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Tracer Test Memorandum for Corona Mine

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1.0 Introduction

Burleson Consulting, Inc. (Burleson) prepared this technical memorandum to document tracer tests conducted at the Corona Mine. This work was conducted in accordance with the Tracer Test Work Plan for Corona Mine, dated April 2016 (Burleson 2016a). The Scope of Work included the following tasks.

Boiler House Infiltration Trench tracer release on May 2, 2016:

1. Mixed a sulforhodamine B (SRB) solution with 1,000 gallons of water to create a 2,000 parts per billion (ppb) solution.
2. Placed one logging fluorometer at the Drain Tunnel outlet, and another logging fluorometer in Kidd Creek roughly 100 yards downstream.
3. Released the SRB solution as a single 1,000 gallon slug.
4. Monitored (downloaded sensor data) periodically.

Injection Well 1 (IW-1) tracer releases on August 18, October 11, 2016:

1. Mixed a SRB solution with 1,000 gallons of water to create 4,000 ppb (August 18), 6,000 ppb (October 11) solutions.
2. Placed one logging fluorometer at the Drain Tunnel outlet, and another logging fluorometer in the Boiler House Infiltration Trench outside the Boiler House adit.
3. Released the SRB solution as a single 1,000 gallon slug.
4. Monitored (downloaded sensor data) periodically.

Injection Well 2 (IW-2) tracer release on November 10, 2016:

1. Mixed a SRB solution with 1,000 gallons of water to create a 6,000 ppb solution.
2. Placed one logging fluorometer at the Drain Tunnel outlet, and another logging fluorometer in the Boiler House Infiltration Trench outside the Boiler House adit.
3. Released the SRB solution as a single 1,000 gallon slug.
4. Monitored (downloaded sensor data) on December 1, 2016.

1.1. Mine Site Description and Location

The Corona Mine is located along Oat Hill Road within the East Mayacmas Mercury District (Yates and Hilpert, 1946). Corona Mine is in the northern portion of the project area and project features are predominantly located on parcels with assessor parcel numbers (APN) 016-020-035 and 016-020-020, and 016-020-026. The site is at an elevation of about 1,900 feet and the topography is relatively steep and forested. Mining features present include waste rock and tailings piles, adits, collapses, a drain tunnel, and up to 2 miles of underground mine workings.

In 1895, James McCauley and the Vallejo Quicksilver Mining Company opened the Corona Mine and operated it until 1906 (Bradley, 1918; Davey, 1895; Williams, 1895). He leased out the claim

to various individuals and companies who worked the mine in 1911, 1916, and from 1939-44 (Gould, 1929). Hugh Ingle, Jr. leased and operated the mine from 1957 to 1972 (Swent, 2000). The Corona Claim was purchased by John Livermore in 1995. The Corona Mine has one of the longest mining histories in the region and witnessed many changes in cinnabar mining and mercury extraction practices. These changes left their mark on the ground, from the stone and brick Scott Furnace built in 1901, to the tube and "D" retorts, to the Gould and Cottrell rotary furnaces of the 1930s and 1940s.

1.2 Memorandum Organization

This memorandum describes the tracer tests at the Boiler House Infiltration Trench, IW-1, and IW-2 in section 2.0. tracer test results are summarized in Section 3.0, and references cited are presented in section 4.0. Figures and appendices follow the text.

2.0 Tracer Test Descriptions

2.1 Boiler House Infiltration Trench Tracer Test

The Boiler House Infiltration Trench extends north of the Boiler House adit about 400 feet directly above the Corona Drain Tunnel (Figure 1). On May 2, 2016, 1,000 gallons of water were mixed with SRB to produce a 2,000 ppm solution in a mobile water tank with pump (Picture A-1). The tracer solution was then pumped into a section of the Boiler House Infiltration Trench roughly 15 feet by 10 feet wide, and 3 feet deep (Picture A-2). Within a few hours, the tracer slug had completely infiltrated the trench bottom. Downward pressure was kept on the tracer slug by continuously releasing water into this section of the Boiler House Infiltration Trench at a rate of 5 gpm for several weeks. The purpose of this was to promote downward flow/infiltration and speed the distribution of the tracer.

Prior to the release of the tracer, two calibrated USB Cyclops-7 Loggers were deployed. One was placed at the Corona Drain Tunnel portal (Picture A-3), and the other was placed in Kidd Creek roughly 100 yards downstream of the Drain Tunnel logger (Picture A-4). Data were collected from both loggers periodically over the next two months.

2.2 Injection Well One Tracer Test

From July 9th through 13th, an inclined boring was drilled at 36° from horizontal 249 linear feet into a mine working. An open-ended injection well was subsequently installed and labeled IW-1. IW-1 is located roughly 825 feet west of the Boiler House Infiltration Trench tracer test location, and roughly 625 feet above the Corona Drain Tunnel.

