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EVALUATION OF A SELECTED SITE FOR A PROPOSED JOPLIN WATER SUPPLY RESERVOIR ON BAYNHAM BRANCH

Second Addendum to December 29, 2020 Report

February 7, 2022

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A contract investigation conducted by the Ozark Underground Laboratory, Inc.

for Glenn Brown, Diamond, MO.

Purpose

This addendum provides additional hydrological information to evaluate a proposed site for the Joplin water supply reservoir on Baynham Branch. Water level and flow data were monitored at the Harris Family Property (HFP) Springs complex over a 15-month period. In addition, in 2021 the Ozark Underground Laboratory (OUL) continued monitoring for tracer dyes at several relevant spring and stream sampling stations established during the initial Baynham Branch tracing study in 2020. This monitoring coincided with dye tracing conducted by the Missouri American Water Company (MAWC) consultants in the fall of 2021. The results of OUL's monitoring of the MAWC's tracing work are included in this addendum.

Flow Characteristics of the HFP Springs

As part of an OUL contract study evaluating the site of a newly proposed water supply reservoir for the town of Joplin, Missouri, two Onset Hobo water level loggers were installed in the HFP Springs complex. The significance of the HFP Springs complex is outlined in detail in the OUL's December 29, 2020 report and subsequent April 2, 2021 addendum. Dye tracing conducted by the OUL in the fall of 2020 showed that most water discharging from the HFP Springs complex originates in losing reaches of nearby Baynham Branch, within the proposed reservoir basin. Water level loggers were installed at the Springs complex to measure leakage rates of the proposed reservoir under natural flow conditions.

The first water level logger was located in the HFP Spring Lake near the outflow structure (Figure 1). Water from the Spring Lake discharges from a 36" diameter corrugated pipe located at the surface of the lake that runs through the lake dam (Figure 2). Water discharging from the pipe flows into a short spring branch and then into Shoal Creek. The second water level logger was located in the wetland area on the west side of the lake where flow is constricted by the lake dam to the northeast and the Kansas City Southern railroad bed to the southwest. Water in the wetland area originates from seeps along the lake access road that discharge through culverts to the wetland. Water in the wetland flows northwest along the Spring Lake dam and confluences with water discharging from the Spring Lake outflow pipe before entering Shoal Creek. Figure 3 shows the locations of the water level loggers in the HFP Springs complex.

In addition to the two spring fed locations that were monitored for flow rate, an additional spring exists northwest of the Spring Lake that discharges into the HFP Spring Branch. Flow rate for this spring was not monitored with a water level logger; however, dye tracing in 2020 showed that this spring received water from Baynham Branch. It is unclear whether this is a true spring or leakage through the dam from the HFP Spring Lake. In either case, the spring flow was not accounted for in the flow rate estimates derived from the water level loggers and thus was considered additional leakage from Baynham Branch.

Figure 1. Location of water level logger and staff gauge near the HFP Spring Lake outflow structure.

Figure 2. Discharge from corrugated pipe in HFP Spring Lake.

