

In response to the question: “What does it mean that there is a public health laboratory workforce shortage and what solutions are available?”, the Texas Department of State Health Services Laboratory Services Section used the APHL project funding to support a three day Lean Yellow Belt training course for twenty individuals from different operational areas of the laboratory. The Yellow Belt course provided participants with a foundation and grounding in the Lean philosophies and how they integrate into a larger business improvement system (Smarter Solutions, Inc.). The goal of providing the Lean Six Sigma Yellow Belt training was to give participants the ability to identify, diagnose, and improve specific areas in the laboratory. Once adept with LSS terms and concepts, the training attendees could act as agents of change and provide education throughout the lab.

Goal 1: Provide Lean Yellow Belt Training for twenty individuals in the laboratory

Smarter Solutions, Inc., based in Austin, TX, provided a 3-day Lean Six Sigma Yellow Belt training session in-house at the Texas DSHS Laboratory. Twenty individuals selected from various representative areas within the laboratory participated. This training included an instructor, textbook, workbook, and notebook for each participant. The program taught the five steps involved in Lean analysis by having students analyze real processes in their respective areas using the Lean paradigm.

Goal 1: Provide Lean Yellow Belt Training for up to 20 individuals in the laboratory					
Activities	Person	Start	Due	Outcome	Status
Schedule 3-day Lean Yellow Belt Training Course	Vanessa Telles	01/01/12	01/15/12	3-day Lean Yellow Belt Training Course	Completed 01/06/12
Meeting for all laboratory leadership to introduce project plans	Vanessa Telles Grace Kubin	01/01/12	01/12/12	Leadership will be aware of project and better able to support staff in their efforts.	Completed 01/10/12

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Identify 20 participants for training course	Vanessa Telles Renee Beckham Grace Kubin	01/01/12	02/15/12	20 individuals selected and scheduled to attend the Lean Yellow Belt Training	Completed 02/10/12
Introductory meeting with 20 selected participants	Vanessa Telles Renee Beckham	01/01/12	02/15/12	Introduce the course, the project and the expected goals.	Completed 02/17/12 Due to scheduling difficulties, the Kick-off Meeting date had to be moved to 02/17/12 to accommodate all participants.
Administer Lean Six Sigma Pre Assessment to 20 training course participants	Vanessa Telles	01/01/12	02/15/12	Completed pre assessments to compare the effectiveness of training course provided	Completed 02/17/12 Due to scheduling difficulties, the Kick-off Meeting date had to be moved to 02/17/12 to accommodate all participants.
Lean Yellow Belt Training Course	20 laboratory participants	01/01/12	02/28/12	Complete Lean Yellow Belt Training	Completed 02/23/12
Prepare summary report of training for report submission to APHL	Vanessa Telles	02/01/12	02/28/12	Complete project report	Completed 02/27/12

Milestones for first status report due February 28, 2012:

1. Schedule 3-day Lean Yellow Belt Training Course:

This Lean Six Sigma Yellow Belt training course was scheduled on January 6, 2012 for the week of February 21-23, 2012. As part of the grant application process, Smarter Solutions, Inc. the company administering the Lean Six Sigma Yellow Belt training and Vanessa Telles were in communication with regards to providing training for 20 participants from the laboratory. The process to request, schedule and pay a vendor can be lengthy, so it was advantageous to know the company ahead of time to allow moving forward with planning efforts.

2. Meeting for all laboratory leadership to introduce project plans:

The meeting for laboratory leadership was held on January 10, 2012 from 9 am to 10 am. Dr. Grace Kubin, the Laboratory Director, sent an email invitation to over 40 leaders in the lab. It was important the email be sent from the Lab Director as it showed her commitment to the improvement process. This invitation included all levels of leadership – group and branch managers, team leaders, area supervisors, and anybody who considers themselves a leader in the organization, including Subject Matter Experts, to long time employees with institutional knowledge. We wanted to be sure all levels of leadership felt welcome and invited to this very important meeting. The further we delve into this continuous quality improvement effort we have realized just how necessary and important it is to the future of this development, that leadership be aware, involved, and understand the changes that will be taking place.

At this meeting, the Laboratory Director introduced the Continuous Quality Improvement (CQI) vision for the lab. She stated how by using the APHL funds as the impetus for moving forward, twenty individuals will be selected by leadership from across all sections of the laboratory to 1) participate in the Lean Yellow Belt training and 2) to make up the newly formed Continuous Quality Improvement team. It has been about 20 years since the Texas DSHS laboratory has had a CQI team. With the burning platform of our large budget cuts and with the APHL funding received, we now have a way to move forward and introduce Lean Six Sigma lab wide by providing training to 20 bench level staff.