On August 18th, 1,000 gallons of water was mixed with a concentration of SRB to produce a 4,000 ppm tracer slug in a mobile water tank with pump (Picture A-5). The slug was then pumped down the injection well (Picture A-6). After the tracer release, about 2,000 gallons of water per day was discharged to IW-1 for the five-week duration of the test to promote flow/infiltration. On October

12th, another 1,000 gallon, 6,000 ppm tracer slug was prepared and injected in IW-1. The discharge of 2,000 gallons of water per day to IW-1was continued through October 18 when seasonal rainfall occurred.

Prior to deployment of the tracer, two calibrated USB Cyclops-7 Loggers were deployed. One was deployed at the Corona Drain Tunnel portal (Picture A-7), and the other was deployed at the Boiler House Infiltration Trench (Picture A-8). Data were collected from both loggers periodically over the next 5 weeks.

2.3 IW-2 Tracer Test

From July 20th through August 4th an inclined boring was drilled at 20.5° from horizontal 164 linear feet into a fracture zone. An open-ended injection well was subsequently installed and labeled IW-2. IW-2 is located roughly 200 feet west of the Boiler House Portal location, 465 feet south of the drain tunnel, and roughly 570 feet above the Corona Drain Tunnel (Figure 1).

On November 10th, 1,000 gallons of water was mixed with a concentration of SRB to produce a 6,000 ppm tracer slug in a mobile water tank with pump. The slug was then pumped down the injection well. After the tracer release, about 2,000 gallons of water per day was discharged to IW-2 for the duration of the test to promote flow/infiltration.

Prior to deployment of the tracer, two calibrated USB Cyclops-7 Loggers were deployed. One was deployed at the Corona Drain Tunnel portal, and the other was deployed at the Boiler House Infiltration Trench. On December 1, 2016, data were collected from both loggers.

The IW-2 tracer test was stopped on December 1 because the detection of the arrival curve at the Drain Tunnel was interrupted by a large rock that fell through the roof of the portal. This is described below in Section 3.3.

3.0 Tracer Test Results

3.1 Boiler House Infiltration Trench

On May 2nd a tracer slug was released in the Boiler House Infiltration Trench. The fluorometer in the Corona Drain Tunnel recorded an initial spike of 67 ppb on May 3rd which leveled off around 17 ppb and steadily dropped to zero by June 27th. The fluorometer in Kidd Creek did not detect the tracer. Lack of tracer detection at Kidd Creek is likely due to dilution (Kidd Creek was flowing during the tracer test) and interference by chemical precipitates forming in the creek.

Tracer concentrations through time are shown on Figure 2. The tracer concentration on Figure 2 appears as a series of discontinuous stepped segments with gradually decreasing maximum concentrations. Each of the steps from higher to lower concentrations occurred when the fluorometer was removed to retrieve data and the probe was cleaned. Cleaning consisted of removing adhering iron precipitates. This cleaning appears to have changed the measurement geometry resulting in the sudden decrease in fluorometer readings. As the accumulation of iron oxide progressed after each cleaning, the fluorometer recorded a new maximum reflecting the tracer concentration. The yellow line was chosen to reflect the maximum readings and reflects a likely arrival curve for the tracer at the Drain Tunnel.

These results confirm a direct hydraulic connection from the Boiler House Infiltration Trench to the Corona Drain Tunnel. These results suggest a tracer travel time of about 18 hours between

the trench and the Drain Tunnel. These results also showed a residence time for the tracer of about 50 days between the infiltration trench and the Drain Tunnel.

3.2 Injection Well One

On August 18th, a tracer slug was released into IW-1. The logger in the Boiler House Infiltration Trench recorded an initial spike of 4.25 ppb on August 20th, and had a decreasing trend down to zero by September 1st. The logger in the Corona Drain Tunnel recorded the presence of the tracer from August 20th to September 1st. Figure 3 shows the tracer arrival curve observed at the Boiler House Portal after the August 18 tracer release to IW-1.

On October 12th, another tracer slug was released into IW-1. Figure 4 shows the tracer arrival curve observed at the Boiler House Portal after the October 12 tracer release to IW-1. The data logger in Corona Drain Tunnel began recording an increasing trend from 0 ppb on October 15th to 1.0 ppb on October 17th, and a decreasing trend from 1.0 ppb on October 17th to 0 ppm on October 21st.

Figure 5 shows the tracer arrival curve observed at the Drain Tunnel after the October 12 tracer release to IW-1. The Drain Tunnel fluorometer recorded values from about -0.8 ppb to about 1 ppb. This is likely because the tracer concentration was very low at the drain tunnel. The scatter in the drain tunnel readings is likely caused by the low measurement range, incomplete mixing of the tracer in the water, and occurrence of abundant iron precipitates in the water.

These results confirm a direct hydraulic connection from IW-1 at the upper mine workings, to the Corona Drain Tunnel. These results also suggest that dosing treatment chemicals at IW-1 will be detectable at the Corona Drain Tunnel portal within 2.5 to 4 days, and that the residence time for the tracer between IW1 and the Drain Tunnel was about 14 days. Therefore, IW-1 is an appropriate point at which to dose treatment chemicals on a pilot basis.