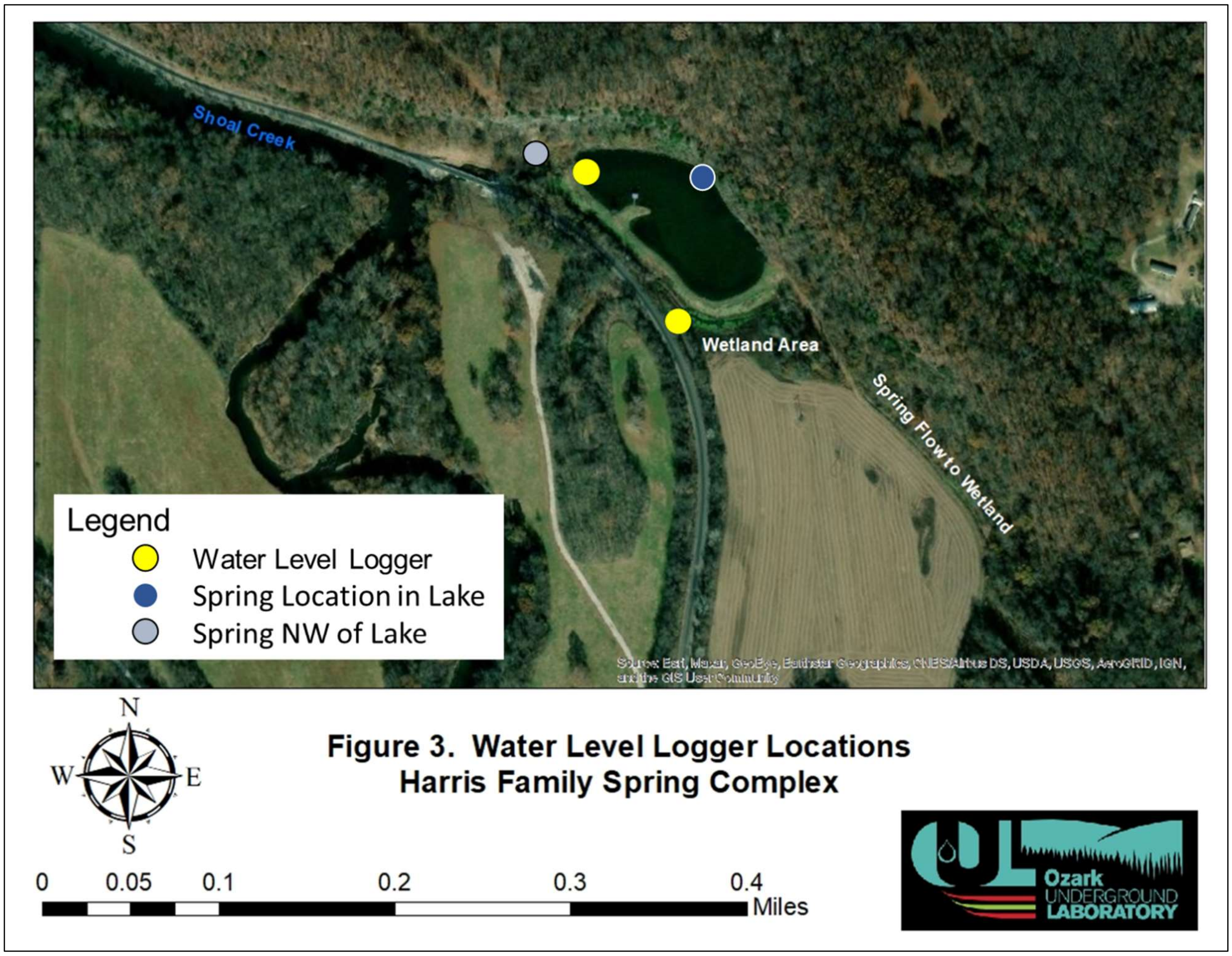

Figure 3. Location of water level loggers in the HFP Springs complex.

In addition to data collected with the water level loggers, OUL staff measured stream discharge from the Spring Lake outflow pipe on multiple occasions with a Pygmy current meter using standard methodologies used by the US Geological Survey. Based on calculated flow rates through the discharge pipe and the stream flow measurements mentioned above, the OUL developed a ratings table that converts water depth data recorded by the water level logger in the Spring Lake to flow rates in million gallons per day (mgd). The Spring Lake has very little surface watershed; therefore, water discharging from the lake outflow pipe is almost entirely the result of discharge from the spring located in the lake. Tracing conducted by the OUL has shown that the spring water in the lake is derived from Baynham Branch.

Due to complexity in channel morphology of the wetland area, it was impractical to develop a ratings table for the water level logger at that location. Instead, flow rates estimated from stream gauging measurements at the HFP Spring Branch near the railroad bridge were used in combination with the ratings table developed for the Spring Lake to estimate flow rate contributions from the wetland area and the spring on the NW corner of the lake. Stream gauging measured flow rates at the Spring

Lake outflow and in the Spring Branch at the railroad bridge on two occasions. On December 1, 2020, discharge at the Spring Lake outflow was 2,038 gpm and discharge at the Spring Branch was 2,244 gpm. On that occasion, the Spring Lake accounted for 91% of the total discharge from the HFP springs complex. On October 21, 2021, discharge at the Spring Lake outflow was measured at 1,114 gpm and discharge from the Spring Branch was 1,178 gpm. On that date, the Spring Lake accounted for 95% of the total discharge from the HFP springs complex. These measurements show that the wetland area and the spring NW of the lake contributed 5-9% of the total discharge from the springs complex on these two occasions.

The Hobo loggers in the HFP spring complex have been continuously recording water level data since November 12, 2020. Figure 4 and Table 1 below show mean daily discharge over a 15-month period from the HFP Spring Lake. The mean daily discharge for the entire 15-month period was 6.6 million galls per day (mgd). The highest mean daily discharge observed was 33.5 mgd and the lowest was 0 mgd. The highest instantaneous discharge observed at the Spring Lake was 45.4 mgd on January 2, 2022.

