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LEAN CASE STUDIES: CONTINUOUS IMPROVEMENT IN STATE AGENCIES

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INTRODUCTION

State environmental leaders are successfully leveraging Lean approaches to improve the quality of the services they deliver to a wide range of customers. Maximizing cost efficiencies and minimizing budget cuts and employee lay-offs are paramount for today's public sector official. For agencies feeling the pinch of declining resources in today's economy, consider giving continuous improvement tools a second look.

Lean is a process improvement approach and set of methods that seek to eliminate non-value added activities or waste. Kaizen and Value Stream Mapping (VSM) events are key to Lean's effectiveness in making rapid, breakthrough improvements while creating an employee-empowered continual improvement culture. In Japanese, *kai* means "to take apart," and *zen* means "to make good."

For the past few years, state governmental agencies with primacy over the administration of environmental programs have begun to significantly improve permitting and administrative processes using Kaizen, VSM, and Six Sigma. Lean events have cut lead times for air and water permit reviews, reduced the complexity and redundancy of administrative tasks and procedures, and improved the quality of state agency reporting, products, and services. The Lean process improves relationships among and between states and stakeholders, U.S. EPA regions, and EPA headquarters. Most importantly, Lean helps states to more efficiently and effectively reach their environmental protection goals.

This report is a compilation of 23 case studies provided by states and the EPA. The studies document the successes that states—and at least one region—have achieved utilizing lean process improvement techniques. The description of the state Lean events include specific examples of the types of changes

that environmental—and other—agencies have made as part of their efforts to cut costs, improve delivery of services, and streamline programs.

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Connecticut - Evaluation of the Air Planning and Standards Division Permit Modeling Program

State Agency: Connecticut Department of Environmental Protection (DEP), Bureau of Air Management (BAM), Planning and Standards Division (PSD)

Method Implemented: Kaizen Event

Summary: The current Division's regulatory air modeling process is impacting the timely issuance of new source review (NSR) air permits. The process under review starts with a pre-permit application meeting through approval of a dispersion modeling analysis performed in support of a permit application.

Scope of the Kaizen Project

Specific Process Involved: Evaluation of the Air Planning and Standards Division Permit Modeling Program.

Goals and Objectives:

- Conduct Value Stream mapping of all steps that affect the modeling process.
- Eliminate wastes and/or non-value added steps found in process.
- Identify ways to improve the process to free up internal staff resources and to contribute to a reduction in elapsed time between a pre-application meeting and final permit approval.
- Establish baseline measures for the Division's permit modeling process and track improvements over time.
- Reduce processing time by one-third.
- Develop project plan to implement changes.
- Develop time measurement system for tracking and reporting projects.
- Update guidance and databases to improve communication flow and make process more visible to stakeholders.
- Increase efficiencies in disseminating inventory data.

Year Conducted: June 2008

Consultant Support: Leanovations, LLC

Process Changes and Results

As a result of this event, the Planning and Standards Division made a number of process changes, including the following:

- Based on our Value Stream Mapping, achieved a 43percent reduction in the number of total steps in the process.
- Rewrote of modeling guidance.
- Implemented new business rules.
- Made key information accessible via DEP website.
- Created and maintain visual boards.

The project yielded the following results:

- Trend indicates reduction in processing time; major improvement goals for the process are still in development.
- Project Plan completed and, to date, 20 tasks out of 38 were completed.
- Development of a time measurement system for tracking and reporting projects was completed, and Key Performance Indicators (KPI) now are tracked.
- In progress/updated guidance and databases. Enhanced and improved Web access; created status mapping boards visible to the public; developed new business rules to facilitate process; developing new guidance document for web posting (currently editing draft document); developing databases which stakeholders can use to facilitate a modeling review (hit a national snag in the quality of data available; expecting resolution from EPA 1st quarter 2009).
- Completed short-term improvement in the dissemination of inventory data by eliminating F.O.I.A. request. Require electronic request of data for speed and tracking purposes. Currently working on e-government inventory access (EMIT On-Line).

