You Missed A QC Seed, Now What?

Harry Wagner, Weston Solutions
Garrick Marcoux, Weston Solutions
Elise Goggin, USACE EM CX

US Army Corps of Engineers®

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You Missed A Seed, Now What?
Making The Most Of Your Quality Program

"Good decisions come from experience. Experience comes from making bad decisions."
– Mark Twain

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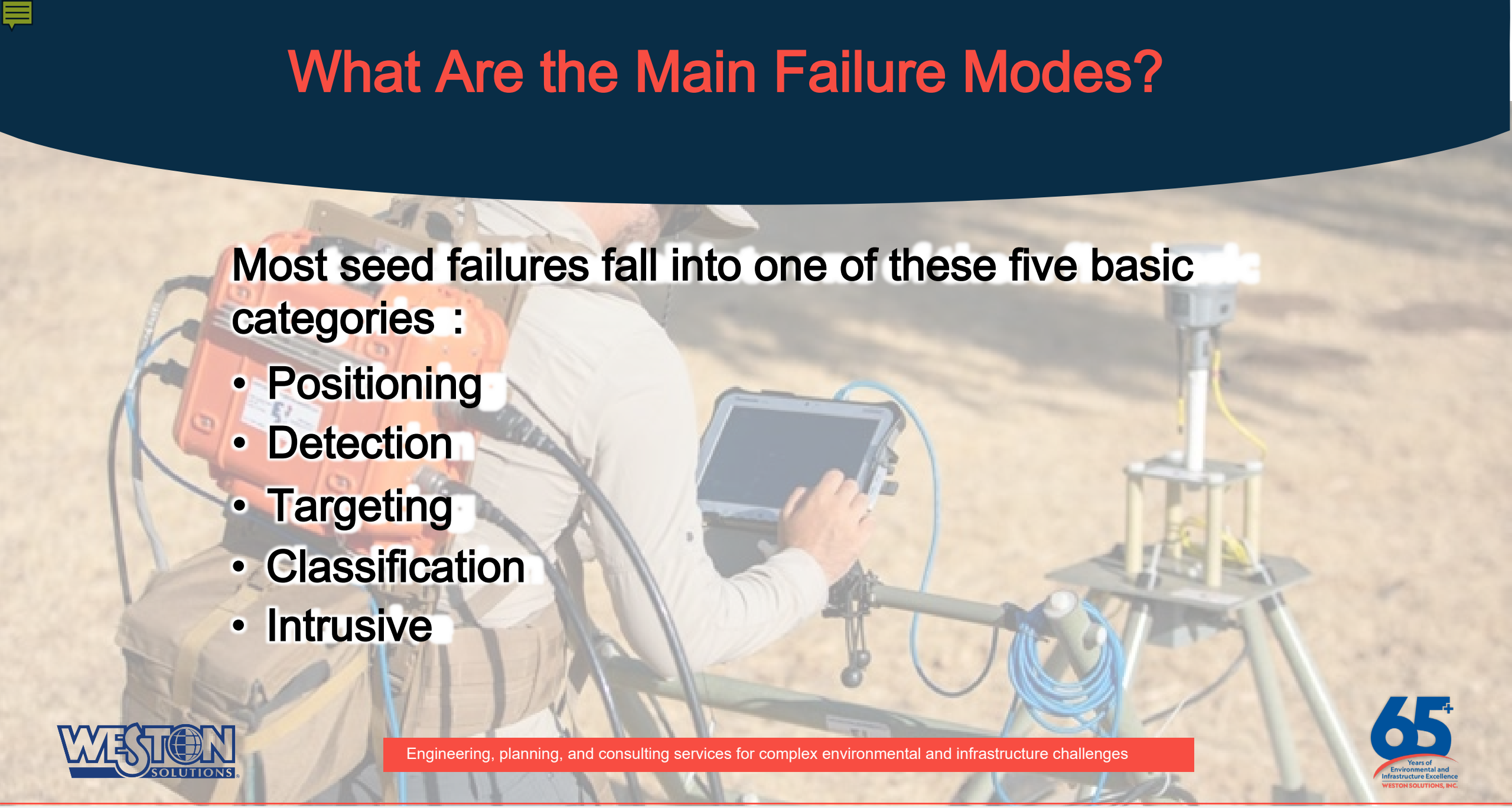
Pop Quiz!

- Do we need to seed on transects in a Remedial Investigation?
- What information do you record when you are seeding?
- Does every MQO failure require corrective action?

