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REPORT

NOV 26 2000

Allied Paper, Inc. Operable Unit

Biota and Surface Water Investigations and Wetlands Assessment

Technical Memorandum 11

Volume 2 of 3

Allied Paper, Inc./Portage Creek/
Kalamazoo River Superfund Site
Remedial Investigation/Feasibility Study
Kalamazoo, MI

May 2000

BBL
BLASLAND, BOUCK & LEE, INC.
engineers & scientists

TECHNICAL REPORT

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Biota and Surface Water Investigations and Wetlands Assessment

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Appendix A

Surface Water Flow Data and Evaluations

BLASLAND, BOUCK & LEE, INC.
engineers & scientists

Documentation for Selection of Target Flows for Portage Creek Sampling

BLASLAND, BOUCK & LEE, INC.
engineers & scientists

→ File 645.51
copy to MPB

LTI-Limno-Tech, Inc.
Memorandum

TO:	Mark P. Brown	DATE:	09/08/93
copies to:	Charles R. Barnes	PROJECT:	KZRV1
	Scott T. Saroff		
	Richard P. DiFiore		
FROM:	Timothy J. Feist		
	Gregory W. Peterson		
SUBJECT:	Target flows for Portage Creek Sampling		

RECEIVED
SEP 13

LTI reviewed the August 25, 1993 letter from Mark Brown of Blasland & Bouck Engineers (B&B) concerning the Allied Paper OU Focused Feasibility Study surface water sampling task. The letter outlined target flow levels for event flow and base flow sampling and specified recommended recovery intervals between storms. The target flows and recovery intervals are to be used as guidelines for sampling high flow storm events and low flow base flows. Based upon our independent review of the historical flow at Reed Street LTI respectfully questions whether the proposed target flows will be representative and the most appropriate targets. This memorandum summarizes our concerns and presents recommendations for alternative target flows.

Summary of Concerns:

We have the following concerns about the proposed target flows:

- The proposed flows are based upon an upstream gage that does not factor in flows from a significant tributary upstream of the sampling site, underestimating the storm event target flow. Since flows will be monitored at the sampling site, we believe that it is more appropriate to establish the targets based upon the Reed Street gage data, as these data are more representative of the site flows.
- Using a 90% exceedence flow as a target for base flow sampling may not allow the regularly scheduled sampling program that was originally proposed, and may not result in the 6 to 8 sampling surveys originally proposed.
- Until a stage rating curve is established for Portage Creek at the Allied OU site there will be high uncertainty associated with estimating flows needed for mobilizing sampling teams.
- We are concerned that there will not be sufficient time to conduct the specified number of base flow and storm event flow surveys due to variability of flows at this time of the year.

Summary of Recommendations:

In light of these concerns and based upon our review of the data, we propose the following modification:

For storm event sampling:

- Portage Creek flows above 75 cfs at the Allied OU should be considered as the target flow for storm event sampling.

- That a survey will be considered successful if at least 3 sampling circuits are conducted at flows above 75 cfs, with no more than 3 circuits being conducted on the receding hydrograph at flows less than 75 cfs.
- Sampling circuits will be separated by a 4-hour interval to prevent contamination of the next circuit's samples from sediments resuspended during sampling activities.
- Storm event surveys will be separated by a minimum of 7 days.
- LTI proposes to begin monitoring and possibly sampling storm events as soon as possible to maximize the likelihood of capturing 3 storm events that meet the specified criteria.

For base flow sampling:

- Portage Creek flows less than approximately 40 cfs should be considered as the target flow base flow sampling.
- Surveys should not be scheduled but instead be conducted when specified low flow conditions are met. This approach should maximize the probability of meeting the specified goal of 6 to 8 base flow surveys between mid-August and mid-December;

Discussion:

Blasland & Bouck conducted its flow analysis of Portage Creek based upon the USGS Portage Creek near Kalamazoo gage (04106300). This gage is located at Lover's Lane, just upstream of the confluence of Portage Creek and the West Fork of Portage Creek. The confluence is upstream of the sampling sites at the Allied OU. As the West Fork has flows ranging from 1.1 to 93.0 cfs and a daily average of 8.9 cfs, an analysis that does not include these flows will tend to underestimate the target flows at the Allied OU. This is supported by results from the first base flow survey, which was conducted before the target guidelines were proposed. While it had not rained for several days, Portage Creek discharge at the Allied OU site was 55 cfs, which is the trigger flow proposed for the storm event surveys.