3. Identify 20 participants for training course:

After the meeting, an email was sent to all leadership requesting nominations for enthusiastic and energetic employees to attend the Lean Six Sigma Yellow Belt training and make up the CQI team. The requirements requested are as follows:

- Someone who shares positive ideas and offers solutions to make things better in their work environment for themselves and their coworkers
- A reliable and dependable employee who is responsible and performs their job duties

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- A team player who is always willing to help co-workers (even without being asked)
- Someone who demonstrates a positive attitude and is pleasant, respectful, and easy to get along with

We asked that each nomination include a brief write up and summarize why the nominee would make a good member of the CQI team and/or for the supervisor to fill in the bullets to describe the employee. We wanted to receive as much information about the individual being nominated but did not want to make it too time consuming for the manager or supervisor making the nomination. In total, we received 18 nominations, of which 15 were selected for training. The other five participants that attended the training were a part of the planning committee and as such were required to attend and participate in the CQI team. We allowed ten days for the nomination period.

Because we did receive more nominations than we could accept for the Lean Yellow Belt training and CQI team, a process was developed to evaluate the nominations. The evaluation included:

- Email each individual to gauge interest in participating
- Does individual meet the qualifications and scores?
- Do they represent all areas of the lab?
- Do we have approval from Branch Managers?

We wanted to ensure that all nominees were interested and excited about participating in the process and were not just volunteered, therefore, we sent an email to each individual to inform them that they were nominated by their supervisor to be a member of the team and training, to let them know the requirements of participating, and asked if this was something they were actually interested in. All nominees were indeed interested in participating.

Additionally, a score form was developed to assess each nomination on a point system. There was a category for each of the most important traits we were looking for and a point value assigned for each.

These categories included: Positive Ideas – 5 points, Positive Attitude – 5 points, Reliable – 5 points, Team Player – 5 points, and Wants to do more to Improve their area – 10 points. The total points available were 30. The highest score received was 30 and the lowest score was 6.

We then looked at the distribution across the laboratory as we wanted to ensure equal representation from all areas, including our two laboratories located off site in San Antonio, TX and Harlingen, TX. We did in fact have representation from each section in the laboratory and two sections were over represented: Clinical Chemistry and Emergency Preparedness each had 4 nominations. We then looked at the lowest scoring individuals from each of those areas and with the Lab Director's approval, asked those three individuals to serve as alternates for the CQI team.

Most individuals were nominated by a supervisor or manager and this was considered final approval. There were, however, a few evaluations received that were not from a supervisor, and in that case we requested an evaluation from the supervisor as final approval. The training would take these individuals away from the bench for 3 days and we wanted everyone, managers and participants, to be aware of the time commitment.

Introductory meeting with 20 selected participants:

The introductory Kick-Off Meeting was held on February 17, 2012 from 1 to 2 pm. The agenda included:

- Introduction and Kick-off – Grace Kubin, Lab Director
- Team Introductions
 - Name
 - Section
 - What do you expect to gain from the LSS Yellow Belt Training?
- Lean Six Sigma Training Information
 - Tuesday, February 21- Thursday, February 23
 - 8 am to 5 pm
 - Room L606

- Lean Assessment

Dr. Kubin has been very involved in the process. She introduced herself and gave her vision of the CQI team as a result of the Lean Yellow Belt Training. This also was the first time many of the individuals met each other, so each participant introduced themselves and explained their background and expectations for the training. Then a few house hold items including, time, date and location of the training were discussed.

Administer Lean Six Sigma Pre Assessment to 20 training course participants:

To close the meeting, we asked each individual to complete the Lean Yellow Belt Training Pre-Assessment. There were 18 individuals in attendance from the Austin lab and they completed a hard copy of the pre-assessment and turned it in before leaving. We chose hard copy so that nobody could use materials for reference as well as to not take away additional time from their bench work. As previously mentioned, two individuals are located remotely, so they participated in the meeting via conference call and the pre-assessment was sent to them through QuestionPro, our online survey system. They also completed and submitted this at the completion of the meeting. The statistician then entered the results into QuestionPro for future analysis and comparison with the Final Assessments at the close of this project.