Table 1: Tracer Test Summary

Test	Tracer Release	Location	First Arrival (min)		Peak Arrival (min)		Peak Departure (min)		Time to Trailing Edge (min)
Infiltration Trench	May 2, 2016 13:10	Drain Tunnel	221		1,256		5,468		73,286
		Kidd Creek	No Tracer Detected						
IW1 Test 1	August 18, 2016 13:20	Infiltration Trench	146		276		826		6,826
		Drain Tunnel	4,562		7,432		9,752		20,472
IW1 Test 2	October 12, 2016 14:19	Infiltration Trench	1st Peak	2nd Peak	1st Peak	2nd Peak	1st Peak	2nd Peak	19,888
			1,272	4,358	2,428	6,038	3,278	14,352	
		Drain Tunnel	3,500		5,940		11,160		16,780
IW2 Test	November 10, 2016, 13:00	Infiltration Trench	Unknown		Unknown		Unknown		Unknown
		Drain Tunnel	2,312		Unknown		Unknown		Unknown

3.3 Injection Well Two

On November 10th, a tracer slug was released into IW-2. Tracer arrival at the logger in the Boiler House Infiltration Trench appears to have been interfered with by ongoing solids removal efforts, and no clear arrival time is discernable at the infiltration trench. The logger in the Corona Drain Tunnel recorded the arrival of the tracer on November 12th. A complete arrival curve was not obtained at the Drain Tunnel because a large rock fell into the portal and knocked the fluorometer out of the flow at about 5:12 on November 15.

Figure 6 shows the tracer arrival curve observed at the Boiler House Portal after the November 10 tracer release to IW-2.

These results show a hydraulic connection between IW-2 and the Drain Tunnel. These results also suggest that dosing treatment chemicals at IW-1 will be detectable at the Corona Drain Tunnel portal within about 1 to 2 days. These results do not allow evaluation of the residence time between IW-2 and the Drain Tunnel.

4.0 References Cited

Bradley, Walter. 1918. Quicksilver Resources of California, California State Mining Bureau, Bul. 78, Sacramento.

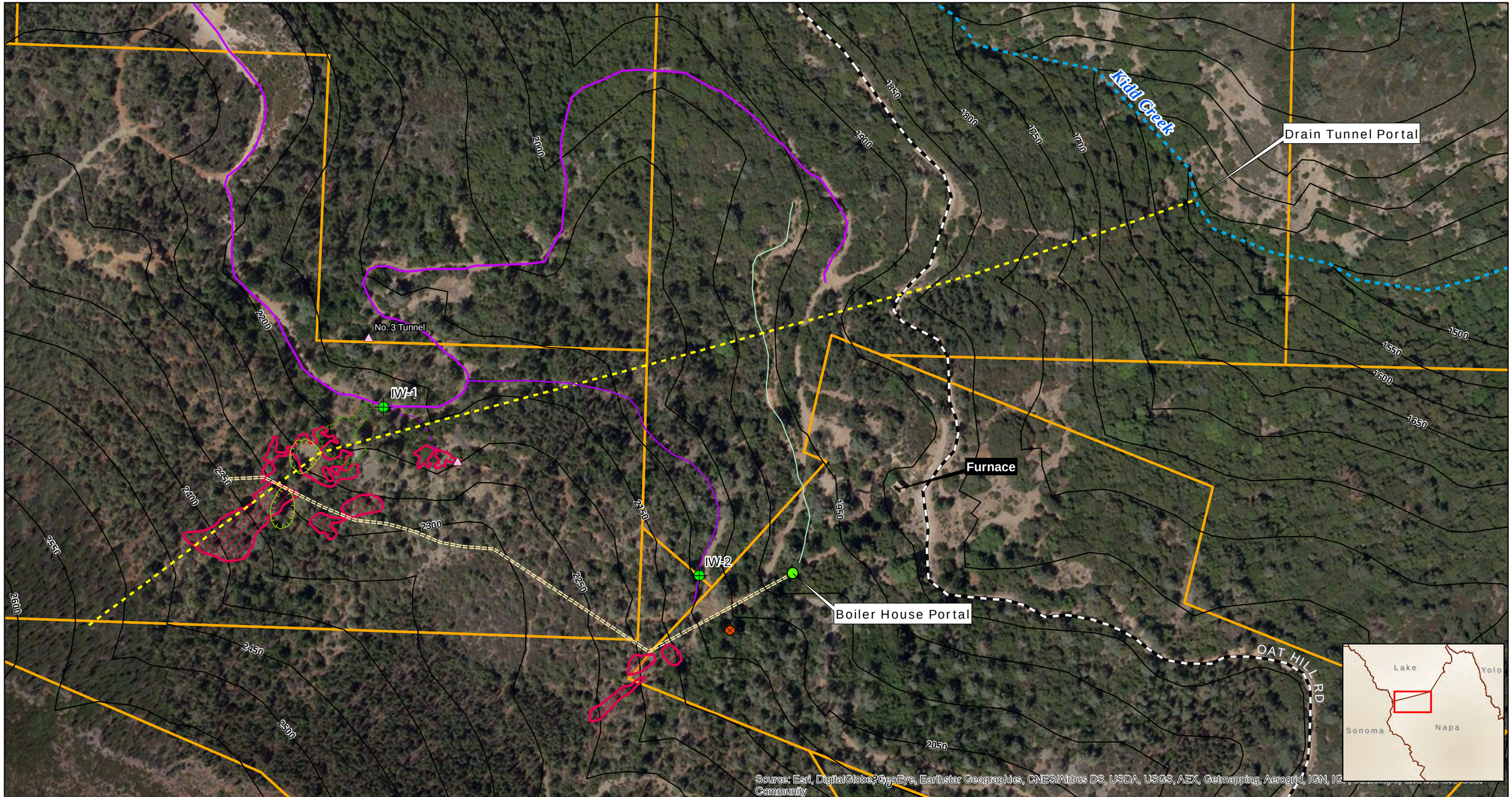
Burleson. 2016. Tracer Test Work Plan for Corona Mine. Napa County. California.

