

IME

institute of makers of explosives

International Explosives Safety Symposium & Exposition



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IME**Intro****Grid****Equipment****Process****Collection
Area****Results****Challenges****Conclusions**

Background: Institute of Makers of explosives (IME)

- IME is the Safety and Security association for the commercial (industrial) explosives industry in the US and Canada since 1913
- Develops recommended practices
- Provides information to legislators, regulators and law enforcement
- One of IME's original tasks was to create the American Table of Distances (ATD)
- IME member companies produce more than 98% of the commercial explosives used in the US



Posters



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Background: IME

- IME mission is: To promote safety and security and the protection of employees, users, the public and the environment and encourage the adoption of uniform rules in the manufacture, transportation, storage, handling, use and disposal of explosive materials.
- American Table of Distances (ATD) is over 100 years old.
- Over that time explosive products, manufacturing processes, and storage practices changed.
- IME decided to pursue an approach, that relied upon quantitative risk assessment (QRA), to determine how and where to store commercial explosives to supplement the ATD.
- IME has since invested in the science of QRA, and its continued improvement, knowing it to be a critical component toward advancements in safely storing commercial explosives.



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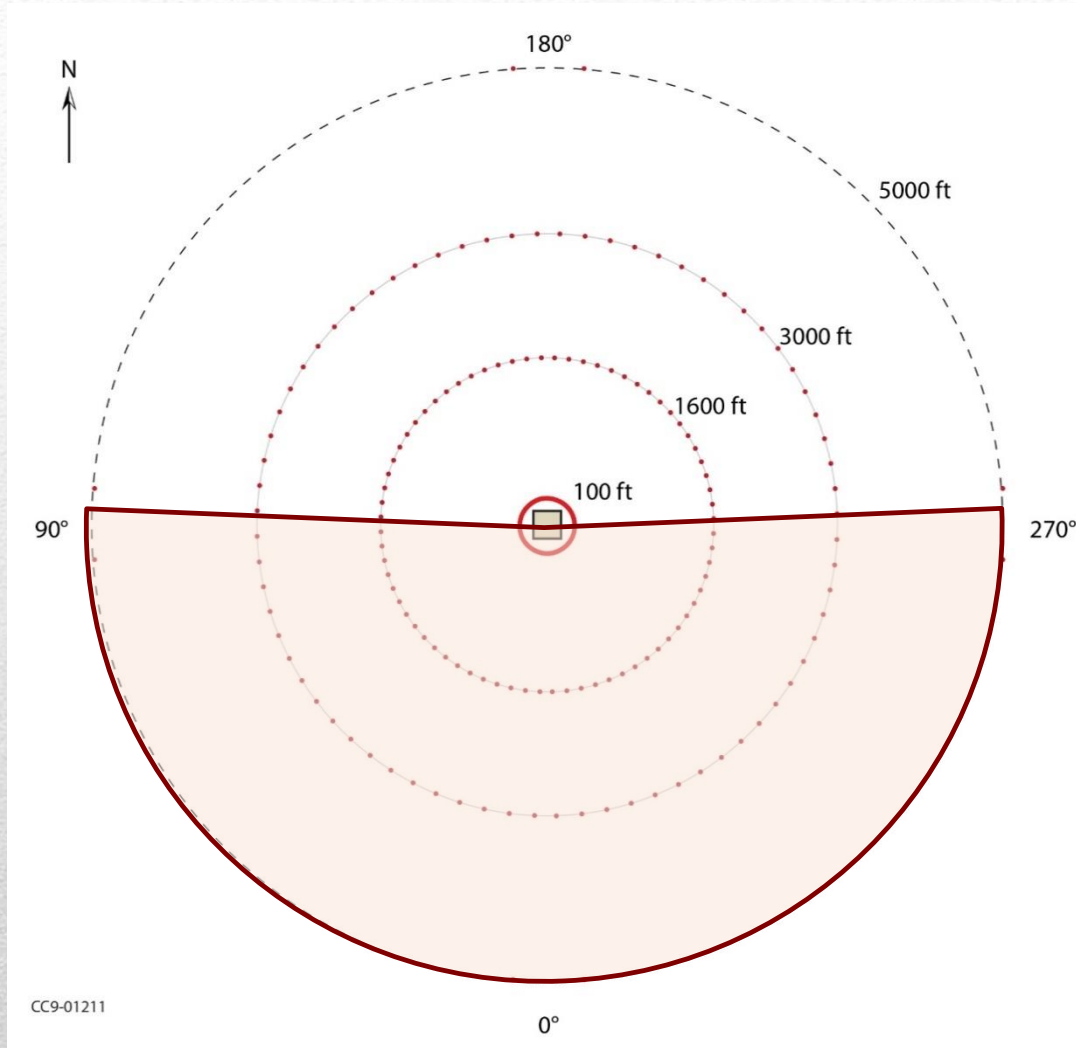
MP ASSOCIATES, INC.

GENERAL DYNAMICS
Ordnance and Tactical Systems



- The IME led a post-detonation debris collection project in conjunction with a large AN railcar detonation
- Test was conducted by the Department of Homeland Security-Transportation Security Administration, Department of Defense-Combating Terrorism Technical Support Office, Sandia National Laboratories, and the U.S. Army Dugway Proving Grounds.
- The test took place at the Utah Dugway Proving Grounds on April 27, 2018 and the debris collection was conducted the following two weeks.





