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Savannah River Remediation Liquid Waste Operations Lifecycle Savings through a Lean Business System at the Savannah River Site - 17245

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ABSTRACT

Savannah River Remediation (SRR) was contracted by the U.S. Department of Energy (DOE) to manage its liquid waste project at the Savannah River Site. The liquid waste project is a unique, high hazard nuclear waste treatment and disposal facility consisting of 51 one million-gallon underground waste tanks, a solvent extraction processing unit, a vitrification facility for the highest radioactive waste, and a grout solidification and disposal facility for lower radioactive decontaminated salt solution. Our Project mission is to treat the nuclear waste and close the associated storage and treatment facilities, of which, 8 tanks have been closed to date.

The Lean philosophy took root decades ago in the manufacturing sector and started with the work of W. Edwards Deming and his contemporaries. In more recent years the process has matured in the Toyota Production System and migrated into fields as diverse as services industries, healthcare, and now the DOE complex. At SRR, a Lean business management system was adopted to address site inefficiencies, aging infrastructure concerns and budget constraints. With yearly escalation and flat budgets, continuous improvement is taking on a larger role - improving the work accomplished for each dollar.

This paper focuses on the program results achieved to date, including the lifecycle savings identified through the Rapid Improvement Event (RIE) process. The RIE process is a Lean tool which creates a cross-functional team to analyze, develop and implement improvements for a given process. DOE-EM has recently emphasized the value of contractor's continuous improvement programs through their implementation of Plan of Action and Milestone (POAM): Goal 2 (Increase Efficiency/Improve Performance) Reduce EM Operations Cost in FY16. POAM Goal 2 was a FY 16 effort to achieve 5% cost savings across most programs. This past year's cost savings initiatives will likely become a trend as DOE and its contractors look to do more with less.

In support of our own business objectives, as well as, DOE's motivation to improve efficiencies, SRR has held over one hundred formal Lean events and dozens of 5S events that have driven improvement across the Project, including tank closure and production facilities. These improvements have significantly reduced the time required to process material and achieve the overall goal of hazard reduction and tank closure.

INTRODUCTION

Lean is an extremely powerful tool for helping organizations identify and eliminate wasteful practices; however, the greatest value from Lean comes from the adoption of a complete Lean Business System (LBS). In a LBS, organizational objectives and goals (SRR's Strategic Plan and True North Metrics) are developed by senior leadership and used to focus the efforts of the entire workforce. Each functional area (Value Stream) can then ensure that their own activities are completely aligned with these overall goals. When Value Streams encounter major obstacles to achieving these goals, targeted Lean Improvement Activities are used to help overcome these barriers. While targeted Lean events help with some issues, many more problems can be identified and solved when the entire workforce is engaged in Managing for Daily Improvement (MDI). This involves everyone applying Lean principles every day in everything they do, using practices such as Visual Management, problem-solving tools, and standardized work. The ultimate goal of any LBS is to take full advantage of the knowledge, ingenuity, and creativity of the entire workforce to maximize the value that will be delivered to the customer.

The SRR approach to Lean was based on a corporate Sellafield model. The advantage of the use of the business system versus "lean as a tool" is the integration of strategic objectives down through day-to-day work activities. Objectives and goals flow down through the organization, while value flows up from the workforce/line organization.

Figure 1: SRR Lean Business System. Strategic Objectives flow down from management and value flows up from line organization.

The LBS is based on four fundamental principles: measurement; standardization; visual systems; and respect for people. Figure 2 demonstrates how the Lean Business System works together to perpetuate ongoing improvements within the organization based on those principles.

SRR established True North Metrics and a balanced business score card using the strategic objectives to guide day-to-day goals of the work force. Strategic planning and metrics generally fall into four categories, including: Safety; Quality; Human Development; and Production.

The score card rapidly communicates to all parts of the organization how we are doing and what we need to "course correct" if we are not on target to be an "A" student.