Post-Kaizen desired state resulted in improved program efficiencies:

- Eliminating administrative wait time has cut the time required to process an inventory request.
- Document transfer time has been reduced to a minimum by the elimination of some supervisory sign-offs and electronic transfer of all documents.
- A significant time step of approximately 10 days for delivery of ambient monitoring data has been eliminated by making this data available to stakeholders on the agency website.

Highlights of the Implementation Project Plan included:

Two-month goals:

1. *Meet with Northeast regional modeling contacts:* At a meeting of the Northeast states modeling contacts, states coordinated to develop common databases, and guidance was discussed; cooperation from other states on modeling guidance expected, but initial database effort will be minimal due to lack of resources and funds for such an effort.
2. *Amended permit application instructions:* Expedite review process by requiring submission of two paper copies and one electronic copy of the application, eliminate supervisory sign-off on modeling transmittal memo, and send memo electronically.
3. *Eliminate F.O.I.A. request for routine inventory search:* Stakeholder can contact appropriate staff directly via e-mail.
4. *File all documents in to SIMS (Site Information Management System):* Drafted and finalized protocol for entering documents into SIMS.
5. *Prepared spreadsheets of measured design concentrations for all criteria pollutants:* Posted this data on the web and developed maps of this data to post on the web.
6. *Prepare spreadsheet of PM_{2.5} 24-hour measured data:* These text files were developed and placed on the website so that stakeholders have direct access to the data at all times; this will save information transfer time.
7. *Develop work plan for uploading inventory data on web:* This is a long term (one year) plan to give stakeholders direct read-only access to routine inventory emissions and stack parameter information.
8. *Develop modeling project spreadsheet and post a visual for the public:* Informs stakeholders about the status of projects at a glance.

Status: Completed - 1, 2, 3, 4, 5, 6, and 8; Ongoing - 7

Six-month goals:

1. *Develop first draft of revised modeling guidance document:* Review current guidance from other states, identify best guidance as a template, write first draft document.
2. *Prepare meteorological data sets for posting on web:* Develop pre-processed meteorological data sets that stakeholders can use in their regulatory modeling.
3. *Quality-assure inventory data for web posting:* QA data to limit need for agency interaction w/stakeholders, this task has not been started.

Status: Completed – 1; Ongoing - 2; Not started - 3

Twelve month goals:

1. *Upload completed meteorological data sets to web page:* Met. Database development is ongoing; some snags have been identified, but one-year completion deadline should be met.
2. *Provide stakeholders opportunity to weigh in on draft revised modeling guidance (March 2009):* To maintain an open process and obtain valuable input from stakeholders.
3. *Finalize revised modeling guidance and post on web page:* Promote consistency, make modeling process as transparent as possible, and avoid mistakes and misunderstandings that lead to frequent rework by stakeholder and re-review by agency.
4. *Post inventory data on web page:* On going through the EMIT On-Line effort.

Status: Ongoing and On Schedule: 1, 2, and 3 on schedule; Ongoing and not on schedule: 4

Additional Comments

Development of KPI chart documented baseline time steps in the modeling process and brought into focus a current timeline of the process and a clear need to implement and even improve the draft project plan. Critical in the process is having management support in accepting recommendations for change and being fully engaged in implementation. Work done by this team has been shared with the eight NESCAUM states; they have been interested in our progress, and we have been updating them on our NESCAUM Modeling Committee quarterly conference calls. A thoroughly detailed and honest Value Stream Mapping of the process is the foundation for everything that follows.

More Information

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**Connecticut - Office of Long Island Sound Structures, Dredging, and Fill Permit
Application Review Process**

State Agency: Connecticut Department of Environmental Protection (DEP), Bureau of Water Protection and Land Reuse, Office of Long Island Sound

Method Implemented: Kaizen Event

Summary: Waste in the Division's Structures, Dredging, and Fill (SDF) permit application review process creates extended processing times and inefficiencies, preventing staff from undertaking new initiatives in permitting, compliance, and enforcement. The specific process is the review of full permit applications from receipt to issuance of the permit document.

