Note: Watershed is approx.
21 square miles

SITE

Legend
- Developed Watershed

Weather Station Source
- CDEC
- CIMIS DWR
- County
- NOAA
- PWS

Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

0 10,000 20,000 30,000 Feet

NOTE: Station labels correspond to station numbers in Table 1.

Exhibit 1:

Rain Gage Map (all gages)

Hromadka & Associates
Hydrologic, Earth and Atmospheric Sciences

VERY PRELIMINARY

TABLE 1 REVISED

WEATHER STATIONS USED FOR VICTORVILLE STORM ANALYSIS[1) 2) 3)]

Gage No.	Gage Id	Type	Gage Name	Operator	Elev. (ft)	Data From	Data To	Data Years	Distance from Site (mi)	Data for Event	Data Used	Notes	Lat	Long
1	KCAVICTO22	Weather Underground	Buttermilk	PWS	3196.00	2015	2018	3	3.31	Y	Y	ARI Evaluated	34.49	-117.36
2	KCAVICTO26	Weather Underground	Silverado High School	PWS	0.00	2016	2018	2	3.73	Y	Y	ARI Evaluated	34.50	-117.38
3	KCAVICTO8	Weather Underground	Brentwood	PWS	2930.00	2009	2018	9	2.28	Y	Y	ARI Evaluated	34.52	-117.35
4	KCAVICTO27	Weather Underground	My Neighborhood	PWS	3022.00	2016	2018	2	1.78	Y	Y	ARI Evaluated	34.48	-117.30
5	KCAHESPE15	Weather Underground	Hawthorne Ave. 92345	PWS	3320.00	2014	2018	4	5.52	Y	Y	ARI Evaluated	34.43	-117.34
6	KCAHESPE28	Weather Underground	Hesperia Chestnut	PWS	3212.00	2016	2018	2	5.46	Y	Y	ARI Evaluated	34.43	-117.31
7	KCAHESPE23	Weather Underground	Mesa	PWS	3268.00	2015	2018	3	4.47	Y	Y	ARI Evaluated	34.45	-117.34
8	KCAHESPE33	Weather Underground	Wedgewood Ct. 92344	PWS	3445.00	2017	2018	1	6.96	Y	Y	ARI Evaluated	34.41	-117.35
9	KCAHESPE4	Weather Underground	Dartmouth St 92344	PWS	3445.00	2005	2018	13	6.77	Y	Y	ARI Evaluated	34.42	-117.35
10	USC00049325	Governmental	VICTORVILLE, CA US	NOAA	2879.92	1917	2018	101	1.80	Y	N	Daily Data	34.53	-117.29
11	KVCV	Governmental	Southern California Logistics	NOAA	2884.00	ND	ND	ND	7.47	Y	N	Greater than 3 miles	34.60	-117.38
12	KCAADELA7	Weather Underground	Adelanto Ca	PWS	2858.00	2016	2018	2	9.14	Y	N	Greater than 3 miles	34.59	-117.44
13	KCAVICTO28	Weather Underground	Airport	PWS	2900.00	2016	2018	2	6.59	Y	N	Greater than 3 miles	34.59	-117.38
14	KCAADELA4	Weather Underground	Adelanto Airport (52CL)	PWS	3061.00	2013	2018	5	9.03	Y	N	Greater than 3 miles	34.54	-117.46
15	KCAADELA9	Weather Underground	Picket fences/ the good part of Adelanto	PWS	3107.00	2016	2018	2	7.04	Y	N	Greater than 3 miles	34.52	-117.43
16	KCAAPPLE37	Weather Underground	Yucca Loma Bridge	PWS	2792.00	2016	2018	2	2.96	Y	N	Greater than 3 miles	34.51	-117.26
17	KCAAPPLE46	Weather Underground	Desert Knolls	PWS	2822.00	2016	2018	2	3.66	Y	N	Greater than 3 miles	34.50	-117.25
18	KCAAPPLE38	Weather Underground	Skyline Ranch	PWS	3002.00	2016	2017	1	5.57	Y	N	Greater than 3 miles	34.48	-117.22
19	KCAAPPLE21	Weather Underground	Jess Ranch/Sun City/Ashwood	PWS	2867.00	2013	2018	5	5.80	Y	N	Greater than 3 miles	34.45	-117.23

VERY PRELIMINARY

TABLE 1 REVISED

WEATHER STATIONS USED FOR VICTORVILLE STORM ANALYSIS[1) 2) 3)]

Gage No.	Gage Id	Type	Gage Name	Operator	Elev. (ft)	Data From	Data To	Data Years	Distance from Site (mi)	Data for Event	Data Used	Notes	Lat	Long
20	KCAAPPLE40	Weather Underground	Del Webb	PWS	2959.00	2016	2018	2	5.75	Y	N	Greater than 3 miles	34.45	-117.24
21	KCAAPPLE35	Weather Underground	Desert Knolls North	PWS	2913.00	2015	2018	3	4.11	Y	N	Greater than 3 miles	34.54	-117.25
22	KCAAPPLE16	Weather Underground	BandT	PWS	2913.00	2010	2018	8	6.68	Y	N	Greater than 3 miles	34.55	-117.21
23	KCAAPPLE32	Weather Underground	MWA Deep Creek Operations Center	PWS	2920.00	2015	2018	3	8.99	Y	N	Greater than 3 miles	34.39	-117.24
24	KCAAPPLE28	Weather Underground	Apple Valley (South) Tussing Ranch Rd. / Jamul Rd.	PWS	3038.00	2014	2018	4	7.91	Y	N	Greater than 3 miles	34.44	-117.20
25	KCAAPPLE44	Weather Underground	Mariana Ranchos	PWS	3117.00	2016	2018	2	8.84	Y	N	Greater than 3 miles	34.42	-117.19
26	KCAAPPLE31	Weather Underground	Marianas Hill	PWS	3442.00	2015	2018	3	10.48	Y	N	Greater than 3 miles	34.42	-117.16
27	KCAPHELA5	Weather Underground	Johnson Rd and Hwy18	PWS	3415.00	2009	2018	9	13.55	Y	N	Greater than 3 miles	34.50	-117.55
28	KCAAPPLE27	Weather Underground	Apple Valley	PWS	3081.00	2014	2018	4	11.22	Y	N	Greater than 3 miles	34.54	-117.12
29	KCAPHELA20	Weather Underground	Dan's House [KI6FRY]	PWS	3993.00	2016	2018	2	13.81	Y	N	Greater than 3 miles	34.42	-117.53
30	US1CASR0005	Governmental	ADELANTO 3.1 S, CA US	NOAA	3084.97	2008	2018	10	7.14	Y	N	Greater than 3 miles	34.53	-117.43
31	USC00040246	Governmental	APPLE VALLEY NUMBER 2, CA US	NOAA	2779.86	2016	2017	1	2.68	Y	N	Greater than 3 miles	34.54	-117.28
32	US1CASR0009	Governmental	APPLE VALLEY 2.6 SE, CA US	NOAA	2940.94	2008	2018	10	7.36	Y	N	Greater than 3 miles	34.50	-117.18
33	MJD	Governmental	MOJAVE R DAM	CDEC	47.00	2006	2018	12	12.13	Y	N	Greater than 3 miles	34.34	-117.24
34	2408700	Governmental	Wilson Ranch Rd Precipitation Gage	County	3589.17	2016	2018	2	12.32	Y	N	Greater than 3 miles	34.47	-117.52
35	KCAHESPE18	Weather Underground	East Hesperia	PWS	3009.00	2015	2018	3	7.32	Y	N	Greater than 3 miles	34.41	-117.26
36	KCAHESPE12	Weather Underground	High Desert Mesa	PWS	3251.00	2014	2018	4	8.08	Y	N	Greater than 3 miles	34.39	-117.29

VERY PRELIMINARY

TABLE 1 REVISED

WEATHER STATIONS USED FOR VICTORVILLE STORM ANALYSIS[1) 2) 3)]

Gage No.	Gage Id	Type	Gage Name	Operator	Elev. (ft)	Data From	Data To	Data Years	Distance from Site (mi)	Data for Event	Data Used	Notes	Lat	Long
37	US1CASR0049	Governmental	PHELAN 6.2 E, CA US	NOAA	3665.03	2014	2018	4	9.98	Y	N	Greater than 3 miles	34.44	-117.46
38	US1CASR0056	Governmental	HESPERIA 3.6 SSW, CA US	NOAA	3544.95	2015	2018	3	9.20	Y	N	Greater than 3 miles	34.38	-117.34
39	USC00043937	Governmental	HESPERIA 2 E, CA US	NOAA	3055.12	2008	2018	10	6.47	Y	N	Greater than 3 miles	34.42	-117.27
40	MRN	Governmental	MORMON ROCK	CDEC	3300.00	2003	2018	15	17.09	Y	N	Greater than 3 miles	34.32	-117.50
41	2402100	Governmental	Adelanto Precipitation Gage A2	County	2919.95	2010	2018	8	7.16	Y	N	Greater than 3 miles	34.57	-117.41
42	2402200	Governmental	Antelope Creek Wash Precipitation Gage A2	County	3169.29	2010	2018	8	7.58	Y	N	Greater than 3 miles	34.40	-117.28
43	KCAVICTO44	Weather Underground	Cobalt Institute of Math & Science Weather Station	PWS	3117.00	2017	2018	1	4.07	N	N	No Data	34.50	-117.38
44	KCAHESPE44	Weather Underground	BT AERO -- Oak Hills	PWS	3553.00	2018	2018	0	7.84	N	N	No Data	34.44	-117.42
45	KCAVICTO53	Weather Underground	Nisquallie	PWS	3156.00	2018	2018	0	1.48	N	N	No Data	34.49	-117.31
46	KCAVICTO39	Weather Underground	Spring Valley Lake - North	PWS	2795.00	2017	2018	1	2.51	N	N	No Data	34.50	-117.27
47	KCAVICTO35	Weather Underground	Spring Valley Lake	PWS	2779.00	2017	2018	1	2.43	N	N	No Data	34.49	-117.28
48	KCAHESPE48	Weather Underground	BDC WX OPS	PWS	3061.00	2018	2018	0	6.59	N	N	No Data	34.42	-117.27
49	KCAAPPLE65	Weather Underground	Mountain Vista	PWS	2908.00	2018	2018	0	5.97	N	N	No Data	34.53	-117.21
50	KCAHESPE35	Weather Underground	Oak Hills Summit Estates	PWS	4101.00	2017	2018	1	11.66	N	N	No Data	34.37	-117.44
51	117	Governmental	VICTORVILLE PUMP PLANT	CIMIS DWR	2858.00	1937	1993	56	3.41	N	N	No Data	34.48	-117.26
52	VCT	Governmental	VICTORVILLE PUMP PLANT	CDEC	2858.00	1937	1993	56	1.87	N	N	No Data	34.53	-117.30
53	W28 9325 00	Governmental	Victorville PP	CDEC	2859.00	1940	2005	65	1.87	N	N	No Data	34.53	-117.30
54	W28 1272 00	Governmental	Cajon West Summit	CDEC	4780.00	1943	2006	63	17.10	N	N	No Data	34.39	-117.57

VERY PRELIMINARY

TABLE 1 REVISED

WEATHER STATIONS USED FOR VICTORVILLE STORM ANALYSIS[1) 2) 3)]

Gage No.	Gage Id	Type	Gage Name	Operator	Elev. (ft)	Data From	Data To	Data Years	Distance from Site (mi)	Data for Event	Data Used	Notes	Lat	Long
55	2406300	Governmental	Oro Grande Precipitation Gage A2	County	2864.17	2010	2018	8	1.56	N	N	No Data	34.53	-117.30
56	9036	Governmental	Mojave Narrows Reg. Park Precipitation Gage	County	2755.82	2015	2018	3	2.25	N	N	No Data	34.51	-117.27
57	2408300	Governmental	Victorville LF Precipitation Gage A2	County	2956.04	2010	2018	8	6.29	N	N	No Data	34.59	-117.27
58	9032	Governmental	Apple Valley Airport Precipitation Gage	County	2976.52	2015	2018	3	8.20	N	N	No Data	34.57	-117.19
59	2404300	Governmental	Desert Knolls Wash Precipitation Gage A2	County	3070.87	2010	2018	8	11.77	N	N	No Data	34.54	-117.11
60	2405100	Governmental	Hesperia Fire Station Precipitation Gage A2	County	3165.02	2016	2018	2	3.57	N	N	No Data	34.46	-117.32
61	2402400	Governmental	Apple Valley Rock Springs Precipitation Gage A2	County	2893.70	2016	2018	2	7.93	N	N	No Data	34.41	-117.23
62	KCAPHELA2	Weather Underground	Desert Queen Palms	PWS	3875.00	2006	2018	12	11.18	Y	N	No Data	34.40	-117.46
63	KCAVICTO34	Weather Underground	BDC STA 313	PWS	3162.00	2017	2018	1	3.36	Y	N	Station Precipitation Recording Error Observed	34.49	-117.36
64	KCAPHELA11	Weather Underground	Baldy Mesa	PWS	3615.00	2014	2018	4	9.47	N	N	There is a data gap between Jan 2017 and April 2017	34.44	-117.45
65	KCAVICTO14	Weather Underground	Sunset Ridge	PWS	3389.00	2013	2018	5	5.73	N	N	There is a data gap between Nov 2016 and July 2017	34.46	-117.39