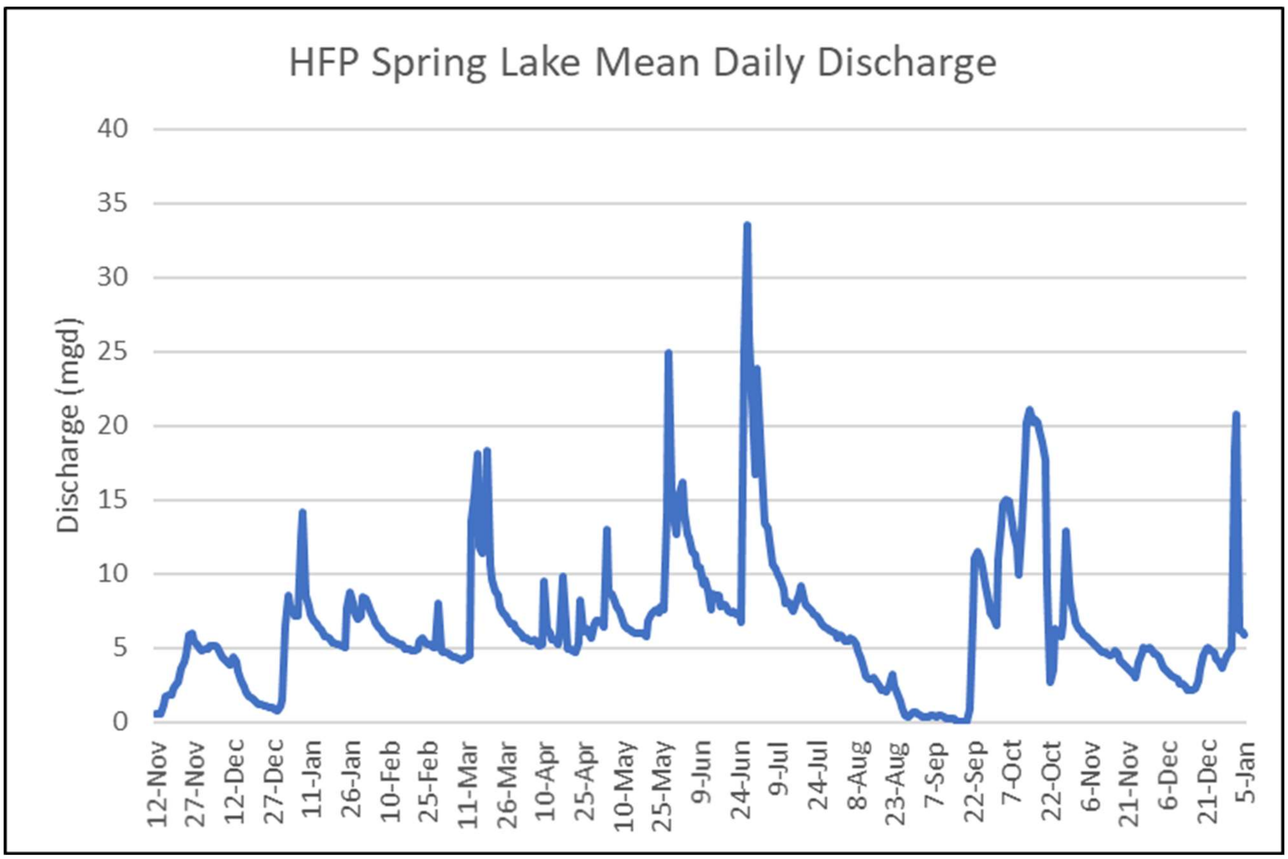

Figure 4. Mean daily discharge from the HFP Spring Lake over a 15-month period.

Table 1. Mean daily discharge values for the HFP Spring Lake over a 15-month period.

Day of Month	Discharge (mgd)													
	2020		2021											2022
	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.
1	-	4.90	6.49	8.28	4.78	5.85	6.83	15.43	23.85	5.68	0.55	6.49	6.70	4.64	18.44
2	-	4.93	8.50	7.82	4.74	5.64	6.64	16.21	19.47	5.85	0.44	10.99	6.32	4.60	20.79
3	-	5.08	7.79	7.43	4.70	5.61	6.39	14.21	15.29	5.75	0.36	13.37	6.09	4.34	6.14
4	-	5.15	7.48	7.05	4.63	5.51	13.02	12.65	13.48	5.45	0.29	14.69	5.88	3.84	6.05
5	-	5.13	7.16	6.69	4.50	5.46	8.70	12.47	13.06	5.42	0.35	15.01	5.71	3.63	5.87
6	-	4.98	7.11	6.42	4.42	5.53	8.59	11.56	12.28	5.67	0.48	14.91	5.59	3.37	-
7	-	4.63	12.46	6.16	4.37	5.40	8.15	11.31	10.69	5.56	0.47	14.03	5.41	3.17	-
8	-	4.39	14.13	6.03	4.30	5.11	7.79	10.59	10.37	5.20	0.33	12.69	5.19	3.13	-
9	-	4.12	8.50	5.77	4.20	5.27	7.43	10.45	10.02	4.80	0.39	11.83	5.02	2.99	-
10	-	3.90	7.83	5.56	4.27	9.47	6.86	9.24	9.62	4.24	0.42	9.94	4.87	2.84	-
11	-	3.88	7.26	5.50	4.38	6.26	6.53	9.54	8.95	3.56	0.37	13.15	4.70	2.61	-
12	0.55	4.42	6.87	5.44	4.43	5.96	6.28	8.90	8.03	3.09	0.27	17.58	4.71	2.61	-
13	0.53	4.10	6.57	5.31	13.62	5.54	6.20	7.60	8.10	2.85	0.22	20.25	4.64	2.39	-
14	0.58	3.38	6.37	5.25	15.34	5.52	6.03	8.64	7.64	2.87	0.18	21.07	4.51	2.18	-
15	1.19	2.79	6.14	5.18	18.10	5.26	6.02	8.57	7.48	2.98	0.20	20.28	4.54	2.14	-
16	1.72	2.37	5.80	4.96	11.83	5.98	6.00	8.55	8.15	2.70	0.00	20.48	4.83	2.15	-
17	1.83	2.03	5.75	4.93	11.37	9.81	6.02	7.81	8.67	2.38	0.07	20.26	4.55	2.23	-
18	1.78	1.76	5.71	4.90	15.17	6.67	5.94	7.94	9.15	2.17	0.01	19.68	4.20	2.76	-
19	2.30	1.58	5.39	4.85	18.36	4.87	5.71	7.90	8.20	2.17	0.00	18.90	3.93	3.54	-
20	2.60	1.51	5.29	4.81	10.68	4.87	6.83	7.51	7.88	2.06	0.00	17.66	3.76	4.47	-
21	2.65	1.32	5.19	4.87	9.55	4.76	7.23	7.37	7.64	2.49	0.92	9.25	3.64	4.91	-
22	3.62	1.23	5.19	5.47	8.86	4.71	7.34	7.43	7.45	3.25	7.01	2.73	3.44	4.98	-
23	4.09	1.23	5.11	5.61	8.53	5.38	7.58	7.29	7.25	2.51	11.04	3.56	3.23	4.81	-
24	4.51	1.10	5.05	5.33	7.74	8.26	7.38	7.37	7.14	1.98	11.53	6.32	2.99	4.65	-
25	5.88	1.05	7.70	5.24	7.40	6.13	7.81	6.74	6.81	1.35	11.01	5.84	4.07	4.32	-
26	5.99	0.95	8.79	5.18	7.10	6.32	7.54	25.22	6.60	1.01	10.47	5.71	4.64	4.02	-
27	5.42	0.93	7.97	5.06	6.89	6.12	14.02	33.58	6.42	0.45	9.19	6.60	4.96	3.66	-
28	5.21	0.88	7.31	4.97	6.64	5.63	24.90	26.15	6.25	0.34	8.15	12.94	4.95	3.94	-
29	4.94	0.79	6.95	-	6.57	6.63	15.64	21.67	6.14	0.46	7.41	9.43	4.99	4.53	-
30	4.80	1.10	7.13	-	6.33	6.83	13.30	16.78	6.05	0.65	6.99	8.18	4.87	4.76	-
31	-	1.45	8.42	-	6.06	-	12.67	-	5.97	0.69	-	7.32	-	4.87	-
Mean	**-**	**2.81**	**7.21**	**5.72**	**8.06**	**6.01**	**8.63**	**12.22**	**9.49**	**3.09**	**2.97**	**12.62**	**4.76**	**3.65**	**-**

