IMPROVE Network QA/QC
Field Audits

Presented at Annual IMPROVE Steering Committee Meeting 11/1/2016, Santa Fe, NM

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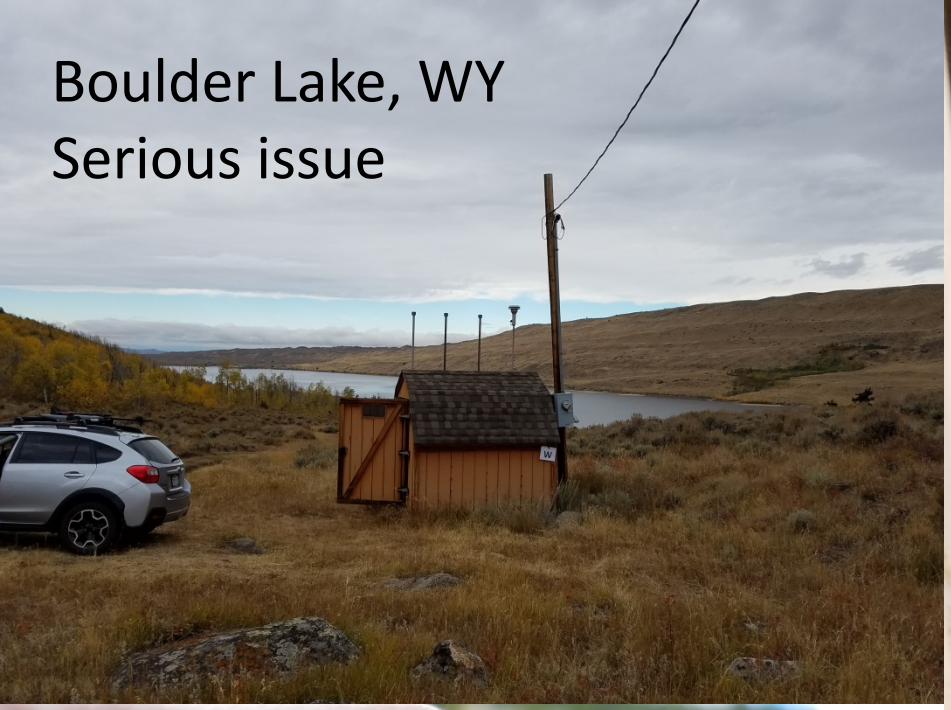
Presentation Overview

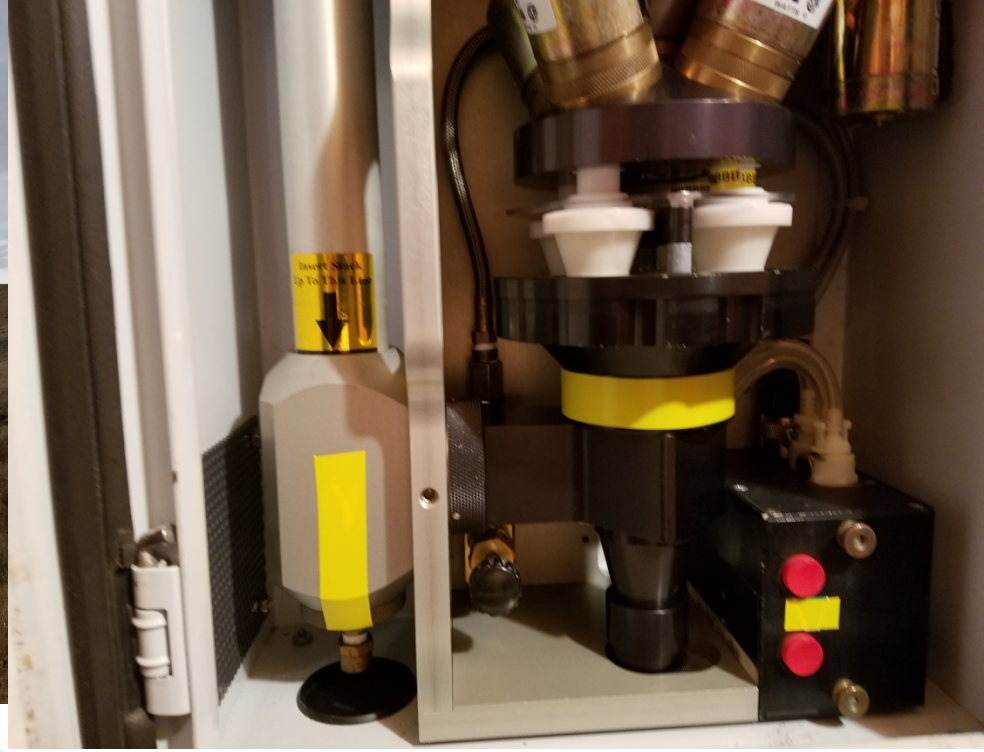
- What the audits entail.
- Who is doing audits and roughly how many audits should be accomplished each year?
- Audit results: sampler and sampling site integrity, flow rates, operator performance
- Future work plan

