger
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- Ann Hartell, NCHRP Senior Program Officer
Environmental Management System (EMS)

- Environmental / Regulatory / Stewardship
  - Air
  - Water
  - Noise
  - Ecology
  - Cultural
  - Waste
Environmental **Management** System (EMS)

EMS

**Management**
Definition: the process of dealing with or controlling things or people

Synonyms: management, running, direction, control, governing, administration, supervision
Environmental Management System (EMS)

Plan
Act (improve)
Check
Do

Systematic & Proactive
### Guided by PDCA

<table>
<thead>
<tr>
<th>Plan</th>
<th>Written Procedures</th>
<th>Performance Targets</th>
<th>Integrated with Quality Assurance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do</td>
<td>Training (all staff levels)</td>
<td>Record Keeping</td>
<td>Reporting</td>
</tr>
<tr>
<td>Check</td>
<td>Audit</td>
<td>Roll up to agency wide Compliance</td>
<td></td>
</tr>
<tr>
<td>Act (improve)</td>
<td>Audit Follow up</td>
<td>Research</td>
<td></td>
</tr>
</tbody>
</table>
Study Steps

1. Web Survey
2. Literature Review
3. Survey
4. Interviews
5. Findings
6. Analysis
7. Tool Development
EMS considered essential and cost effective
EMS / (QA) is a standard business practice
ISO 14001 certifications are rare
Most DOTs have gaps in their PDCA cycle
DOT units approach EMS independently
EMS tends to be reactive in practice
Findings - EMS in Practice

- EMS can promote “Streamlining”
- Ownership fosters rigor
- Integration improves efficiency
- Staff training and engagement is common
- “Checking” and “Acting” tend to be done as time (and knowledge) permits
Analysis:
EMS Practice by Program Area

Highway Maintenance Activities

EMS procedures for highway maintenance activities are practically universal with record keeping, training, and reporting utilized by most and audit and audit follow-up employed by almost a third of those reporting. Embedded environmental expertise, field availability of GIS resource mapping, "tailgate" training, and a developing stewardship ethic are among the most promising developments in this area. However, less than a third of DOTs seem to have performance targets and only seven with second actions utilize the full POCA system.
Need for EMS IA

- EMS benefits are being “left on the table”
- EMS assessment methods are lacking
- Proven EMS processes are unpublished
- Environmental Units may not understand Maintenance and Operational processes and needs
Information Array (IA)

Benchmarking tool

- Agency Wide View
- Identify Gaps
- Facilitate Improvements
One Size Will Not Fit All

- Ownership is essential
- PDCA may be universal, but different institutional settings
  - Culture
  - Setting
  - Capacity
  - Leadership
- Planning ≠ Design ≠ Maintenance
DOT EMS IA - Layout
Tab 2: Instructions

**NCHRP DOT Environmental Management System Information Array (DOT EMS IA)**

**Background**

- What an EMS is.
- How to successfully initiate / expand / benchmark an EMS.
- How to improve EMS effectiveness using peer resources, and
- How to quickly access EMS literature and survey data.

As used herein, an Environmental Management System (EMS) is defined as a systematic means of planning, executing, checking, revising, and improving environmental compliance and/or stewardship. In this light, even basic quality assurance procedures for avoidance of environmental violations are within the continuum of ESM applications.

**Information Access / Benchmarking Instructions**

Practitioners may begin by reviewing the DOT EMS Prototype Benchmarking Tool at Tab 3 DOT EMS Agency Benchmarking Tool with their agency’s Plan/Do/Check/Act procedures to gain an agency-wide perspective of EMS practice across all program areas.

For more detailed analysis of agency EMS practices within each program area, Tab 6 Program Level Benchmarking, Tab 4 allows practitioners to compare their (or other) state survey data with commonly accepted Plan/Do/Check/Act conventions. The Benchmarking Lookup Tool also allows the user to search and assess by topic and by state by clicking on the “arrow” icons of the various “column” tabulations.

Further background, references, and examples from the survey may be found at Tab 5 State DOT References.

Additional tabs contain suggested search terms (Tab 6 Keywords), literature summaries (Tabs B-8: Literature Review), and links as specified. A webinar presentation, including an example application of this Information Array, may be opened by clicking on the link to the right.