Discharge estimates from the Spring Lake plus the other nearby springs that comprise the HFP Springs complex are a conservative estimate of leakage from Baynham Branch under natural flow conditions without a dam. Creation of a dam with an impounded depth of approximately 100 feet at the dam would increase head on water in Baynham Branch. Page 3 of the OUL report of December 29, 2020 indicates that the groundwater gradient from Baynham Branch between the dam and Lime Kiln Road to the HFP Springs Complex would increase from 2.8 feet per thousand to 20.9 feet per thousand. That is a 750% increase and the standard Darcy groundwater equation indicates that flow with a full impoundment would be expected to increase by approximately 750% over the maximum flow rate measured over the 15-month period at the HFP Spring Lake. That maximum flow rate for the lake was 45.4 mgd. The wetland area and spring NW of the lake contribute on average an additional 7% to the flow rate for an estimated maximum flow rate during the 15 month study period of 48.6 mgd discharging from the HFP springs complex. This translates to approximately 365 mgd of leakage possible with the proposed reservoir full. Of course, a flow of 365 mgd will never occur because the reservoir will never fill as is clearly proven by current leakage rate measurements.

In addition to the major losing stream segments on Baynham Branch downstream of Lime Kiln Road there are other significant losing segments upstream of Lime Kiln Road. While dyes introduced in two of these losing stream segments were detected in Baynham Branch downstream of Lime Kiln Road, there are no data to show that part of this sinking flow does not bypass the portion of Baynham Branch downstream of Lime Kiln Road. Such bypassing groundwater could discharge from the HFS complex or at other unidentified points. Additionally, Baynham Branch downstream of Lime Kiln Road has perennial flow, but discharge from the HFP Spring Lake is sometimes zero. This indicates the existence of substantial Spring Lake leakage and/or underflow beneath the lake.

MAWC Dye Tracing

Dye tracing conducted by the OUL in the fall of 2020 demonstrated that massive leakage would occur from the planned Baynham Branch impoundment. This leakage occurred in losing stream reaches of Baynham Branch, where water was lost to the subsurface in the proposed reservoir basin upstream of MAWC's planned dam site and discharged at the HFP Springs complex. The study report was shared with executives of MAWC in early 2021. In the spring of 2021, MAWC obtained access to properties within the planned reservoir basin through temporary condemnation to conduct their own geophysical and hydrological investigations. As part of these investigations, MAWC consultants conducted additional dye tracing in the basin.

Throughout 2021 the OUL periodically monitored a select number of relevant spring and stream sampling locations used in our fall 2020 tracer study. In the late summer of 2021, the OUL was notified that MAWC's consultants planned to conduct a dye trace. In early October of 2021, the OUL began monitoring dye sampling locations every other week to detect dyes introduced by MAWC's consultants. Table 2 and Figure 5 show dye sampling locations monitored by the OUL in late 2021. Appendix A contains all 2021 data from the OUL.

Dye Introduction 1. Fluorescein dye introduced into Baynham Branch at a location upstream of Lime Kiln Road.

This dye introduction was apparently made between October 6 and October 21, 2021. The actual location and amount of dye used is not known to the OUL. Fluorescein was detected at all OUL stations on Baynham Branch from Station 108 just upstream of Lime Kiln Road downstream to Station 113 at the railroad bridge. The largest detections at all stations were in samples in place for the period from October 21 to November 10, 2021. Fluorescein was detected at all three sampling points in the HFP Springs complex (Station 114 – 116). No fluorescein was detected at Station 121 in Carver Branch downstream of Lime Kiln Road. This trace verified the OUL Trace 20-03 with fluorescein that was introduced into Baynham Branch a short distance downstream of Lime Kiln Road.