What Are the Main Failure Modes?



Most seed failures fall into one of these five basic categories :

- Positioning
- Detection
- Targeting
- Classification
- Intrusive

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How Do You Find The True Root Cause?

The 5 Whys

What is the problem? Missed QC seed

Why did this happen? Seed was not targeted. Root cause? NO

Why did this happen? Seed was not detected. Root cause? NO

Why did this happen? Team didn't pass over the seed. Root cause? NO

Why did this happen? Line spacing was insufficient. Root cause? NO

Why did this happen? Poor lane control. Root cause? NO

Why? Root? NO

Why?

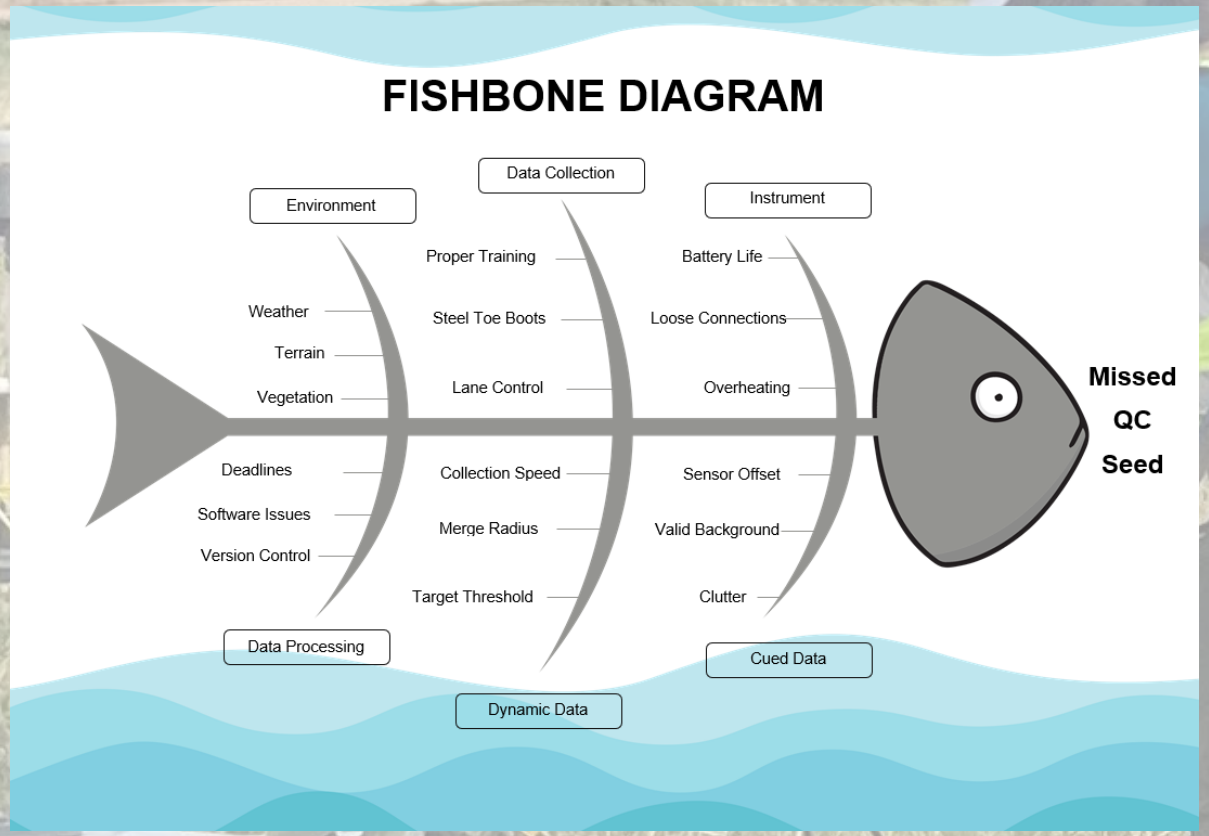
Possible solutions & countermeasures

Use tapes and cones for line spacing.

Add third team member to assist.

The 5 Whys were originally deloped by SAKICHI TOYODA, founder of Toyota Industries
Canvas designed by TUZZit.

How Do You Find The True Root Cause?