LTI conducted a partial flow analysis of Portage Creek for other work on the Allied site, and completed the analysis for this investigation. We used the available data from the Reed Street USGS gage (Portage Creek at Kalamazoo, 04106500) located immediately downstream of the Allied OU, which only had data through 1985. However, by statistically comparing the available data to combined data from upstream stations on both Portage Creek and the West Fork Portage Creek a linear regression was calculated ($r^2 = 0.92$, $p < 0.01$) and used to synthesize data for 1986-1990.

Storm Flow Sampling:

The results of this analysis show that the 10 percent exceedence flow is 75 cfs, and LTI proposes that this flow be used as a target for storm event surveys. An analysis of rainfall indicates that a 1.4-inch rain in 24 hours will ensure flows greater than 75 cfs. LTI proposes to mobilize for storm event surveys within 6 hours of one of the following criteria:

- Portage Creek flow exceeding 75 cfs;
- the prediction of imminent heavy rainfall with Portage Creek flow approaching 75 cfs;
- rainfall approaching 1.4 inches within a 24-hour period; and

- any flow event where Portage Creek discharge at the Allied OU site increases 15 cfs from pre-storm conditions within a 24-hour period.

For safety purposes the first set of samples will not be taken until dawn if the 6-hour period is during the night. LTI proposes that at least 3 of the 6-8 sampling circuits be conducted during flows above 75 cfs as a criteria for a survey to be considered successful, and that no more than 3 circuits would be conducted at lower discharges as the Creek level recedes. We agree that a 7 day separation between sampling periods should ensure that separate storm events are being sampled.

LTI proposes the following guidelines to reduce the possibility of collecting samples contaminated by sediments suspended from activities of the previous sampling circuit. Sampling will first be conducted at the downstream site during each circuit, and sampling circuits will be separated by a 4-hour interval to allow any sediments resuspended during sampling activities to settle or be flushed past the most downstream site.

LTI proposes to begin monitoring and possibly sampling storm events on September 13, 1993 two weeks before the originally scheduled September 27, 1993 start date. With the limited time available in the schedule we feel that the extra period may increase the likelihood of obtaining samples from 3 storm events that meet the above criteria. Even with the longer schedule it may not be possible to obtain 3 storm events with extended flows over 75 cfs during this period. This is demonstrated by Figure 1, a partially synthesized record of flows from the last 10 years at the Reed Street gage. This data also suggests that Portage Creek has become "flashier" in recent years, with much sharper peaks of storm flows. This may also make it more difficult to obtain 3 or more samples per storm event at flows greater than 75 cfs.

Base Flow Sampling:

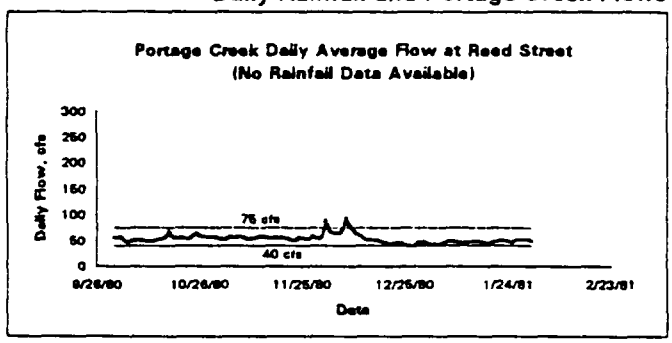
Based upon the actual and synthesized Reed Street gage records LTI proposes the following changes to the proposed base flow sampling criteria. The Reed Street gage records show a 90 percent exceedence flow of approximately 37 cfs and an 80 percent exceedence flow of 40 cfs (Figure C-7, line E-E). With these criteria as guidelines, and based upon an examination of Figure 1, the proposed regular, once per 2 weeks sampling schedule may not be suitable for gathering base flow samples, and it also may not be possible to obtain 6-8 surveys during the September to December time period. An examination of Figure 1 shows that flows below 40 cfs are sporadic and did not occur after October 1 in some years. It may be necessary for LTI to mobilize for base flow surveys in the same manner as storm surveys. LTI proposes to mobilize for base flow surveys under the following criteria:

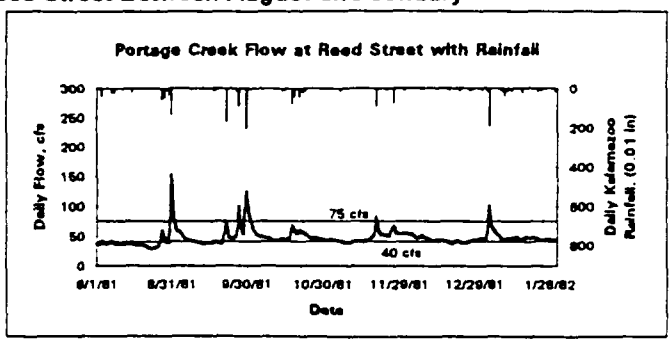
- at least 7 days since the previous base flow survey,
- no significant rainfall for 5 days,
- Portage Creek flow from the previous day of less than or equal to 40 cfs as determined from a stage rating curve from the Alcott Street gage or as estimated at the Alcott Street sampling site, and
- a stable or decreasing trend in Portage Creek flows as estimated from the above gages.

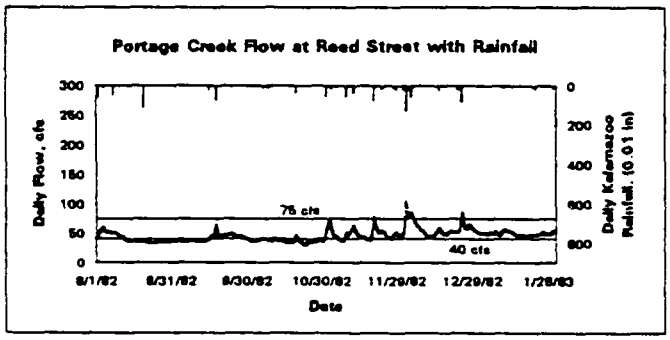
The above criteria will require more monitoring effort from LTI than originally proposed. LTI will need to establish a stage rating curve at the Alcott Street site as soon as possible so target sampling flows can be better estimated. LTI will also need to monitor Portage Creek gage readings on a frequent basis so it can be determined when target criteria are met.

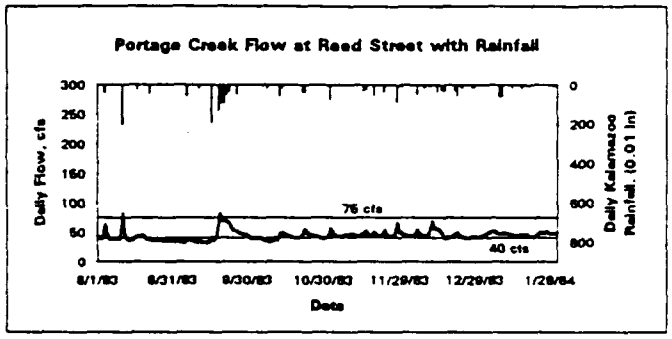
FIGURE 1

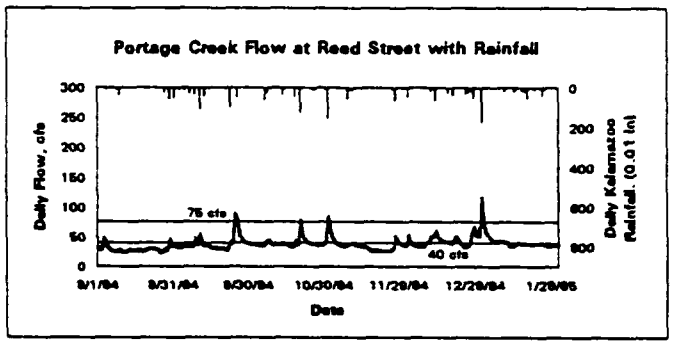
Daily Rainfall and Portage Creek Flows at Reed Street Between August and January

