

THE CONTINUOUS QUALITY IMPROVEMENT PROCESS

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- Michigan Storage Tank Section

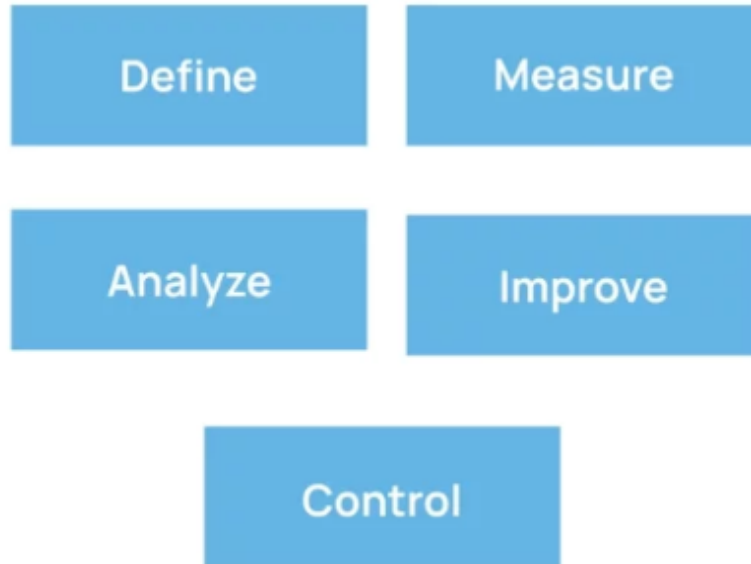
CONTINUOUS QUALITY IMPROVEMENT PROCESS

- The Continuous Quality Improvement (CQI) originates over 100 years ago with Ford's Lean Manufacturing improvement process.
- There are different methodologies including Lean Six Sigma, PDCA Cycle, and Baldrige Excellence Framework

The Lean Six Sigma methodology is typically structured around the [DMAIC](#) (Define, Measure, Analyze, Improve, Control) cycle:

SIX

DMAIC



1. **Define:** Clearly define the problem, goals, and scope of the improvement project.
2. **Measure:** Establish baseline performance metrics and collect relevant data.
3. **Analyze:** [Identify root causes](#) and factors contributing to the problem or inefficiency.
4. **Improve:** Develop, implement, and validate solutions to address the identified issues.
5. **Control:** Establish control measures to sustain the improvements and monitor ongoing performance.

Lean Six Sigma

Lean Six Sigma has different levels of certification

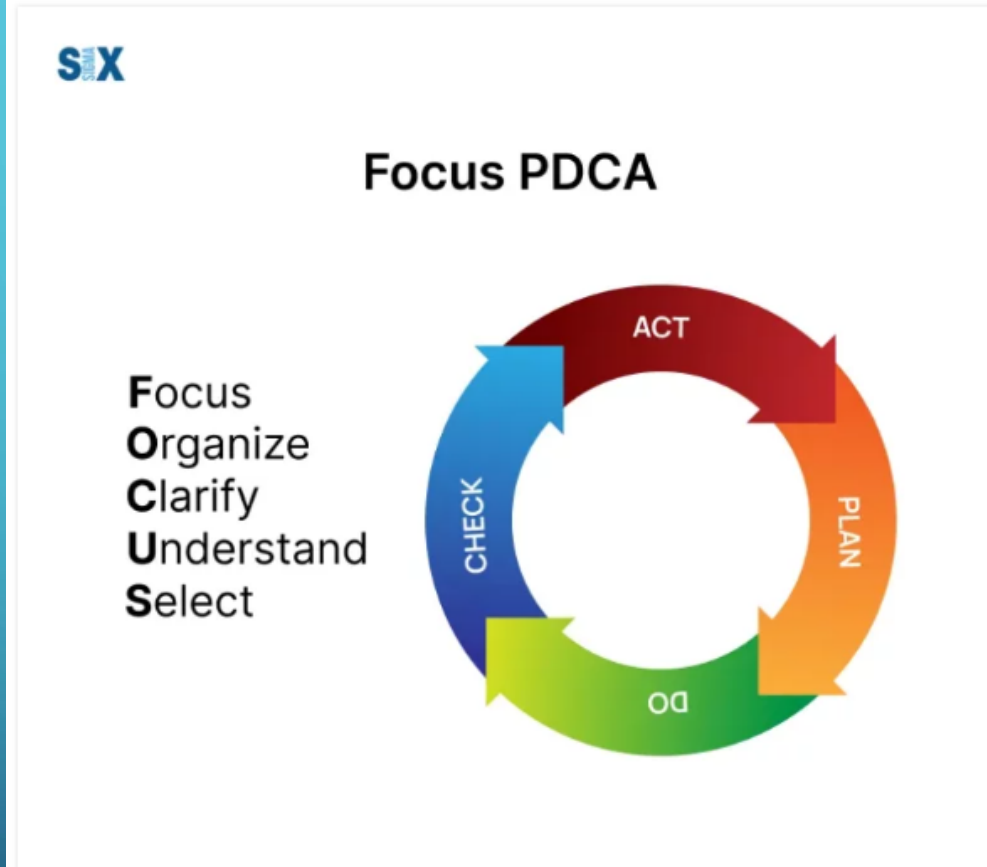
- White Belt
- Yellow Belt
- Green Belt
- Black Belt