Lean Yellow Belt Training Course:

On February 16, 2012, previous to the actual Lean Yellow Belt training course for the 20 selected individuals, the planning committee decided to provide a Lean Overview Training for Leadership in the laboratory. The agency's Quality Improvement Manager's were able to provide the overview in combination with two member's from the planning committee. The purpose of this training was to give laboratory leaders background information so they would be able to:

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- Describe why Lean Six Sigma is used in laboratory environments
- Identify three tools used in lean
- Describe the essential role of Public Health Laboratory Leaders in supporting Lean

As previously mentioned, communication is a very important aspect in any Lean implementation. As the CQI Team was preparing to move forward with Lean, we thought it was important that supervisors and managers be familiar in Lean concepts before members of their teams were submersed in training for three days.

The actual Lean Yellow Belt Training Course was held at the DSHS Laboratory from Tuesday, February 21-Thursday, February 23, 2012, 8 am to 5 pm each day. The intense three day training covered all concepts important in Lean Six Sigma. The class consisted of lecture, group and class exercises, and group discussion. Please see attached agenda for a summary of all topics covered.

Prepare summary report of training for report submission:

Completed February 27, 2012

Milestones for Second Status Report Submission: April 30, 2012:

Goal 2: Identify team members and project planning					
Activities	Person	Start	Due	Outcome	Status
Select team members to participate in project improvement teams	Vanessa Telles Renee Beckham Grace Kubin Training participants	03/01/12	03/15/12	Finalized list of approved Quality Improvement team members	Completed 03/01/12
Project kick off meeting for all selected participants	Grace Kubin Vanessa Telles Training participants	03/01/12	03/10/12	Quality improvement teams prepared for the planning portion of project	Completed 03/08/12

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Plan, define, and brainstorm project goals and processes	Vanessa Telles Quality Improvement Teams Grace Kubin	03/15/12	04/25/12	Plan developed for quality improvement projects	Completed 03/26/12
Prepare summary report for submission to APHL	Vanessa Telles	03/15/12	04/30/12	Submit status report	04/30/12

1. Select team members to participate in project improvement teams:

After attending the Lean Yellow Belt training, it was decided that a single, unified project would be the best way to approach the project improvement process. This would provide each of the 20 training participants the opportunity to gain the momentum, experience, and the skills necessary as we move forward in our continuous quality improvement efforts. With approval from the Laboratory Director, it was decided that a 5S improvement project would be the identified project for the CQI Team as well as an excellent introduction to Lean concepts for the entire lab.

The overall purpose of 5S is to arrange work areas in the best manner possible to optimize performance, comfort, safety and cleanliness. Additionally, Lean thinking puts emphasis on the value of people and 5S enhances this value as people are working in a neat and clean environment. It is the basic process for Lean implementation, it is often considered the foundation for Lean, and is a good model for Lean activities further down the road. There are many benefits to implementing 5S in the workplace, including, but not limited to, reduced cycle times, improved working conditions, safety and morale, and allowing for better adherence to Safety Operating Procedures (SOPs). Another benefit and factor we took into consideration when selecting 5S as the CQI Team project is that it can be accomplished at an individual level. It does not always require a team or special training.

As a result, each team member has been provided the option to work on an individual level or to include a larger group, or team, when executing their specific 5S project. The resultant goal will remain the same as each participant will plan, develop, and execute a project unique to their specific work area.

Project kick off meeting for all selected participants:

The Laboratory Director approved a 5S project for the laboratory on March 1, 2012. After the Lean Yellow Belt (LYB) training, we held a LYB Debriefing Meeting on March 8, 2012. At this meeting, the Project Manager and the Efficiencies Team Lead introduced the idea of a 5S project for the CQI Team. The team willingly agreed to move forward with a 5S project.

The 5S Kick-Off Meeting was held on March 26, 2012. The agenda included:

- CQI 5S Timeline
 - June 30th – Summary of 5S projects from each team member due
- CQI Meetings
 - Monthly CQI Meetings – First Monday each month at 2 pm
 - 5S Project Meetings – 3rd Monday of each month at 2.30 pm
- 5S Introduction for Manager and Team Leads
- Lab Week – April 23 to April 27
- Wrap up

Plan, define, and brainstorm project goals and processes:

Each team member was able to select, plan and develop a 5S project unique to their specific work area. In this way, the CQI Team was able to work as a leader of their own project and at the same time, collaboratively with the larger CQI Team if faced with a difficult situation or challenge for the duration of the 5S implementation. Again, due to the nature of 5S, each team member had the option to work individually or to create a team within their specific area. On June 30, 2012 each team member submitted a project report detailing the project selected.