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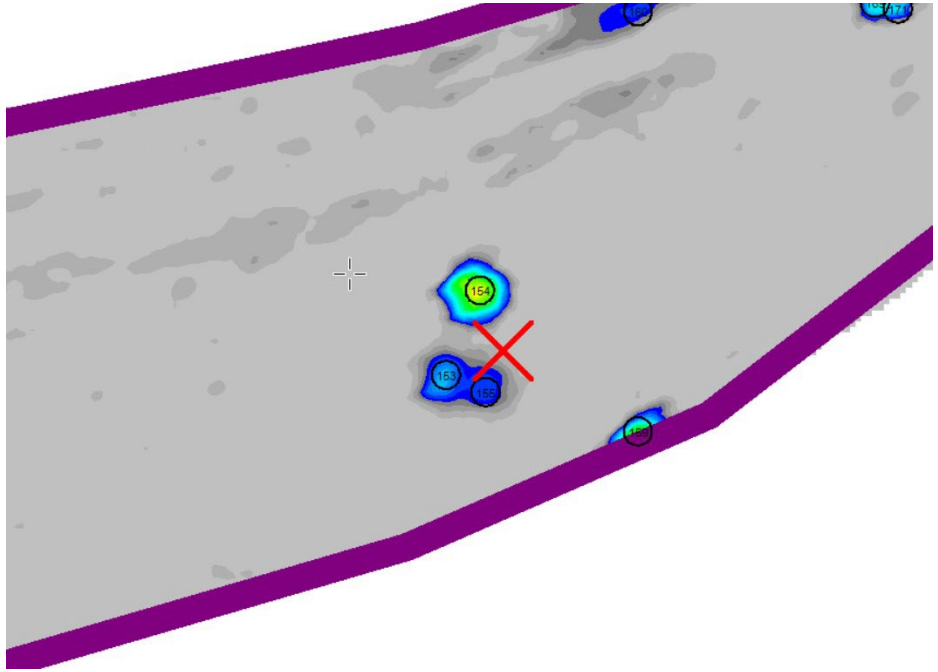
Positioning Failures

Initial Corrective Action

→Add more targets!