**EMS IA Excel Tips and Tricks**

1. The information in this Excel spreadsheet is presented in “read only” mode but may be downloaded and modified for local use.
2. The spreadsheet contains hyperlinks and an occasional “mouse-over” feature. Clicking on embedded links will take you to the associated webpage or location within a tab. “Mouse-over” comments will appear when your cursor selects the active cell.
3. Pressing “Control + F” activates a search function within the document. This can be used to search for a specific word or phrase. A listing of common search terms is available at Tab 6: Keywords.
4. Tabs at the bottom of the page access separate topics as labeled. The arrow keys to the left of the first tab can be right-clicked to view and select from available tabs.
5. For additional instructions on the use of Excel, please see the “Tell me what you want to do...” in the menu at the top of this page, or press “ALT-H” and begin typing a question or keywords.
EMS IA - Instructions

For use by DOT Environmental Staff, Design Managers, Maintenance Engineers, Operation Managers, and Executive Staff to understand and access reference material on:

1. What an EMS is
2. How to successfully initiate / expand / benchmark an EMS
3. How to improve EMS effectiveness using peer resources, and
4. How to quickly access EMS literature and survey data.

*Begin with Tab 3 - Benchmarking*
Tab 3: Prototype Benchmarking Tool

<table>
<thead>
<tr>
<th>Benchmarking Tool</th>
<th>Plan</th>
<th>Do</th>
<th>Check</th>
<th>Act (Improve)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Program Area</strong></td>
<td></td>
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</tr>
<tr>
<td>Equipment Management</td>
<td>Written Procedures, Performance Targets</td>
<td>Integrated with Quality Assurance Training (of all staff levels)</td>
<td>Audit</td>
<td>Roll up to Agency Wide Compliance</td>
</tr>
<tr>
<td>Equipment Management</td>
<td>Materials recycled, good housekeeping practiced.</td>
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</tr>
<tr>
<td>Highway Maintenance Facilities</td>
<td>Materials, fuels, stormwater, wastes under active management.</td>
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</tr>
<tr>
<td>Highway Maintenance Activities</td>
<td>Sensitive resources factored into planning, training, audit and support.</td>
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</tr>
<tr>
<td>NEPA</td>
<td>Commitments tracked through construction and maintenance.</td>
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</tr>
<tr>
<td>Bridge Maintenance</td>
<td>Sensitive resources, factored into planning, training, audit and support.</td>
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<tr>
<td>Other Activities</td>
<td>Specialized support engaged.</td>
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</tr>
</tbody>
</table>

**Instructions**

3 - DOT EMS Agency Benchmarking

4 - Program Level Benchmarking

5 - State DOT References

6 - Keywords

7 - State DOT References
Tab 4: Program Level Benchmarking

<table>
<thead>
<tr>
<th>Plan</th>
<th>Do</th>
<th>Check</th>
<th>Act (improve)</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equipment Maintenance</td>
<td></td>
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<tr>
<td>Written procedures, record keeping, and training followed by audits are not done. Processes are inconsistent and non-compliant, leading to discrepancies.</td>
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<tr>
<td>Facility Maintenance Reviews</td>
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<tr>
<td>Less than half of the facilities responding have performance targets and less than a quarter report ITPA targets.</td>
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<tr>
<td>Bridge Maintenance</td>
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<tr>
<td>Other Activities</td>
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</tbody>
</table>

Highway Maintenance Facilities

EMS procedures for highway maintenance facilities seem more rigorous and result in better performance. They have established performance targets and are more transparent in their reporting. ITPA reports are more comprehensive compared to those of the other sectors.
Filter for State Data

Equipment Maintenance

<table>
<thead>
<tr>
<th>States / State Summary</th>
<th>Plan</th>
<th>Do</th>
<th>Check</th>
<th>Act (Improve)</th>
</tr>
</thead>
<tbody>
<tr>
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<td>13/13</td>
<td>6/13</td>
<td>12/13</td>
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- Arizona
- Arkansas
- California
- Colorado
- Connecticut
- Delaware
- District of Columbia
- Florida
- Georgia
- Hawaii
- Illinois
- Indiana
- Iowa
- Kansas
- Kentucky
- Louisiana
- Maine
- Maryland
- Massachusetts
- Michigan
- Minnesota
- Mississippi
- Missouri
- Montana
- Nebraska
- Nevada
- New Hampshire
- New Jersey
- New York
- North Carolina
- North Dakota
- Ohio

4 - Program Level Benchmarking

Agency Benchmarking

4 - Program Level Benchmarking

5 - State DOT References
<table>
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<tr>
<th>Topic</th>
<th>State DOT</th>
<th>Link</th>
<th>Date</th>
<th>Document</th>
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<td><a href="https://www.mhcc.org/documents/EMS/EMS%202016%20EMS%20Equipment%20Management%20EMS%20Equipment%20Management.pdf">https://www.mhcc.org/documents/EMS/EMS%202016%20EMS%20Equipment%20Management%20EMS%20Equipment%20Management.pdf</a></td>
<td>2017</td>
<td>Environmental Accuracy, Inventory, Significance Ranking</td>
<td>audit, recordkeeping, inspection,</td>
</tr>
</tbody>
</table>
## SURVEY RESPONSE

See the Final Report for additional background and detail [Hyperlink].