As previously mentioned in the project proposal, this project is scalable due to the size of the laboratory. At the LYB Debriefing meeting, it became evident that there were already some road blocks as the

trainees returned to their work areas. Some individuals on the team were met with opposition when trying to introduce the newly learned Lean terminology and concepts to their team and/or supervisors. As a result, the CQI Team proposed that for moving forward, laboratory management at various levels needed to be introduced to the concepts of 5S. This was an excellent idea and has been an important part in moving forward for various reasons. First of all, education and communication are largely important when it comes to introducing Lean concepts in any environment. Secondly, in order for any Lean project to be successful, you must have buy in from the different levels of management. This also provided the opportunity to introduce a lab wide 5S project to group managers. Finally, it allowed the CQI Team to be introduced to the laboratory as a resource for moving forward as well as providing some visibility for the team.

On April 5, 2012, the CQI Team held a 5S Introduction Training for Leadership. All levels of leadership at the DSHS Laboratory were invited to attend. This included all team leads, supervisors, group managers, and branch managers. The Laboratory Director also attended and was there to show her support for the project and the CQI Team. Five team members volunteered and gave a presentation on one of the 5S's and the project manager gave the overview and summary. Then, with the support and backing from the Laboratory Director, all group managers were asked to participate in a 5S project. They were asked to identify at least one physical area to 5S and submit a goal statement of what they plan to accomplish. At the completion of the project, they submitted a finalized checklist of accomplishments by June 30, 2012. In lieu of typical audits at the end of a 5S project, the Lab Director will perform walk-about in each of the areas that participated to observe first hand the projects that occurred in each area. Our hope is that as the Lab Director makes her informal visits, each group will realize that she is committed to implementing these quality improvements and as a result will help enforce the work being done.

Anytime a new concept or way of doing something is introduced, there will be resistance. That is the biggest struggle with most quality improvement projects. The training did help provide some relief against the road blocks, but there is still much work to be done. As you walk around the halls of the laboratory today, you see very outdated and old equipment in the halls with stickers that say “surplus”, you see 5S posters hanging in different work areas, as well as trash cans being filled with trash and waste that has been accumulated. It has been encouraging and motivating to see.

Prepare summary report for submission to APHL:

Completed April 30, 2012

Milestones for third status report submission: June 30, 2012

Goal 3: Identification of Low Hanging Fruit Issues and process flow charting					
Activities	Person	Start	Due	Outcome	Status
Process workflow charting	Quality Improvement Teams Renee Beckham Vanessa Telles	April 2012	June 2012	Process workflows for each team	Completed 06/30/12
Prepare final summary report for submission to APHL	Vanessa Telles	May 2012	June 2012	Submit final report	Completed 07/31/12

Process workflow charting:

As previously mentioned, as the project evolved it became unified 5S project for all the CQI Team to execute in each of their areas. Therefore, actual process workflows were not a required or needed part of the project and instead, all participants were required to execute a 5S project and submit a write up. On June 16, 2012, the post-assessment was given to all participants. Final projects were due by all participants by June 29, 2012 at the close of business.

Prepare final summary report for submission to APHL:

This was completed for submission on the due date of July 31, 2012.

Evaluation:

To evaluate the effectiveness of the overall training course provided, each of the twenty participants selected were given a pre- and post- training assessment to evaluate their level of knowledge in the Lean Six Sigma process, one prior to attending training and the other after training and project completion. Based on criteria used for evaluating Lean Six Sigma projects, the assessments consisted of a series of questions including knowledge based multiple choice questions, yes/no questions, and open ended questions. The results obtained were analyzed statistically and used to evaluate the effectiveness of the training, the projects completed, and the attitudes toward the projects implemented.

There were a total of 20 participants in the training. All 20 individuals participated in the pre-assessment given at the Lean Six Sigma Kick-off meeting on February 17, 2012. The post- assessment was given at the final 5S meeting held on June 16, 2012. All but one participant who is out on maternity leave were able to complete the survey, for a total of 19 post assessment responses.