Plan-Do-Study-Act (PDSA) Cycle

The [PDSA Cycle](#), also known as the [Deming Cycle](#) or the [Shewhart Cycle](#), is a fundamental model for continuous improvement.

Developed by Walter A. Shewhart and popularized by W. Edwards Deming, this iterative approach provides a structured framework for implementing and refining improvements.

The PDSA Cycle consists of four stages:



1. **Plan:** Identify the problem, gather relevant data, and develop an improvement plan.
2. **Do:** Implement the planned improvement on a small scale or pilot basis.
3. **Study:** Analyze the results of the implementation, gather data, and evaluate the effectiveness of the improvement.
4. **Act:** Based on the study phase, decide whether to adopt, modify, or abandon the improvement. If **successful**, standardize and implement the improvement on a broader scale.

Sustaining Continuous Quality Improvement Efforts

Implementing CQI is an ongoing journey, not a one-time event. Sustaining [continuous improvement efforts](#) requires a long-term commitment and dedicated effort.

Key strategies for sustaining CQI within an organization include:

1. **Continuous monitoring and evaluation:** Regularly monitoring and evaluating the progress and impact of improvement initiatives is essential for identifying areas that require further attention or adjustments.
2. **Celebrating successes and sharing best practices:** Recognizing and celebrating successful improvement initiatives can help reinforce the [culture of continuous improvement](#) and motivate employees to actively participate.
3. **Embedding CQI into organizational processes:** Integrating CQI principles and methodologies into core organizational processes, such as strategic planning, new product development, and operational management, ensuring that continuous improvement becomes ingrained in the organizational DNA.
4. **Fostering a culture of learning and innovation:** Encouraging a mindset of continuous learning, experimentation, and innovation can help organizations stay agile and adapt to changing market dynamics, embracing new improvement opportunities as they arise.

By sustaining CQI efforts, organizations can continually refine their processes, enhance their offerings, and maintain a competitive edge in an ever-changing business landscape.