Davey, H.C. 1895. Letter to James McCauley. Unpublished document in john Livermore Collection. September 27.

Gould, H.W. 1929. Letter to J.W. McCauley. Unpublished document in John Livermore Collection. December 6.

Swent, Eleanor. 2000. Independent Small Mines Operators, 1940 to 1999; Corona Mine. Western Mining in the Twentieth Century Series Knoxville/McLaughlin Mine, Regional Oral History Office, University of California, Bancroft Library, Berkeley, California.

Yates, Robert G. and Hilpert, Lowell S. 1946. Quicksilver Deposits of the Eastern Mayacmas District, Lake and Napa Counties, California. California Journal of Mines and Geology. V42. No. 3



Legend

- Injection Wells
- Parcel Lines
- Collapse Feature
- Pit
- Ore Body/Stope
- Stope
- Adit
- Boiler House Portal
- Drain Tunnel
- 50ft Contour
- Creeks
- Roads
- Private Road
- Proposed Access Road
- Spring
- Existing Infiltration Trench
- Boiler House Adit

N

0 112.5 225 450

Feet

Corona Mine

Figure 1: Site Features & Tracer Test Locations

Source: Bing Maps aerial imagery web mapping service; Napa County GIS Department 2011; Burleson Consulting 2012.

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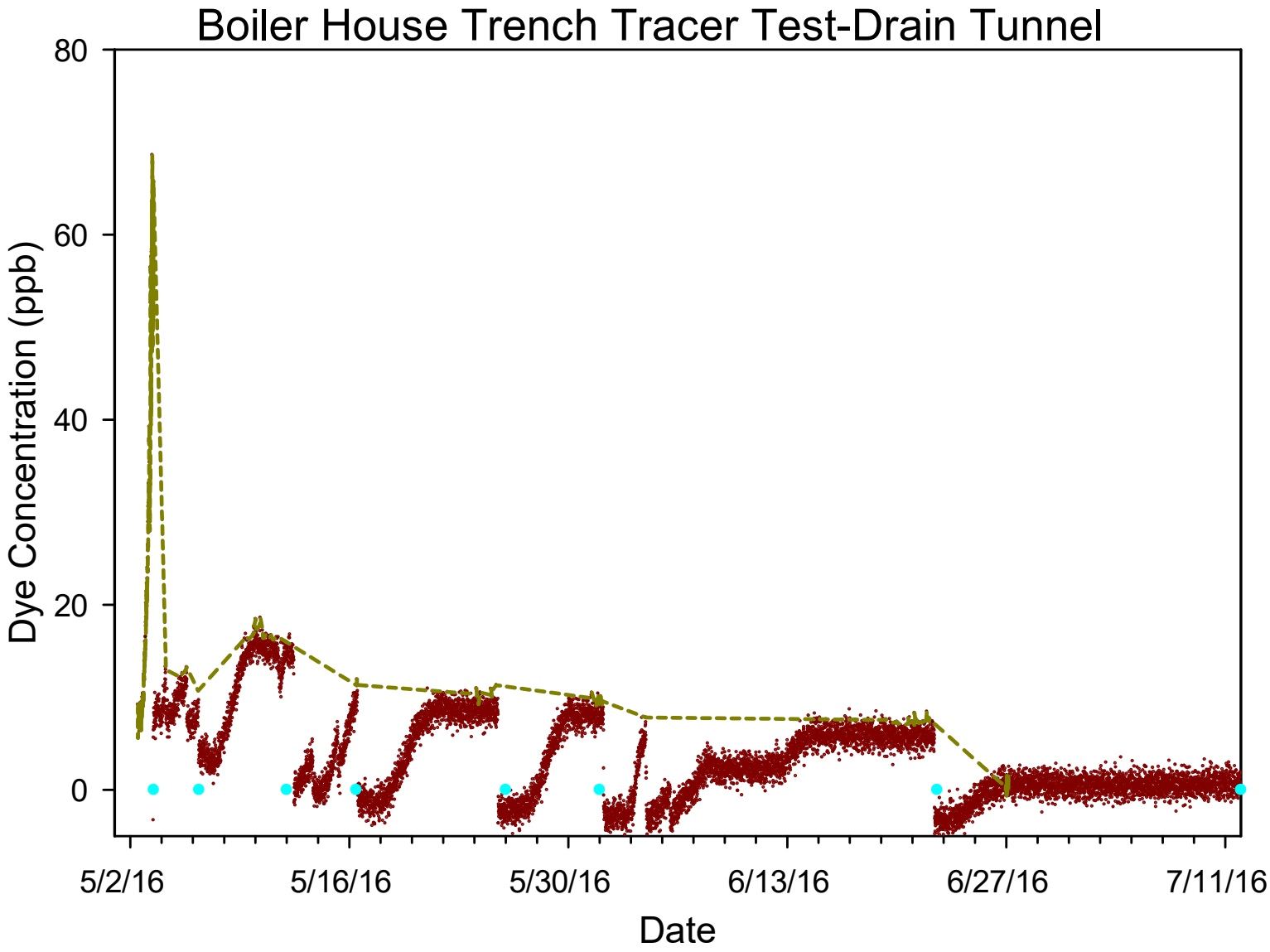
Path: S:\GIS\Projects\Corona_Mine_II\Figure_1_Proposed_Drilling_Locations.mxd