Table 2. Dye sampling station locations monitored in the fall and winter of 2021.

Station	Station Location	Northing	Easting	Approx. Elevation
108	Baynham Br. u/s Lime Kiln Road	36.96260	-94.38515	976
109	Parks Spring #1	36.96054	-94.38768	970
110	Parks Spring #2	36.95975	-94.38865	965
111	Baynham Br. u/s dam site 1	36.95861	-94.39227	958
112	Baynham Br. u/s dam site 3	36.95829	-94.39545	954
113	Baynham Br. @ RR bridge	36.95970	-94.40460	945
114	HFP Spring Branch @ RR bridge	36.96702	-94.40651	945
115	Spring flow up-gradient of HFP Spring Lake	36.96585	-94.40316	948
116	HFP Spring Lake outflow	36.96698	-94.40554	945
121	Carver Branch d/s Lime Kiln Road	36.97542	-94.39377	975
123	Baynham Br. u/s dam site 2	36.95800	-94.39488	955

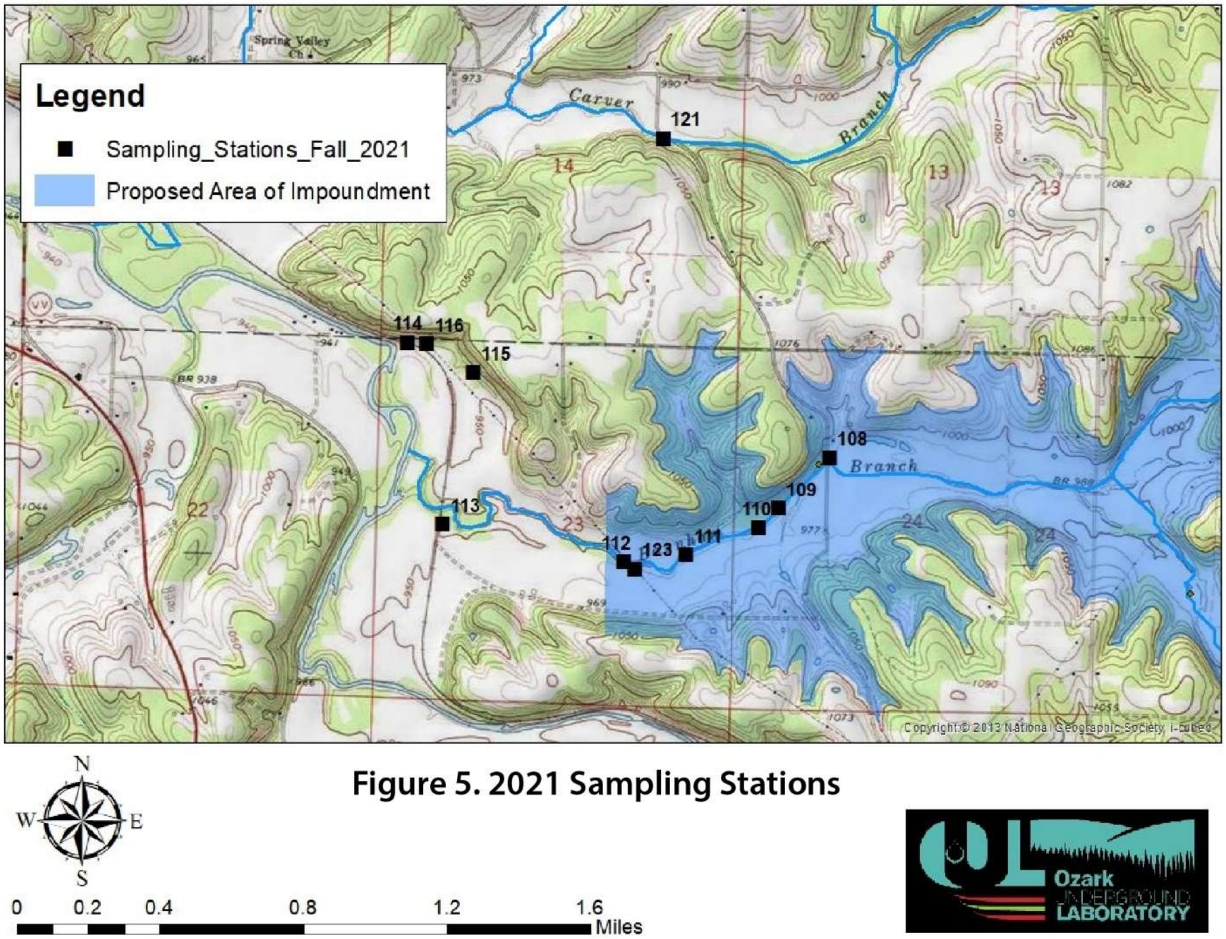

Figure 5. Baynham Branch dye sampling stations monitored in the fall and winter of 2021.

Dye Introduction 2. Eosine dye introduced into Baynham Branch at a location downstream of all of the OUL dam site sampling stations (Stations 111, 112, and 123) but upstream of the railroad bridge on Baynham Branch (Station 113).