Debris Collection Gear

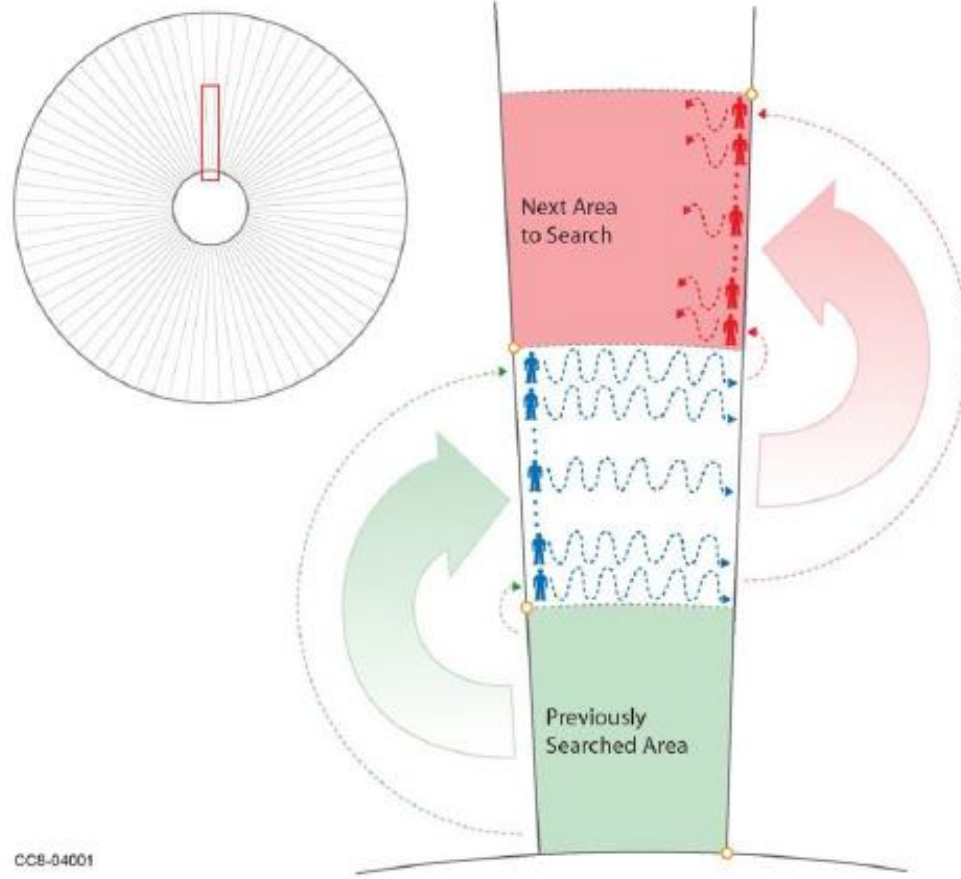
Instrumentations Equipment

- Differential GPS equipment for grid survey and debris recovery (battery powered)

Other Equipment Needs

- One “gator”
- Front end loader and crane scale
- Eight (8) handheld walkie-talkies
- Three (3) wheelbarrows
- Three (3) large floor scale with a minimum capacity of 450 lb.
- Six (6) portable scales (battery operated) with capacity of at least 11 lb and a resolution to 0.03 ounces (1 gram).
- Eight (8) spools of rope with a minimum length of 1500 feet.
- Approximately 25,000 survey flags of three (3) different colors.
- Eight (8) 5-gallon debris buckets to aid in collection process.
- Survey stakes (225 + 5% buffer needed)