Questions that were the same on both the pre and post test were compared and analyzed based on whether they were “belief” based questions or “knowledge” based questions. There were a total of six belief and six knowledge based questions. Examples of the belief questions are as follows: “Do you feel you have leadership support to guide you through the Lean Six Sigma process?”, “Do you believe you have the necessary skills to implement process changes in your area?” or “Do you believe that Lean Six Sigma is relevant to your work?”. Examples of knowledge based questions are: “Are you aware of the tools used in Lean Six Sigma Processes?”, “Are you familiar with the DMAIC approach used in Lean Six

Sigma?” or “What is a Control Plan?”. See Appendix A for the complete list of Pre and Post Assessment questions given.

The participant’s responses indicate a significant difference in their knowledge and beliefs before and after training. Knowledge was gained in several areas including the tools and processes used in Lean Six Sigma, in basic statistics, as well as in methods for charting various processes. The participants believe that Lean Six Sigma is relevant in their work areas and a good use of time for projects in their area. They also believe that they have the leadership support and the skills to support them through a Lean Six Sigma project. Percentages were calculated for each response in both assessments, then a Paired T-test was run to determine the significance of mean differences between the pre and post assessment responses at alpha .05. See Appendix B for corresponding charts.

There is one belief question which stands out and should be addressed. In the post assessment, the question “Do you feel you are a valuable member of a team within the lab?” had an increase in people saying “No” they did not feel like a valuable member of the team. (See Appendix B, Chart B6) As previously mentioned, some of the team members encountered resistance while implementing their 5S projects. While the team has the support of upper management in the laboratory and at the agency, some of the middle management are not completely on board with Lean Six Sigma. It is possible that this contributes to the finding.

Below is a summary of results for the knowledge and belief based questions:

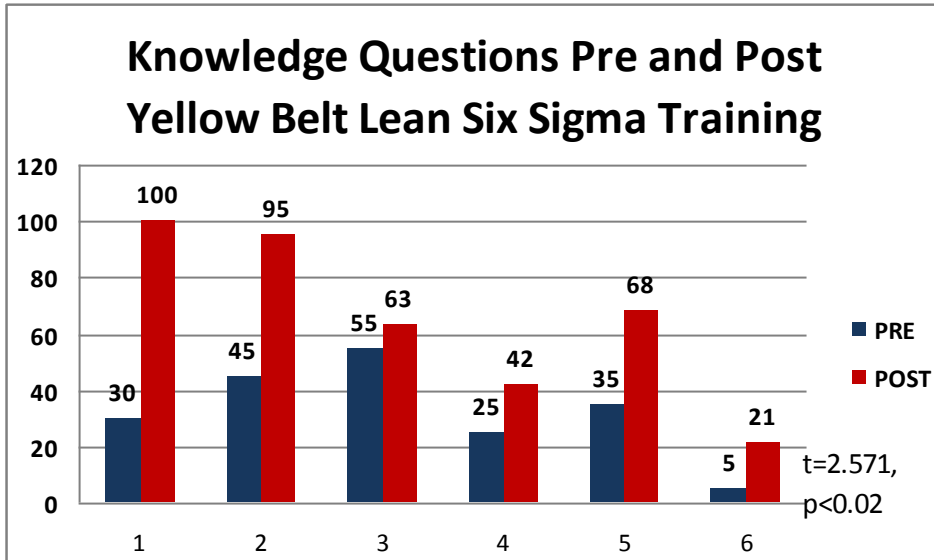


Figure 1: This graph depicts a significant difference in the knowledge gained after attending the training.