CONTINUOUS QUALITY IMPROVEMENT IMPLEMENTATION

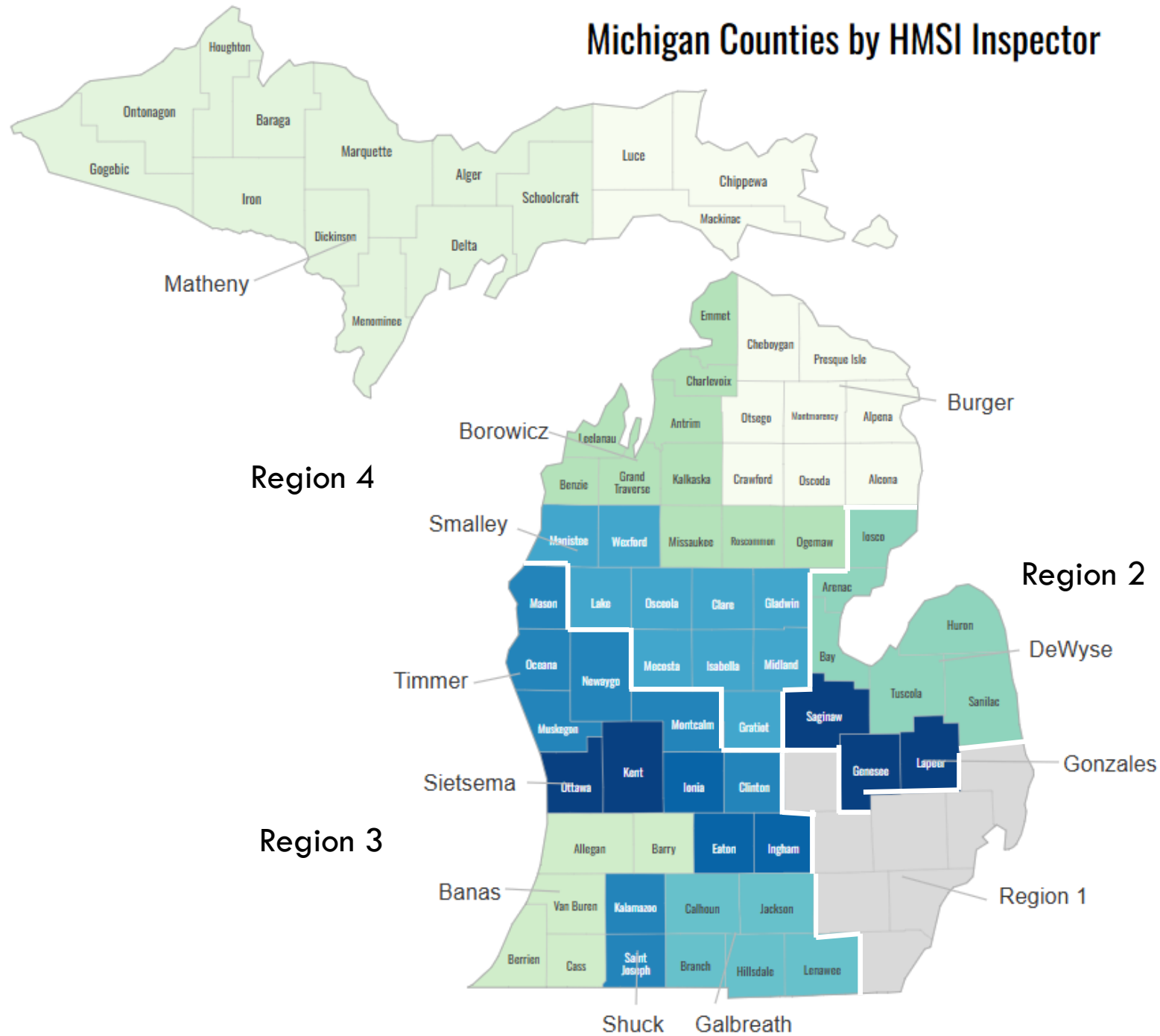
- The Storage Tank Section (STS) began implementing the CQI process in 2020 to ensure or improve state inspector performance consistency
 - For the Inspection Team, CQI is a 2-part process. The first part involves the supervisor to perform ride-along inspections with their Hazardous Materials Storage Inspectors (HMSI) to monitor inspection performance and public relation interaction.
 - The second part of the CQI process is for the supervisor to perform an inspection on a facility that was recently inspected by the HMSI. This is done for a comparison of the two reports to verify that the HMSI noted the same violations as the supervisor, or to identify a deficiencies that need to be addressed.
 - In 2025, the CQI process was expanded to monitor the work of contractors or Class B operators when performing precision testing, i.e., line tightness testing, line leak detector testing, etc... This is done to ensure the test is being performed according to PEI or testing equipment standards, and to educate them on any areas that need to corrected.

STORAGE TANK SECTION INSPECTION TEAM

SINCE JANUARY 1ST, 2025

- There are currently 20 HMSIs and 2 regional supervisors.
- The HMSIs inspect USTs, ASTs, LPG, H2, and CNG systems for vehicle fueling.
- Mike Charbonneau supervises Regions 1 & 2
 - 8 Trained HMSIs
 - 1 Newly hired HMSI has began training and 1 position advertised.
 - HMSI on-board training can take 6-12 months
- Herb Jenkins supervises Regions 3 & 4
 - 10 Trained HMSIs

Michigan Counties by HMSI Inspector



STORAGE TANK SECTION STATISTICS

SINCE JANUARY 1ST, 2025

- Currently, Storage Tank Section (STS) has completed 5,837 inspections, which includes installation, removals, release investigations, and inspections against complaints.
- The STS has performed 2,317 triennial inspections. Of these, 379 facilities (16.4%) were in-compliance with federal and state regulations at the time of the first inspection.
- NOTE: This has improved from last year where the first inspection compliance rate was 8%.
- There were 809 facilities (41.7%) back in compliance at the time of the first reinspection.
- These statistics show STS will have completed at least 3,067 additional inspections due to facilities non-compliance at the first inspection.