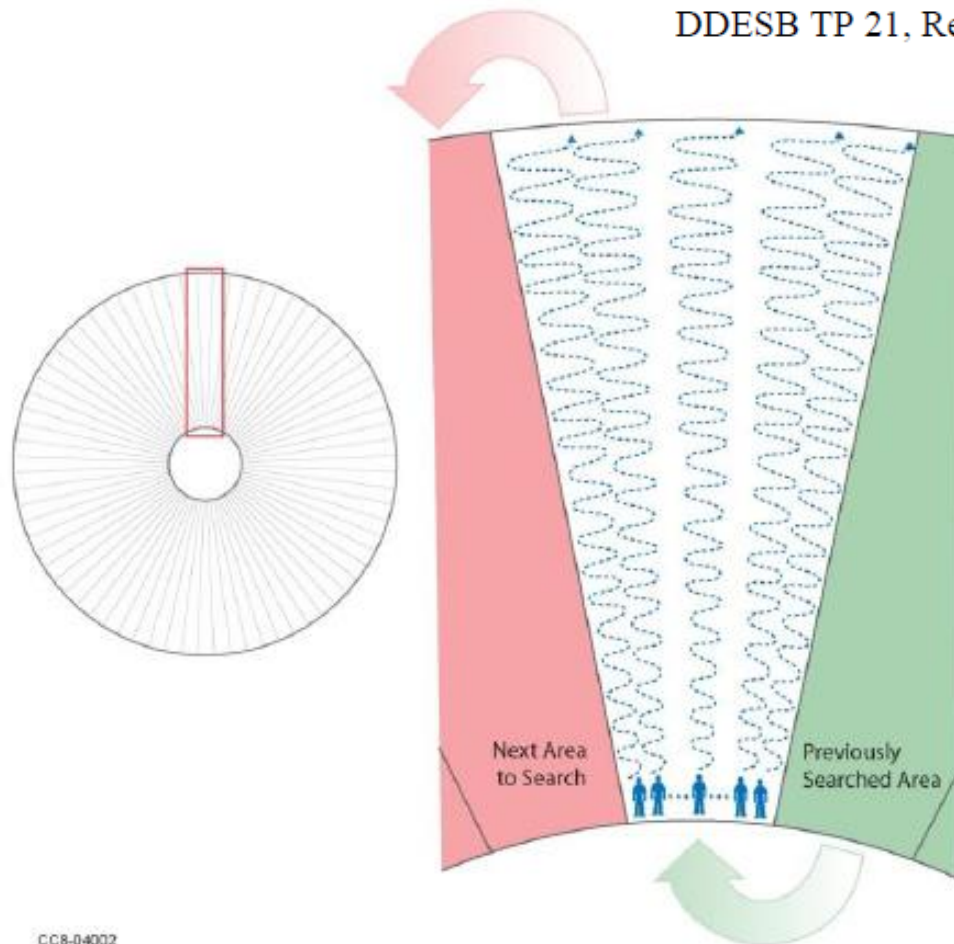


CCB-04001

Figure 3-1. Width Walk Search Technique



DDESB TP 21, Revision 2

**Figure 3-2. Length Walk Search Technique**

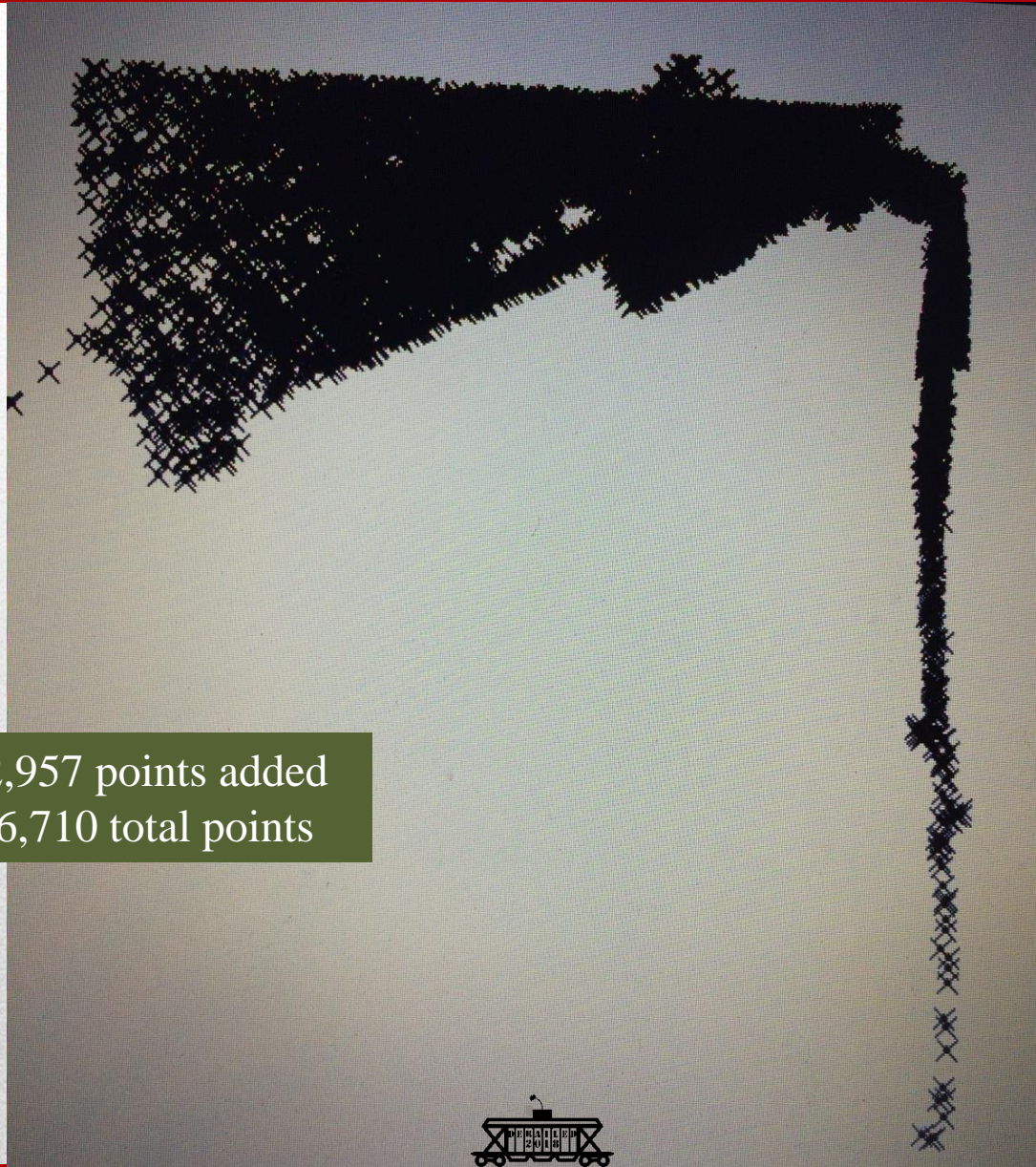
Date	4/30/2018	5/1/2018	5/2/2018	5/3/2018	5/4/2018	5/5/2018	5/6/2018	5/7/2018	5/8/2018	5/9/2018	5/10/2018	Total Man-Hours
Crew Size	21	22	22	22	20	8	0	21	20	21	23	1400
Man-Hours	147	154	154	154	140	56	0	147	140	147	161	