Scope of the Kaizen Project

Specific Process Involved: Structures, Dredging, and Fill Permit Application Review Process

Goals and Objectives:

- Identify waste within the permit application review process including the initial completeness review, consistency determination, site inspections, general processing, and internal review, approval, and sign-off steps.
- Develop a value stream map of the permitting process, document process steps, and develop written Standard Operating Procedures.
- Reduce average processing time by minimizing the number of steps in the process.
- Reduce average processing time of initial response letter ("fee letter").
- Reduce average processing time from application receipt to permit decision.
- Reduce the pending permit application backlog by 50 percent.

Year Conducted: June 2008

Consultant Support: Leanovations, LLC

Process Changes and Results

As a result of this event, the Office of Long Island Sound made a number of changes to the application review process, including the following:

- Eliminated steps in the permit review process, which were not value-added.
- Eliminated the time-consuming back and forth between the analyst and the applicant/engineer.
- Instituted a new permit review process whereby the applicant is required to coordinate with state and local entities prior to application submission in order to identify potential concerns and obtain recommendations.
- Strongly encouraged pre-application meetings between applicants/engineers and staff to assure the submission of a complete application that is consistent with statutory standards.
- Standardized forms and permit documents.
- Substantially reduced certified and general mailings that were not required by statute to reduce costs.
- Began the use of new permit process documents and mail procedures prior to the complete implementation of Lean to glean the early benefits from the Lean process.

The project yielded the following results:

- Completed the value stream map and development of written Standard Operating Procedures.
- Reduced average process review steps from 132 steps (June 2008) to 76 steps (January 2009) (42percent reduction).
- Reduced average processing time of initial response letter from 205 days (June 2008) to 23 days (January 2009) (89 percent reduction) (one application; proposed was 30 days).

- Reduced average processing time from application receipt to permit decision from 566 days (June 2008) to 52 days (January 2009) (90 percent reduction) (one application; proposed was 131 days).
- Reduced application backlog from 269 (June 2008) to 262 (January 2009) (3percent reduction).

Post-Kaizen desired state resulted in improved program efficiencies:

- Pre-application consultation with local officials and resource experts eliminates nearly all waiting for review/response during application review and allows applicants to revise application before even submitting to DEP.
- Requirement for surveys to be submitted with all application drawings so that DEP may rely upon drawings with greater certainty of site conditions.
- Revised mailing list to provide significant time and cost savings for DEP.
- New Pre-Application Questionnaire allows DEP to identify concerns early in the process.

Highlights of the Implementation Project Plan included:

Two month goals:

1. Revise protocol for clerical staff assignment of applications by town-assignments.
2. Complete hard copy of future state map.
3. Create central location for all new permit template documents.
4. Create new consultation forms and instructions.
5. Develop new notice of insufficiency and other correspondence.
6. Develop new summary sheets (completed for all goals).

Six-month goals:

1. Create new application form and instructions.
2. Train permit staff on new review procedures.
3. Conduct outreach and training for regulated community and consultants.
4. Conduct outreach and training for local officials and resource experts.
5. Develop protocol for analyst recommendation meeting.
6. Develop permit process.
7. Upload new forms to Internet.
8. Request delegation of authority to Bureau Chief for signature.
9. Train clerical staff on new PN procedure.
10. Develop Frequently Asked Questions document; implement new procedure (November 1, 2008) (completed and/or ongoing for all goals).

Twelve month goals:

1. Seek statutory/regulatory change for application fees.
2. Develop process for expiration notices.
3. Conduct customer survey (Status Update: June 30, 2009).

Additional Comments

The transition period allowed direct attention to be paid to backlogged applications. The regulated community embraced change and suggested additional improvements and innovations. CT DEP hopes to expand process improvements to other application types in near future. The post-Kaizen regular meetings are critical to ensuring that forward momentum continues. We recognize that Key Performance Indicators may not show immediate results, especially when a full application process is the focus of Kaizen improvement.