Key:
Red Dots: Raw Data from logger
Yellow Line: Smoothed data graph
Blue Dots: Logger Download

Figure 2

Corona Infiltration Trench Tracer Test, Tracer vs. Time at the Drain Tunnel, Corona Mercury Mine, Napa County, California

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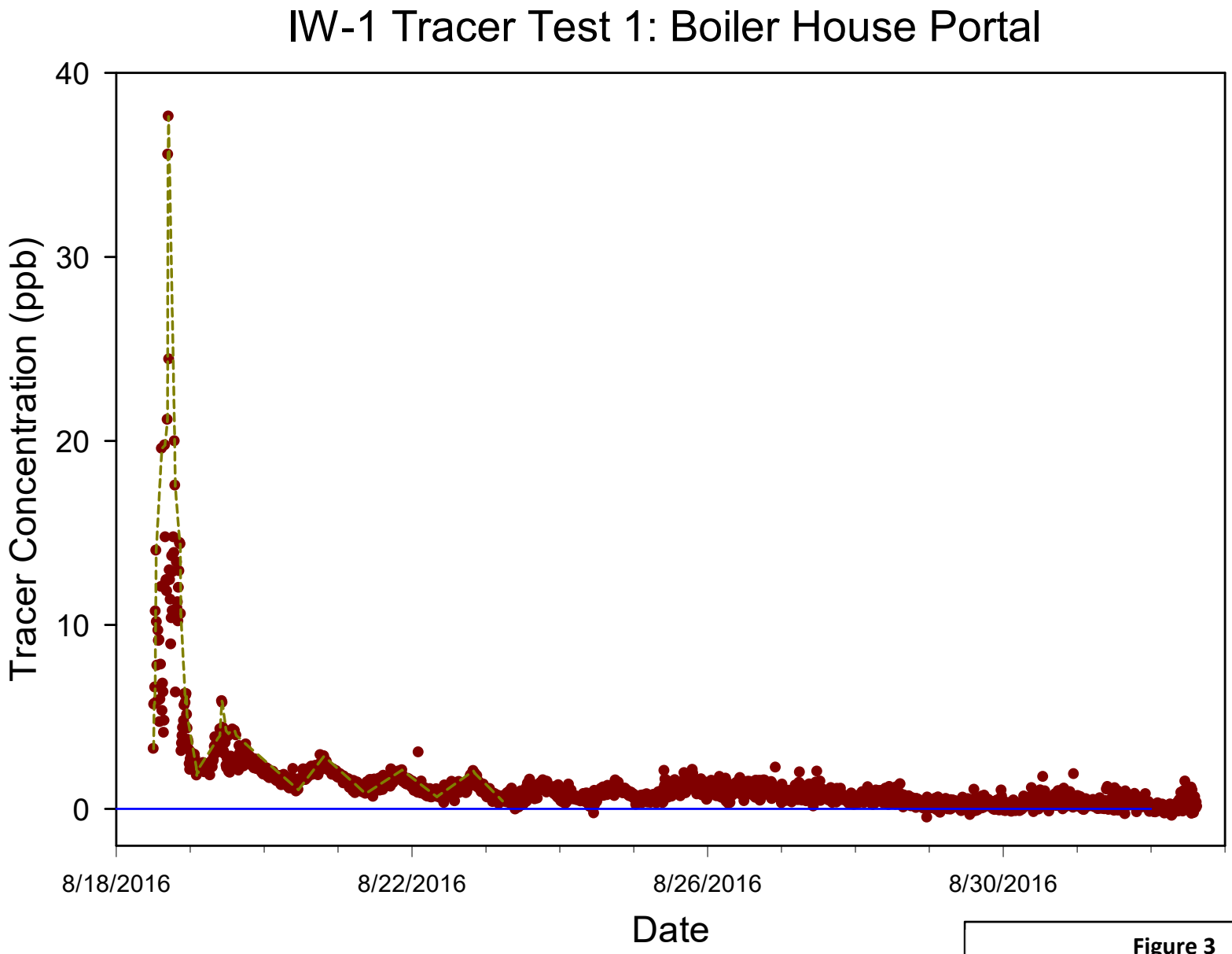