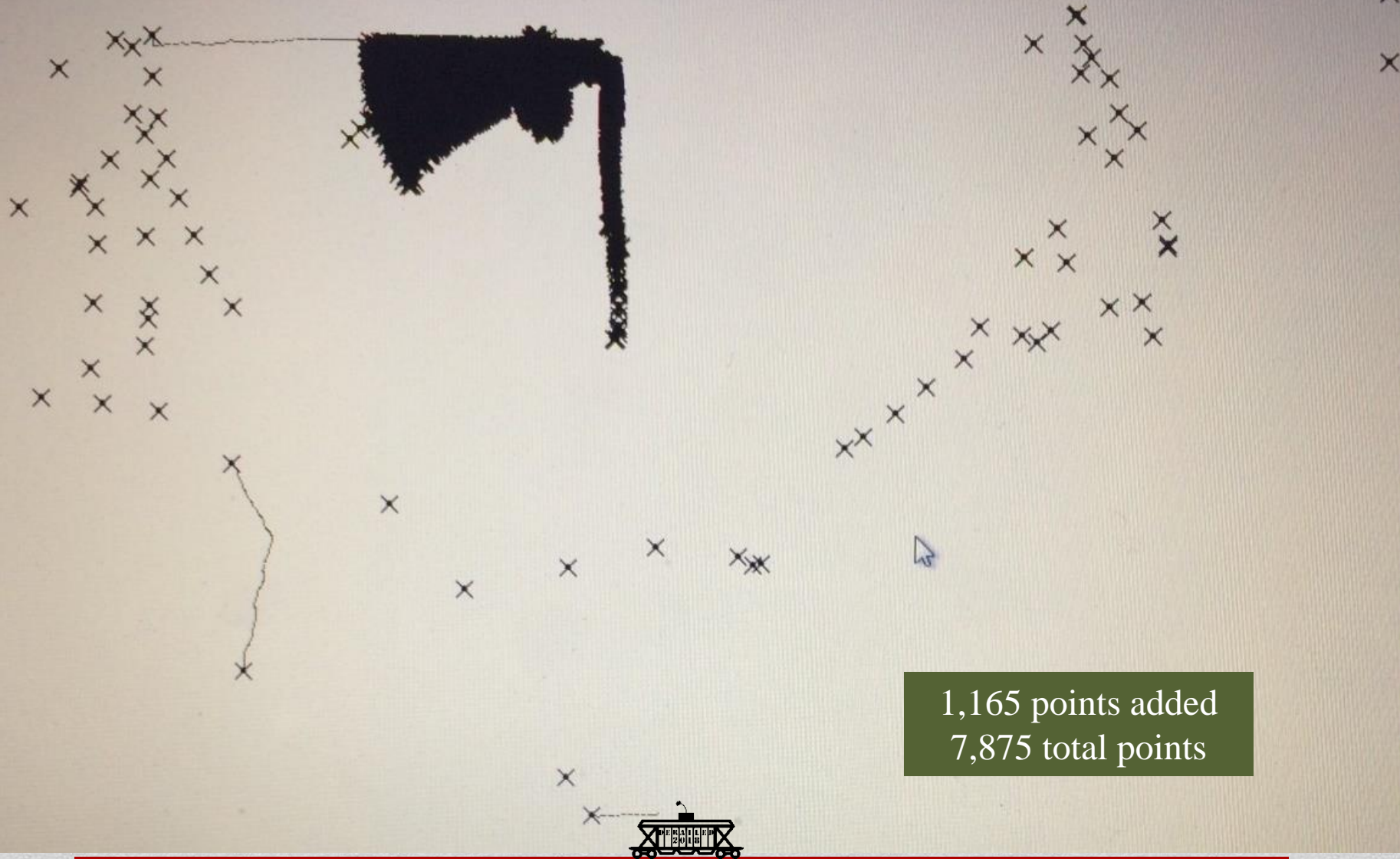
IME	Intro	Grid	Equipment	Process	Collection Area	Results	Challenges	Conclusions
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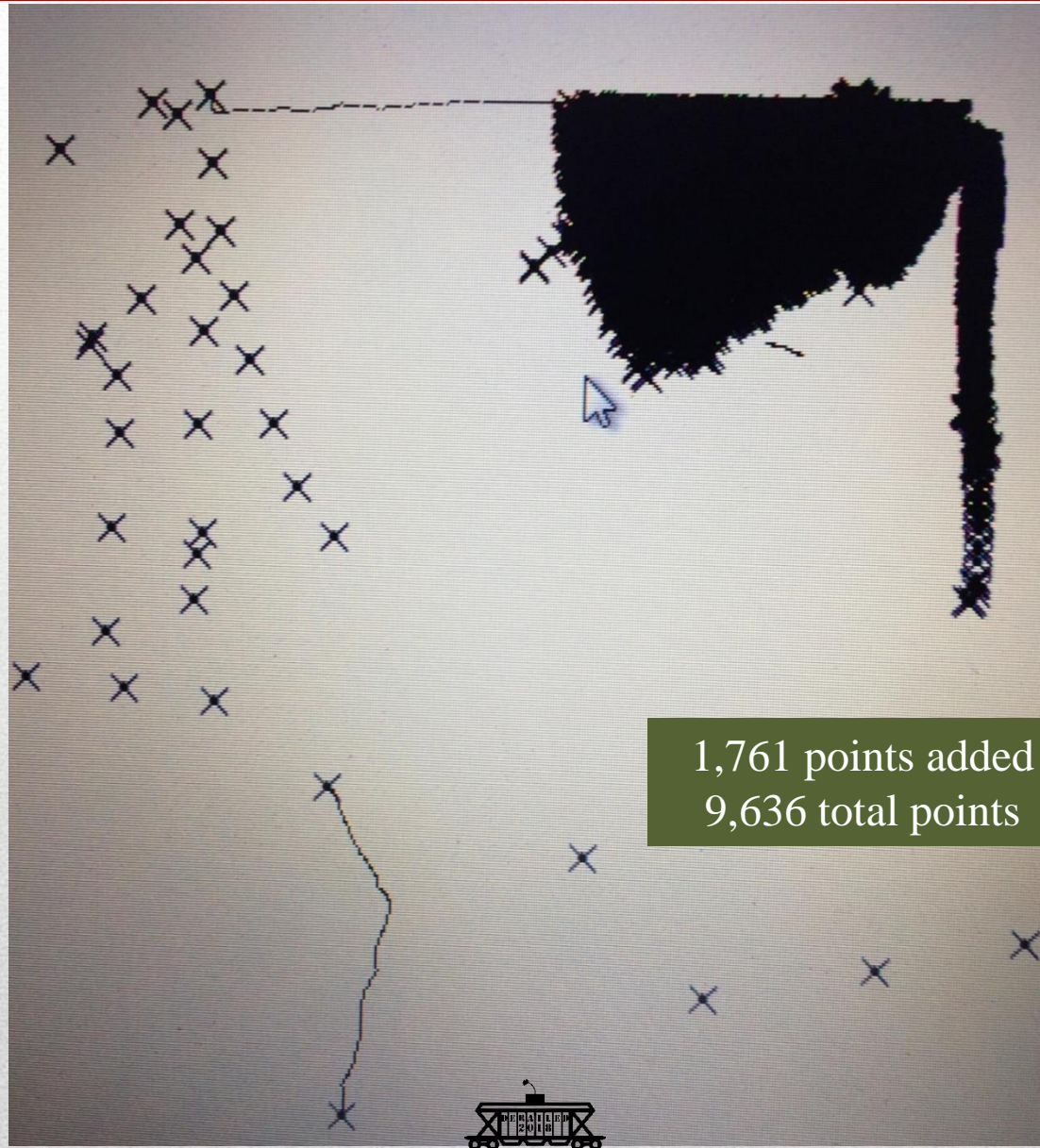
3,573
points