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Connecticut - Evaluation of the Water Permitting and Enforcement Division's Enforcement Program

State Agency: Connecticut Department of Environmental Protection (DEP), Bureau of Materials Management & Compliance Assurance (MMCA), Water Permitting and Enforcement Division (WPED)

Method Implemented: Kaizen Event

Summary: The Division's Enforcement programs do not consistently meet the Department's Enforcement Response Policy (ERP) timeframes. The Division includes three separate enforcement programs – Storm Water Permitting and Enforcement; Industrial Enforcement; and Field Compliance and Enforcement. Each of the program's administrative enforcement processes needs to be evaluated and standardized to improve overall enforcement program timeliness. The work processes under review are from the point of an issuance of an NOV, through to its subsequent next steps – either to closure or to an elevated enforcement action (i.e., draft Consent Order).

Scope of the Kaizen Project

Specific Process Involved: Evaluation of the Water Permitting and Enforcement Division's Enforcement Program.

Goals and Objectives:

- Conduct value stream mapping on the three programs.
- Eliminate wastes and/or non-value added steps found in the administrative enforcement activities.
- Identify ways to improve administrative enforcement processes so as to meet the Agency's Enforcement Response Policy (ERP) timeframes.
- Establish baseline measures for the Division's enforcement processes.
- Reduce Notice of Violations (NOV) response review time by 50percent (60 days to 30 days).
- Reduce enforcement elevation decision time by 30percent (60 days to 42 days).
- Reduce the time for drafting formal enforcement document by 30percent (Actual time to draft - 387 days; ERP timeframe - 180 days; Pre- Kaizen goal - 120 days).
- Reduce the timeframes regarding review process for: staff (45 day goal), supervisors (15 day goal) and managers (15 day goal).
- Reduce NOV backlog: 6 month goal = 50 percent (291) and 12 month goal = 75 percent (387).
-Revised 6 month goal (596): Status as of January = 549 (46 percent).

-Revised 12 month goal (894): *June 2009*.

Year Conducted: June 2008

Consultant Support: Leanovations, LLC

Process Changes and Results

As a result of this event, the Water Permitting and Enforcement Division made a number of changes to the process, including the following:

- Based on our Value Stream Mapping, achieved a 68 percent reduction in the number of total steps in the process. Eliminated all no value steps in the review process.
- Standardized forms and permit documents; utilized electronic transmittals among staff for review of draft documents.
- Developed Standard Operating Procedures for standard administrative work practices for enforcement program staff.
- Eliminated pre-agenda meetings.
- Established Key Performance Indicators (revised), tracked KPIs and shared with all enforcement staff.
- Created electronic buck-slip for sign-off of documents.
- Created Status boards and visual file management process.
- Changed NOV review process.

The project yielded the following results:

- Trends indicate a reduction in the NOV response review time. Currently (1/09), average is 13.2 days, resulting in a 75 percent reduction.
- Reduced enforcement elevation decision time to 7 days, resulting in an 88percent reduction.
- Reduced the time for drafting a formal enforcement document; trends (1/09) indicate a reduction: currently, average is 104 days, resulting in a 73 percent reduction.
- Reduced the timeframes regarding review time by staff:
 - Staff review time: currently (1/09), average is 46 days (needs work).
 - Supervisors review time: currently (1/09), average is 12 days.
 - Managers review time: currently (1/09), average is 12 days.
- Reduced NOV backlog:
 - Revised 6 month goal (596): Status as of January = 549 (46percent)
 - Revised 12 month goal (894): *June 2009*

Post-Kaizen desired state resulted in improved program efficiencies:

- The time to draft a final Consent Order currently (1/09) averages 112 days. The Agency's Enforcement Response Policy sets a deadline of 180 days.
- An important value-added step new to the process is the bifurcation of management lead decision-making on enforcement cases.
- Established Weekly Status Meetings that have facilitated information sharing, discussion/debate and decision-making on cases resulting in timely resolution of cases, and consistency among the three enforcement program administrative approaches.