VERY PRELIMINARY

TABLE 1 REVISED

WEATHER STATIONS USED FOR VICTORVILLE STORM ANALYSIS[1) 2) 3)]

Gage No.	Gage Id	Type	Gage Name	Operator	Elev. (ft)	Data From	Data To	Data Years	Distance from Site (mi)	Data for Event	Data Used	Notes	Lat	Long
66	KCAVICTO15	Weather Underground	Eagle Ranch-15	PWS	3274.00	2014	2018	4	5.05	Y	Y	ARI Evaluated	34.48	-117.39
67	KCAVICTO20	Weather Underground	Tatum Plaza	PWS	2920.00	2015	2018	3	1.78	Y	Y	ARI Evaluated	34.53	-117.31
68	KCAVICTO1	Weather Underground	Eagle Ranch-1	PWS	3300.00	2009	2018	9	5.10	Y	Y	ARI Evaluated	34.48	-117.39
69	KCAVICTO24	Weather Underground	Spring Valley Lake Association	PWS	2799.00	2016	2018	2	2.53	Y	Y	ARI Evaluated	34.49	-117.27
70	2402700	Governmental	Baldy Mesa Co Yard Precipitation Gage A2	County	3323.36	2016	2018	2	5.46	Y	Y	ARI Evaluated	34.47	-117.39

1) Highlighted cells indicate the stations used in the analysis.
2) See Figure 1 for station locations.
3) ND = no data

TABLE 2 REVISED

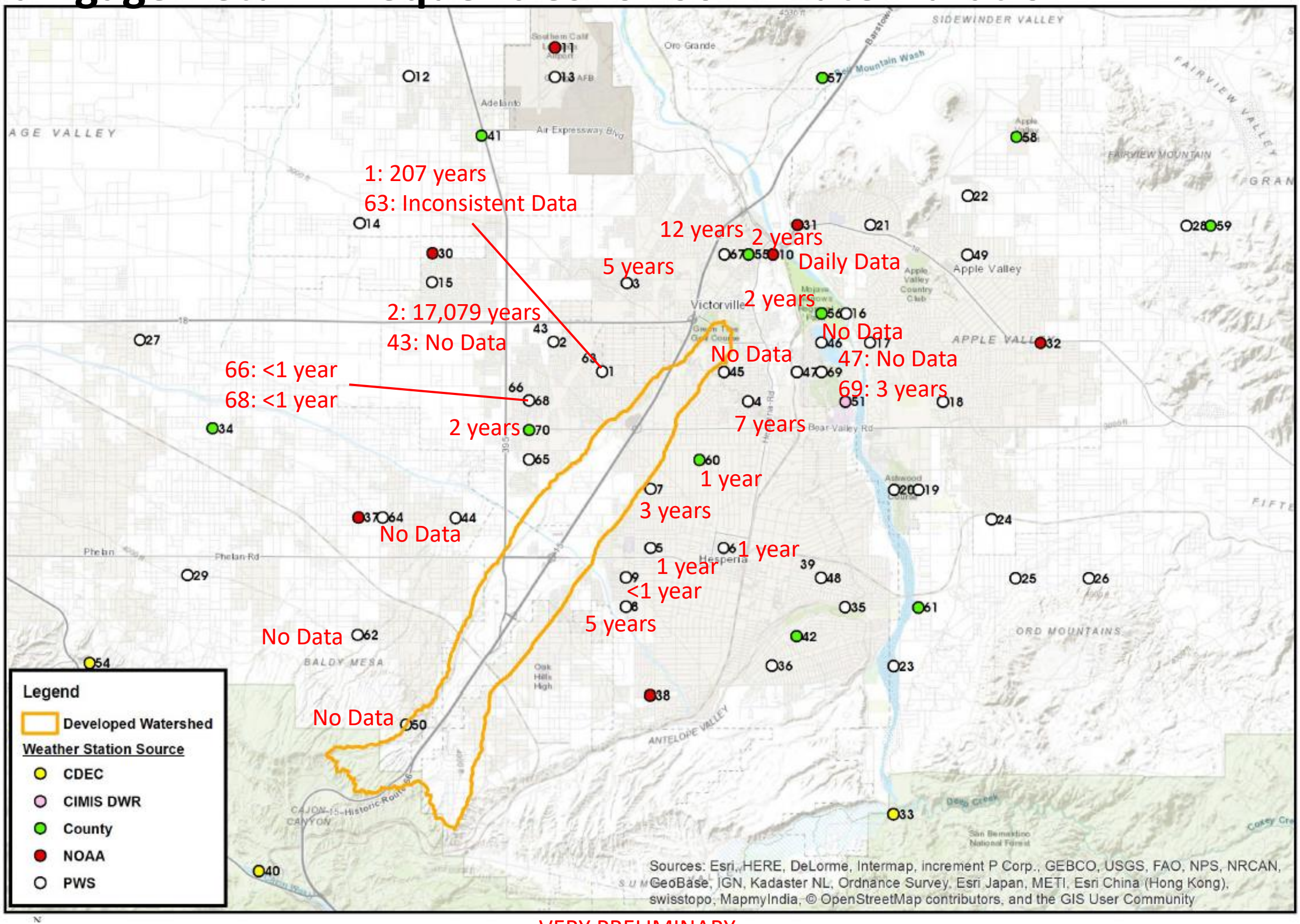
PRECIPITATION AND ARI INFORMATION BY STATION [1)2)]

			Max Precipitation by Interval						ARI					
Station Name	Estimated Storm Interval [hrs.]	Total Storm Accum [in]	5 minute Interval	15 minute Interval	30 minute Interval	60 minute Interval	120 minute Interval	180 minute Interval	5 minute Interval	15 minute Interval	30 minute Interval	60 minute Interval	120 minute Interval	180 minute Interval
KCAVICTO8	4.0	1.42	0.06	0.15	0.29	0.50	0.90	1.16	< 1	< 1	2	5	13	19
KCAVICTO22	10.3	3.53	0.23	0.41	0.78	1.29	2.03	2.61	16	18	56	207	711	928
KCAHESPE23	9.0	1.65	0.05	0.16	0.29	0.49	0.80	1.01	< 1	1	2	3	6	7
KCAHESPE4	7.25	1.14	[3)]	0.08	0.16	0.31	0.51	0.63	[3)]	< 1	< 1	< 1	2	1
KCAHESPE33	10.0	2.74	0.08	0.18	0.33	0.63	1.11	1.50	< 1	1	2	5	15	23
KCAVICTO26	4.0	4.60	0.36	0.87	1.47	2.40	3.23	3.80	137	1,160	3,372	17,079	16,757	12,428
KCAHESPE15	5.50	0.86	0.03	0.10	0.17	0.34	0.53	0.66	< 1	< 1	< 1	1	2	2
KCAHESPE28	5.0	0.90	0.05	0.11	0.19	0.31	0.49	0.59	< 1	< 1	< 1	1	1	1
KCAVICTO27	6.0	1.80	0.06	0.18	0.35	0.59	1.02	1.28	< 1	1	3	7	22	28
2402700	10.0	1.31	0.05	0.11	0.21	0.37	0.63	0.81	< 1	< 1	< 1	2	3	3
KCAVICTO20	8.0	2.09	0.08	0.18	0.34	0.67	1.17	1.43	< 1	< 1	3	12	38	52
KCAVICTO24	7.0	0.79	0.05	0.11	0.21	0.39	0.54	0.60	< 1	< 1	1	3	3	2
KCAVICTO15	4.0	0.33	0.02	0.05	0.07	0.11	0.19	0.29	< 1	< 1	< 1	< 1	< 1	< 1
KCAVICTO1	4.0	0.24	0.02	0.04	0.06	0.11	0.19	0.20	< 1	< 1	< 1	< 1	< 1	< 1

1) ARI calculated from NOAA Atlas 14 Point Precipitation Tables, as described in the text.
2) Standard rounding was employed for ARI values.
3) This station was recording at 15 minute intervals resulting in the exclusion of the 5-min interval.