Day 4 (5/3/18)



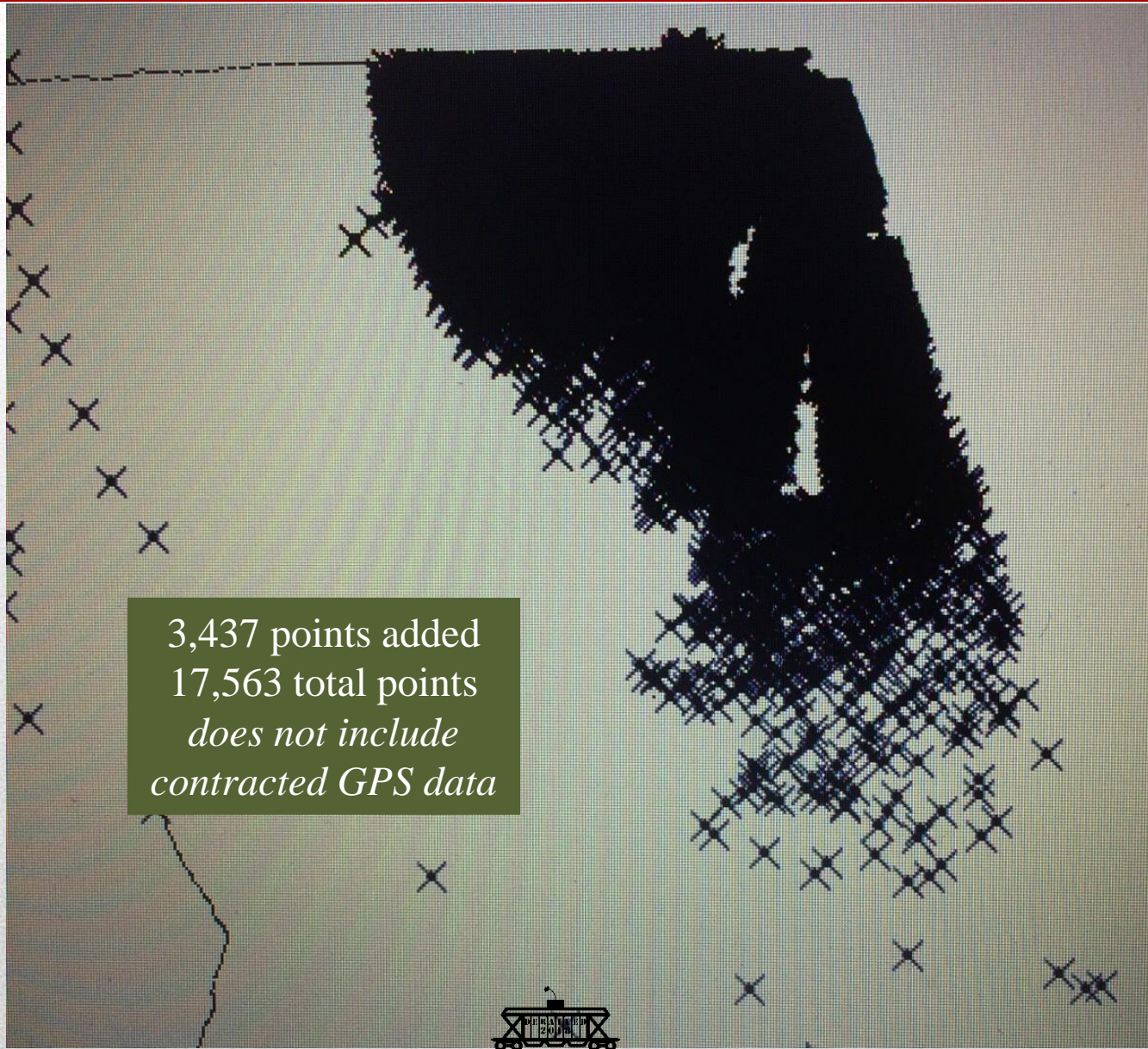
1,165 points added
7,875 total points



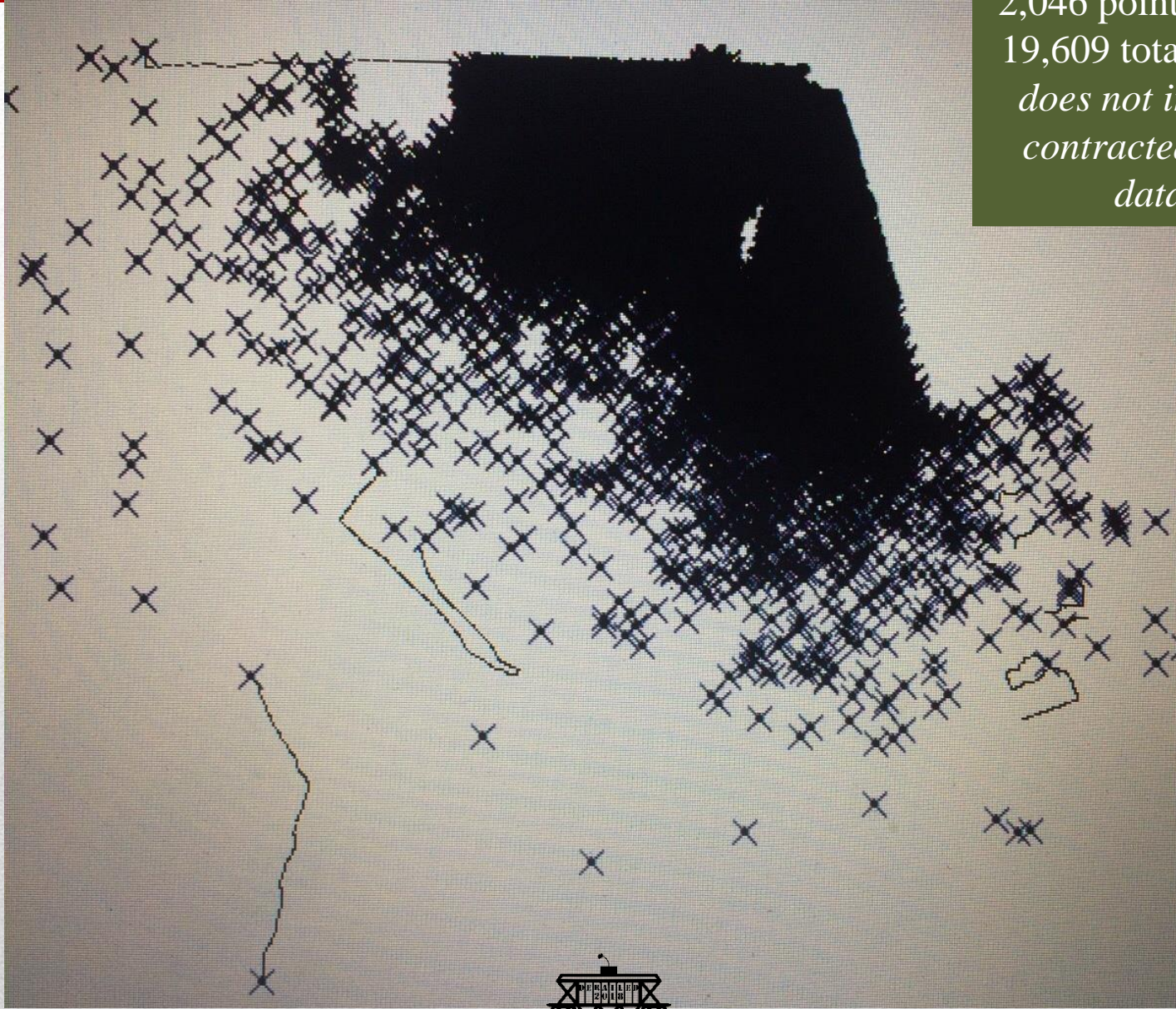