Key:
Red Dots: Raw Data from logger
Yellow Line: Smoothed data graph

Figure 3

IW-1 Tracer Test 1, Tracer vs. Time at the Boiler House Portal, Corona Mercury Mine, Napa County, California

Burleson Consulting, Inc.

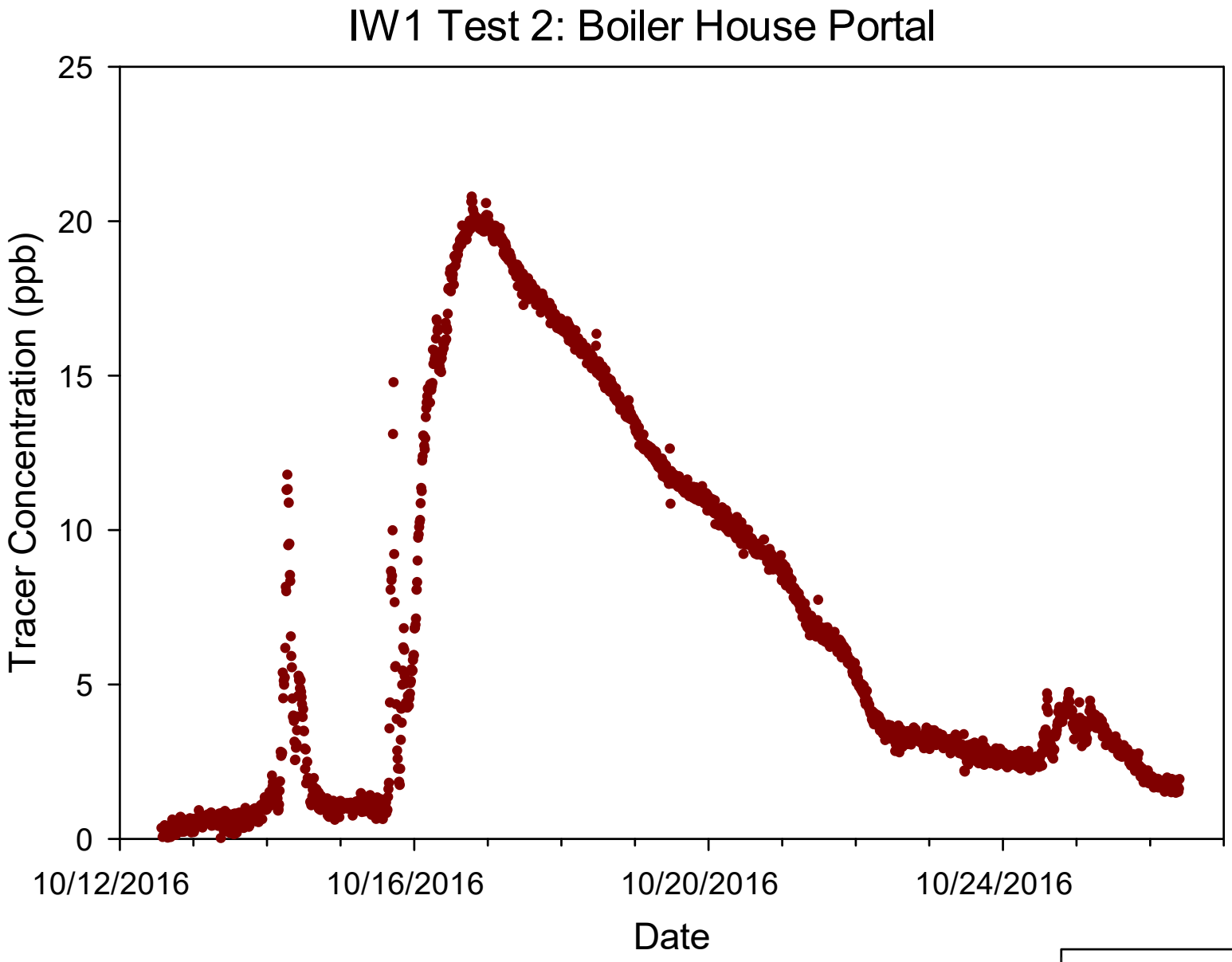

Figure 4

IW-1 Tracer Test 2, Tracer vs. Time at the Boiler House Portal, Corona Mercury Mine, Napa County, California

Burleson Consulting, Inc.