Weminuche Wilderness, CO
Site Overview
Photos
Sampler/stand integrity
Sample flow obstructions

This Controller runs on
Standard Time
Only
Do not use Daylight Savings
DO NOT FORCE!
WHITEY
BGI tetraCal
MesaLabs
tetraCal

Boulder Lake, WY
Serious issue





IMPROVE sampler auditors and audits

1. AzDEQ; Andy Clifton

- MEAD SAWE BALD SYCA
- **2. CDPHE; Cindy Wike, Clyde Sharp, Bret Harkwell**
- GRSA MEVE WHRI ROMO MOZI SHMI

3. EPA_R1 (NE); Chris St.Germain

- MAVI PENO

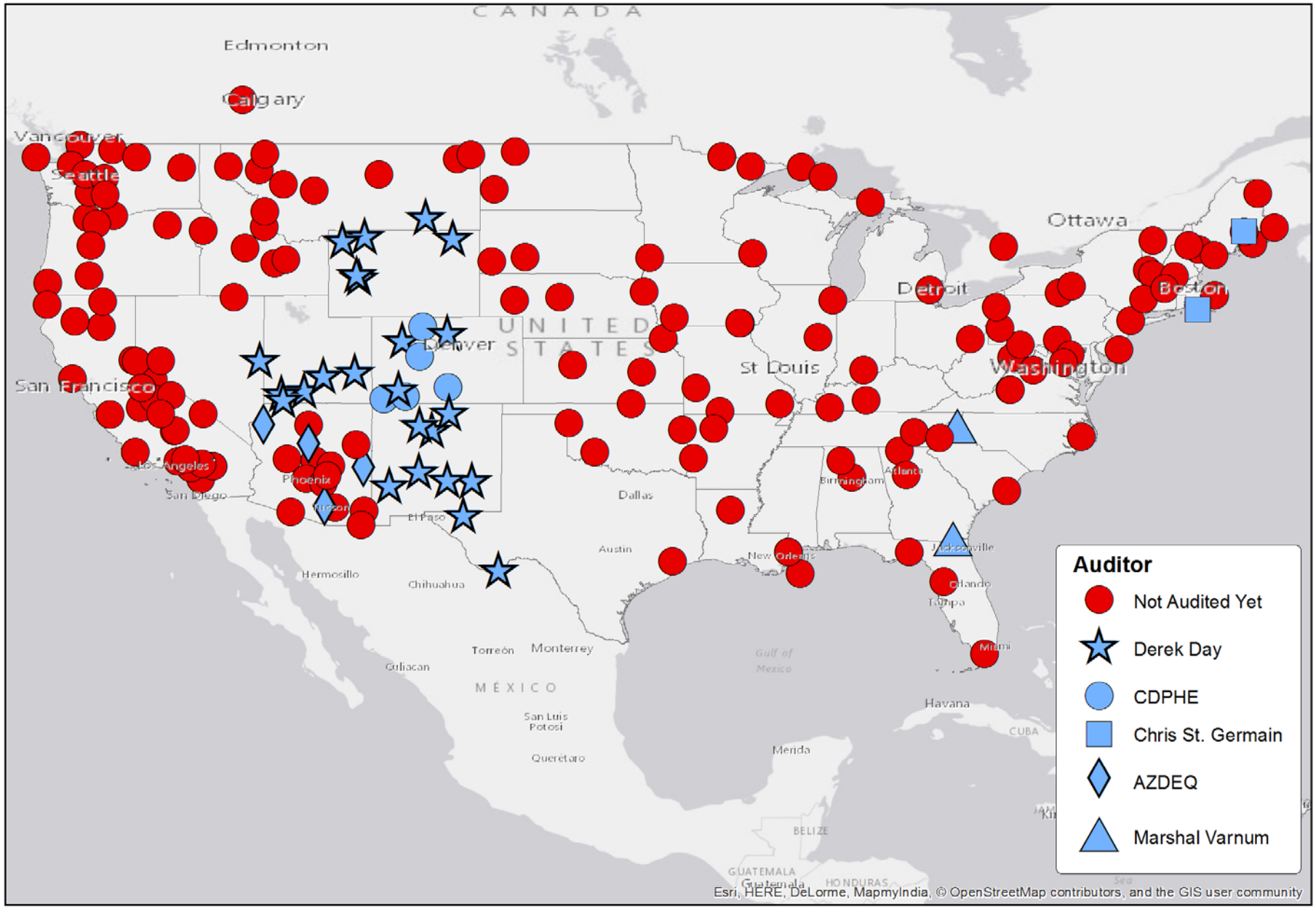
4. EPA_R4 (SE); Marshal Varnum

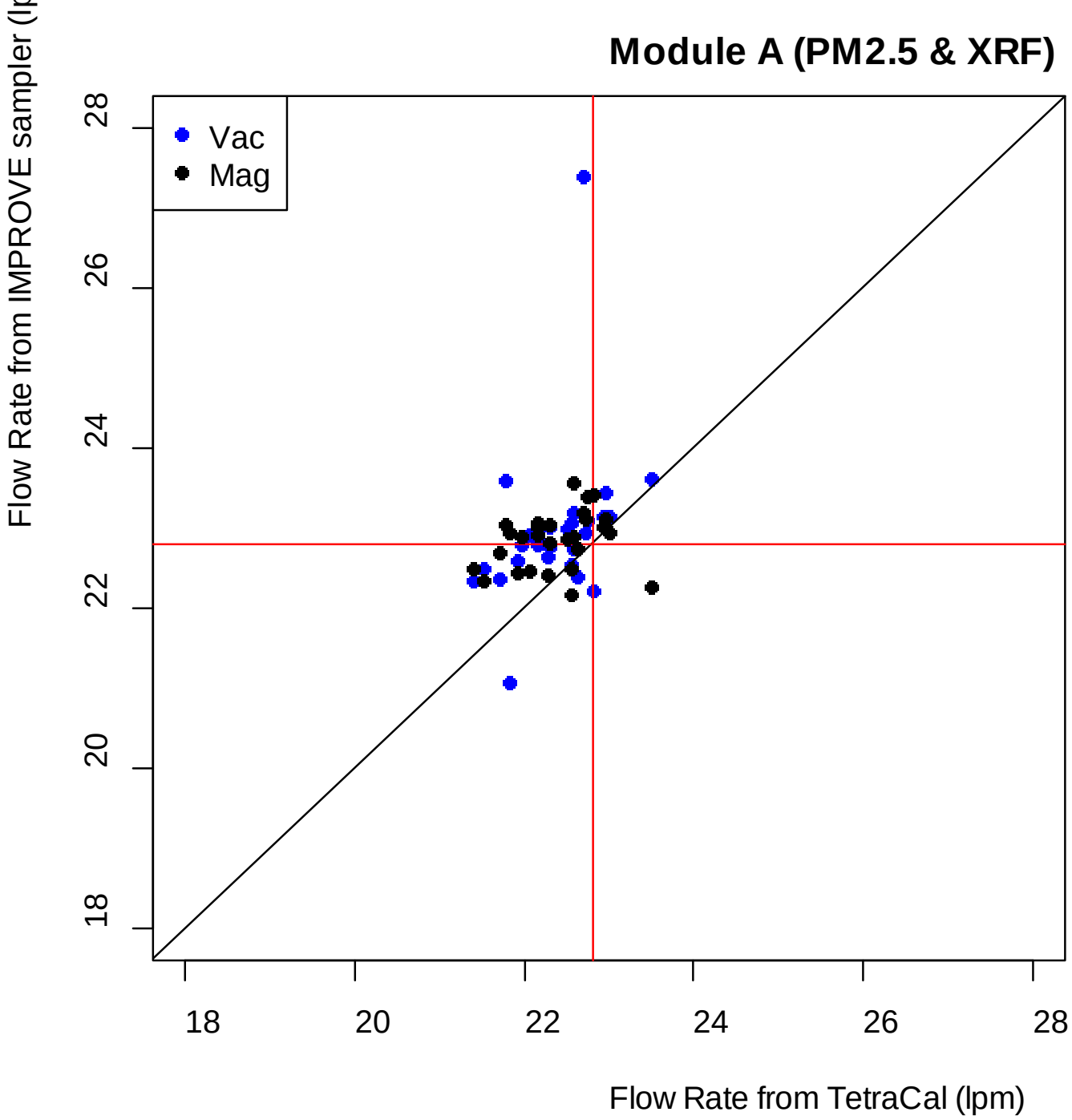
- LIGO OKEF
- **5. CSU; Derek Day**
- Auditor Training: LIGO (Dennis Crumpler) ROMO (CDPHE)
- FLTO CANY CAPL GRBA ZICA BRCA WEMI BOLA BRID YELL NOAB NOCH THBA WHPE SAPE BOAP GICL GUMO BIBE WHIT SACR BAND