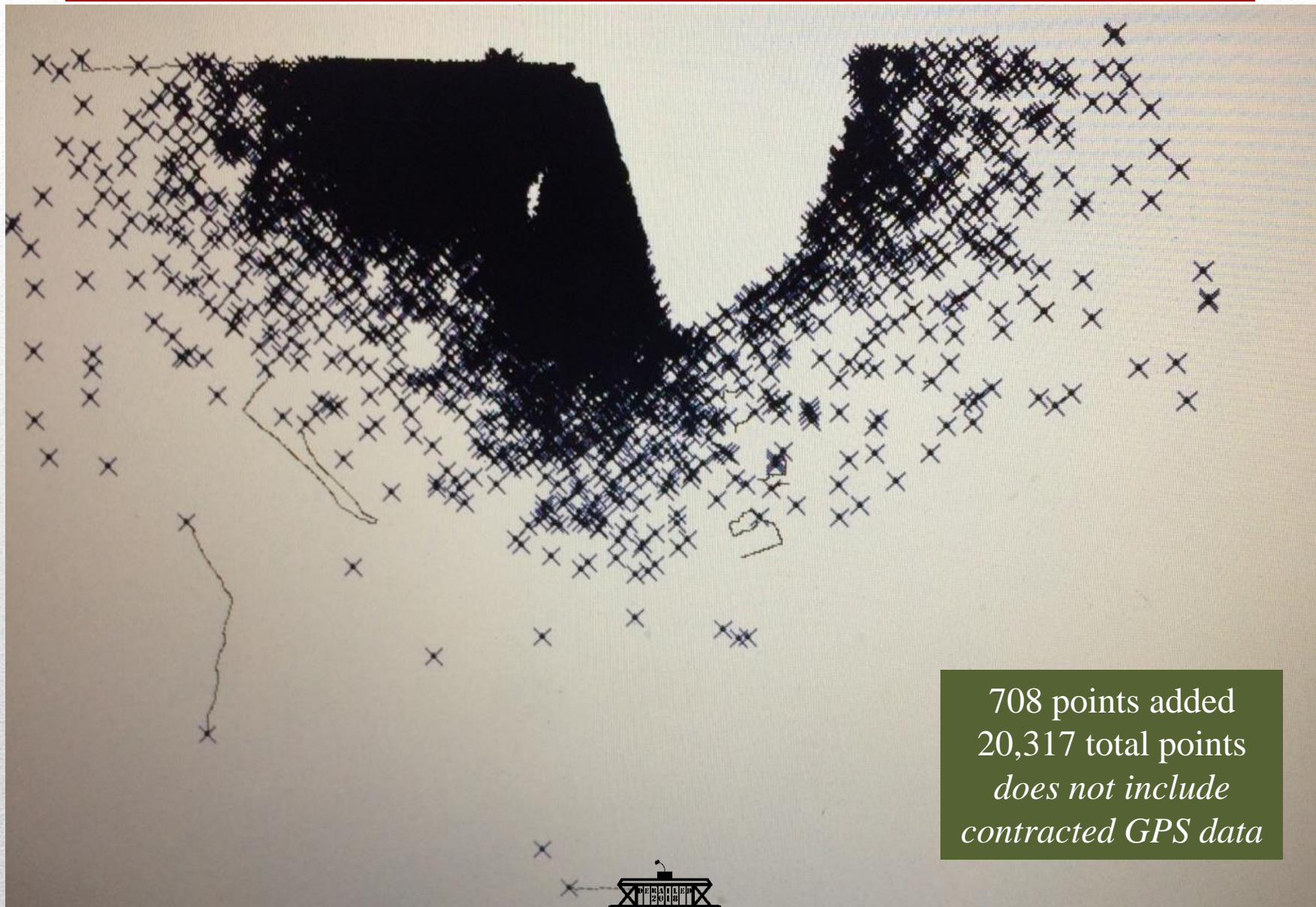
1,863 points added
11,499 total points
*does not include
contracted GPS data*