APPLICATION OF CQI IN OTHER AREAS

- In October 2021, a state audit found that STS had 2,400 inspections over the 3-year cycle.
- When I came on board in March 2023, that number was at 1,567 overdue.
- At the same time, the number of reinspections going overdue was rising because the focus was on triennial inspections.
 - The compliance dates for first inspections are up to 120 days before red tagging. Certain violations can result in immediate retagging.
 - Because reinspections had not been the priority, there numerous facilities that did not get reinspected until 8-19 months later.
- I worked with the Regional supervisors to devise plans to continue decreasing overdue inspections, while also performing reinspections on time.
- By the end of 2024, STS was down to 35 overdue inspections, and the majority of facilities were being reinspected on time..

APPLICATION OF CQI IN OTHER AREAS

- Methods used to increase productivity
 - Reorganized Region 1 facility assignments
 - Due to employee turnover, the assignments were given as they came due. This led to inspectors sharing cities, as well as excessive travel time.
 - Assignments were reassigned to ensure each inspector had a designated area of responsibility that followed the highway system into Detroit. Detroit was divided among inspectors by zip codes.
 - Created spreadsheets that pulled information from database reports to monitor the number of facilities assigned per inspector and the number of inspections overdue or coming due to predict times where there will be an increased number of inspections.

HMSI Name	Total Facilities	County Name	Total Facilities	County Name	Total Facilities	County Name	Total Facilities	9/4/2025			
Regions 1 & 2		Alcona County	27	Gratiot County	102	Missaukee County	30				
Brian Parker	551	Alger County	38	Hillsdale County	77	Monroe County	168				
David Flaishans	550	Allegan County	160	Houghton County	59	Montcalm County	129				
Jerry Arnold	540	Alpena County	53	Huron County	99	Montmorency Count	28				
Max Bryson	0	Antrim County	52	Ingham County	209	Muskegon County	205				
Mike DeWyse	498	Arenac County	43	Ionia County	79	Newaygo County	83				
Mike Freed	606	Baraga County	20	Iosco County	59	Oakland County	877				
Vacant	419	Barry County	65	Iron County	30	Oceana County	73				
Scott Gonzales	633	Bay County	103	Isabella County	47	Ogemaw County	62				
Stephen Thompson	590	Benzie County	31	Jackson County	158	Ontonagon County	24				
Tim Brooks	571	Berrien County	207	Kalamazoo County	198	Osceola County	52				
Region Total	4958	Branch County	62	Kalkaska County	40	Oscoda County	30				
Regions 3 & 4		Calhoun County	177	Kent County	506	Otsego County	58				
Aaron Smalley	562	Cass County	73	Keweenaw County	8	Ottawa County	219				
Chad Sietsema	509	Charlevoix County	56	Lake County	27	Presque Isle County	36				
Craig Galbreath	579	Cheboygan County	68	Lapeer County	84	Roscommon County	58				
Dale Burger	522	Chippewa County	97	Leelanau County	37	Saginaw County	199				
Dan Shuck	575	Clare County	68	Lenawee County	112	Sanilac County	93				
Joe Banas	553	Clinton County	88	Livingston County	129	Schoolcraft County	35				
Nick Borowicz	557	Crawford County	43	Luce County	29	Shiawassee County	85				
Rick Dennis	563	Delta County	64	Mackinac County	41	St. Clair County	197				
Scott Matheny	530	Dickinson County	65	Macomb County	581	St. Joseph County	87				
Scott Timmer	590	Eaton County	119	Manistee County	52	Tuscola County	94				
Region Total	5540	Emmet County	53	Marquette County	112	Van Buren County	137				
Not Assigned	0	Genesee County	363	Mason County	63	Washtenaw County	268				
Total Combined	10498	Gladwin County	51	Mecosta County	75	Wayne County	1578				
		Gogebic County	31	Menominee County	45	Wexford County	69				
		Grand Traverse County	101	Midland County	88						
							10498				

Info for Weekly Report			Totals
Total Number of Past Due Triennial Inspections Completed			61
Total Number of Past Due Triennial Inspections Accumlated			0
Total Number of Past Due Triennial Inspections Completed by Administrative Closure (running total)			261
Total Past Due Triennial Inspections			204
Total Past Due Triennial Inspections plus Accumulated			204
Percentage of Past Due Triennial Inspections Completed			92%
Total High-Risk overdue (Macomb, Oakland, Wayne)			65