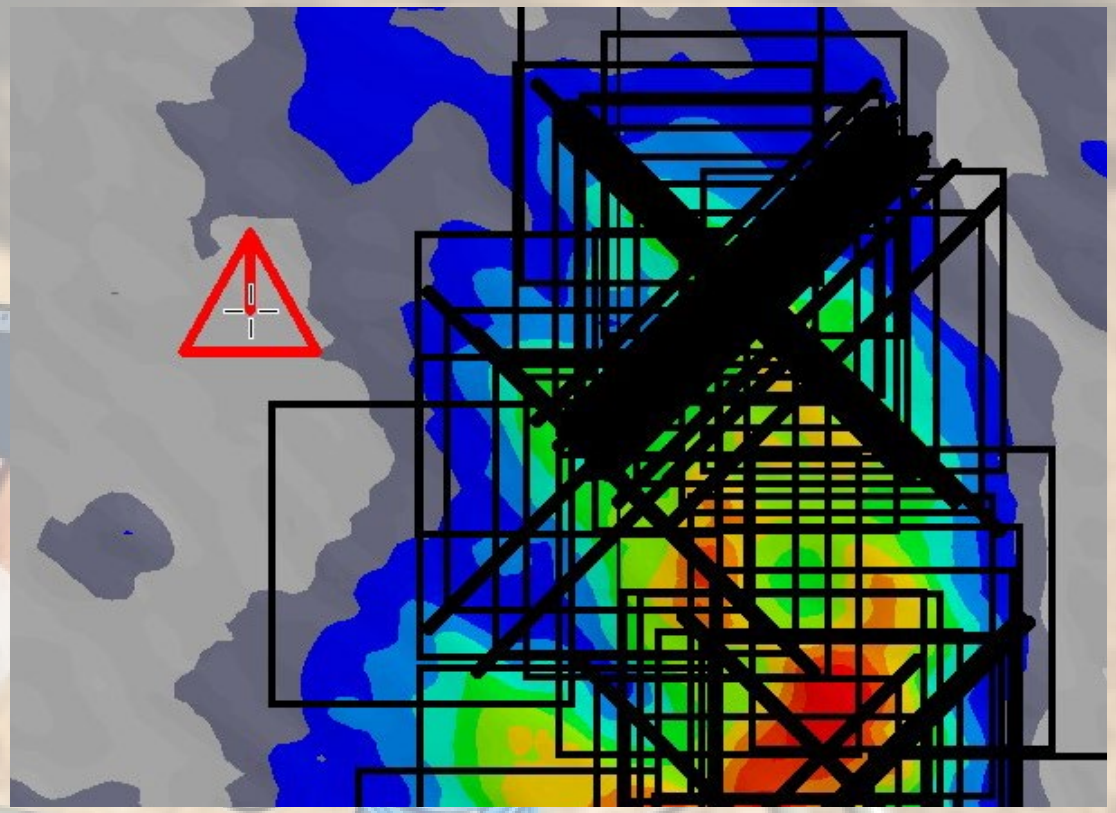


Additional Corrective Action

→Collect data with IMU to correct for tilt

Detection Failures

- Did you pass the AM and PM IVS tests?
- Do the field notes tell you anything?
- Are there other seeds in the grid?