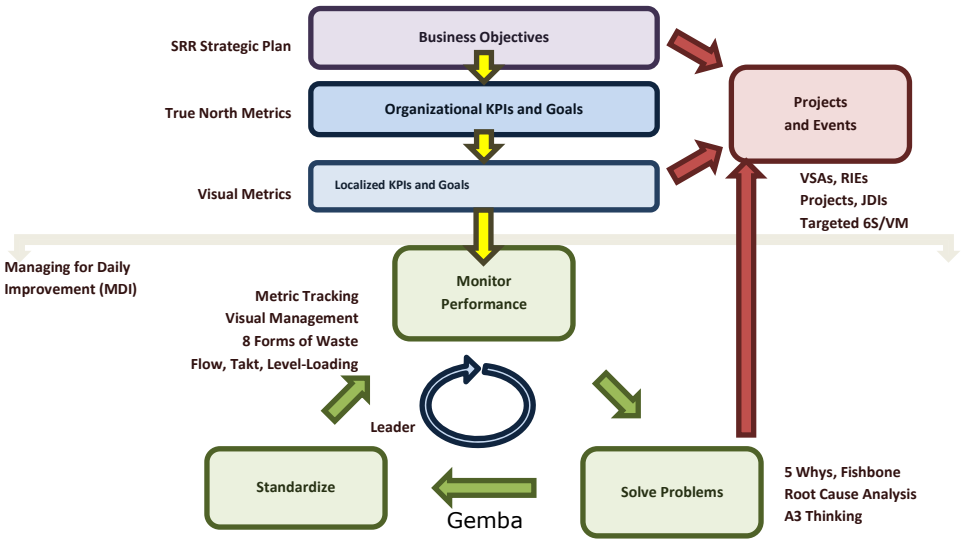


Figure 2: Integrated Lean Business System. Integrates strategic business objectives to day-to-day work activities through the balanced score card and visual management.

Day to day management is implemented through visual boards that are sustained by Gemba walks. Gemba walks are standard, routine management tours of work areas to discuss with employees what isn't working that day. Gemba walks give employees an opportunity to discuss what isn't going right and how management can help. Management then focuses on what needs to be fixed to keep providing value to our customer.

It's through our integrated approach that SRR has been able to effectively achieve the Lean results to date and how we have been able to continue systematic improvements to our processes and systems over the past three years.

DISCUSSION

Lean implementation at SRR

Significant budget challenges drove SRR to start a LBS in 2013; and it's the results that have kept the program going since. SRR has conducted over 100 formal lean events, dozens of workplace organizational (5S) actions, had approximately 30% of its workforce participate in at least one formal Lean event and had over 30 instances where key outside stakeholders have come to the Project to be part of a continuous improvement effort. To date, SRR has identified over $1.9B in life cycle efficiencies, with some of our greatest rewards being a safer work environment for our employees.

The SRR journey towards Lean was initiated by our executive management team through facilitated strategic planning sessions. The strategic planning sessions started with SRR's executive management team focusing on what would make us successful in the eyes of our customer and how we can measure that success. This information is the core of our balanced scorecard and true north metrics. The next step of the process is identifying how we would achieve each of the success factors. If we currently have a path to get there, the team is satisfied. If we cannot achieve the objective with our current systems or processes, then a Lean activity is identified to understand how we can overcome the gap and complete the objective. SRR then focuses its organization on how to overcome these gaps and achieve the objectives.

The overall SRR LBS is managed by our Executive Steering Committee through our Mission Control Center (MCC). The MCC is a designated location where our Continuous Improvement Teams assemble and track their metrics, discuss actions for closure, create countermeasures when needed, and celebrate successes (event closures) on a regular basis. The MCC is an integral part of our communication strategy and methodology for sharing our successes and failures with the remainder of the organization and recovery actions as applicable.

A3 Thinking and People Based Problem Solving

As hard as we might try, it is nearly impossible to create a process that never encounters a problem. When problems do occur, Lean offers a variety of tools that apply a structured approach to help solve those problems more efficiently and effectively. One very important Lean method that can be used for problems of any size or level of complexity is called A3 Thinking. This tool utilizes a single sheet of 11x17-inch paper (metric size equivalent is "A3") divided into nine blocks to direct problem solving activities and provoke thought about how a process could be improved to eliminate problems. Each block of the A3 has a specific purpose and leads the user(s) through a process to thoroughly examine the problem, the affected process, the underlying issues, the potential improvements, and the effectiveness of the final solutions. The graphic below shows the title of each of the nine blocks, how they should be arranged, and the question that should be answered in each step. Because these efforts are all recorded on a single sheet of paper, the A3 also becomes an extremely useful tool for documenting and visually communicating the actions that were taken to address a specific problem. This tool is the core building block for formal Lean events and is the basis for many of the benefits that we have achieved to date.