VERY PRELIMINARY

Raingage Return Frequencies for 60 minute Duration



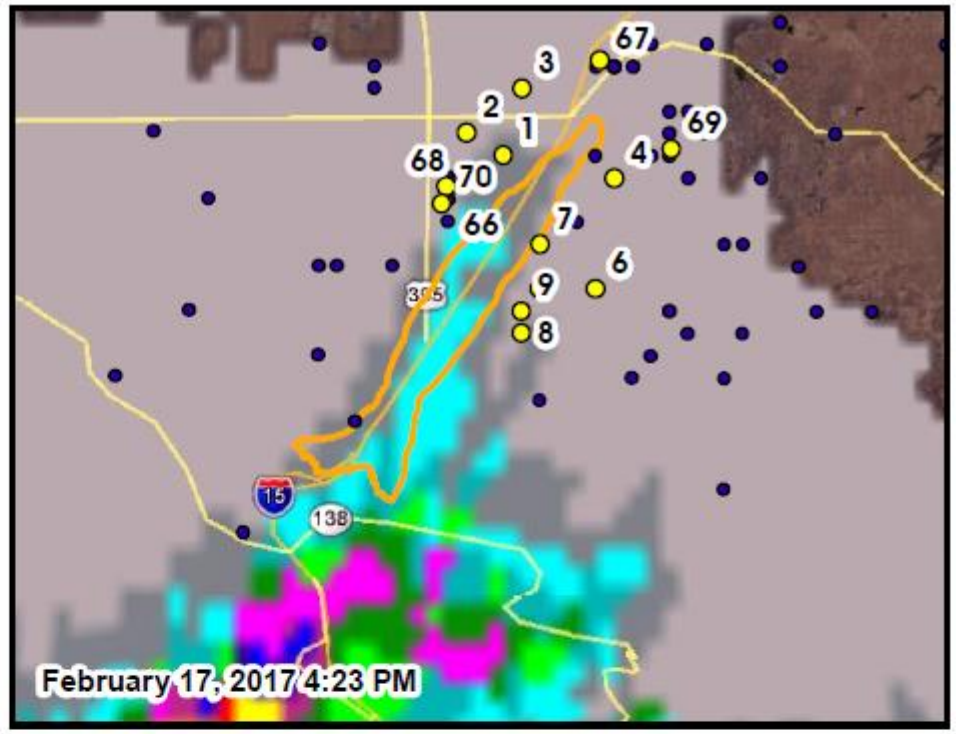
VERY PRELIMINARY

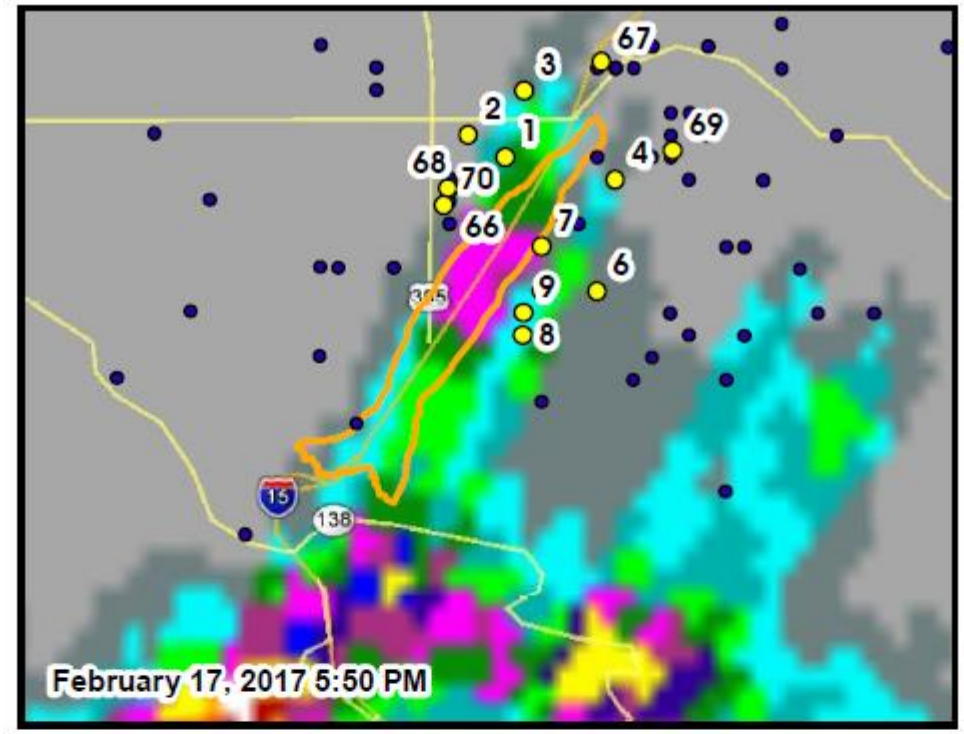
Legend

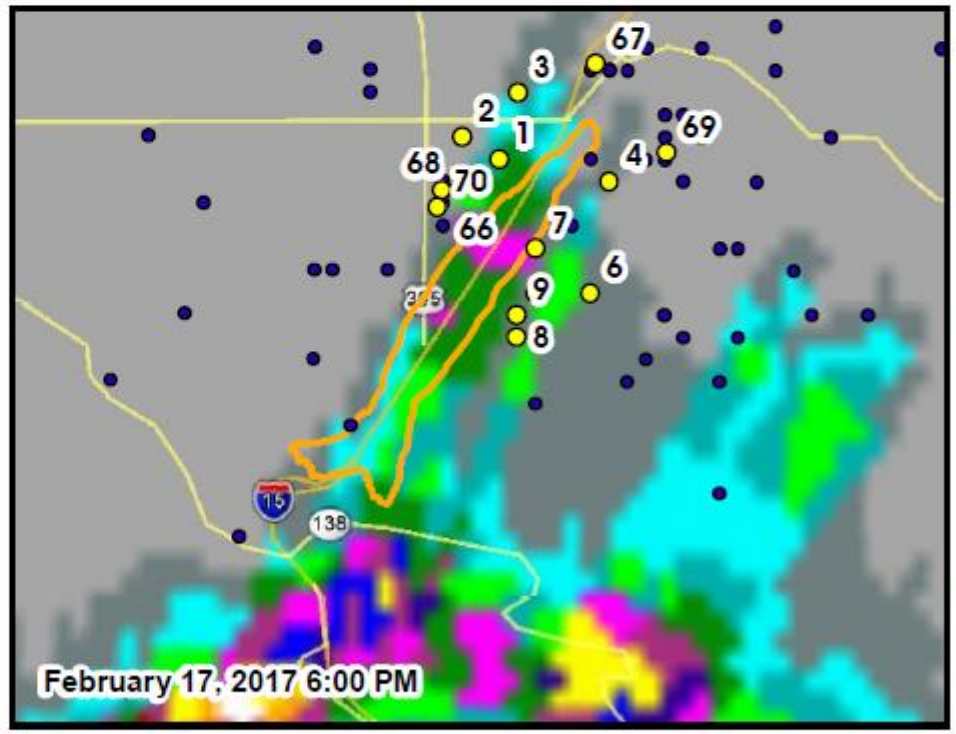
- Stations Analyzed
- Other Stations
- Delineated Watershed

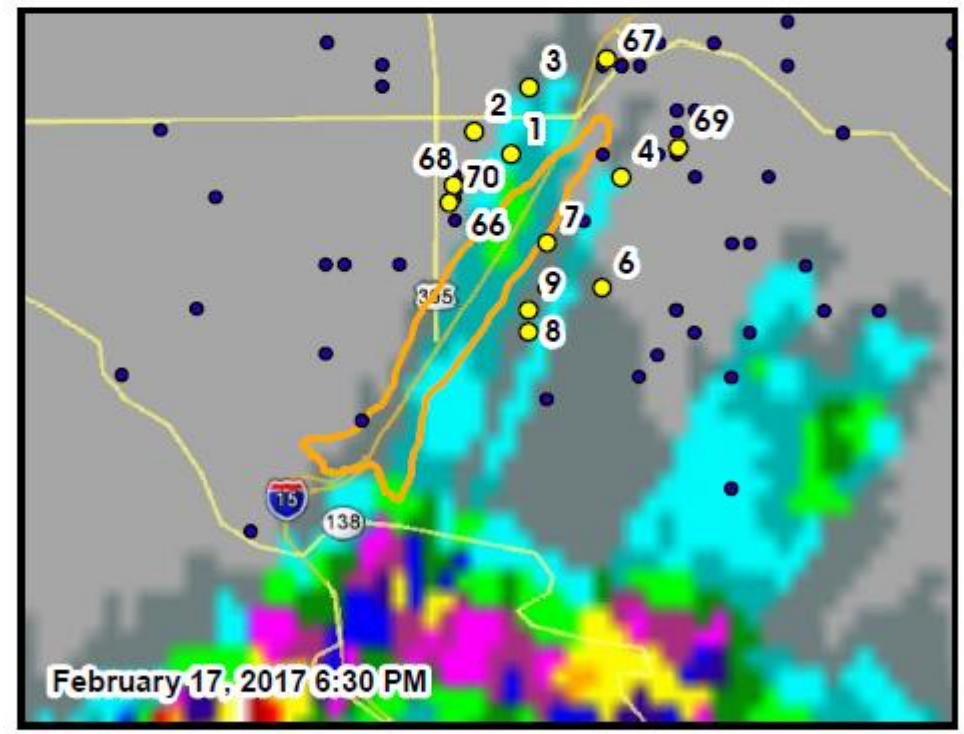
Precipitation (in)

- 0
- 0.1
- 0.2
- 0.3
- 0.4
- 0.5
- 0.6
- 0.7
- 0.8
- 0.9
- 1
- 1.25
- 1.5
- 1.75









0 25,000 50,000 75,000 Feet

NOTE: Station labels correspond to station numbers in Table 1.

Exhibit 3:

Hromadka & Associates
Hydrologic, Earth and Atmospheric Sciences

Regional Radar Imagery and Rain Gage Locations Used

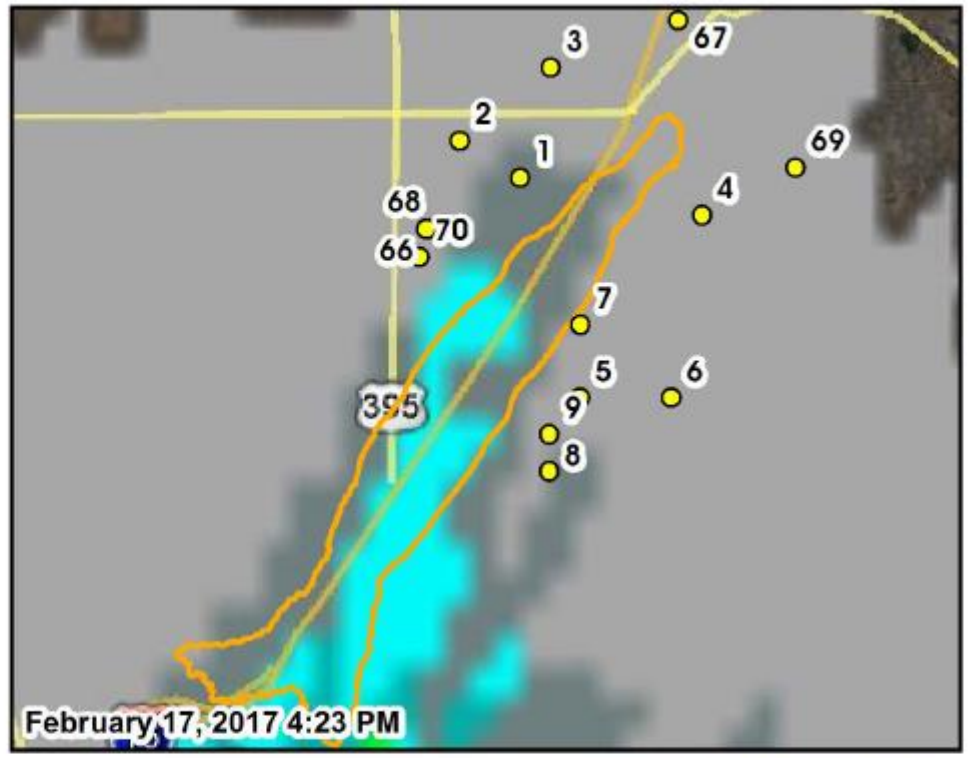
VERY PRELIMINARY

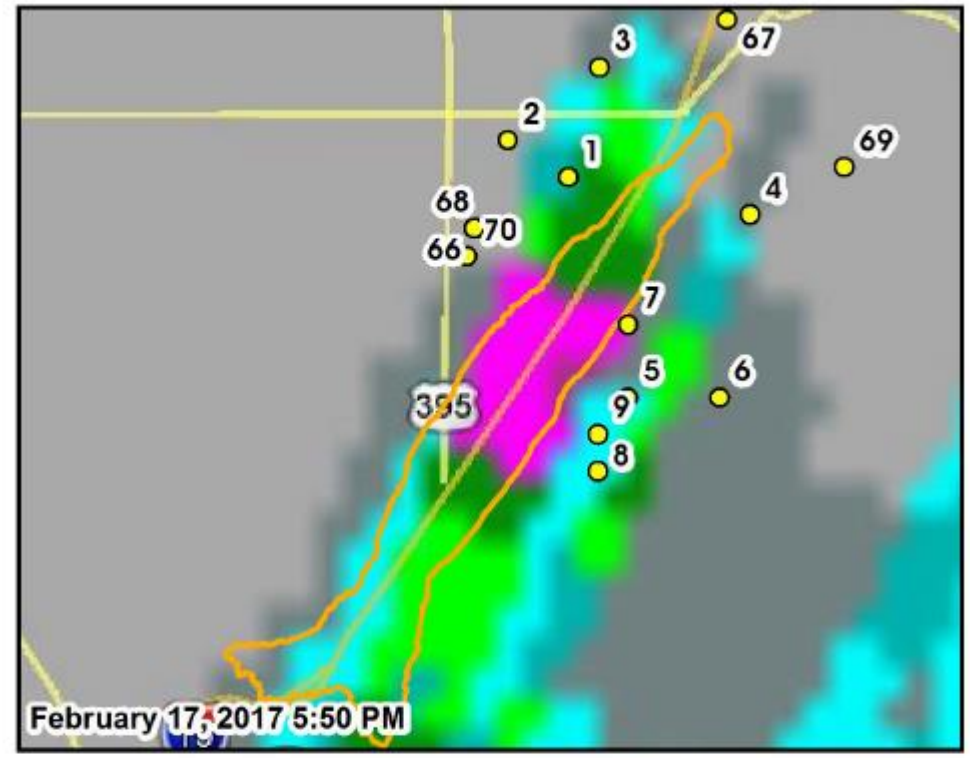
Legend

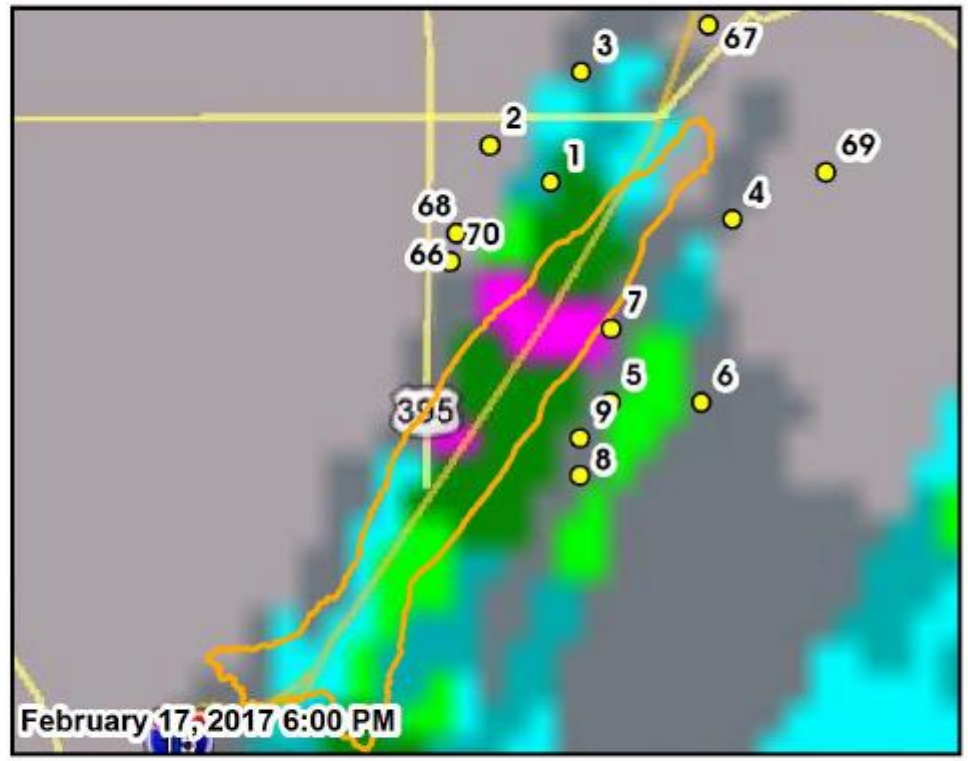
- Stations Analyzed
- Delineated Watershed