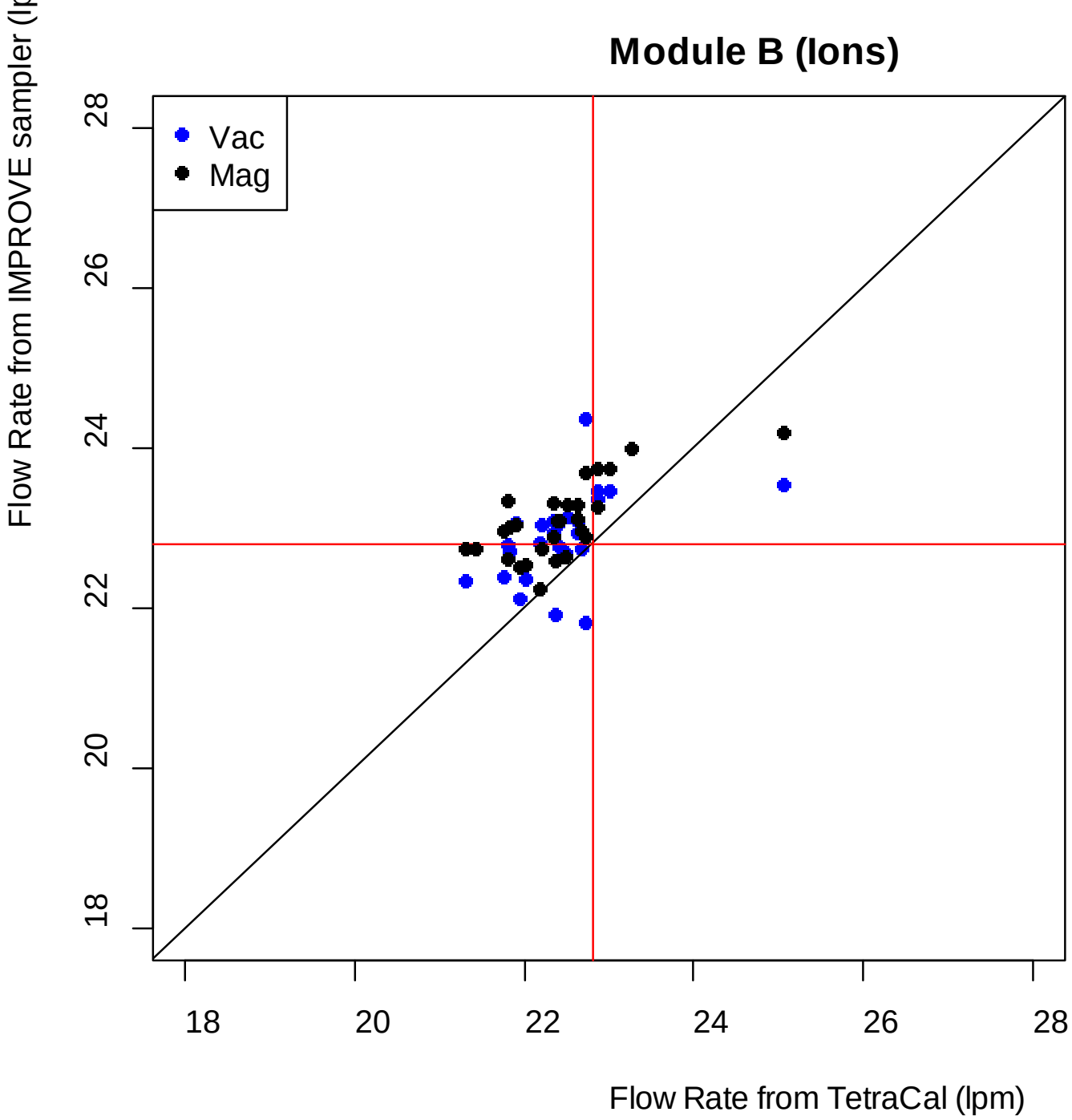
6. State of Maryland; Tom Gronaw

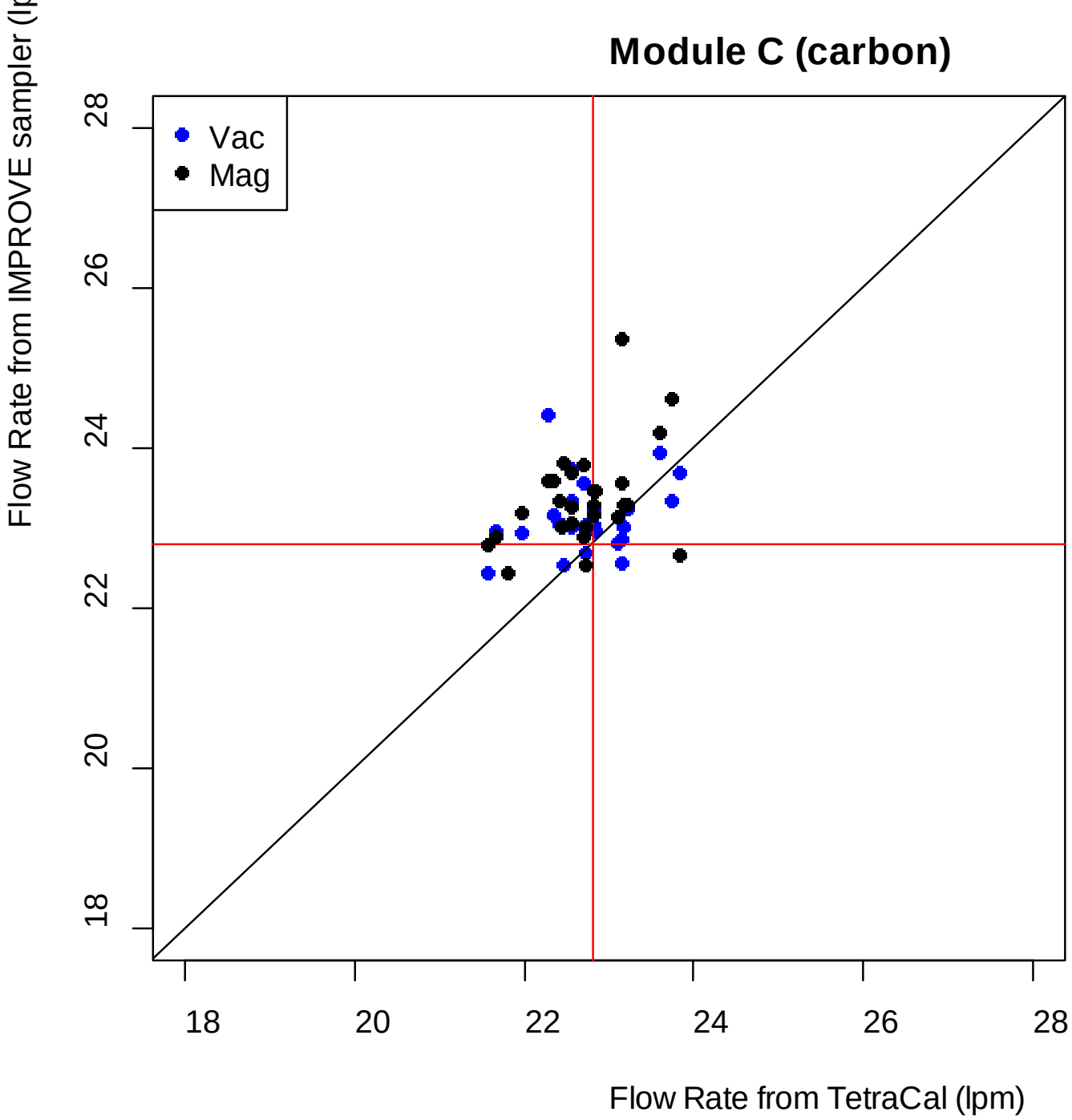
Total of 36 sites will be audited in 2016 and around 25-30 sites should be audited annually with a goal of auditing all sites in about a 10 year period.