## GENERAL FRAMEWORK AND HISTORY

1. Application of EMS elements across various state DOT operations have expanded over the years.
2. Most operational units have developed and implemented their own processes and procedures in some form or another.
3. Virtually all state DOTs are using elements of the ISO 14001 EMS standard, but only a few have fully implemented it.
4. EMS programs have been a key to realizing cost savings and other efficiencies.
5. While clearly important, funding has generally not been a driving (or a limiting) issue.
6. Regulatory pressure was a consideration in the past but does not appear to be a direct driver today.

## TOPIC

6a. Using the definition above, please indicate how your agency applies environmental management systems (EMS) in its daily operations.

### STATE

<table>
<thead>
<tr>
<th>Agency Name</th>
<th>DOT Environmental Director/Staff</th>
<th>Meet</th>
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# Tab 4: Benchmarking Lookup

<table>
<thead>
<tr>
<th>States / State Summary</th>
<th>Plan</th>
<th>Do</th>
<th>Check</th>
<th>Act (Improve)</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tabulated State Summary</td>
<td>Written Procedures</td>
<td>Performance Targets</td>
<td>Integrated with Quality Assurance</td>
<td>Training (at all staff levels)</td>
<td>Record Keeping</td>
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<table>
<thead>
<tr>
<th>YOUR DOT</th>
<th>Plan</th>
<th>Do</th>
<th>Check</th>
<th>Act (Improve)</th>
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</table>

Written procedures, record keeping, and training followed by audits are core EMS processes, so their predominance is indicative of a serious interest in EMS for equipment maintenance. However, less than half of the organizations responding have performance targets and less than a quarter report PDCA capabilities.
<table>
<thead>
<tr>
<th>Topic</th>
<th>State DOT</th>
<th>Link</th>
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</thead>
<tbody>
<tr>
<td>EMS Equipment Management</td>
<td>New Hampshire</td>
<td><a href="https://www.nh.gov/dot/operations/highwaymaintenance/documents/EMSGloss">EMS Gloss</a></td>
</tr>
<tr>
<td>EMS Equipment Management</td>
<td>Oregon</td>
<td><a href="https://www.nh.gov/dot/operations/highwaymaintenance/documents/EMSGloss">EMS Gloss</a></td>
</tr>
</tbody>
</table>
1.4 EMPTY CONTAINERS

- Empty drums should be stored in a manner that indicates the drum is empty. Examples of ways to show the drum is empty include storing the drum sideways with the bungs horizontal, labeling the drum "empty," or keeping the drum in an area signed "empty drums" or similar wording. Refrain from storing drums that previously contained liquids upside-down.

Figure 1-1: Examples of ways to store a drum that indicate the drum is empty.

- If an empty container will be reused, the original label should be removed. The container should be relabeled with the intended contents, such as "trash" or "metal parts."

- Empty drums should be returned to the vendor for reconditioning, where available.

- Where available, recycling is recommended for empty containers that are not reused or returned to the vendor (e.g., recycling unwanted metal drums and cans as scrap metal). Contact local recyclers for availability and requirements.

- Empty containers that are not recycled, reused, or returned to the vendor should be managed as solid waste (i.e., trash). A list of permitted municipal landfills and transfer stations is located in Appendix J. Plastic drums should be cut into two separate pieces prior to disposal. Contact the local landfill for specific requirements.
Summary

- 25-25 111 EMS Study available
- EMS benefits not fully realized
- EMS Information Array can help DOT’s “Step up their game”

For more information on NCHRP 25-25/Task 111 (Including the Final Report):


Or search: NCHRP 25 25 EMS
Or visit: AASHTO - CEE - EMS

For technical questions on the data or variables, contact:
Gary R. McVoy, Ph.D.
Principal Investigator
gmcvoyllc@gmail.com
518.368.8374

Additional implementation assistance may be also available from:
6 Questions / Comments