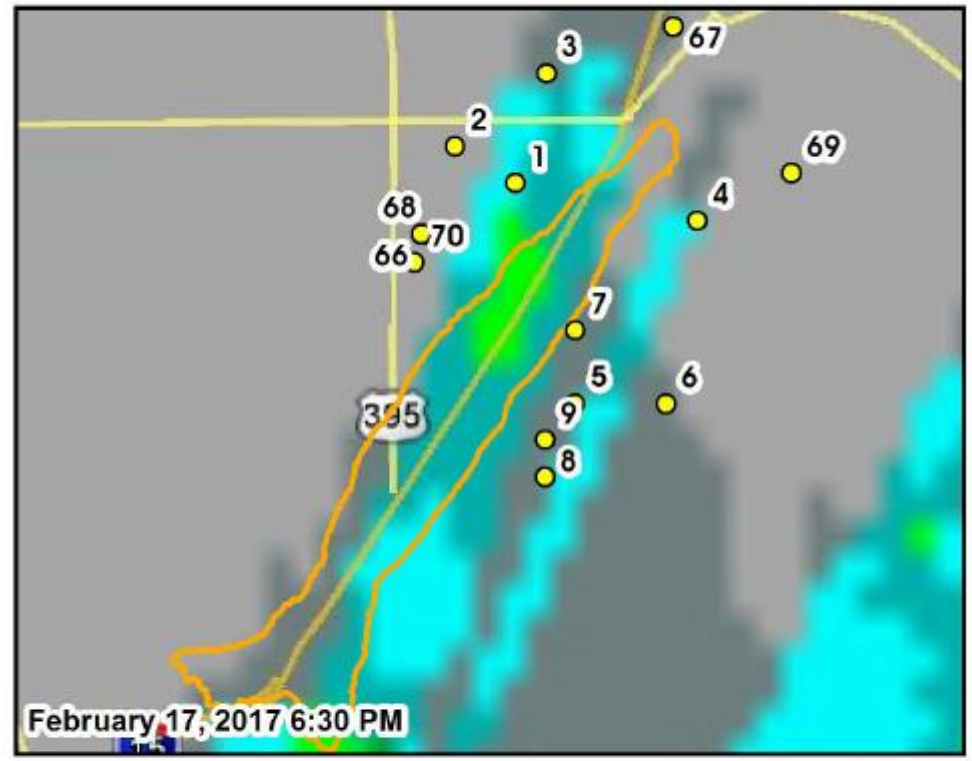
Precipitation (in)

- 0
- 0.1
- 0.2
- 0.3
- 0.4
- 0.5
- 0.6
- 0.7
- 0.8
- 0.9
- 1
- 1.25
- 1.5
- 1.75









N W E S

0 12,000 24,000 36,000 Feet

NOTE: Station labels correspond to station numbers in Table 1.

Exhibit 2:

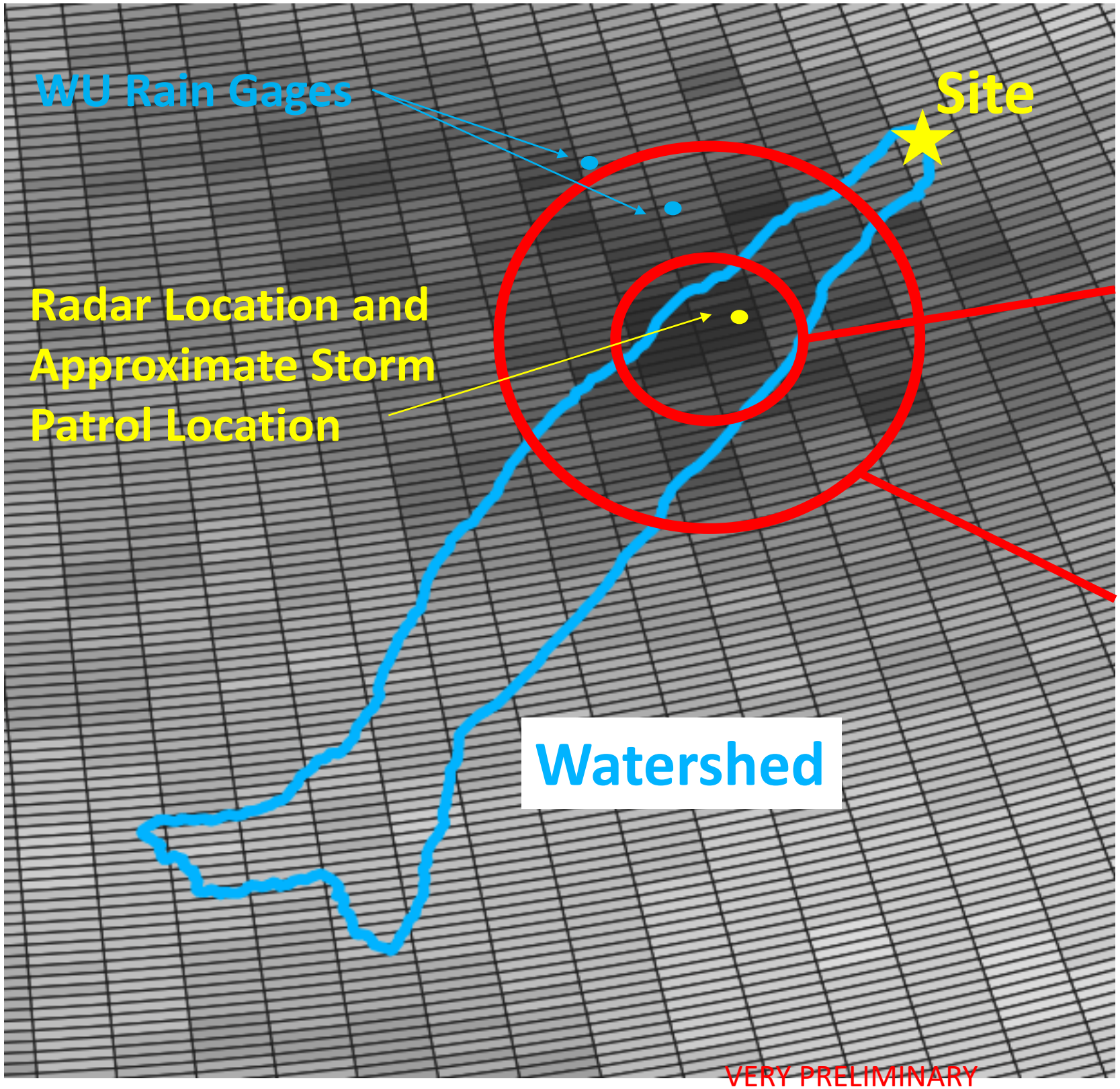
Hromadka & Associates
Hydrologic, Earth and Atmospheric Sciences

Local Radar Imagery and Rain Gage Locations Used

VERY PRELIMINARY

KEYX RADAR: One Hour Precipitation

Darker = More Rainfall



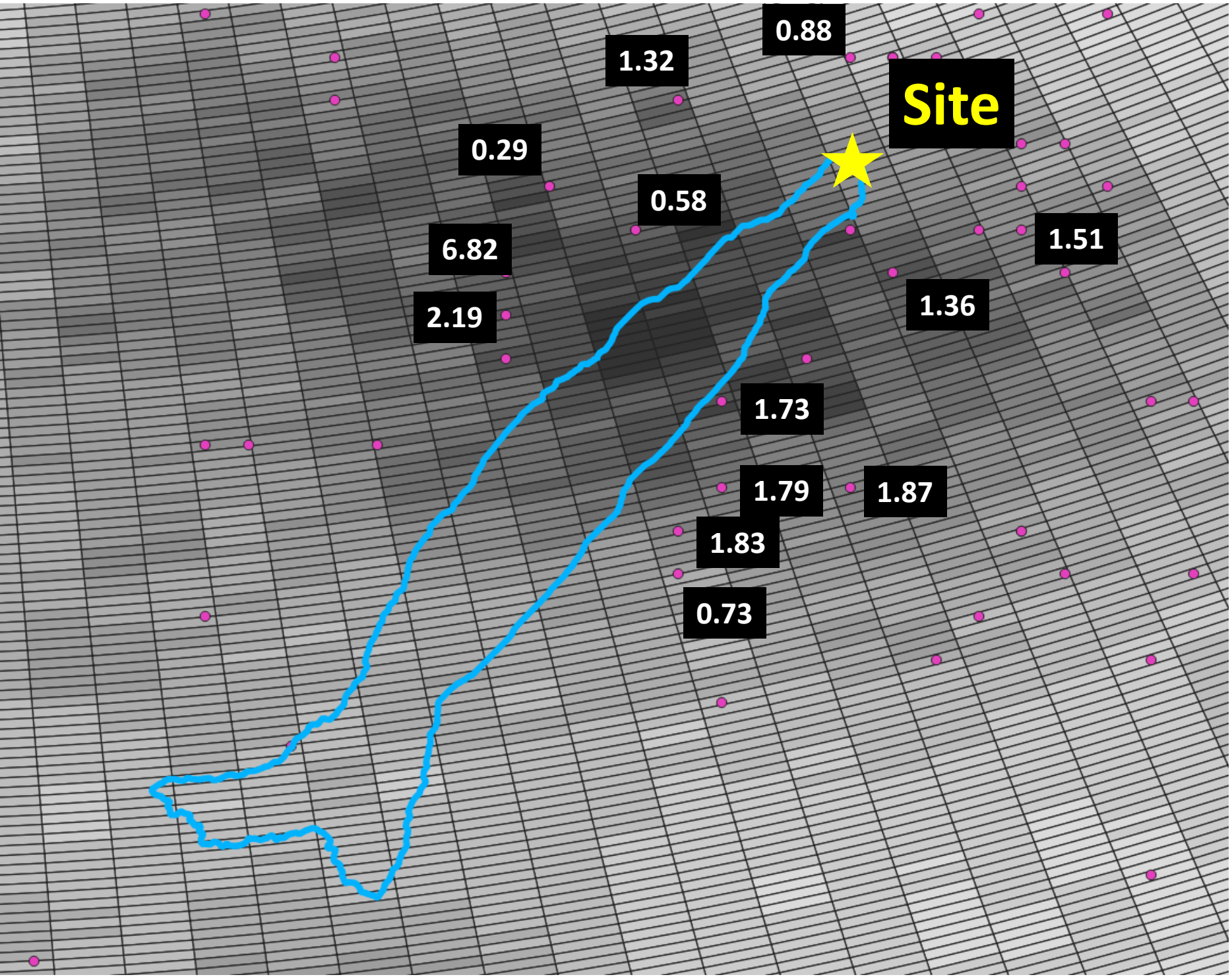
Storm Return Frequency is approximately 10 – 50 years in this area for the 60 minute peak duration