This dye introduction was apparently made between November 10 and December 1, 2021. The actual location and amount of dye used is not known to the OUL. The dye introduction point was farther downstream in Baynham Branch than any of the OUL dye introductions. The only OUL detection of this dye in Baynham Branch sampling stations was at Station 113 at the railroad bridge. The eosine was detected at all HFP Springs sampling points (Stations 114 - 116). The largest detection in the HFP Spring was in the spring flow upgradient of the HFP Spring Lake at Station 115.

A small detection (0.605 ppb) was observed at Station 121 in Carver Branch downstream of Lime Kiln Road in a sampler in place for the period of October 21 to November 10. The detection in this sample was observed before MAWC introduced eosine into Baynham Branch. This dye most likely is residual from OUL Trace 20-04 where 3 pounds of eosine dye mixture was introduce into Carver Branch upstream of this sampling point.

Dye Introduction 3. Sulforhodamine B dye introduced into Carver Branch at a location upstream of Lime Kiln Road.

This dye introduction was apparently made between November 10 and December 1, 2021. The actual location and amount of dye used is not known to the OUL. The only detection site was OUL Station 121 in Carver Branch downstream of Lime Kiln Road. This trace replicated OUL Trace 20-04 that showed that Carver Branch does not contribute water to any of the springs in the HFP Springs complex.

OUL Data from MAWC Dye Traces

Appendix A includes all OUL results from the MAWC dye introductions. All dye concentrations are based on the as-sold dye mixtures normally used by the OUL. All of these dye mixtures have approximately 75% dye equivalents. The OUL methods were outlined in our report of December 29, 2020 to which this is an addendum.

Conclusion

The OUL has demonstrated with dye tracing and flow rate measurements that massive leakage will occur from the planned Baynham Branch reservoir. Dye tracing conducted by consultants for MAWC has verified the OUL work. The plan for a dam on Baynham Branch is plagued by multiple technical flaws as demonstrated in our report of December 29, 2020. Data in this addendum provides measurements of the magnitude of leakage out of the planned reservoir site. Collecting such basic hydrologic data should have been a major component of a prudent investigation by MAWC. In the absence of such an effort by MAWC, and with authorization from our client, this information is being supplied to state and federal agencies that will be involved in reviewing plans for this poorly conceived project.

The hydrologic reality is that the Baynham Branch basin leaks massive amounts of water at rates up to almost 50 million gallons per day as shown by flow rate measurements. Increasing the depth of water over leakage zones with the planned hundred foot high dam will vastly increase the hydraulic head and resulting leakage rates. Foundation treatments at the planned dam will not solve the basin leakage problem. Joplin water users may well need an additional 30 million gallons of water per day. If so, Joplin needs a dependable water supply. Putting a dam on a stream basin that is already capable, under natural conditions, of leaking about 50 million gallons per day will not supply Joplin's needs. Missouri American Water Company's planned big water supply reservoir in Baynham Branch is a mirage.

References

Aley, Thomas and David Woods. 2020. Evaluation of a selected site for a proposed Joplin water supply reservoir on Baynham Branch. Ozark Underground Laboratory contract report to Glenn Brown. 55p. plus appendixes. Copies available from Contact@ozarkundergroundlab.com.

Aley, Thomas and David Woods. 2021. Evaluation of a selected site for a proposed Joplin water supply reservoir on Baynham Branch; Addendum 1 to December 29, 2020 Report. Ozark Underground Laboratory contract report to Glenn Brown. 14p. Copies available from: Contact@ozarkundergroundlab.com

Appendix A

Summary of OUL Dye Sampling Results from MAWC Dye Introductions.

Table 1. Results for charcoal samplers analyzed for the presence of fluorescein, eosine, rhodamine WT (RWT) and sulforhodamine B (SRB) dyes.

Peak wavelengths are reported in nanometers (nm); dye concentrations are reported in parts per billion (ppb).