Highlights of the Implementation Project Plan included:

Two-month goals:

1. Centralized Division's Enforcement File Management: colored folders, e-mail pop-ups, revised buck-slips that include timeframes for sign-offs; created a process for automatically generating closure letters and created new process for notice to responsible parties to improve compliance with response requirements.
2. Created status boards.
3. Changed the NOV review process. Initiated and conducted weekly status meetings.
4. Defined manager's expectations of enforcement actions and defined managerial responsibility for decision making.
5. Assigned Field Staff to Office to reduce NOV backlog.
6. Implemented work review process using electronic drafts.
7. Training provided to staff on Access and Excel (database management) and training on project management.

Status: *Completed for all two-month goals.*

Six month goals:

1. "Standard Operating Procedure for Administrative Enforcement Processes" drafted and made effective 01/14/09. This SOP establishes protocols for the enforcement process including case preparation, document flow, case coordination, and supervisory review. This SOP covers the period from completion of the inspection report through to the issuance of NOVs and completion of the first draft of formal enforcement action.
2. Standardize NOV, CO language and penalty calculations for General Permits: Standard Work Formats being created for Vehicle Maintenance General Permit (drafted); Storm Water Industrial General permit (final draft); Tumbling and Cleaning General Permit (draft by June 30, 2009).
3. Implemented First-In/First-Out for the review and sign-off of enforcement actions at the managerial level.

Status: *Completed and/or ongoing for all six-month goals.*

Twelve month goals:

1. Developing a draft format for Field Consent Order (ticket/enforcement) for General permit violations.
2. Standardize penalty for more categories.
3. Streamline databases.
4. Developing a draft format for standard language for CO per individual permits and general permits.

Status: *Update June 30, 2009*

Additional Comments

Critical in the process is having management support in accepting recommendations for change and being fully engaged in implementation. Important to keep all Division staff informed as to the project's goals and implementation activities. Buy-in from staff is critical to make the process work. As the project implementation moves forward, need to be mindful of including others within the programs to integrate efforts moving forward. Acknowledge the work of the Team and Team Leader. There are competing demands on implementing Lean and on going work of the enforcement day-to-day program demands. Need to balance early on the KPIs and the goals set during the Pre-Kaizen planning phase.

During the Kaizen event it is important to include Information Technology expertise to identify opportunities for program efficiencies using the various databases and computer capabilities. Always use Plan-Do-Check-Act (P-D-C-A) as project plan is being implemented. Critical to the successful implementation of the project plan is the administrative support. Work done by this team has been shared with other Agency enforcement programs.

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Delaware – Minor Source Air Construction Permitting

State Agency: Delaware Department of Natural Resources and Environmental Control (DNREC)

Method Implemented: Value Stream Mapping (VSM)

Summary: The Delaware Department of Natural Resources and Environmental Control (DNREC) first used Value Stream Mapping (VSM) in July 2005 to identify ways to make air construction permitting processes more efficient. Michigan's success using VSM to improve a similar air permitting process served as a model for Delaware's initiative. The Department's "Future state" VSM workshop goals focused on improving permit processing times by significantly reducing rework and waiting periods and increasing early communication with the permit applicant. The Delaware Economic Development Office, General Motors, and other industry representatives provided technical assistance and guidance during all phases of the VSM process improvement initiative. Success stemming from the air construction permitting VSM workshop has led Delaware DNREC to expand its process improvement initiative—the Department is currently in the planning stages for five additional VSM projects.

Scope of the VSM Project

Specific Process Involved: Workshop on minor source air construction permitting

Goals and Objectives: The Delaware Economic Development Office, in conjunction with local industry representatives familiar with Michigan's success using VSM, recommended that Delaware DNREC apply VSM tools to increase efficiency in their permitting processes. Industry representatives, primarily from the automotive and applied chemistry sectors, were part of the project team and participated in the VSM workshop, permit redesign, and subsequent monthly project review meetings.

Year Conducted: 2005