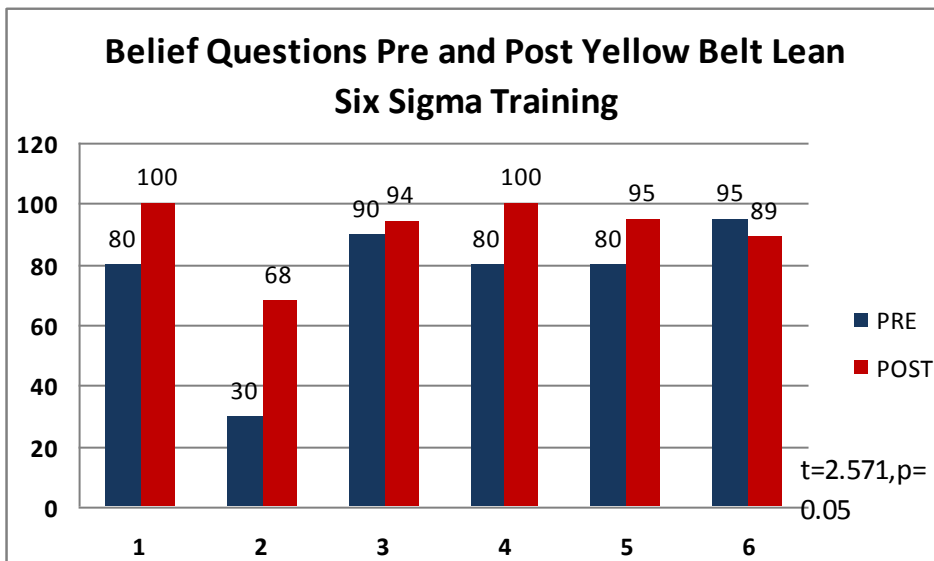


Figure 2: This graph depicts a significant difference in the beliefs gained after attending the training.

The post assessment questions that were not included in the pre test were also analyzed to describe whether participants thought the training was helpful, if it helped them achieve their project goals and to help gauge team involvement. The majority of participants felt the training was worthwhile and that it improved their overall knowledge, skills and abilities. The respondents felt that they were able to meet their goals with the project they defined as they were able to successfully complete it. It was also indicated that the participants will be able to implement their project in different areas of the lab. Overall, the results were positive and the training set out what it was set to accomplish.

The open ended question, “What project can you implement in your area for efficiencies?” is being collected for use at future meetings to discuss the potential of new projects in the lab.

Lessons Learned and Future Steps:

Implementing Lean Six Sigma concepts in the laboratory is a challenge and is something that takes time. In fact, it requires an overall culture change, which is not an easy task. Changing the scope of the project from creating process workflows to a 5S project seemed to be a good decision for the lab. It provided a good introduction to Lean concepts and was an easy enough task that everyone could participate in without causing too much disruption in the lab. Several people have stated that this project gave them “permission” to clean and organize their area and not feel guilty because it was a priority for the lab. Communication is important in any organization and is especially important when implementing Lean Six Sigma. While there was frequent communication regarding this project, I think the team could have created more educational posters and flyers to hang in the lab to spread the word around. A few individuals submitted their reports late and perhaps more communication, instruction, and reminders would have helped with that as well. Additionally, as aforementioned, some of the team members encountered more resistance than others in regards to having support by both middle management and from colleagues either not wanting to spend the time or not wanting to change the way things have

always been done for the 5S project. That posed quite a challenge. I suspect that more communication and information could have helped relieve some of the resistance. While there will always be resistance when implementing change, perhaps more communication and education could have served to alleviate this. As we move forward with future projects, education and communication will remain the largest challenges, however, we hope that we can find better ways to communicate more effectively to reach more people.

The laboratory plans to continue moving forward with the implementation of Lean Six Sigma. The purpose of the newly formed CQI team is to continue to spread the concepts and ideas of Lean Six Sigma throughout the lab. In creating the CQI Team charter, education and communication were noted to be the top priorities for the team. This includes educating the lab in Lean concepts, engaging and encouraging employees to participate in Lean activities, and introducing Lean concepts to the laboratory. In this basic way, with no funding necessary, the CQI Team hopes to be able to continue to spread the CQI momentum throughout the lab. Future trainings will, however, be dependent on further funding opportunities. The laboratory will ultimately strive to provide further development in Lean Six Sigma to enable a select few individuals the opportunity to become Green and Black Belt trained and, as a result, be able to execute more detailed and in-depth quality improvement projects.

The Department of State Health Services has two Performance Improvement Managers. They have been integral in helping kick off the Lean Six Sigma process as they served as mentors and trainers for the laboratory. They have since graciously provided guidance and support whenever called upon. As the lab moves forward with Lean Six Sigma, the Performance Improvement Manager's have put us in contact with Quality Engineers from MD Anderson Hospital in Houston, Texas. These Quality Engineers have created a Lean Six Sigma program for their institution from the ground up and have slowly and steadily built it over the past 5 years. We hope to establish a strong relationship with MD Anderson's

Quality Engineers in asking them to serve as mentors and collaborators as we continue moving forward. We recently had our first conference call with them to learn what their facility has accomplished thus far as well as what challenges they have encountered along their processes. Future conference calls and plans for site visits are being scheduled for the upcoming months as we seek their expertise in guiding us to become successful in achieving our goals of developing and maintaining Lean Six Sigma concepts.

Final Projects:

See Appendix C for the final 5S projects submitted by each of the 20 members of the CQI Team.