Improve Site Audit




Module A (PM2.5 & XRF)
Vac
Mag
Flow Rate from IMPROVE sampler (lpm)
Flow Rate from TetraCal (lpm)
18
20
22
24
26
28


Module B (Ions)
Vac
Mag
Flow Rate from IMPROVE sampler (lpm)
Flow Rate from TetraCal (lpm)
18
20
22
24
26
28


Module C (carbon)
Vac
Mag
Flow Rate from IMPROVE sampler (lpm)
Flow Rate from TetraCal (lpm)
18
20
22
24
26
28

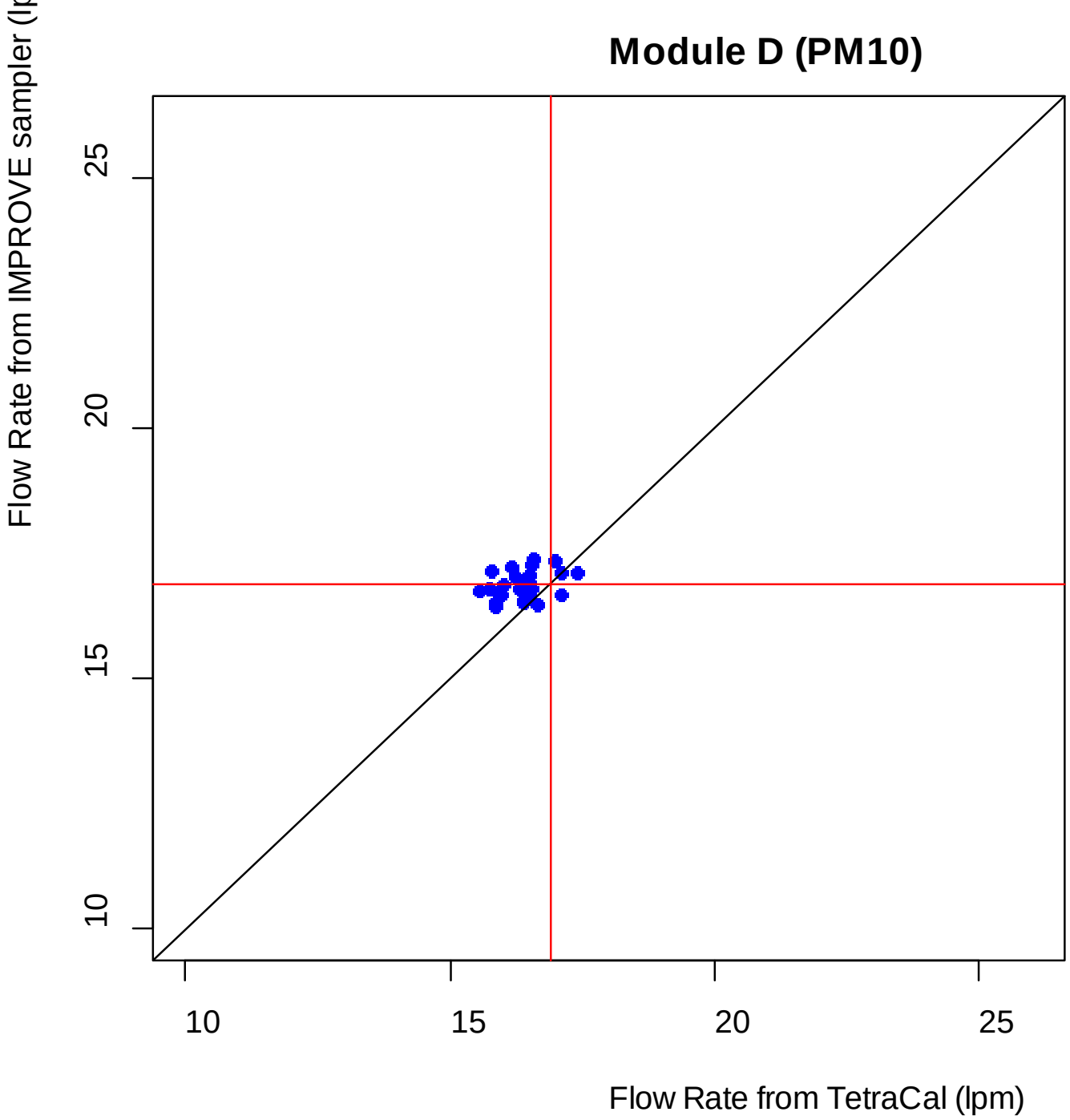

Module D (PM10)
Flow Rate from IMPROVE sampler (lpm)
Flow Rate from TetraCal (lpm)
10
15
20
25
10
15
20
25

Table of Flow Rate Audit Results

		TIME			TEMP			MOD A Vac	MOD A Mag	MOD B Vac	MOD B Mag	MOD C Vac	MOD C Mag	MOD D Vac
Site Name	Audit Date	AUDIT	IMPROVE	<5	AUDIT	IMPROVE	<10	(A-V)/A*100%	(A-M)/A*100%	(A-V)/A*100%	(A-M)/A*100%	(A-V)/A*100%	(A-M)/A*100%	(A-V)/A*100%
BALD	7/27/2016	9:04	9:08	Pass	23.40	24.33	0.93	2.09	2.33	2.96	0.41	0.14	0.77	1.73
MEAD	6/7/2016	11:51	11:53	Pass	38.50	38.42	0.08	8.41	5.99	7.26	4.26	9.70	6.01	8.88
SAWE	7/7/2016	12:04	12:05	Pass	38.40	39.48	1.08	2.13	0.73	2.04	3.17	2.45	9.60	2.39
SYCA	8/24/2016	12:35	12:33	Pass	30.60	32.90	2.30	1.03	0.50	2.26	3.91	1.12	1.95	3.59
GRSA	5/16/2016	9:35	9:31	Pass	11.30	13.29	1.99	4.44	5.15	6.14	6.18	0.66	0.57	7.66
MEVE	5/17/2016	9:12	9:10	Pass	14.10	15.17	1.07	3.08	4.59	4.95	6.80	6.07	5.82	4.64
WHRI	6/22/2016	11:25	11:26	Pass	26.30	28.09	1.79	3.21	4.02	3.04	3.19	2.91	4.27	4.88
ROMO	7/6/2016	9:10	9:09	Pass	24.60	23.30	1.30	2.95	3.50	1.48	2.24	1.07	2.11	2.80
MAVI	6/22/2016	10:41	10:41	Pass	25.90	26.33	0.43	1.04	1.87	3.18	3.21	2.11	2.37	NA
LIGO	3/29/2016	12:12	12:13	Pass	14.80	16.81	2.01	3.06	2.43	3.10	5.65	4.09	5.72	3.18