Coming Due	Date	Facilities per period	Overdue Facilities
Over 11 months overdue	10/4/2021	0	
Over 10 months overdue	11/3/2021	0	
Over 9 months overdue	12/3/2021	1	
6 - 9 months overdue	3/3/2022	3	
0 - 6 months Overdue	9/4/2022	234	In the normal 3-year cycle
Due in 30 days	10/4/2022	129	
Due in 60 days	11/3/2022	172	
Due in 90 days	12/3/2022	145	
Due in 120 days	1/2/2023	213	
Due in 150 days	2/1/2023	252	
Due in 6 months	3/3/2023	249	
Due in the next 1 year	9/5/2023	1554	
Due in the next 1.5 years	3/8/2024	1855	
Due in the next 2 years	9/4/2024	2041	
Due in the next 2.5 years	3/8/2025	1877	
Due in the next 3 years	9/4/2025	1720	

As of 9/1/2025

As of Today238

As of 9/1/2025

As of Today 238

APPLICATION OF CQI IN OTHER AREAS

- Environmental Engineer was being inundated with phone calls from installation companies regarding UST setback distances from drinking water wells.
 - Worked with Engineers and Regional Supervisors to create a handout that answers basic well questions and explained variance application process.
- Speaking with Arabic owners and operators (o/o) about the language barrier for inspection relations.
 - 5 forms, including Registration and Plan Review applications, have been translated to Arabic as a reference document so O/Os have a better understanding of the form requirements.
- Financial Analyst was being asked to produce invoices for HMSIs, which took time away from other responsibilities.
 - Trained HMSIs on how to get invoices and verify that they show the correct amount.

STORAGE TANK SECTION

Well Information

Installation of a Regulated UST Tank(s) Located Near Water Well

Owner submits a Notice of Proposed Installation of Underground Storage Tanks form (BFS-3820)

The Pre-Registration for Underground Storage Tanks form provided by the department shall be submitted to the department 45 days before installation of the UST tank(s).

MAIL TO:

Department of Licensing and Regulatory Affairs
Bureau of Fire Services – Storage Tank Section
P.O. Box 30033, Lansing, MI 48909

Email to: LARA-UST-AST@michigan.gov
or DIRECTLY TO ENGINEER

New Requirements with the passage of 2022 PA 160

Effective Date: 11/14/18 MUSTR referenced Act 399 & Act 368 which changed the required setbacks distances. ACT 160 (effective 7/19/22) reiterated (clarified) the new setbacks and provide the replacement option (nothing for additional or new facility-see below changes).

- Added Section 211021 to 1994 PA 451 as amended.
- Specify New UST required setback to existing wells based on well type.
- Allows the replacement of an existing UST tank(s) that did not qualify for the exception noted in section 280.20(d)(1), on a one-for-one basis.
- Certification requirements for replacement tank(s) located within specified isolation zones.
- Signature page added to UST Installation Application (BFS-3820).

MUSTR definitions

UST System - means a tank or combination of tanks, including underground pipes connected to the tank or underground of tanks, including underground ancillary equipment containment tank, if any, which is, was, or may have been, used to contain an accumulation of regulated substances and the volume of which, including the volume of the underground pipes connected to the tank or tanks, is 10% or more beneath the surface of the ground.

Underground Tank – means an UST, except that such term does not include underground piping.

Regulated Substance –

- Petroleum
- A substance defined in section 101(14) of title I of the comprehensive environmental response, compensation and liability act of 1980, Public Law 96-510, 40 U.S.C. section 9601 et seq, but not including a substance regulated as a hazardous waste under subtitle C of the solid waste disposal act of 1965, title II of Public Law 89-272, as amended, 42 U.S.C. section 6921 to section 6931 and section 6933 to section 6939b.

Active UST Tank(s) - means an UST tank(s) that has been in use within the past 12-months.