The 9 Steps of A3 Thinking		
1. Reason for Action	4. Gap Analysis	7. Completion Plan
Why is it important to improve this process?	What is holding us back?	How will we implement the improvements?
2. Initial State	5. Solution Approach	8. Confirmed State
How good are we now?	What could we do differently or better?	Did we improve as much as we wanted to?
3. Target State	6. Rapid Experiments	9. Insights
How good do we think we can be?	Which improvement ideas are most viable?	What did we learn from this event?

Figure 3: A3 Problem Solving Technique

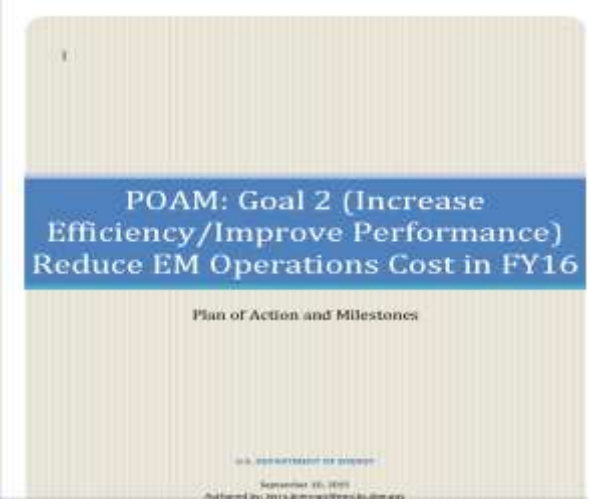
Workforce Engagement in Identifying and Eliminating the 8 Forms of Waste

As SRR began its Lean journey, it became evident that workforce engagement is critical to a successful continuous improvement program. Identifying and eliminating waste is a core concept of our Lean Business System and by eliminating waste, you can save valuable resources, improve processes, shorten schedules and deliver what the customer wants more efficiently. There are "Eight Forms of Waste", including:

1) **Waiting –** This includes all idle time, such as waiting for parts or materials; waiting for people; waiting for decision / approval;
2) **Overproduction –** This is simply making more product than required;
3) **Rework –** This is waste that causes the work, activity or process to be done over due to incorrect / inadequate information; incomplete documents;
4) **Motion –** This includes people and/or machine activity that does not add value to the product or process, excessive walking, travel; searching for information;
5) **Processing –** This is any work that does not add value, such as excess approvals; too much information; over-engineering; endless refinement;
6) **Inventory –** This is excess in supply of parts or materials; work in process or retaining parts or information not needed;
7) **Intellect –** Underutilization of employee's time and talent; poor morale; employees not adequately trained;
8) **Transportation –** This waste includes moving obsolete / broken equipment and/or materials in the process while adding no value.

Eliminating unnecessary work gets big results and often with no more investment than a change of mindset and practice.

Our Customer Expects It!
Through its annual performance efficiency objectives, the Department of Energy (our customer) is driving complex-wide continuous improvement programs at each of the sites to improve how we do business. Our customer is not only the Department of Energy and our regulatory stakeholders, but also our employees and taxpayers. Figure 4 is the Annual Plan of Action and Milestones POAM issued in FY2016 that addresses annual objectives established for Projects across the complex.



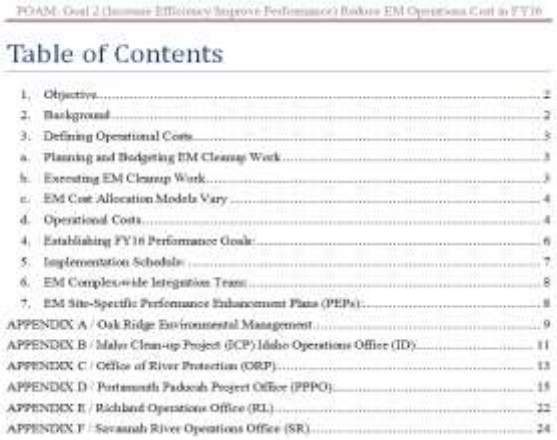

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Figure 4: Annual Plan of Action and Milestones POAM

Benefits Come in All Shapes
Benefits come in a variety of forms for the Project including both hard and soft dollar savings, project schedule compression resulting in life cycle costs savings, production improvements and efficiencies, and safety benefits such as error proofing, human performance improvements and hazard reduction.