- Are there other targets in the grid?
- Is the seed too deep?



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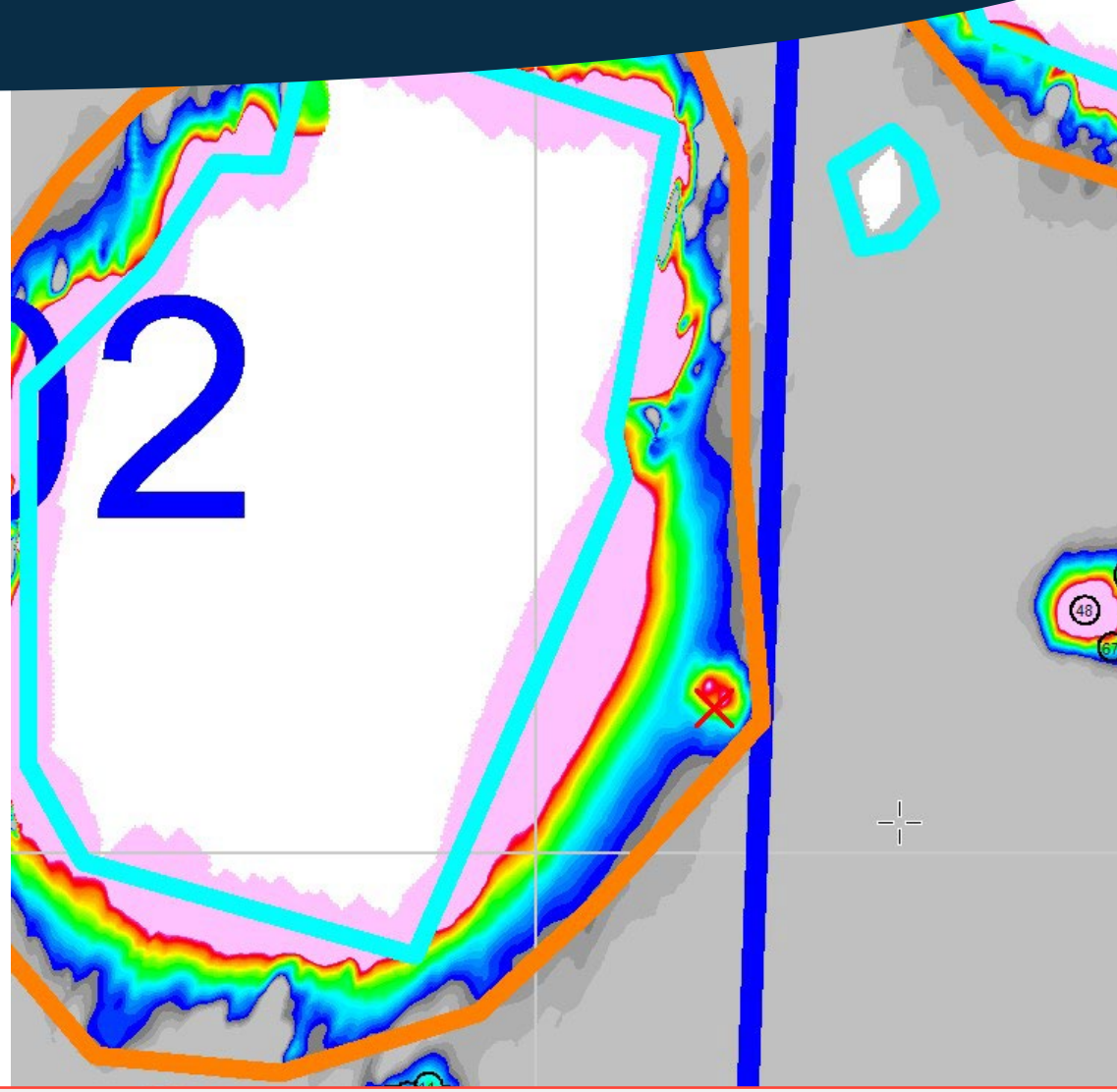
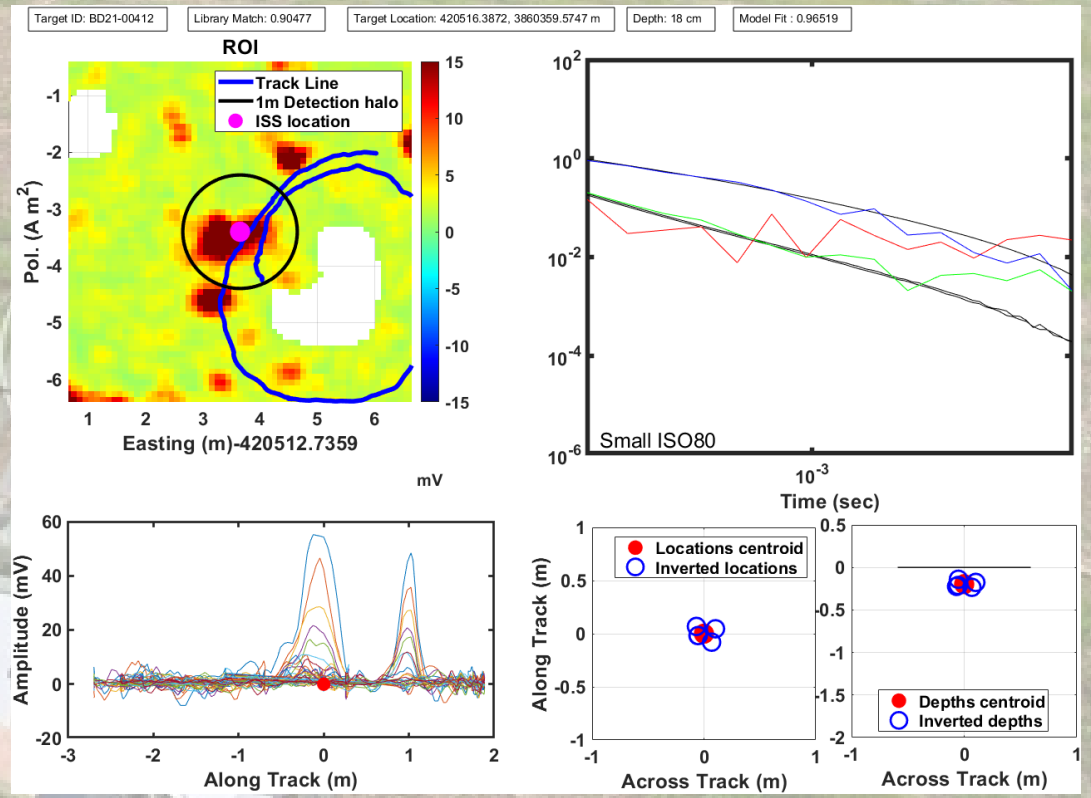
Targeting Failures