OKFE	7/12/2016	11:36	11:36	Pass	36.90	41.83	4.93	0.56	5.14	6.07	3.44	0.49	4.85	1.67
ROMO	7/6/2016	9:10	9:09	Pass	24.60	23.30	1.30	3.63	4.27	2.16	3.01	1.71	2.93	3.48
LIGO	5/24/2016	11:51	11:51	Pass	21.70	23.00	1.30	3.34	3.51	5.45	5.40	2.73	2.63	2.64
FLTO	8/5/2016	8:46	8:44	Pass	19.50	20.00	0.50	2.24	1.73	2.68	2.45	1.89	1.57	3.84
CANY	8/8/2016	7:56	7:55	Pass	31.10	32.79	1.69	20.68	2.26	2.69	1.83	5.36	5.05	5.07
CAPI	8/3/2015	8:40	8:40	Pass	24.80	25.97	1.17	0.56	0.27	1.00	0.74	0.13	0.34	0.29
GRBA	8/11/2016	11:30	11:31	Pass	27.30	29.73	2.43	1.60	2.82	2.79	3.48	1.46	2.49	4.52
ZICA	8/15/2016	8:24	8:24	Pass	27.50	26.90	0.60	2.85	4.43	3.49	4.48	3.89	4.91	6.73
BRCA	8/16/2016	8:20	8:21	Pass	20.60	22.21	1.61	2.21	1.59	4.11	5.44	1.47	0.82	1.33
WEMI	8/18/2016	7:50	7:47	Pass	16.20	13.52	2.68	0.04	0.15	0.85	2.72	0.56	2.76	4.25
BOLA	9/22/2016	9:25	9:24	Pass	15.30	15.28	0.02	3.82	4.25	3.79	3.83	3.59	3.29	5.43
BRID	9/23/2016	9:13	9:13	Pass	10.20	10.47	0.27	4.62	3.99	4.52	7.13	4.46	5.67	6.92
YELL	9/27/2016	11:12	11:12	Pass	16.60	19.39	2.79	0.75	1.42	0.37	1.35	1.23	0.16	1.16
NOAB	10/4/2016	7:55	7:56	Pass	6.70	7.65	0.95	1.76	0.67	1.64	3.09	1.53	1.37	NA
NOCH	10/5/2016	10:15	10:16	Pass	6.80	5.42	1.38	2.58	2.69	3.83	0.86	1.64	3.79	0.94
THBA	10/7/2016	10:16	10:17	Pass	10.50	10.58	0.08	0.99	0.62	1.98	1.00	3.73	5.60	2.27
SHMI	9/27/2016	10:46	10:45	Pass	22.50	21.63	0.87	3.93	1.96	3.88	2.51	0.38	6.12	5.14
MOZI	9/13/2016	11:09	11:09	Pass	11.50	14.58	3.08	3.33	5.19	1.74	2.56	2.98	2.96	0.81
Mean Difference							1.4508040		2.78709834		3.369341827		3.446469365	3.701289047