2,046 points added
19,609 total points
*does not include
contracted GPS
data*

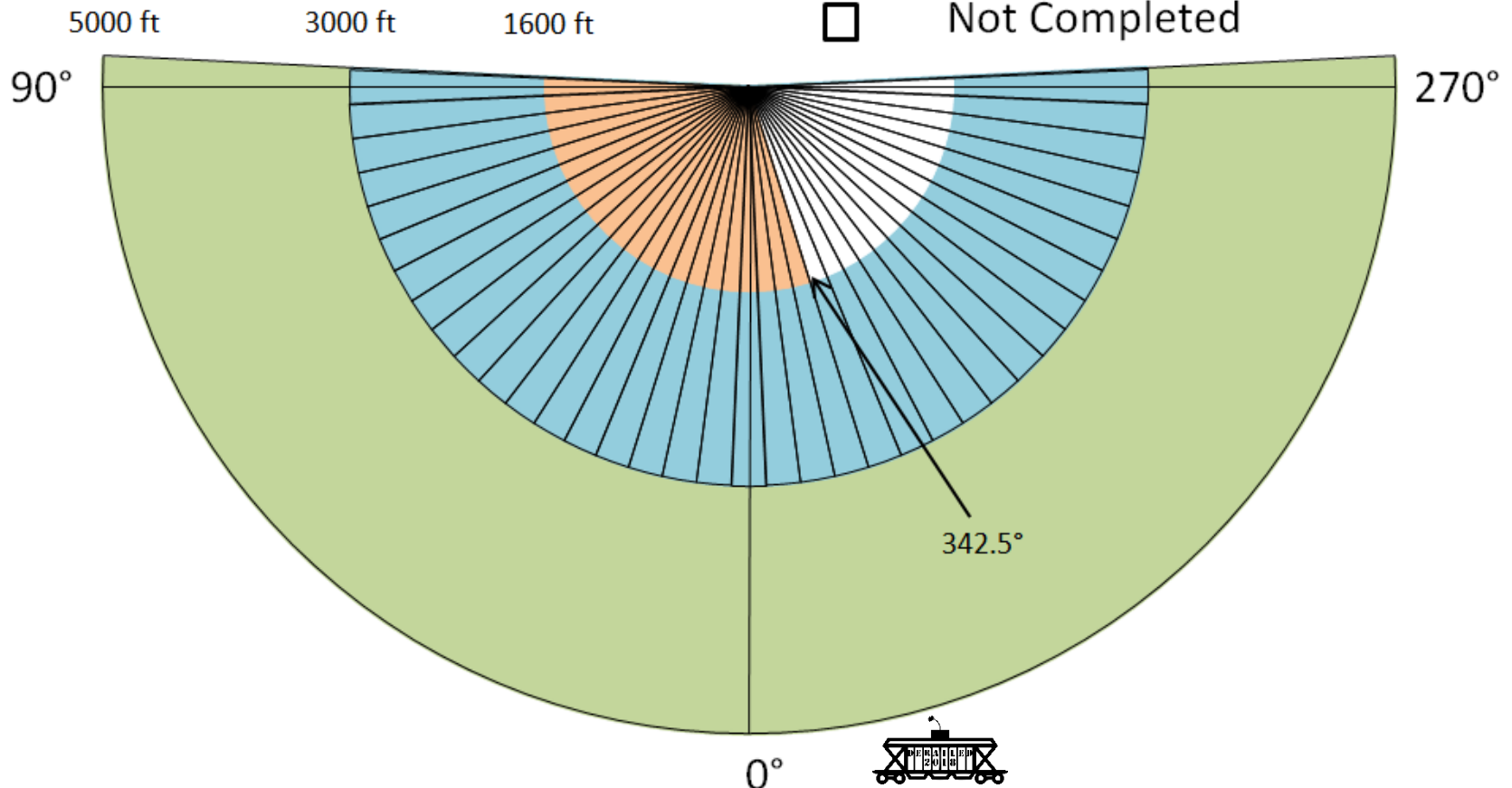




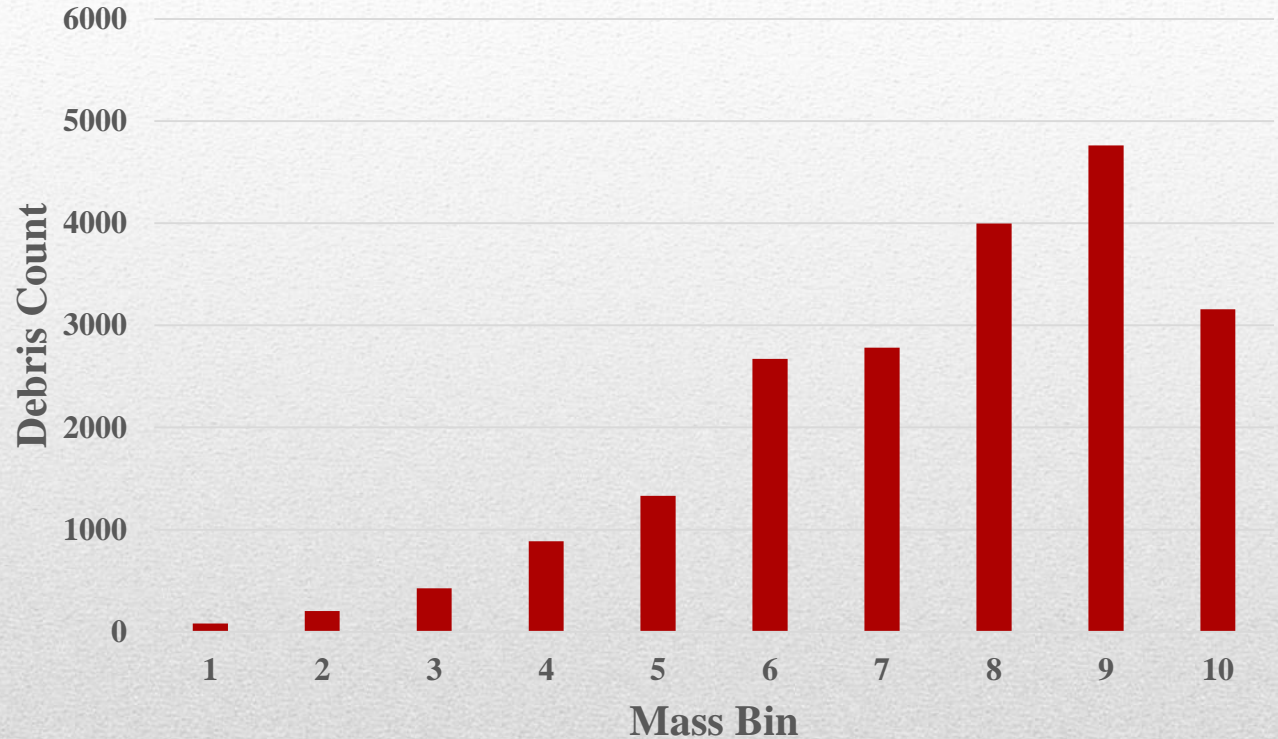
Derailed Collection Area

Legend

- Near Field - Completed
- Mid Field - Completed
- Far Field - Completed
- Not Completed



Debris Count by Mass Bin

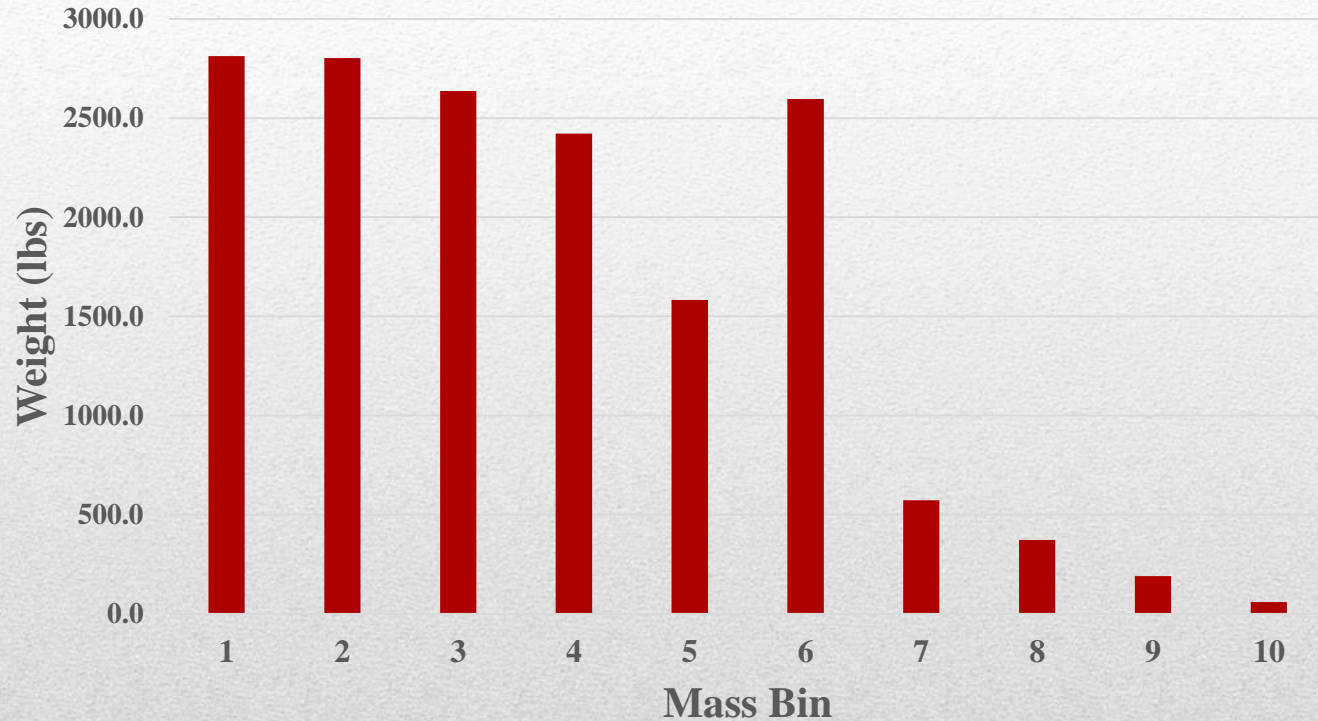


Bin #	Mass Steel
1	>26 lbs. (11793g)
2	10 – 26 lbs. (4536 -11793g)
3	4.5 – 10 lbs. (2040-4536g)
4	1.8 – 4.5 lbs. (816-2040g)
5	0.8 – 1.8 lbs. (363-816g)
6	0.3 – 0.8 lbs. (136-363g)
7	0.14 – 0.3 lbs. (63.5-136g)
8	0.06 – 0.14 lbs. (27.2-63.5g)
9	0.025 – 0.06 lbs. (11.3-27.2g)
10	0.013 – 0.025 lbs. (5.9-11.3g)



Weight by Mass Bin

Bin #	Mass Steel
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Challenges

- GPS Bottleneck/ Local Contractor
- Limited Time
- Timing
- New Workers Second Week
- Limited Workers
- Short Notice
- Funding



Conclusions

- Two weeks effort, an average of 20 persons/day & approximately 1400 manhours.
- Goal was a 195° area out to 5,000 ft.
- Near Field (100 ft. - 1600 ft.) was only collected from 92.5° to 342.5°.
- Mid Field (1,600 ft. - 3,000 ft.) and Far Field (3,000 ft. - 5,000 ft.) collection was completed.
- Symmetry can be applied due to favorable weather conditions.
- The total area examined for debris was approximately 940 acres.
- Debris:
 - 20,187 lbs. of debris.
 - 21,066 pieces of debris (+5g).
- As mass bin decreases the relative proportion of debris pieces within that bin increases.
- Although there are proportionally few pieces of larger debris much of the total mass is present in them.
- While there are a lot of debris pieces in the smaller mass bins they don't amount to much of the overall mass ☐ less hazardous.