60 Min Duration Rainfall = 0.8 – 1.0 inches

Approximate Effective Watershed

KEYX RADAR: One Hour Precipitation Ratio of Radar/Gage

Darker = More Rainfall



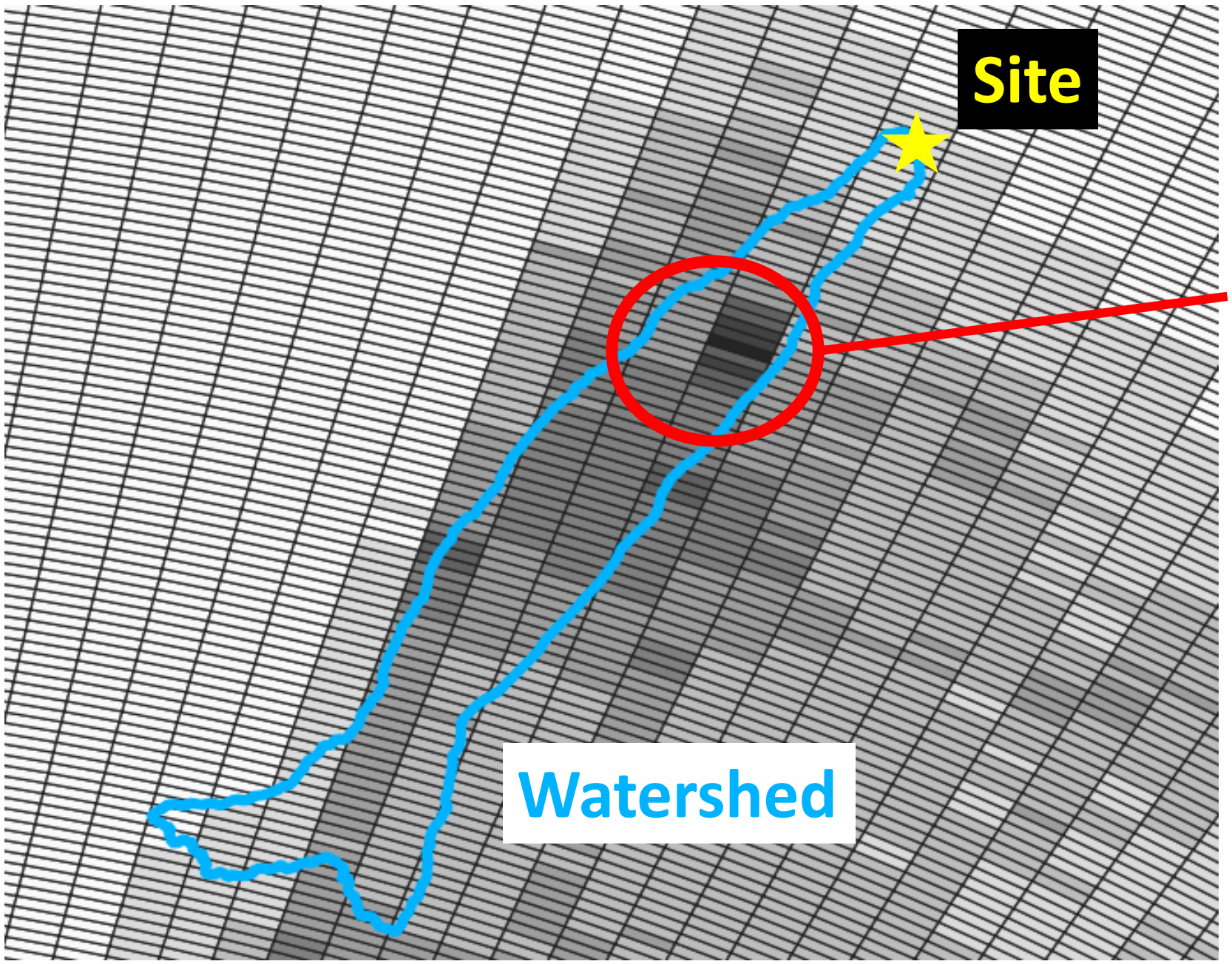
NOTE:
>1 indicates that Radar is overpredicting precipitation

<1 indicates that Radar is underpredicting precipitation

VERY PRELIMINARY

KSOX RADAR: One Hour Precipitation

Darker = More Rainfall



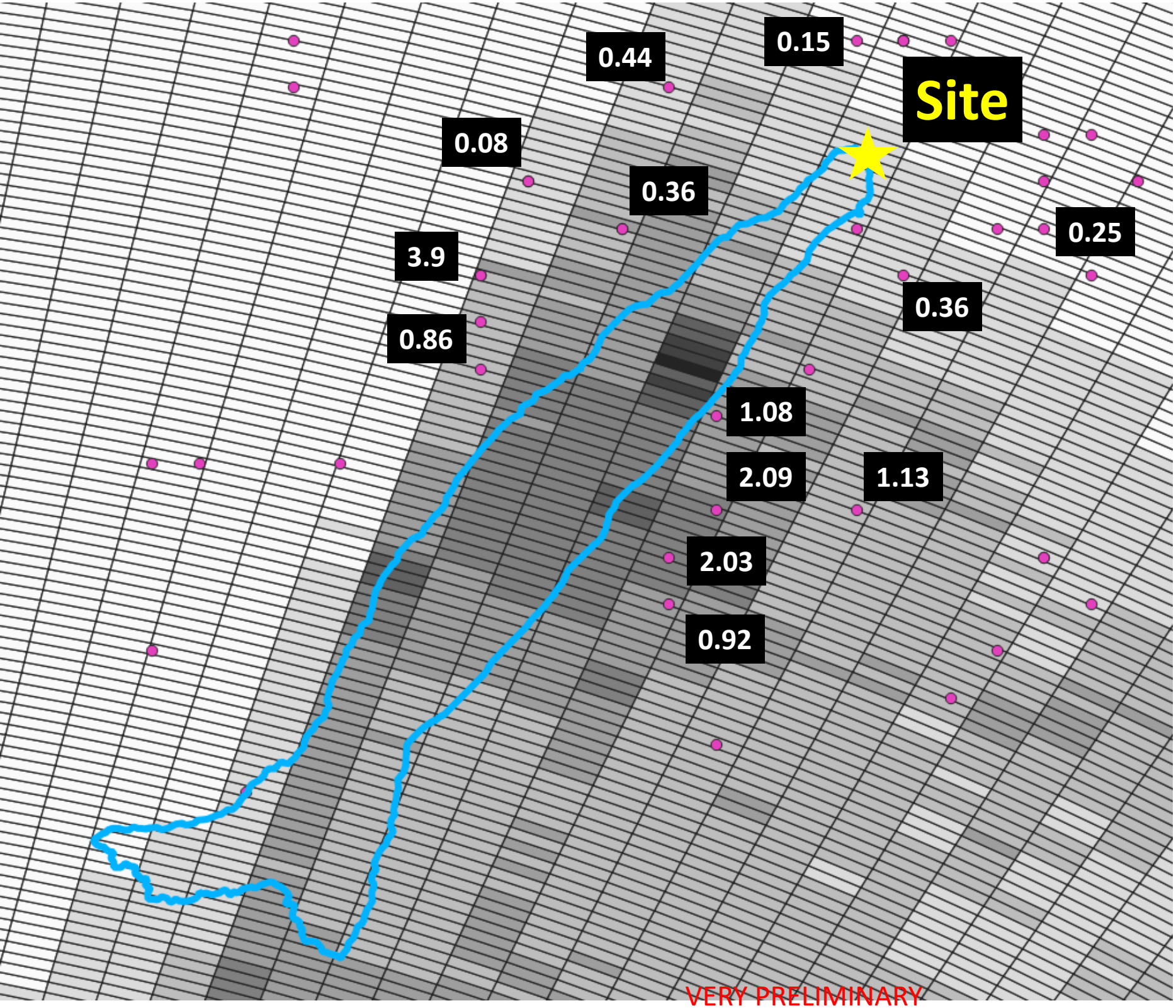
Storm Return Frequency is approximately 5 – 50 years in this area for the 60 minute peak duration

60 Min Duration Rainfall = 0.6 – 1.0 inches

VERY PRELIMINARY

KSOX RADAR: One Hour Precipitation Ratio of Radar/Gage

Darker = More Rainfall



NOTE:
>1 indicates that Radar is overpredicting precipitation

<1 indicates that Radar is underpredicting precipitation

Stream Gage 2925:

Oro Grande Wash

Daily Mean Discharge in Cubic feet/second Water Year Oct 2016 to Sep 2017

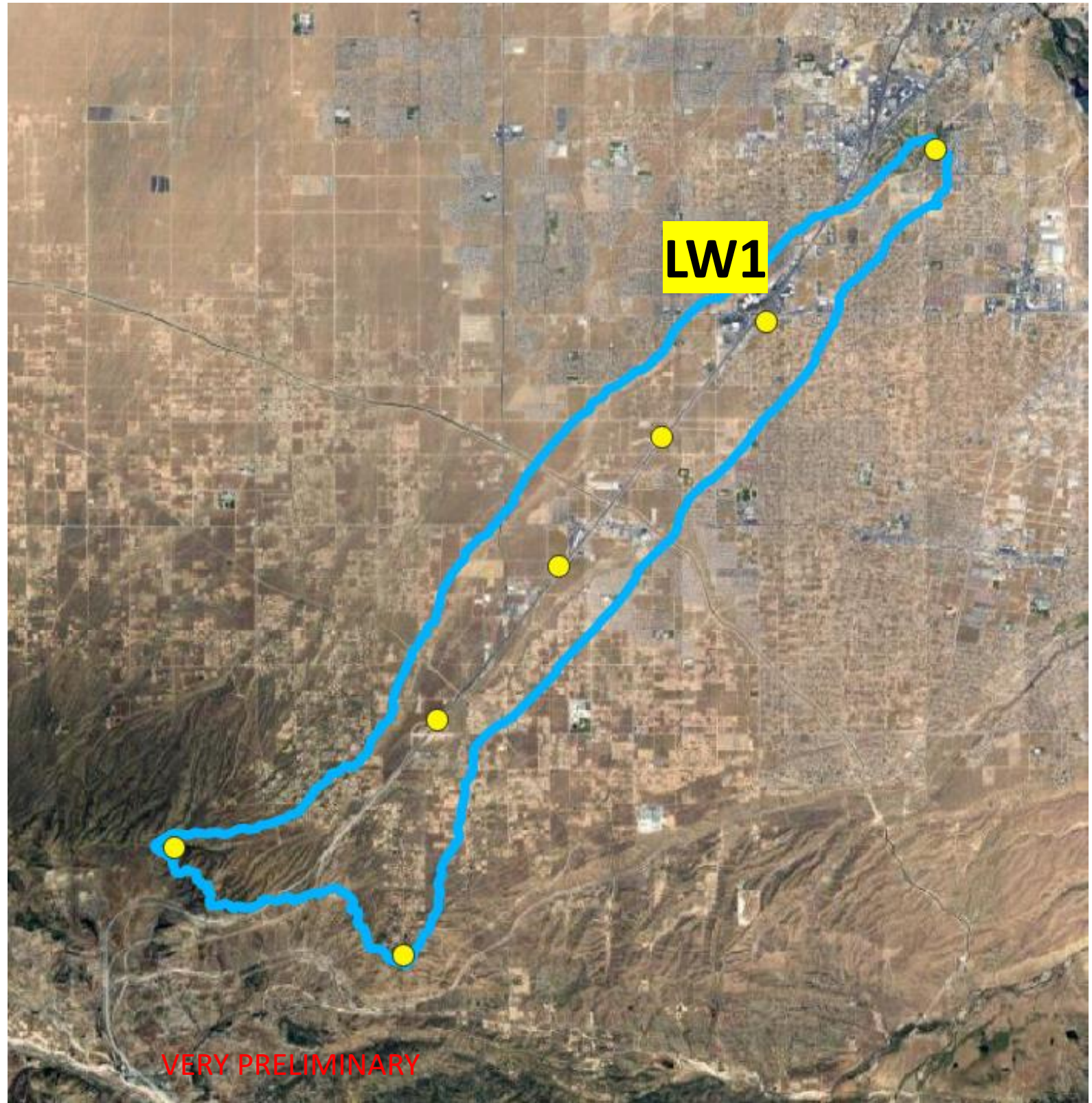
Day	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	0	0	0			0					12	12
2	0	0	0			0					12	12
3	0	0	0			0					12	12
4	0	0	0	0		0					12	12
5	0	0	0	0		0					12	12
6	0	0	0	0		0					12	12
7	0	0	0	0		0					12	12
8	0	0	0	0		0					12	12
9	0	.10	0	0		0					12	12
10	0	.11	0	0		0					12	12
11	2.2	.11		0		0					12	12
12	4.3	0		0		0				12	12	12
13	0	.11		0		0				12	12	12
14	0	.11		0		0				13	12	12
15	0	0		0	.06					13	12	12
16	0	0		0	0					13	12	
17	0	0		0	.13						12	
18	0	0		0	.12						12	
19	0	0		0	0						12	12
20	0	.06		.05	0						12	12
21	0	0		0	0							
22	0	0		.06	0						12	12
23	0	0			0						12	12
24		0			0	12					12	12
25		0			0	12					12	12
26	0	0			0	12					12	12
27	0	0			0	12					12	8.8
28	0	0			0	12					12	.27
29	0	0	0		------	12					12	.33
30	0	0			------	12					12	.33
31	0	------			------						12	------
Total	6.5	0.60	0	0.11	0.31	84				245	372	285.73
Mean	.22	.020	0	.006	.022	4.00				12.3	12.0	10.6
Max	4.3	.11	0	.06	.13	12				13	12	12
Min	0	0	0	0	0	0				12	12	.27
Acre-Ft	13	1.2	0	.22	.61	167				486	738	567