Michigan UST Rules – Timelines

11/14/18 to present			
5/23/12 to 11/13/18	Secondary Containment	Isolation	Exclusion
7/11/08 to 5/22/12			
1/3/91 to 7/11/08	Secondary Containment	Non-Secondary Containment Area	Exclusion
*Earlier than 1/2/91	Replacement UST with secondary containment can be in an Exclusion Zone if replacing a pre-1/3/91 UST already located in Exclusion Zone(s)		

Note: If no piping upgrades made between each timeline and date of proposed construction

Public Water Supply

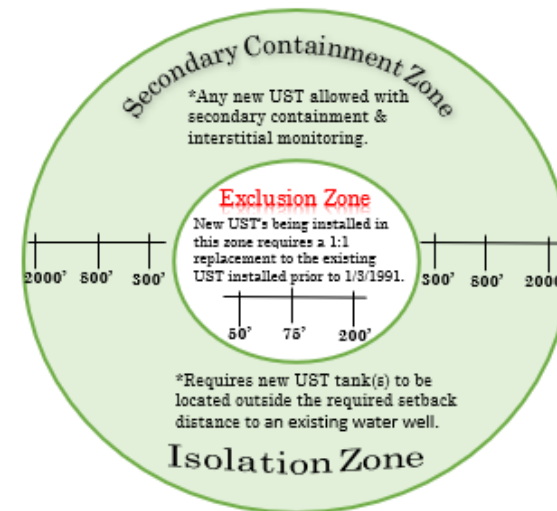
- Any water supply serving drinking water to other than a single-family residence.
- Well type classification system for public water supplies was established under the Michigan Safe Drinking Water Act, 1976 PA 399, as amended, being MCL 325.1001 et seq. (Act 399 Rules), and the administrative rules promulgated thereunder, being R 325.1010 et seq.
- Public water supplies are classified by the population served or the nature of their customer base and are classified into 3-types.
- The area where groundwater is drawn becomes larger when greater volumes of water are withdrawn from a well.

- A “normal” private well may supply water for one household and draw about 1000 gallons of water per day from the ground.

Types of Zones

Isolation Zone	Requires new UST tanks to be located outside the required setback distance to an existing water well.	2000 ft.	Type I community IIa noncommunity
		800 ft.	Type IIb noncommunity Type III
		300 ft.	Household or other
Secondary Containment Zone	Requires UST tank(s) to be secondary contained and interstitially monitored.	2000 ft.	Type I community IIa noncommunity
		800 ft.	Type IIb noncommunity Type III
		300 ft.	Household or other
Exclusion Zone	Requires new UST tank(s) to be located outside the required setback distance to an existing water well.	200 ft.	Type I community IIa noncommunity
		75 ft.	Type IIb noncommunity Type III
		50 ft.	Household or other