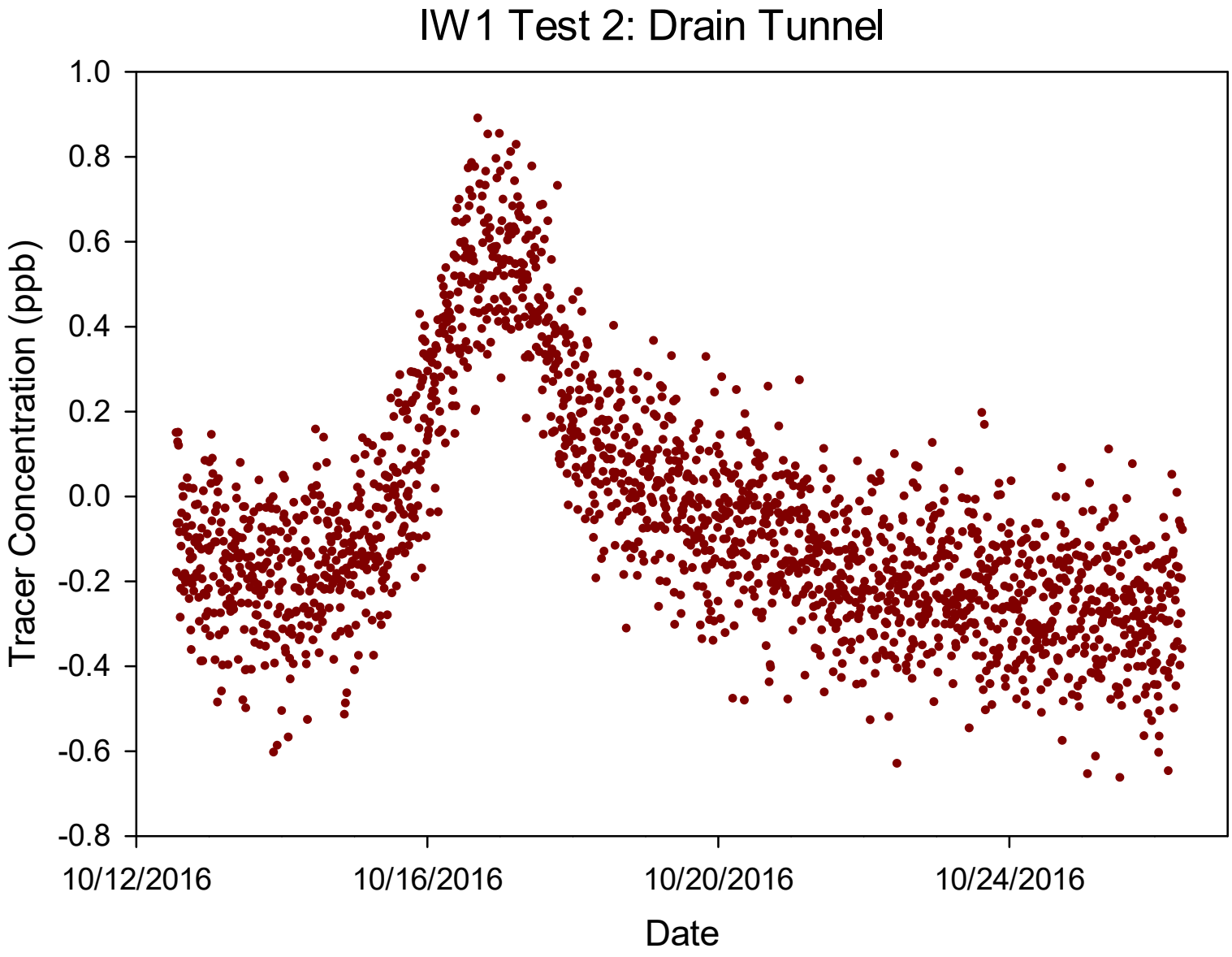

Figure 5

IW-1 Tracer Test 2, Tracer vs. Time at the Drain Tunnel, Corona Mercury Mine, Napa County, California