Storm Event Date

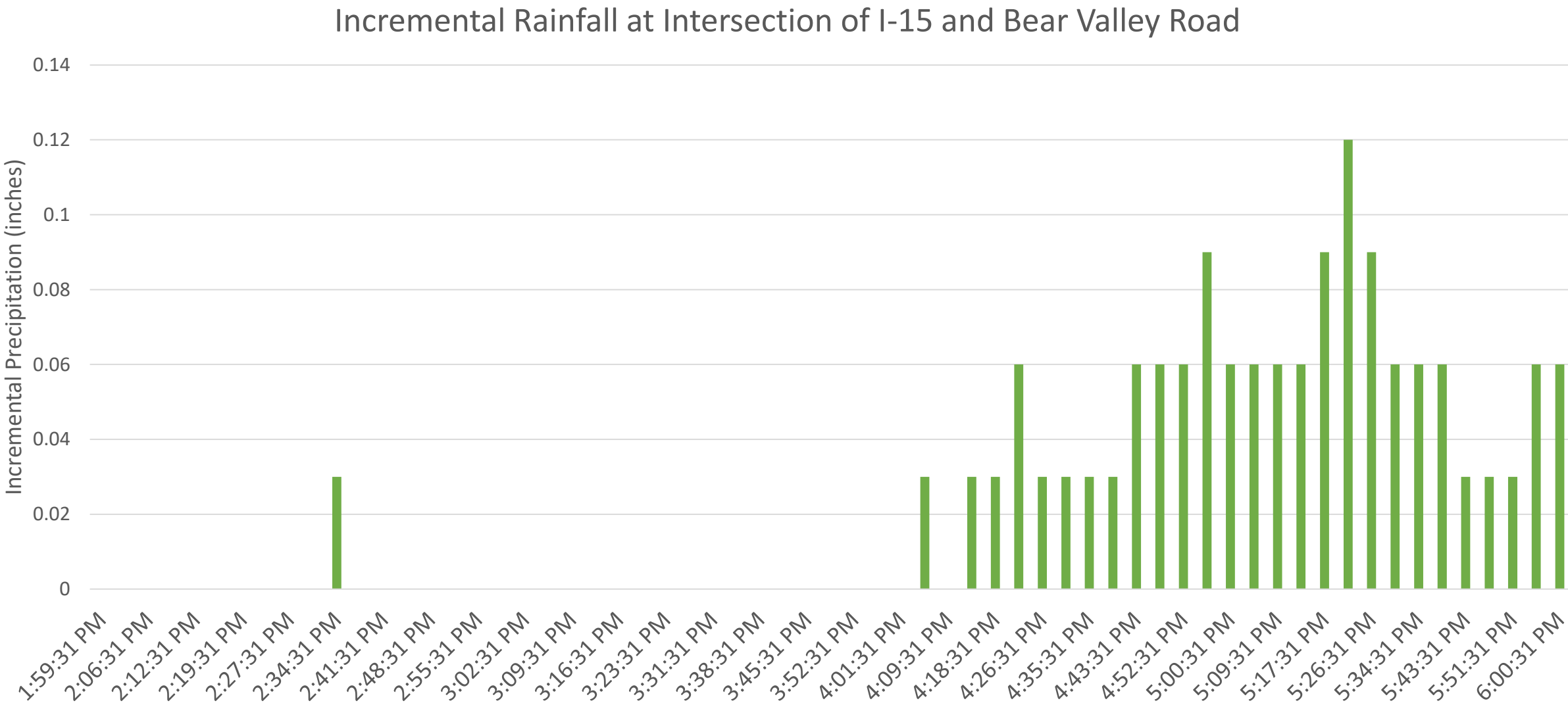
10:00:00 02/17/2017,	0.000
11:00:00 02/17/2017,	0.000
12:00:00 02/17/2017,	0.000
13:00:00 02/17/2017,	0.000
14:00:00 02/17/2017,	0.000
15:00:00 02/17/2017,	0.000
16:00:00 02/17/2017,	0.000
17:00:00 02/17/2017,	0.000
18:00:00 02/17/2017,	0.000
19:00:00 02/17/2017,	0.000
20:00:00 02/17/2017,	0.000
21:00:00 02/17/2017,	0.000
22:00:00 02/17/2017,	0.917
23:00:00 02/17/2017,	0.881
00:00:00 02/18/2017,	1.308
01:00:00 02/18/2017,	1.308

VERY PRELIMINARY

Timing of the Rainfall in Victorville: KEYX Radar

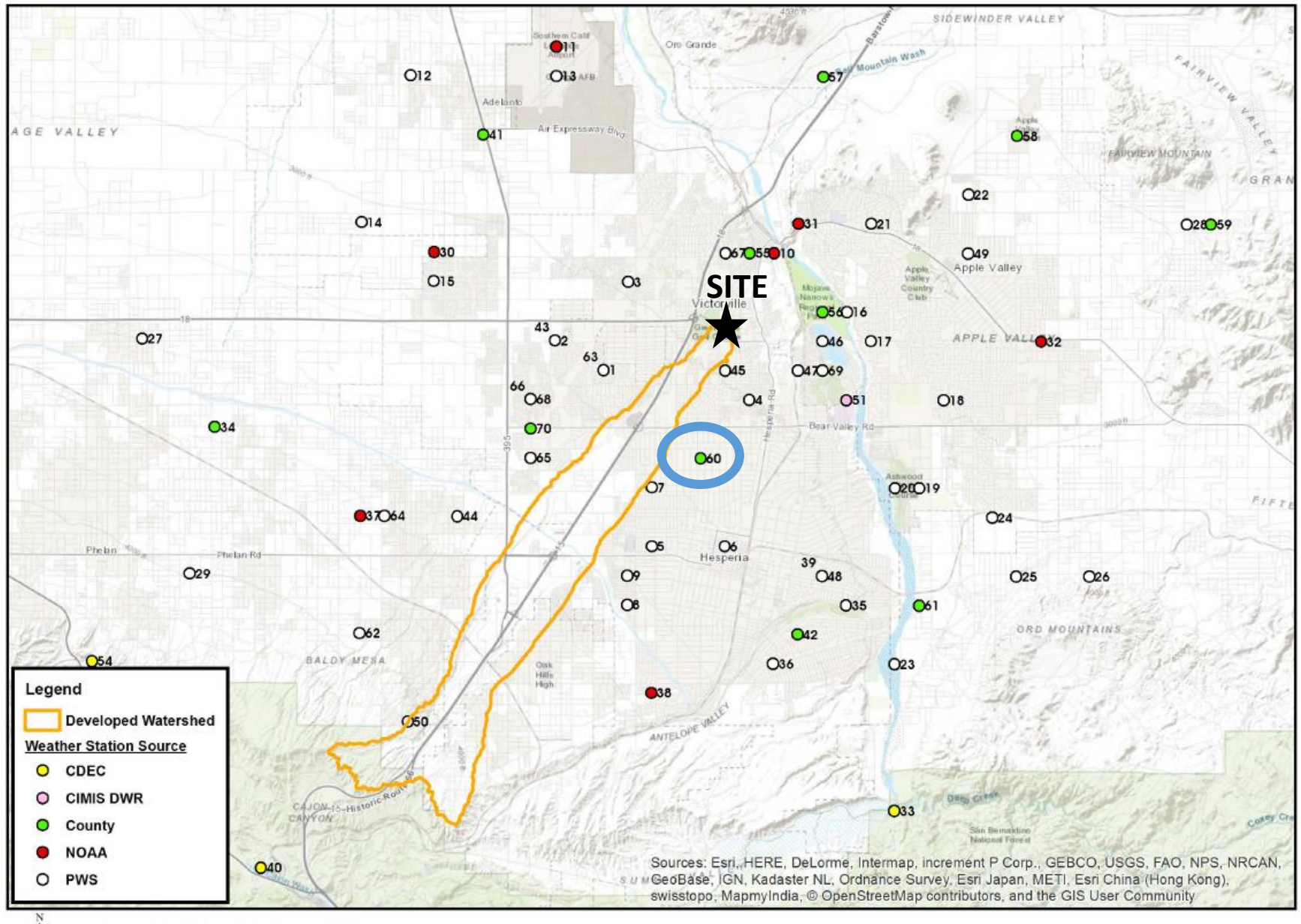


Timing of the Rainfall in Victorville: KEYX Radar



VERY PRELIMINARY

Timing of the Rainfall in Victorville: Gage 2919 (Hesperia Fire Station)



NOTE: Station labels correspond to station numbers in Table 1.

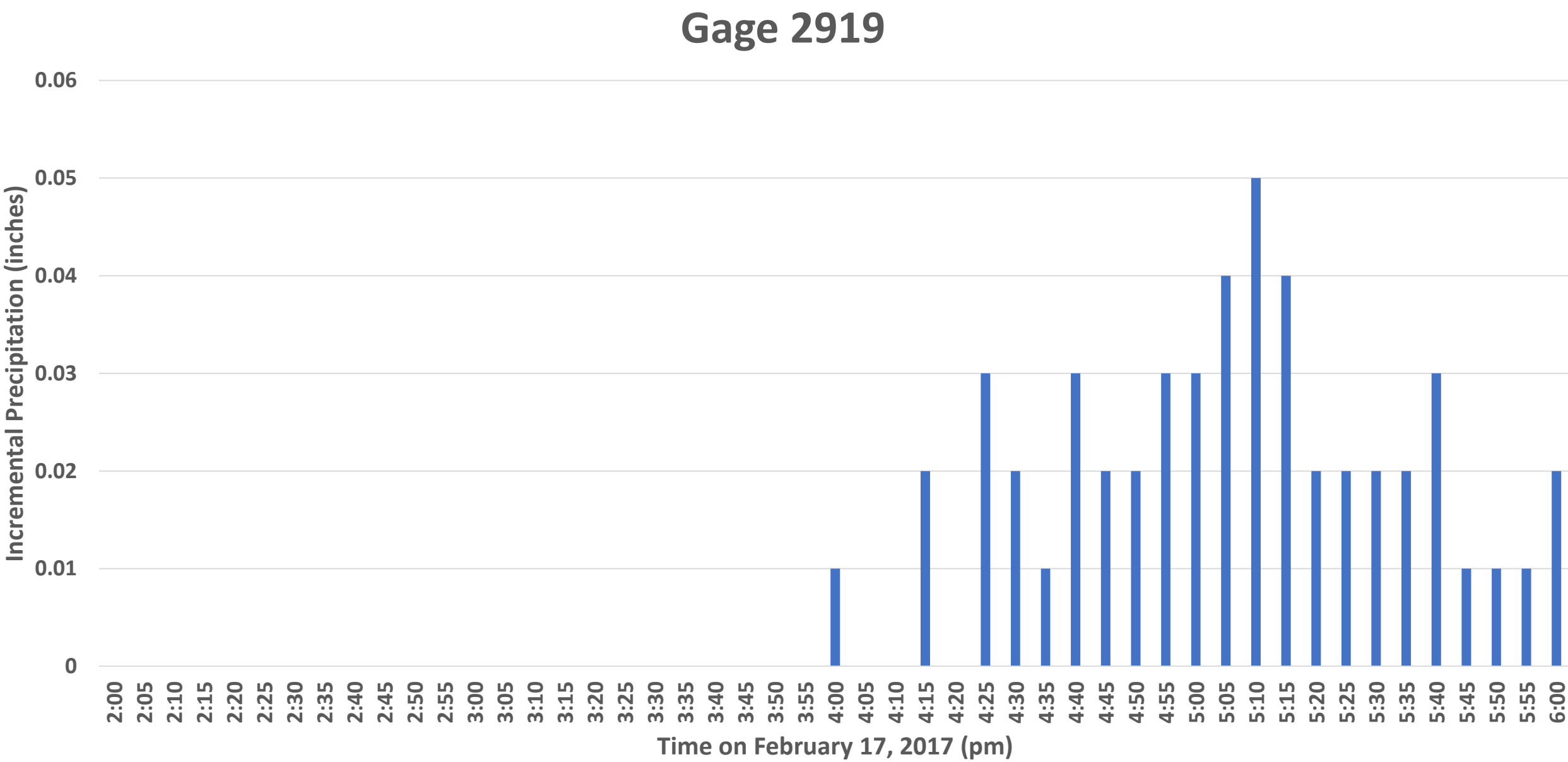
Exhibit 1:

Rain Gage Map (all gages)

Hromadka & Associates
Hydrologic, Earth and Atmospheric Sciences

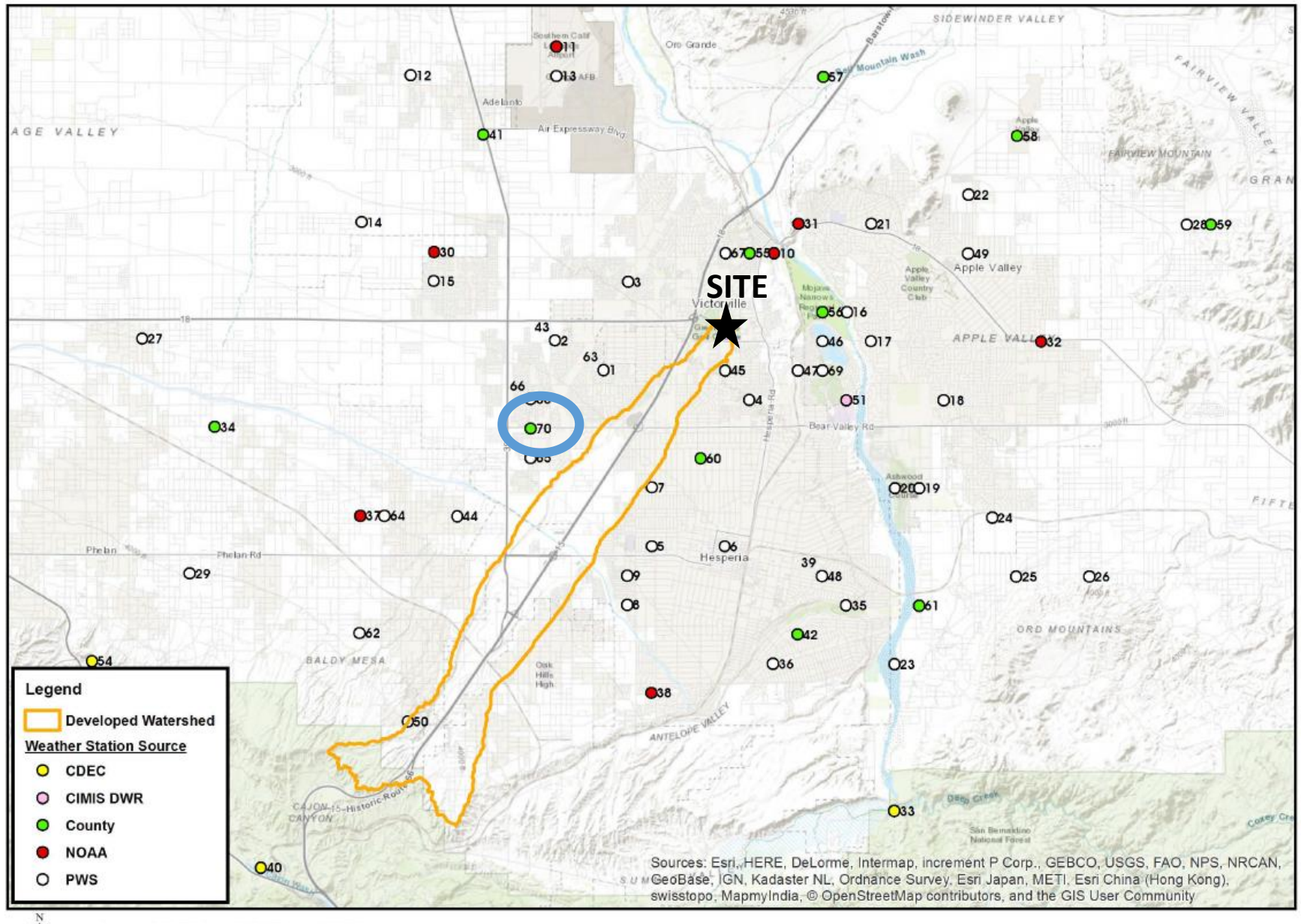
VERY PRELIMINARY

Timing of the Rainfall in Victorville: Gage 2919 (Hesperia Fire Station)



VERY PRELIMINARY

Timing of the Rainfall in Victorville: Gage 2958 (Baldy Mesa Co. Yard)



NOTE: Station labels correspond to station numbers in Table 1.

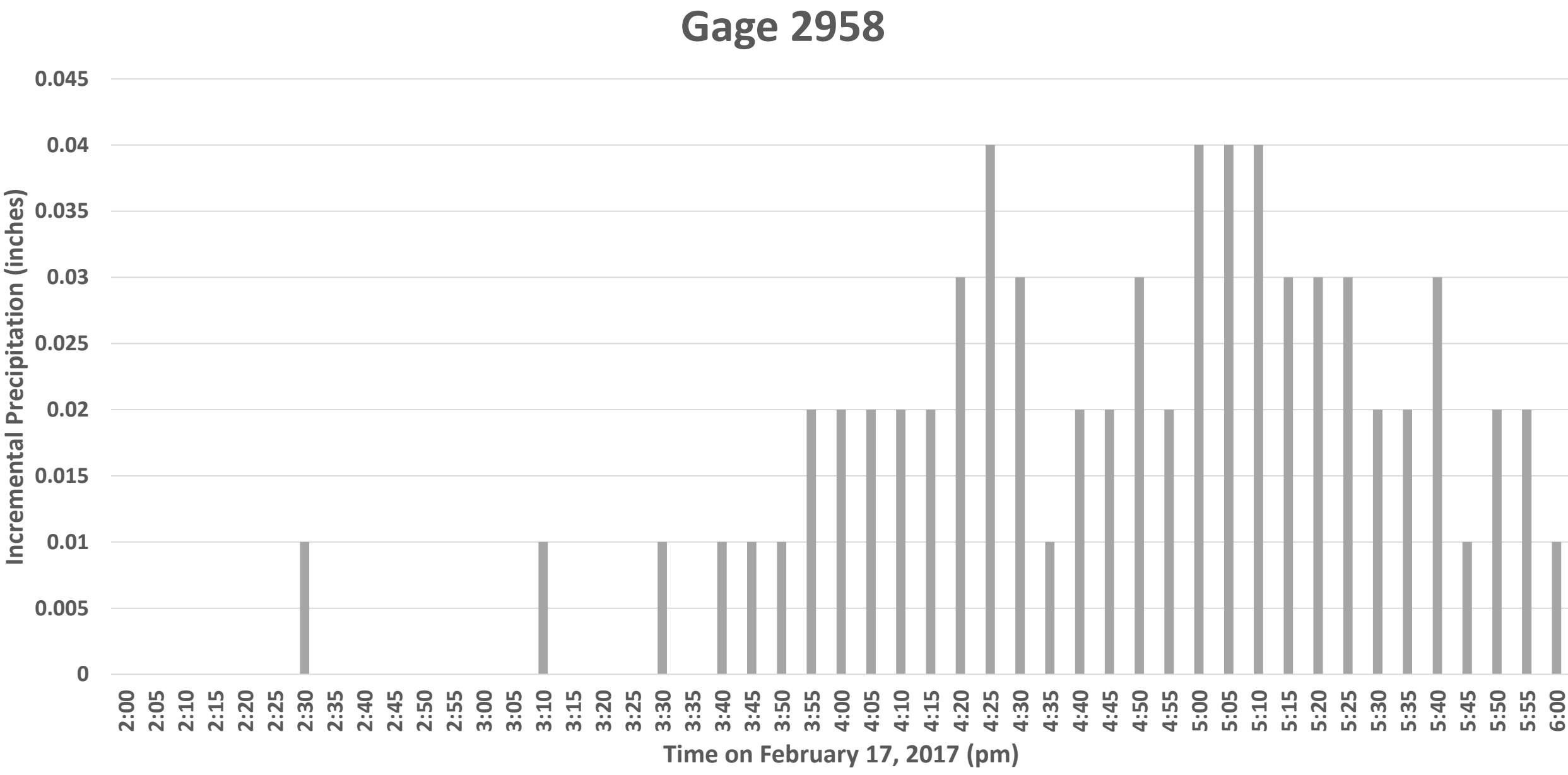
Exhibit 1:

Rain Gage Map (all gages)

Hromadka & Associates
Hydrologic, Earth and Atmospheric Sciences

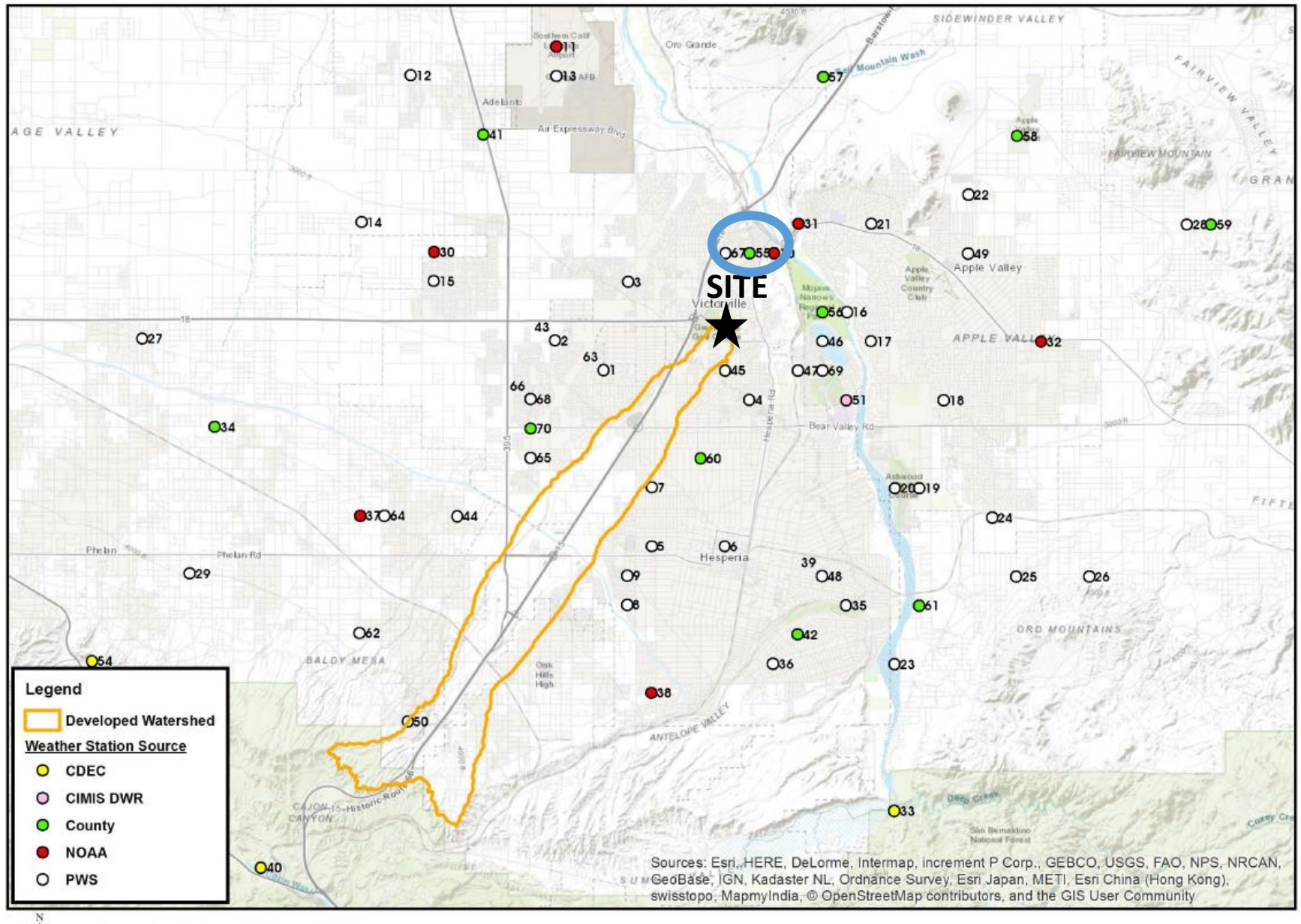
VERY PRELIMINARY

Timing of the Rainfall in Victorville: Gage 2958 (Baldy Mesa Co. Yard)



VERY PRELIMINARY

Timing of the Rainfall in Victorville: Gage 2925 (Oro Grande)



NOTE: Station labels correspond to station numbers in Table 1.