Water Well Zones



STATE INSPECTOR CQI CASE #1

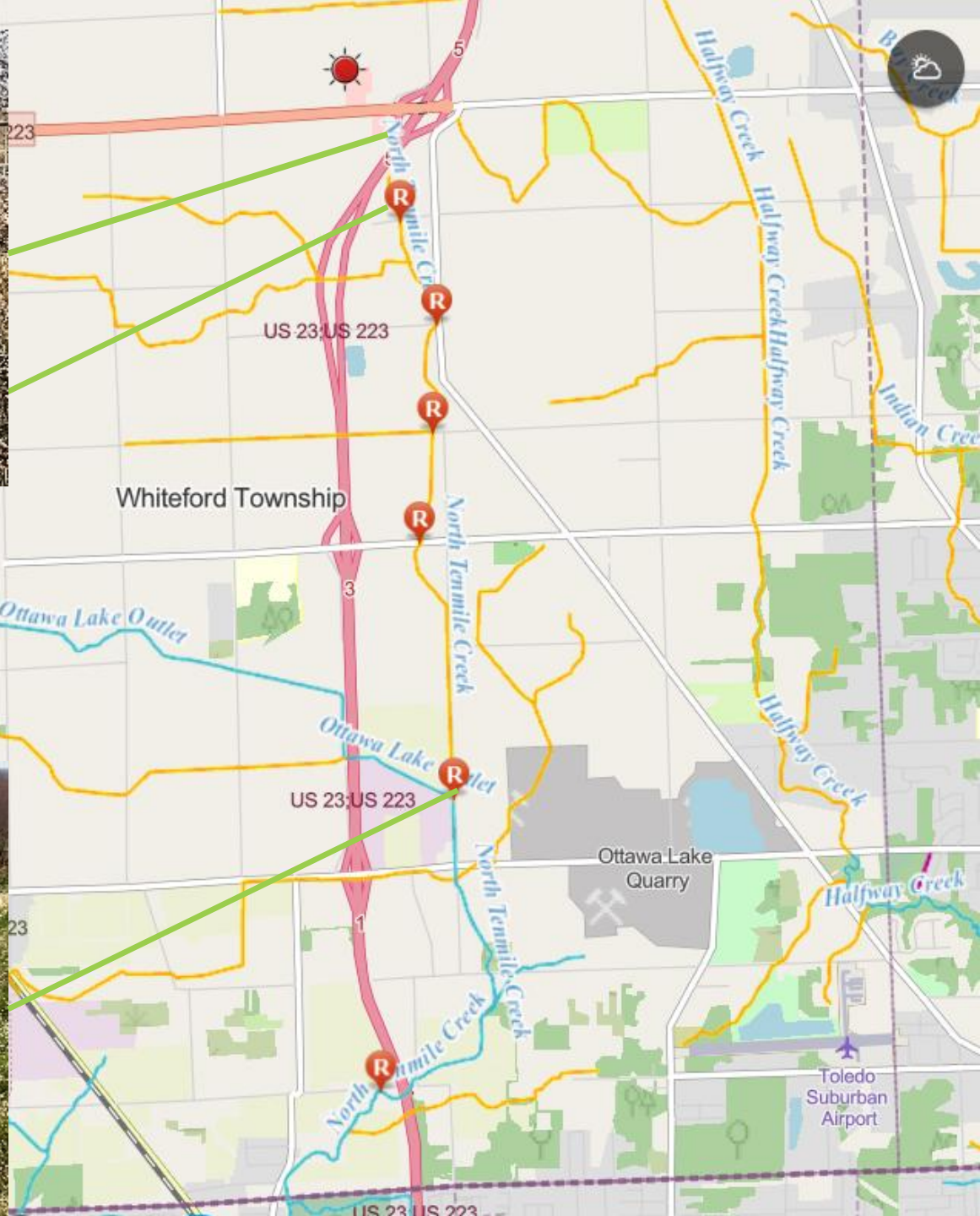
- In 2023, a state inspector filed a completed triennial inspection report for a LPG facility. The date of the inspection fell on a day of the week that is known that the business is closed. The inspection report claimed the inspector was able to inspect records and performed inspections inside of the facility fencing
 - Regional supervisor began interviewing the business manager and company personnel to get statements on whether the inspector had access to the facility and records.
 - Supervisor also performed a triennial inspection while on-site and found # violations that were not noted on the inspector's report.
 - Supervisor began investigation to identify any other questionable reports.