- Is your targeting failure actually a positioning or detection failure?
- Did the QC Geophysicist screw up with where they planted the seed? Make a Blind Seed Plan!
- Are there dipole picks at each end of the seed?
- We have started using non -blind seeds in challenging areas and providing the ground truth for these items to the data processor to assist in positioning and targeting TOI.



Classification Failures

- There is a fine balance between paring down the dig list and removing actual TOI.
- Is more automation better to remove the human factor?
- We have seen Cat 3 targets on seeds with nearby Cat 1 targets (but not close enough to meet MQOS).
- Should seeds be placed in cluttered areas?



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Intrusive Failures

- Set expectations!
- Review data and provide feedback as quickly as possible.
- Can a geophysicist be considered essential personnel and join the initial intrusive effort?

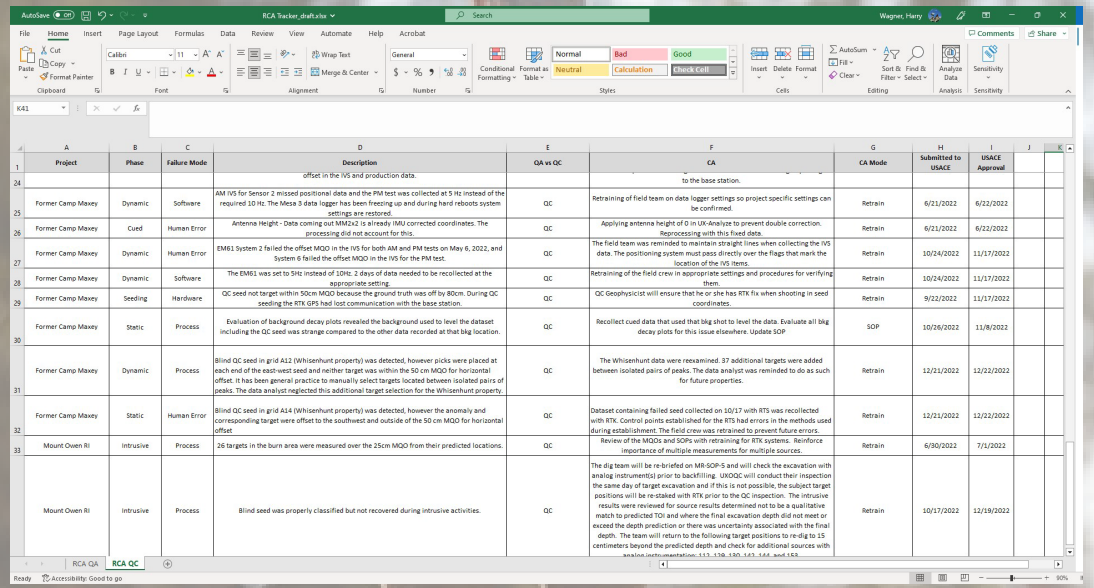
How Do We Explain Failures To Our Clients and Stakeholders?

Communication is key!

- Explain the purpose of QC seeds and set expectations during QAPP development and the TPP process, before there is a failure.
- When you are doing QC and encounter a missed seed, the best thing you can do is respond quickly .
- Let the QA geophysicist know that there is an issue as soon as identified but wait until we have a root cause analysis and corrective action complete to share it with stakeholders.
- At that time, you should be able to answer any concerns they may have and manage expectations.

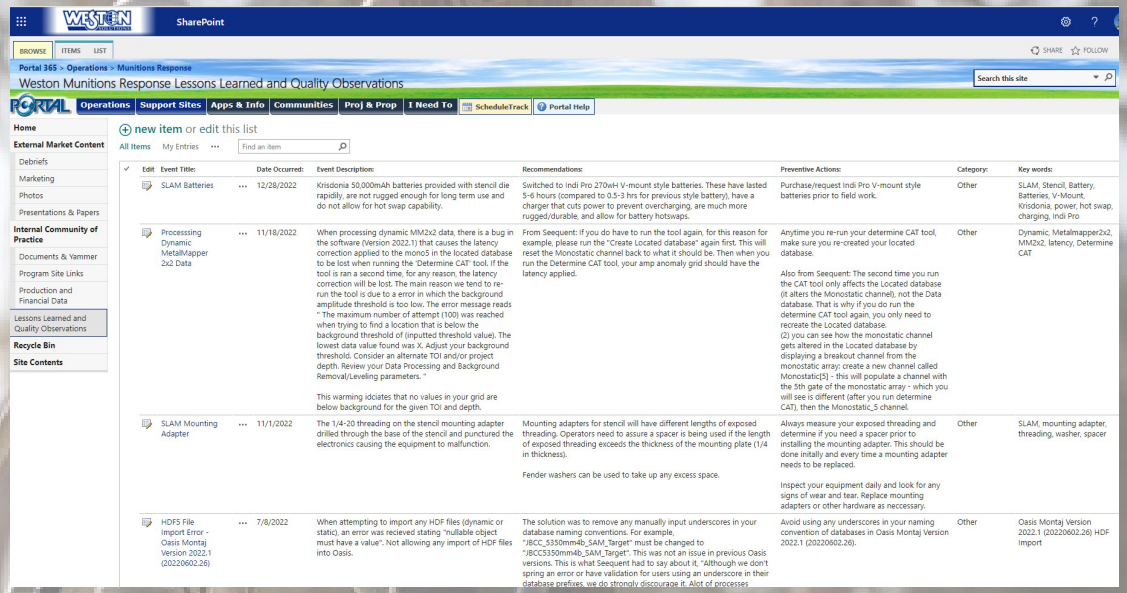
How Do You Share This Information Across Your Organization?