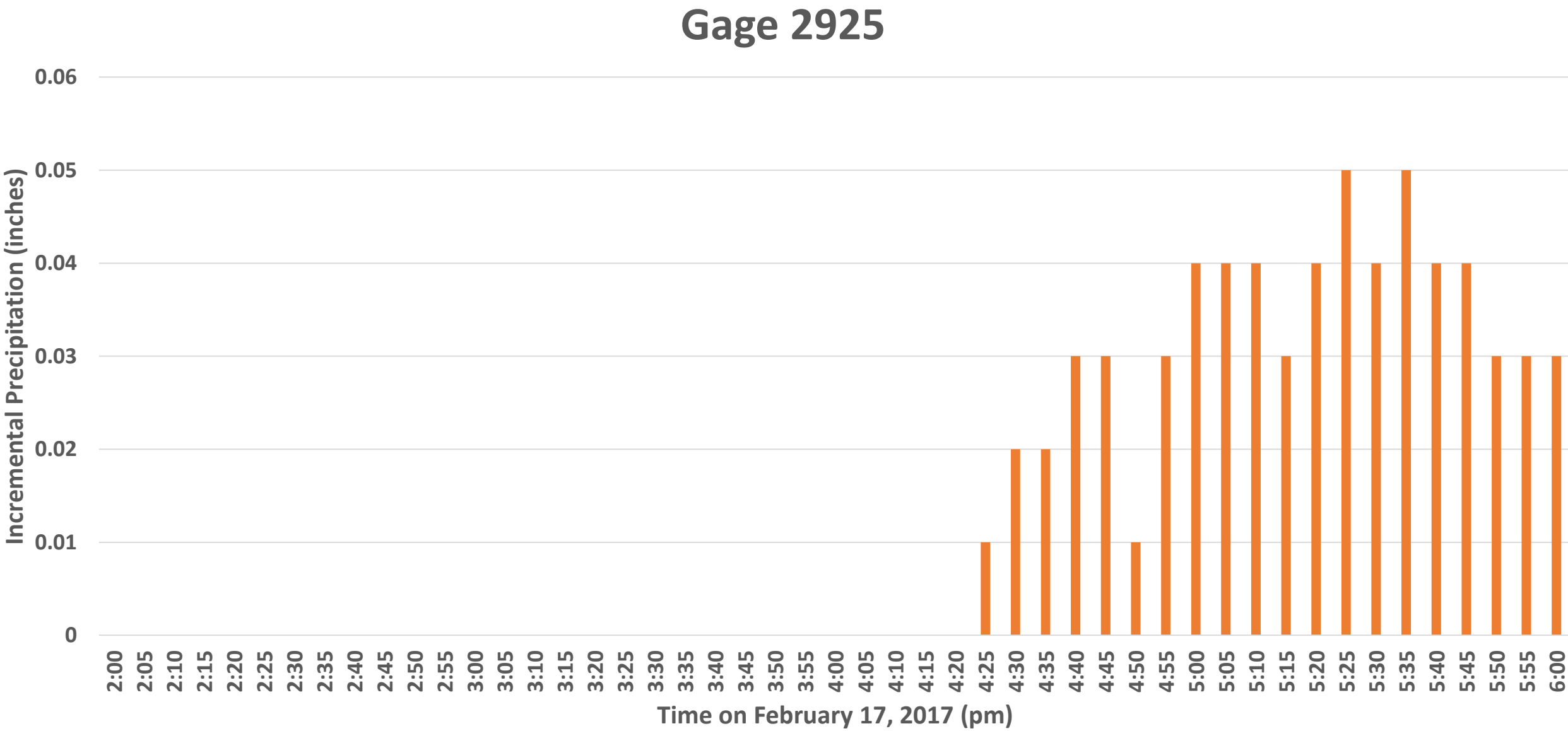
Exhibit 1:

Rain Gage Map (all gages)

Hromadka & Associates
Hydrologic, Earth and Atmospheric Sciences

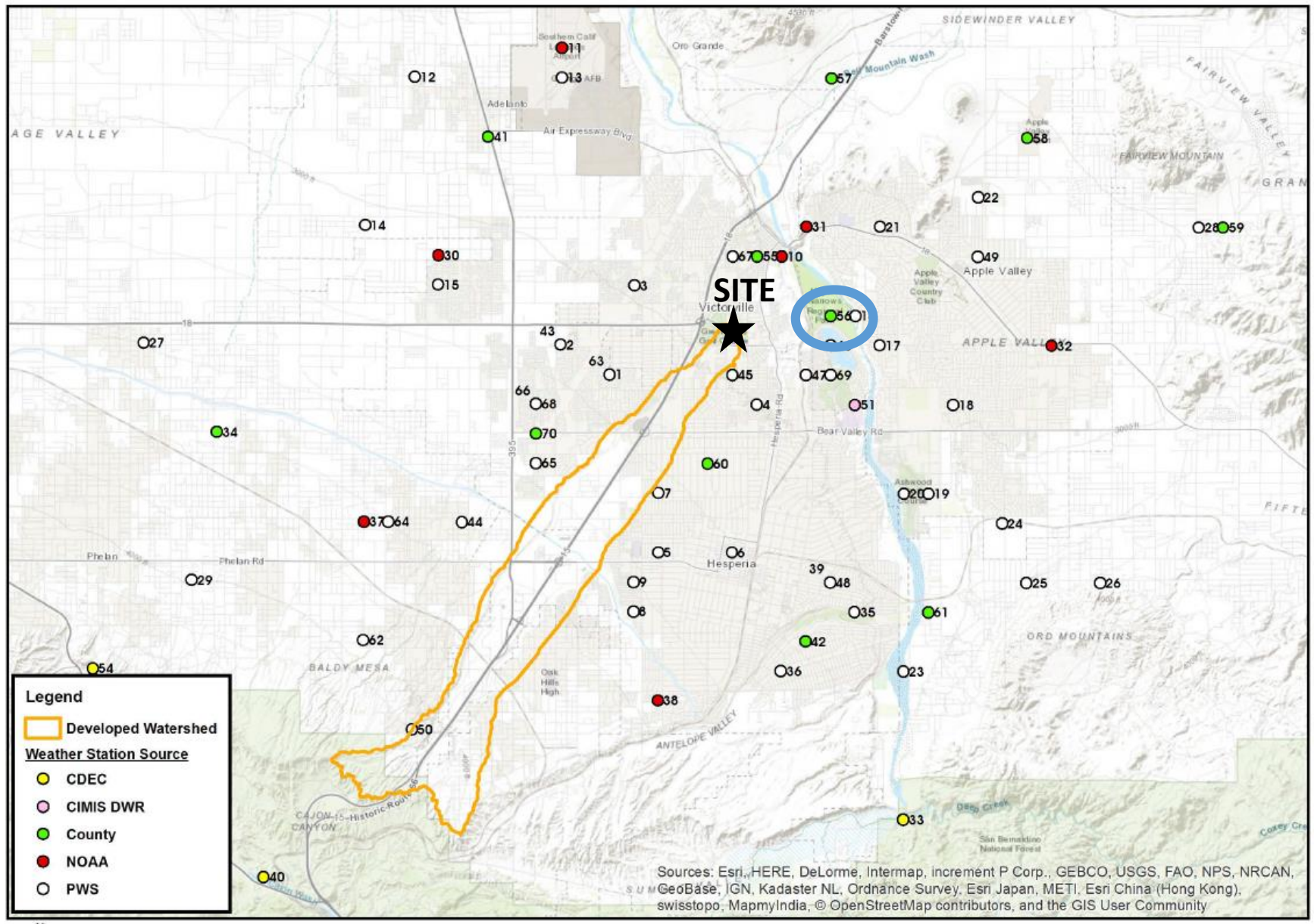
VERY PRELIMINARY

Timing of the Rainfall in Victorville: Gage 2925 (Oro Grande)



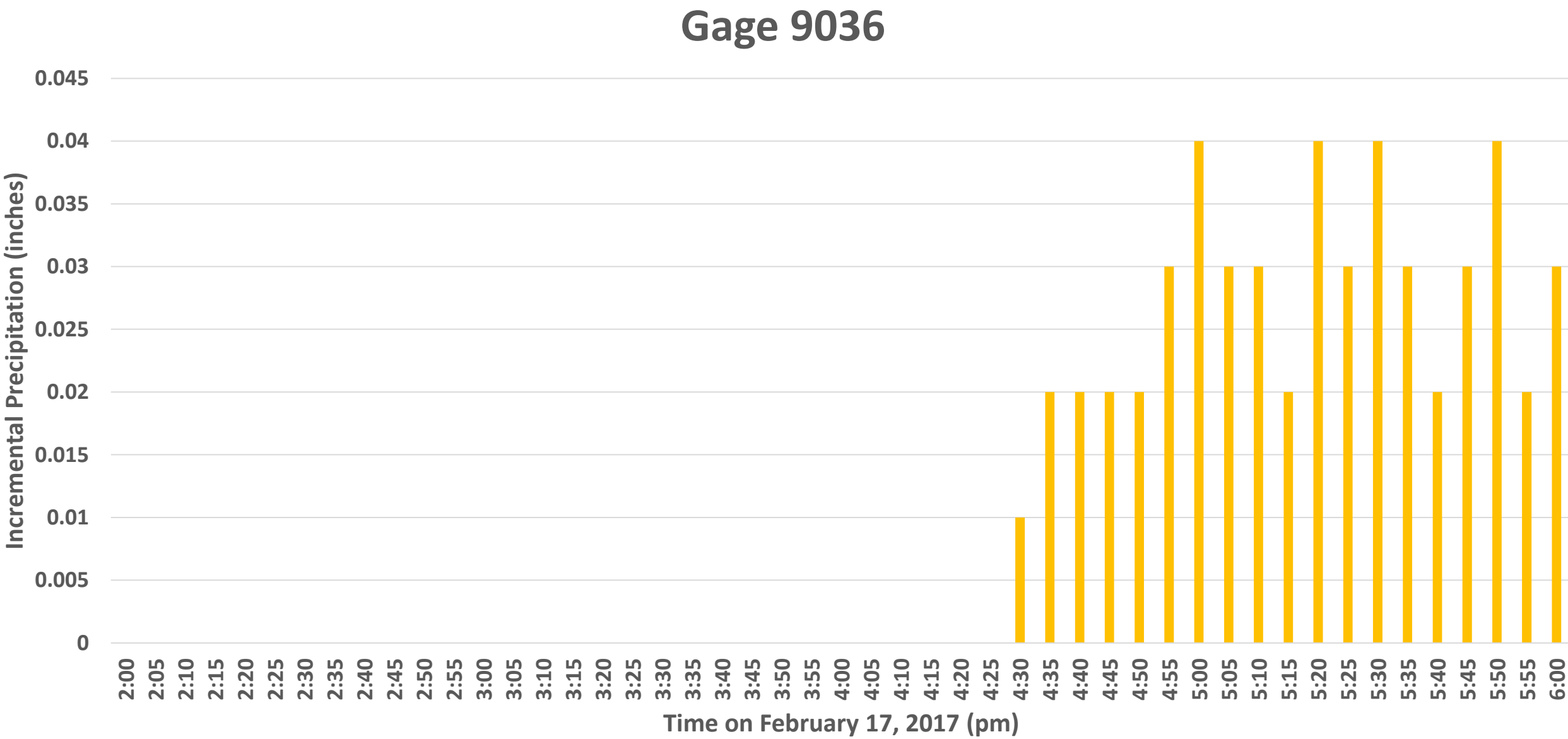
VERY PRELIMINARY

Timing of the Rainfall in Victorville: Gage 9036 (Mojave Narrows)



VERY PRELIMINARY

Timing of the Rainfall in Victorville: Gage 9036 (Mojave Narrows)



VERY PRELIMINARY

Storm Videos

Victorville, CA

Name	Description	Location	Link
Man Killed in Victorville Flooding Identified as Michael Williams, 41	Small clip of the swift water rescue team assisting after a vehicle became partially submerged in water.	Pebble Beach Drive	https://youtu.be/iMiTQZ7kTWo
Male Motorist Killed in Victorville after Being Overcome By Flash Flood	Flood waters swept three vehicles	Pebble Beach Drive	https://youtu.be/f3hMCbMH0XM
One Dead After Car Swept into Flood Waters in Victorville During Storm	Swift Water Rescue team assisting after a vehicle is submerged in water.	Pebble Beach Drive and La Paz Drive	https://youtu.be/lf7cW-zVTW8

VERY PRELIMINARY