Site Name	Audit Date	Audit Issues and Concerns
BALD	7/27/2016	Clock reset
MEAD	6/7/2016	Excavating to the East about 10 meters from the site. Started around 5/23/16
SAWE	7/7/2016	All pass
SYCA	8/24/2016	New Site location, Garland Praire Rd. and Thomas Loop Rd. Parks, Arizona
GRSA	5/16/2016	All pass
MEVE	5/17/2016	All pass
WHRI	6/22/2016	All pass
ROMO	7/6/2016	All pass
MAVI	6/22/2016	No D module audit (stack unmoveable)
LIGO	3/29/2016	All pass large tree was removed
OKFE	7/12/2016	All pass
ROMO	7/6/2016	Auditor Observations
LIGO	5/24/2016	Auditor Training
FLTO	8/5/2016	Brush encroachment. Red caps not kept in plastic bags.
CANY	8/8/2016	Mod A MaxVac Fail Mod A ORI Fail Mod C Maxvac Fail
CAPI	8/3/2016	Sampler not operating upon arival; Tree nearby asked them to trim it. Time reset.
GRBA	8/11/2016	Tree nearby asked them to trim it.
ZICA	8/15/2016	Reset Clock
BRCA	8/16/2016	Reset Clock
WEMI	8/18/2016	Sampler stand needs work. A few trees are too tall and too close - they will be trimmed back. Maxvac fail
BOLA	9/22/2016	Initial B module failure - proper plug inserted then all pass.
BRID	9/23/2016	All pass but I had to remove D sampler from the stand to put tube back in.
YELL	9/27/2016	All pass.
NOAB	10/4/2016	No D module audit (stack unmoveable)
NOCH	10/5/2016	All pass
THBA	10/7/2016	All pass but I had to remove D sampler from the stand to remove stack to perform audit (used a bit of vacumm grease to reinstall).
SHMI	9/27/2016	All pass
MOZI	9/13/2016	All pass

Future Work

- Summarize 2016 audit results (report and post to website)
- Auditor training/certification program and make sure all operators use similar equipment (certified flow meters)
- Redo the audit form (remove unnecessary questions) streamlined
- Spring 2017 auditor training for CDPHE and AzDEQ in conjunction with southern CA audits
- Fall 2017 auditor training for east coast and do some audits there.