SRR has evaluated over 15 different value streams, performed in excess of 100 Lean actions and had almost 1/3 of our workforce participate in at least one continuous improvement event. To date, we have identified and reported over $1.9B in lifecycle savings for the project. Figure 5 summarizes some of our significant examples of benefits that we have realized since the implementation of the Lean program. In addition, SRR does not just advocate the Lean program as the only continuous improvement process, there are other numerous ways that SRR promotes improving project efficiencies across the Project.

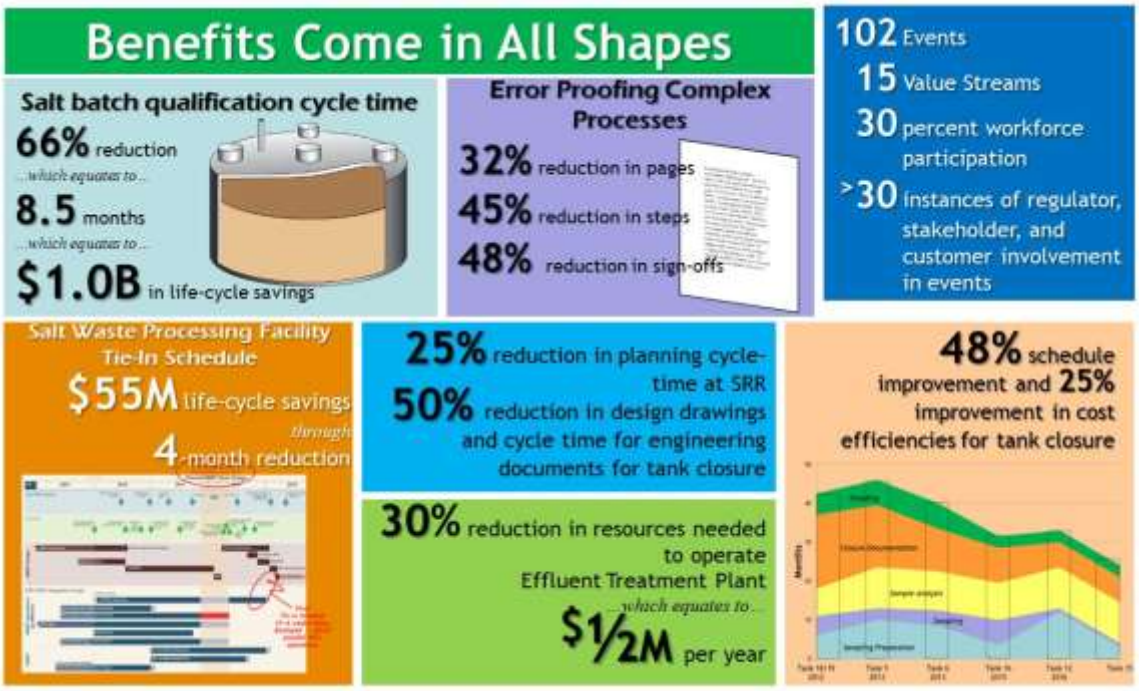

Figure 5: Summary of Continuous Improvement Initiatives

CONCLUSIONS

SRR has made great improvements and realized tremendous benefits since it began its Lean Journey! However, there is still so much further to go. The Lean process helps to eliminate tasks that are unimportant while focusing on value. More importantly the workforce ability, knowledge, and creativity is utilized by engaging the workforce at all levels to create a better product, quicker and cheaper, without sacrificing quality or safety. True implementation of Lean requires a drastic change to culture and established ways of doing business. Change is never easy but often necessary to adapt and thrive. SRR has chosen Lean not because it is an easy change but because it is a necessary one for properly utilizing the workforce at the highest level of proficiency.