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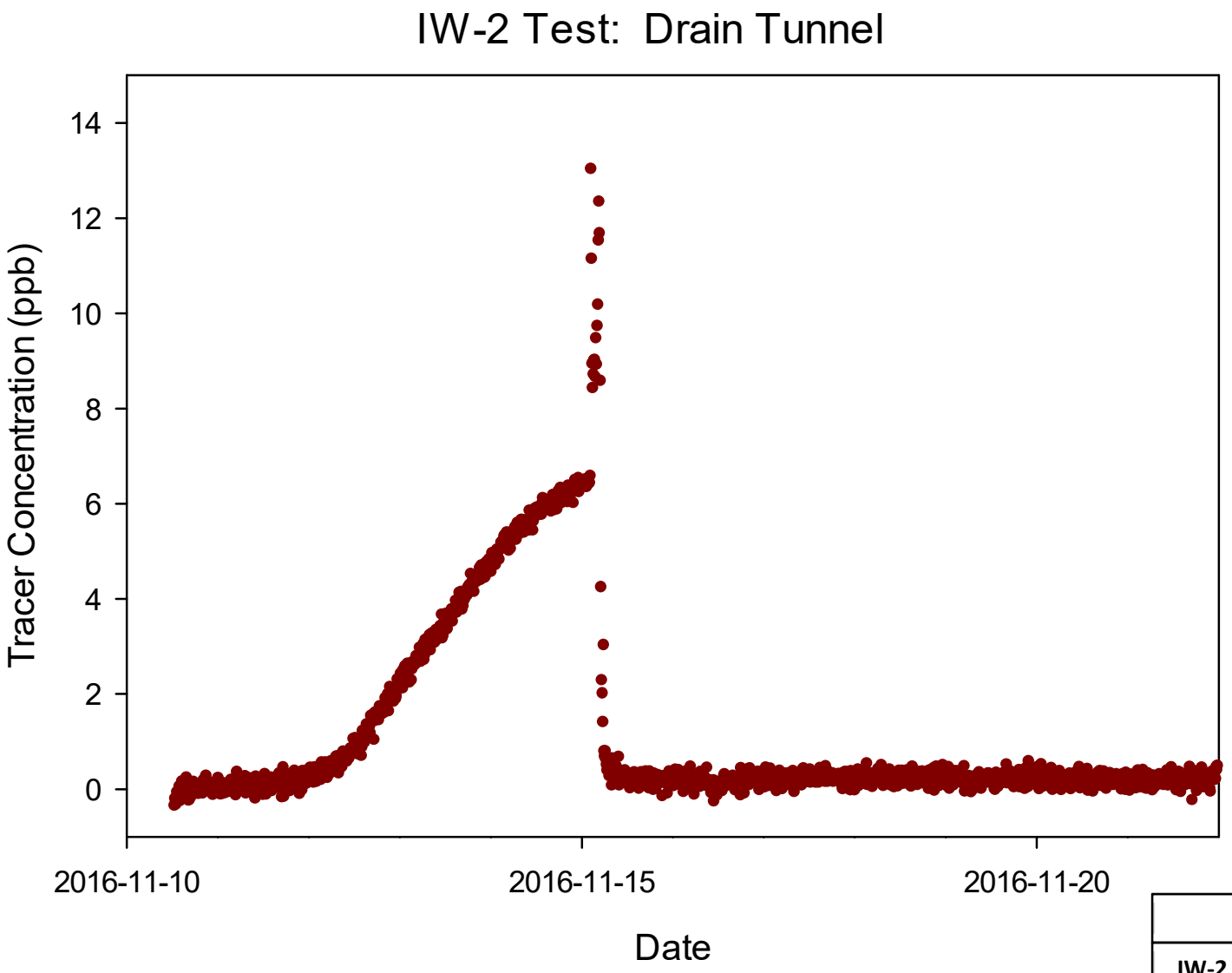

Figure 6

IW-2 Tracer Test, Tracer vs. Time at the Drain Tunnel, Corona Mercury Mine, Napa County, California

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Appendix A

Photo Log

(Four Pages)

Appendix A
Corona Mine Tracer Test
Photo Log of Field Activities

Photo Description	Photo
Boiler House Infiltration Trench Tracer Test View of the Sulforhodamine B being mixed in a 500 gallon Water Buffalo next to the Boiler House Infiltration Trench. **A-1**	
Boiler House Infiltration Trench Tracer Test View to the northwest of the Boiler House Infiltration Trench after the tracer was deployed. **A-2**	

Appendix A
Corona Mine Tracer Test
Photo Log of Field Activities

Photo Description	Photo
Boiler House Infiltration Trench Tracer Test View to the west inside Corona Drain Tunnel portal **A-3**	
Boiler House Infiltration Trench Tracer Test View to the northeast of the logger deployed in Kidd Creek. **A-4**	

Appendix A
Corona Mine Tracer Test
Photo Log of Field Activities

Photo Description	Photo
IW-1 Tracer Test View of the water buffalo with tracer mixed with 500 gallons of water at IW-1. **A-5**	
IW-1 Tracer Test View to the northwest of the tracer being injected into IW-1. **A-6**	

Appendix A
Corona Mine Tracer Test
Photo Log of Field Activities

Photo Description	Photo
IW-1 Tracer Test View to the west inside the Corona Drain Tunnel with the data logger visible in the pvc pipe above the water. **A-7**	
IW-1 Tracer Test View to the west of the Boiler House Infiltration Trench with deployed logger visible in front of culvert pipe. **A-8**