RCA Tracker



Project	Phase	Failure Mode	Description	QA vs QC	CA	CA Mode	Submitted to USACE	USACE Approval
			offset in the IVS and production data.		to the base station.			
Former Camp Maxey	Dynamic	Software	AM IVS for Sensor 2 missed positional data and the PM test was collected at 5 Hz instead of the required 10 Hz. The Mesa 3 data logger has been freezing up and during hard reboots system settings are restored.	QC	Retraining of Field team on data logger settings so project specific settings can be confirmed.	Retrain	6/21/2022	6/22/2022
Former Camp Maxey	Cued	Human Error	Antenna Height - Data coming out MM2x2 is already IMU corrected coordinates. The processing did not account for this.	QC	Applying antenna height of 0 in UX-Analyze to prevent double correction. Reprocessing with this fixed data.	Retrain	6/21/2022	6/22/2022
Former Camp Maxey	Dynamic	Human Error	EM61 System 2 failed the offset MQO in the IVS for both AM and PM tests on May 6, 2022, and System 6 failed the offset MQO in the IVS for the PM test.	QC	The field team was reminded to maintain straight lines when collecting the IVS data. The positioning system must pass directly over the flags that mark the location of the IVS items.	Retrain	10/24/2022	11/17/2022
Former Camp Maxey	Dynamic	Software	The EM61 was set to 5Hz instead of 10Hz. 2 days of data needed to be recollected at the appropriate setting.	QC	Retraining of the field crew in appropriate settings and procedures for verifying them.	Retrain	10/24/2022	11/17/2022
Former Camp Maxey	Seeding	Hardware	QC seed not target within 50cm MQO because the ground truth was off by 80cm. During QC seeding the RTK GPS had lost communication with the base station.	QC	QC Geophysicist will ensure that he or she has RTK fix when shooting in seed coordinates.	Retrain	9/22/2022	11/17/2022
Former Camp Maxey	Static	Process	Evaluation of background decay plots revealed the background used to level the dataset including the QC seed was strange compared to the other data recorded at that big location.	QC	Recollect cued data that used that big shot to level the data. Evaluate all big decay plots for this issue elsewhere. Update SOP	SOP	10/26/2022	11/8/2022
Former Camp Maxey	Dynamic	Process	Blind QC seed in grid A12 (Whisenhunt property) was detected, however picks were placed at each end of the east-west seed and neither target was within the 50 cm MQO for horizontal offset. It has been general practice to manually select targets located between isolated pairs of peaks. The data analyst neglected this additional target selection for the Whisenhunt property.	QC	The Whisenhunt data were reexamined. 37 additional targets were added between isolated pairs of peaks. The data analyst was reminded to do as such for future properties.	Retrain	12/21/2022	12/22/2022
Former Camp Maxey	Static	Human Error	Blind QC seed in grid A14 (Whisenhunt property) was detected, however the anomaly and corresponding target were offset to the southwest and outside of the 50 cm MQO for horizontal offset	QC	Dataset containing failed seed collected on 10/17 with RTS was recollected with RTK. Control points established for the RTS had errors in the methods used during establishment. The field crew was retrained to prevent future errors.	Retrain	12/21/2022	12/22/2022
Mount Owen RI	Intrusive	Process	26 targets in the burn area were measured over the 25cm MQO from their predicted locations.	QC	Review of the MQOs and SOPs with retraining for RTK systems. Reinforce importance of multiple measurements for multiple sources.	Retrain	6/30/2022	7/1/2022
Mount Owen RI	Intrusive	Process	Blind seed was properly classified but not recovered during intrusive activities.	QC	The dig team will be re-briefed on MR-SOP-5 and will check the excavation with analog instrument(s) prior to backfilling. UXOQC will conduct their inspection the same day of target excavation and if this is not possible, the subject target positions will be re-staked with RTK prior to the QC inspection. The intrusive results were reviewed for source results determined not to be a qualitative match to predicted TOI and where the final excavation depth did not meet or exceed the depth prediction or there was uncertainty associated with the final depth. The team will return to the following target positions to re-dig to 15 centimeters beyond the predicted depth and check for additional sources with	Retrain	10/17/2022	12/19/2022