OUL Number	Station Number	Station Name	Date/Time Placed	Date/Time Collected	Fluorescein		Eosine		RWT		SRB	
					Peak (nm)	Conc (ppb)	Peak (nm)	Conc (ppb)	Peak (nm)	Conc (ppb)	Peak (nm)	Conc (ppb)
F4522	**108**	**Baynham Br. u/s Lime Kiln Rd**	**10/6/21 1645**	**10/21/21 1435**	**ND**		**ND**		**ND**		**ND**	
F4906	108	Baynham Br. u/s Lime Kiln Rd	10/21/21 1435	11/10/21 1035	515.2	330	ND		ND		ND	
F5084	108	Baynham Br. u/s Lime Kiln Rd	11/10/21 1035	12/1/21 0905	515.2	17.2	ND		ND		ND	
F5519	108	Baynham Br. u/s Lime Kiln Rd	12/1/21 0905	1/5/22 0909	515.6	3.62	ND		ND		ND	
F4908	**109**	**Parks Spring #1**	**10/21/21 1207**	**11/10/21 1132**	**516.1**	**560**	**ND**		**ND**		**ND**	
F5086	109	Parks Spring #1	11/10/21 1132	12/1/21 0929	514.7	7.79	ND		ND		ND	
F5522	109	Parks Spring #1	12/1/21 0929	1/5/22 0926	515.7	2.68	ND		ND		ND	
F4528	**110**	**Parks Spring #2 (downstream)**	**12/21/20 0853**	**10/21/21 1200**	**ND**		**539.4**	**3.26**	**ND**		**ND**	
F4909	110	Parks Spring #2	10/21/21 1200	11/10/21 1123	515.1	290	ND		ND		ND	
F5087	110	Parks Spring #2	11/10/21 1123	12/1/21 0933	514.8	15.6	ND		ND		ND	
F5523	110	Parks Spring #2	12/1/21 0933	1/5/22 0921	515.4	1.73	ND		ND		ND	
F4530	**111**	**Baynham Br. u/s dam site 1**	**12/21/20 0908**	**10/21/21 1236**	**ND**		**539.4**	**1.12**	**ND**		**ND**	
F4910	111	Baynham Br. u/s dam site 1	10/21/21 1236	11/10/21 1151	515.1	181	ND		ND		ND	
F5088	111	Baynham Br. u/s dam site 1	11/10/21 1151	12/1/21 0942	514.4	3.50	ND		ND		ND	
F5524	111	Baynham Br. u/s dam site 1	12/1/21 0942	1/5/22 0935	515.8	0.889	ND		ND		ND	
F4912	**112**	**Baynham Br. u/s dam site 3**	**10/21/21 1400**	**11/10/21 1244**	**515.1**	**281**	**ND**		**ND**		**ND**	
F5090	112	Baynham Br. u/s dam site 3	11/10/21 1244	12/1/21 0950	515.2	10.8	ND		ND		ND	
F5526	112	Baynham Br. u/s dam site 3	12/1/21 0950	1/5/22 0944	515.9	2.47	ND		ND		ND	
F4523	**113**	**Baynham Br. @ RR Bridge**	**10/6/21 1656**	**10/21/21 1122**	**ND**		**ND**		**ND**		**ND**	
F4907	113	Baynham Br. @ RR Bridge	10/21/21 1122	11/10/21 1053	515.3	334	ND		ND		ND	
F5085	113	Baynham Br. @ RR Bridge	11/10/21 1053	12/1/21 0917	ND		541.0	131	ND		ND	
F5521	113	Baynham Br. @ RR Bridge	12/1/21 0917	1/5/22 1006	514.2	0.604	541.5	9.19	ND		ND	
F4524	**114**	**Hunley spring br @ RR Bridge**	**10/6/21 1611**	**10/21/21 1022**	**ND**		**ND**		**ND**		**ND**	
F4904	114	Hunley spring br @ RR Bridge	10/21/21 1022	11/10/21 0955	515.1	38.3	ND		ND		ND	
F5082	114	Hunley spring br @ RR Bridge	11/10/21 0955	12/1/21 0840	518.0	1.07	540.7	6.41	ND		ND	
F5517	114	Hunley spring br @ RR Bridge	12/1/21 0840	1/5/22 0830	ND		540.0	1.65	ND		ND	
F4525	**115**	**Spring flow U/G Hunley spring lake**	**10/6/21 1625**	**10/21/21 1013**	**ND**		**ND**		**ND**		**ND**	
F4905	115	Spring flow U/G Hunley spring lake	10/21/21 1013	11/10/21 1014	515.2	3.78	ND		ND		ND	
F5083	115	Spring flow U/G of Hunley spring lake	11/10/21 1014	12/1/21 0852	ND		540.6	67.7	ND		ND	
F5518	115	Spring flow U/G of Hunley spring lake	12/1/21 0852	1/5/22 0850	515.4 *	0.529	ND		ND		ND	
F4526	**116**	**Hunley spring lake outflow**	**10/6/21 1605**	**10/21/21 0954**	**ND**		**ND**		**ND**		**ND**	
F4903	116	Hunley spring lake outflow	10/21/21 0954	11/10/21 0938	515.1	41.5	ND		ND		ND	
F5081	116	Hunley spring lake outflow	11/10/21 0938	12/1/21 0938	515.4 **	1.17	541.0	5.51	ND		ND	
F5516	116	Hunley spring lake outflow	12/1/21 0938	1/5/22 0840	ND		538.6 **	1.02	ND		ND	

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Peak wavelengths are reported in nanometers (nm); dye concentrations are reported in parts per billion (ppb).

OUL Number	Station Number	Station Name	Date/Time Placed	Date/Time Collected	Fluorescein		Eosine		RWT		SRB	
					Peak (nm)	Conc (ppb)	Peak (nm)	Conc (ppb)	Peak (nm)	Conc (ppb)	Peak (nm)	Conc (ppb)
F4527	**121**	**Carver Branch d/s Lime Kiln Rd**	**10/6/21 1707**	**10/21/21 0902**	**ND**		**ND**		**ND**		**ND**	
F4901	121	Carver Branch d/s Lime Kiln Rd	10/21/21 0902	11/10/21 0852	ND		540.0	0.605	ND		ND	
F5078	121	Carver Branch d/s Lime Kiln Rd	11/10/21 0852	12/1/21 0814	ND		ND		ND		579.5	979
F5514	121	Carver Branch d/s Lime Kiln Rd	12/1/21 0814	1/5/22 0805	ND		ND		ND		579.1	178
F4529	**123**	**Baynham Br. u/s dam site 2**	**12/21/20 0911**	**10/21/21 1304**	**ND**		**539.4**	**1.09**	**ND**		**ND**	
F4911	123	Baynham Br. u/s dam site 2	10/21/21 1304	11/10/21 1215	515.2	339	ND		ND		ND	
F5089	123	Baynham Br. u/s dam site 2	11/10/21 1215	12/1/21 0948	514.6	9.19	ND		ND		ND	
F5525	123	Baynham Br. u/s dam site 2	12/1/21 0948	1/5/22 0940	515.4	2.35	ND		ND		ND	
F4902	**130**	**Valley House Well**	**10/21/21 0930**	**11/10/21 0915**	**ND**		**ND**		**ND**		**ND**	
F5079	130	Valley House Well	11/10/21 0915	12/1/21 0828	ND		ND		ND		ND	
F5515	130	Valley House Well	12/1/21 0828	1/5/22 0819	ND		ND		ND		ND	

Table 2. Results for water samples analyzed for the presence of fluorescein, eosine, rhodamine WT (RWT) and sulforhodamine B (SRB) dyes.