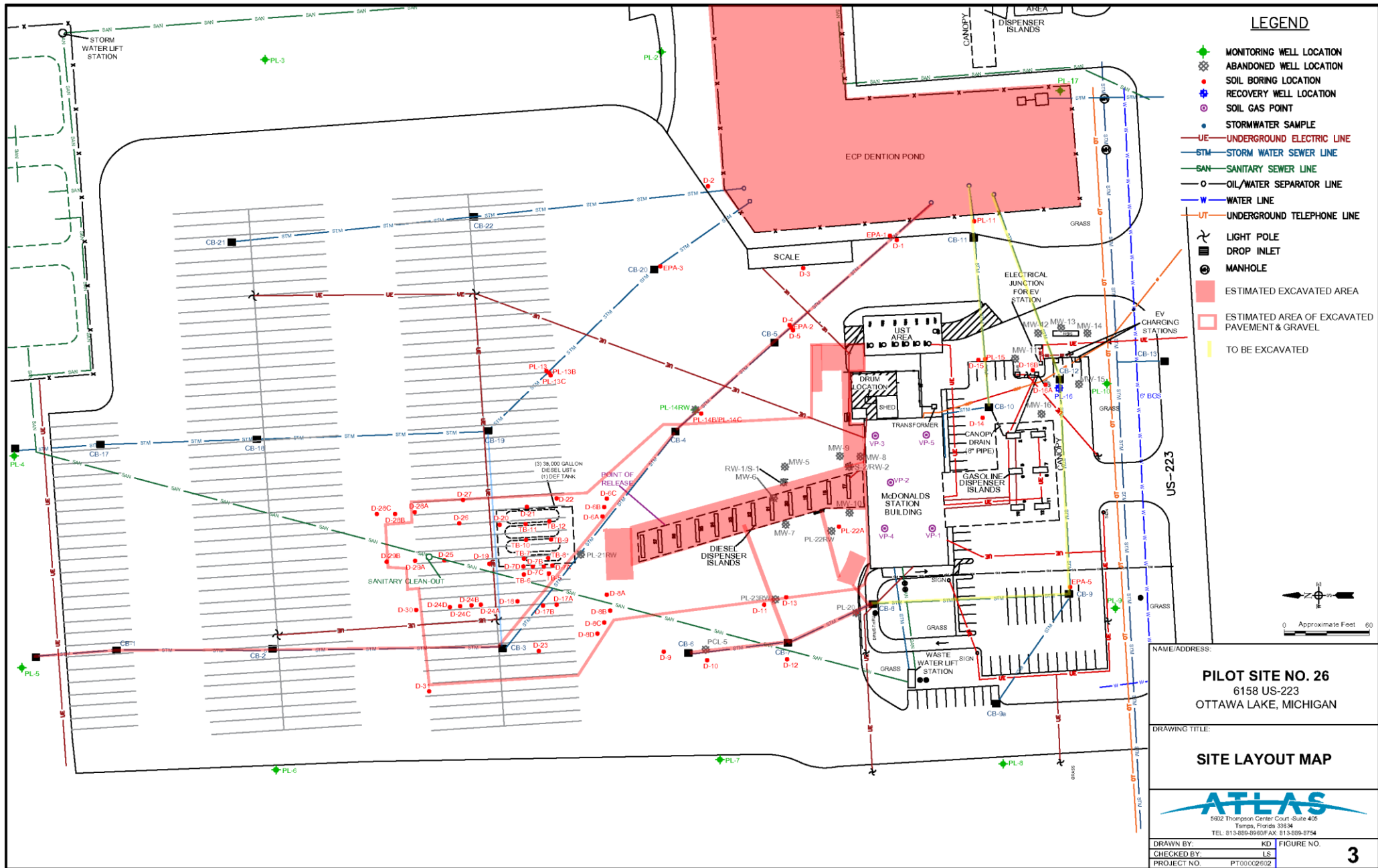
STATE INSPECTOR CQI CASE #2

- HMSIs in Region 1 were instructed to backfill other inspector's areas to assist with reducing inspection backlog.
 - HMSI A identified multiple instances of questionable inspection practices from HMSI B.
 - For example, facility sign-in/sign-out log at automotive production facility showed the 2021 inspection by HMSI B was performed in 45 minutes.
 - The 2024 inspection by HMSI A took 3 hours based on the distance between multiple systems at large facility.
 - Inspector B removed red tags at a gas station. Inspector A and Supervisor performed a CQI inspection and found that the items the station were tagged for were still not corrected.
 - Regional supervisor began monitoring inspection reports, performed follow up inspections of those facilities recently inspected by HMSI B, and spoke with owners and operators to get statements to any questionable inspection issues.

CONTRACTOR TESTING CQI CASES #1 & 2

- In early 2024, there were three inspections where the passing precision testing results were questioned by the HMSI.
 - The HMSI knew that the system pressure was too low based on the reported results.
 - The HMSI requested that they were present to witness a retest.
 - The tests failed when the system pressure was brought to the manufacturer's requirements.
- In March 2024, a gas station was found to be leaking even though precision testing had passed that month.
 - Precision tests were redone with HMSI present and failed even though they had passed the day before.
 - Investigation between BFS, EGLE, and the EPA led to the discovery of the largest gas station release in Michigan's history.





REMOVAL METRICS



	Recovered Liquid (Gallons)
Fuel from excavation/leak area	17,105
Fuel from oil/water mixture	9,755
Fuel from line jetting	4,342
Total Diesel Recovered	31,202

Approximate Final Numbers:

- 4,892,352 gallons of oil/water mix
- 4,887,681 gallons of liquid waste
- 160 cubic yards of oil impacted waste
- 1,214 Tons of oil impacted sediments from North Tenmile Creek

Note: All off-site disposal facilities were verified for State and Local approval/compliance.

CONTRACTOR TESTING CQI CASE #3

- STS leadership was in a meeting with the owner on going repairs about red tagged tanks at facility A.
 - The owner's Class B operator submitted 3-year sump testing results for facility B, which is in another city.
 - The owner told us that the Class B operator was working on fixing facility A at the same time the testing report showed he supposed to be at facility B.
 - Another contractor was at facility B and verified that he had been there all day and no one had been there to test the sumps.
- STS leadership instructed all HMSIs that all testing results from the Class B would not be accepted until additional training could be verified.
 - Held meeting with the Class B operator to discuss false reporting, inspection training, and corrective plan.
 - Class B operator performance was to be monitored until HMSIs confirmed that the testing was being completed according to PEI RP-1200.

REFERENCES

- [Continuous Quality Improvement \(CQI\): Driving Organizational Excellence - SixSigma.us](#)