Lesson Learned Portal



Edit	Event Title:	Date Occurred:	Event Description:	Recommendations:	Preventive Actions:	Category:	Key words:
	SLAM Batteries	12/28/2022	Krisdonia 50,000mAh batteries provided with stencil die rapidily, are not rugged enough for long term use and do not allow for hot swap capability.	Switched to Indi Pro 270wH V-mount style batteries. These have lasted 5-6 hours (compared to 0.5-3 hrs for previous style battery), have a charger that cuts power to prevent overcharging, are much more rugged/durable, and allow for battery hotswaps.	Purchase/request Indi Pro V-mount style batteries prior to field work.	Other	SLAM, Stencil, Battery, Batteries, V-Mount, Krisdonia, power, hot swap, charging, Indi Pro
	Processing Dynamic MetalMapper 2x2 Data	11/18/2022	When processing dynamic MM2x2 data, there is a bug in the software (Version 2022.1) that causes the latency correction applied to the mono5 in the located database to be lost when running the 'Determine CAT' tool. If the tool is ran a second time, for any reason, the latency correction will be lost. The main reason we tend to re-run the tool is due to a error in which the background amplitude threshold is too low. The error message reads " The maximum number of attempt (100) was reached when trying to find a location that is below the background threshold of (inputted threshold value). The lowest data value found was X. Adjust your background threshold. Consider an alternate TOI and/or project depth. Review your Data Processing and Background Removal/Leveling parameters. " This warming idiciates that no values in your grid are below background for the given TOI and depth.	From Seequent: If you do have to run the tool again, for this reason for example, please run the "Create Located database" again first. This will reset the Monostatic channel back to what it should be. Then when you run the Determine CAT tool, your amp anomaly grid should have the latency applied.	Anytime you re-run your determine CAT tool, make sure you re-created your located database. Also from Seequent: The second time you run the CAT tool only affects the Located database (it alters the Monostatic channel), not the Data database. That is why if you do run the determine CAT tool again, you only need to recreate the Located database. (2) you can see how the monostatic channel gets altered in the Located database by displaying a breakout channel from the monostatic array: create a new channel called Monostatic[5] - this will populate a channel with the 5th gate of the monostatic array - which you will see is different (after you run determine CAT), then the Monostatic_5 channel.	Other	Dynamic, Metalmapper2x2, MM2x2, latency, Determine CAT
	SLAM Mounting Adapter	11/1/2022	The 1/4-20 threading on the stencil mounting adapter drilled through the base of the stencil and punctured the electronics causing the equipment to malfunction.	Mounting adapters for stencil will have different lengths of exposed threading. Operators need to assure a spacer is being used if the length of exposed threading exceeds the thickness of the mounting plate (1/4 in thickness). Fender washers can be used to take up any excess space.	Always measure your exposed threading and determine if you need a spacer prior to installing the mounting adapter. This should be done initally and every time a mounting adapter needs to be replaced. Inspect your equipment daily and look for any signs of wear and tear. Replace mounting adapters or other hardware as neccessary.	Other	SLAM, mounting adapter, threading, washer, spacer
	HDF5 File Import Error - Oasis Montaj Version 2022.1 (20220602.26)	7/8/2022	When attempting to import any HDF files (dynamic or static), an error was recieved stating "nullable object must have a value". Not allowing any import of HDF files into Oasis.	The solution was to remove any manually input underscores in your database naming conventions. For example, "JBCC_5350mm4b_SAM_Target" must be changed to "JBCC5350mm4b_SAM_Target". This was not an issue in previous Oasis versions. This is what Seequent had to say about it, "Although we don't spring an error or have validation for users using an underscore in their database prefixes, we do strongly discourage it. Alot of processes	Avoid using any underscores in your naming convention of databases in Oasis Montaj Version 2022.1 (20220602.26).	Other	Oasis Montaj Version 2022.1 (20220602.26) HDF Import

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Questions?

Remember, failures are opportunities to learn. They aren't a bad thing unless you keep making the same mistakes over and over.

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Want To Know More?

Contact Us

Harry Wagner, CQM
MMRP Geophysical QC Manager
Weston Solutions, Inc.

Harry.Wagner@WestonSolutions.com
775-225-1424

Garrick Marcoux, PGp
MMRP Geophysical Group Manager
Weston Solutions, Inc.

Garrick.Marcoux@WestonSolutions.com
865-566-1013

Elise Goggin
QA Geophysicist
USACE EM CX

Elise.M.Goggin@usace.army.mil
256-640-5822

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