Peak wavelengths are reported in nanometers (nm); dye concentrations are reported in parts per billion (ppb).

OUL Number	Station Number	Station Name	Date/Time Collected	Fluorescein		Eosine		RWT		SRB	
				Peak (nm)	Conc (ppb)	Peak (nm)	Conc (ppb)	Peak (nm)	Conc (ppb)	Peak (nm)	Conc (ppb)
F4929	**108**	**Baynham Br. u/s Lime Kiln Rd**	**11/10/21 1035**	**508.5**	**0.090**	**ND**		**ND**		**ND**	
F5095	108	Baynham Br. u/s Lime Kiln Rd	12/1/21 0905	504.4 (1)	0.018	ND		ND		ND	
F5530	108	Baynham Br. u/s Lime Kiln Rd	1/5/22 0909	ND		ND		ND		ND	
F4931	**109**	**Parks Spring #1**	**11/10/21 1132**	**507.3**	**0.057**	**ND**		**ND**		**ND**	
F5097	109	Parks Spring #1	12/1/21 0929	ND		ND		ND		ND	
F5532	109	Parks Spring #1	1/5/22 0926	ND		ND		ND		ND	
F4932	**110**	**Parks Spring #2**	**11/10/21 1123**	**507.1**	**0.059**	**ND**		**ND**		**ND**	
F5098	110	Parks Spring #2	12/1/21 0933	ND		ND		ND		ND	
F5533	110	Parks Spring #2	1/5/22 0921	ND		ND		ND		ND	
F4933	**111**	**Baynham Br. u/s dam site 1**	**11/10/21 1151**	**507.3**	**0.056**	**ND**		**ND**		**ND**	
F5099	111	Baynham Br. u/s dam site 1	12/1/21 0942	ND		ND		ND		ND	
F5534	111	Baynham Br. u/s dam site 1	1/5/22 0935	ND		ND		ND		ND	
F4935	**112**	**Baynham Br. u/s dam site 3**	**11/10/21 1244**	**507.5**	**0.053**	**ND**		**ND**		**ND**	
F5102	112	Baynham Br. u/s dam site 3	12/1/21 0950	ND		ND		ND		ND	
F5536	112	Baynham Br. u/s dam site 3	1/5/22 0944	ND		ND		ND		ND	
F4930	**113**	**Baynham Br. @ RR Bridge**	**11/10/21 1053**	**506.4**	**0.028**	**ND**		**ND**		**ND**	
F5096	113	Baynham Br. @ RR Bridge	12/1/21 0917	ND		536.0 (1)	0.092	ND		ND	
F5531	113	Baynham Br. @ RR Bridge	1/5/22 1006	ND		ND		ND		ND	
F4927	**114**	**Hunley spring br @ RR Bridge**	**11/10/21 0955**	**ND**		**ND**		**ND**		**ND**	
F5093	114	Hunley spring br @ RR Bridge	12/1/21 0840	ND		ND		ND		ND	
F5529	114	Hunley spring br @ RR Bridge	1/5/22 0830	ND		ND		ND		ND	
F4928	**115**	**Spring flow U/G Hunley spring lake**	**11/10/21 1014**	**507.0**	**0.023**	**ND**		**ND**		**ND**	
F5094	115	Spring flow U/G of Hunley spr lake	12/1/21 0852	ND		ND		ND		ND	
F4926	**116**	**Hunley spring lake outflow**	**11/10/21 0938**	**ND**		**ND**		**ND**		**ND**	
F5092	116	Hunley spring lake outflow	12/1/21 0938	ND		ND		ND		ND	
F5528	116	Hunley spring lake outflow	1/5/22 0840	ND		ND		ND		ND	
F5091	**121**	**Carver Br. d/s Lime Kiln Rd**	**12/1/21 0814**	**ND**		**ND**		**ND**		**581.4**	**1.64**
F5527	121	Carver Br. d/s Lime Kiln Rd	1/5/22 0805	ND		ND		ND		583.2 (1)	0.113
F4934	**123**	**Baynham Br. u/s dam site 2**	**11/10/21 1215**	**507.2**	**0.050**	**ND**		**ND**		**ND**	
F5101	123	Baynham Br. u/s dam site 2	12/1/21 0948	ND		ND		ND		ND	
F5535	123	Baynham Br. u/s dam site 2	1/5/22 0940	ND		ND		ND		ND	
F4925	**130**	**Valley House Well**	**11/10/21 0915**	**ND**		**ND**		**ND**		**ND**	
F4936	**131**	**D/S Baynham Br, visual sample**	**11/10/21 1233**	**507.1**	**0.049**	**ND**		**ND**		**ND**	