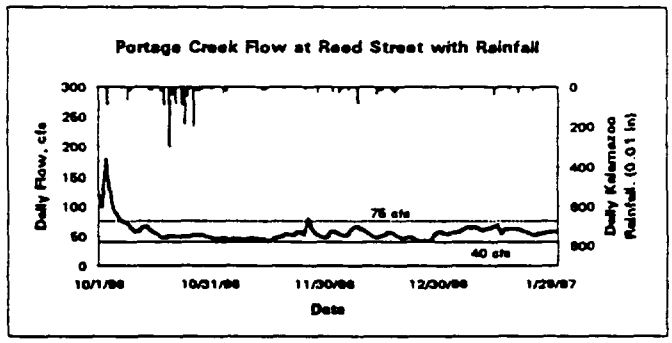


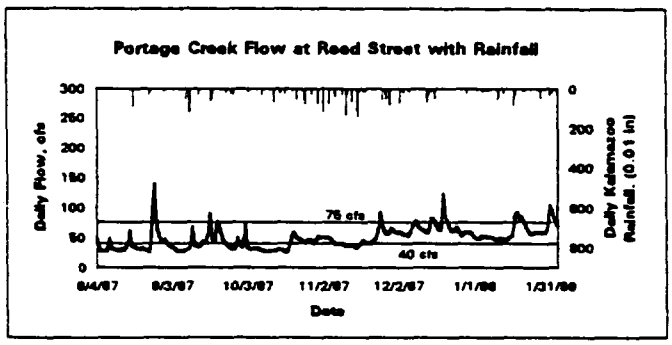


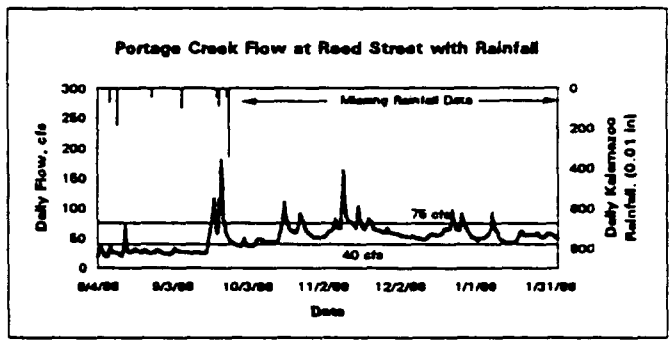


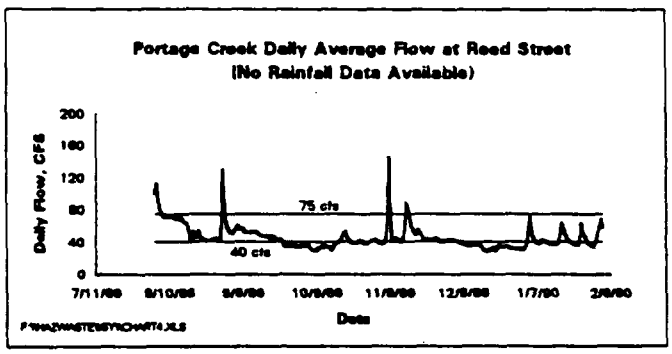


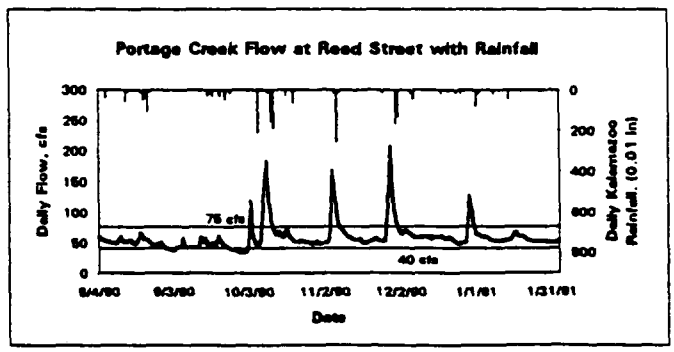












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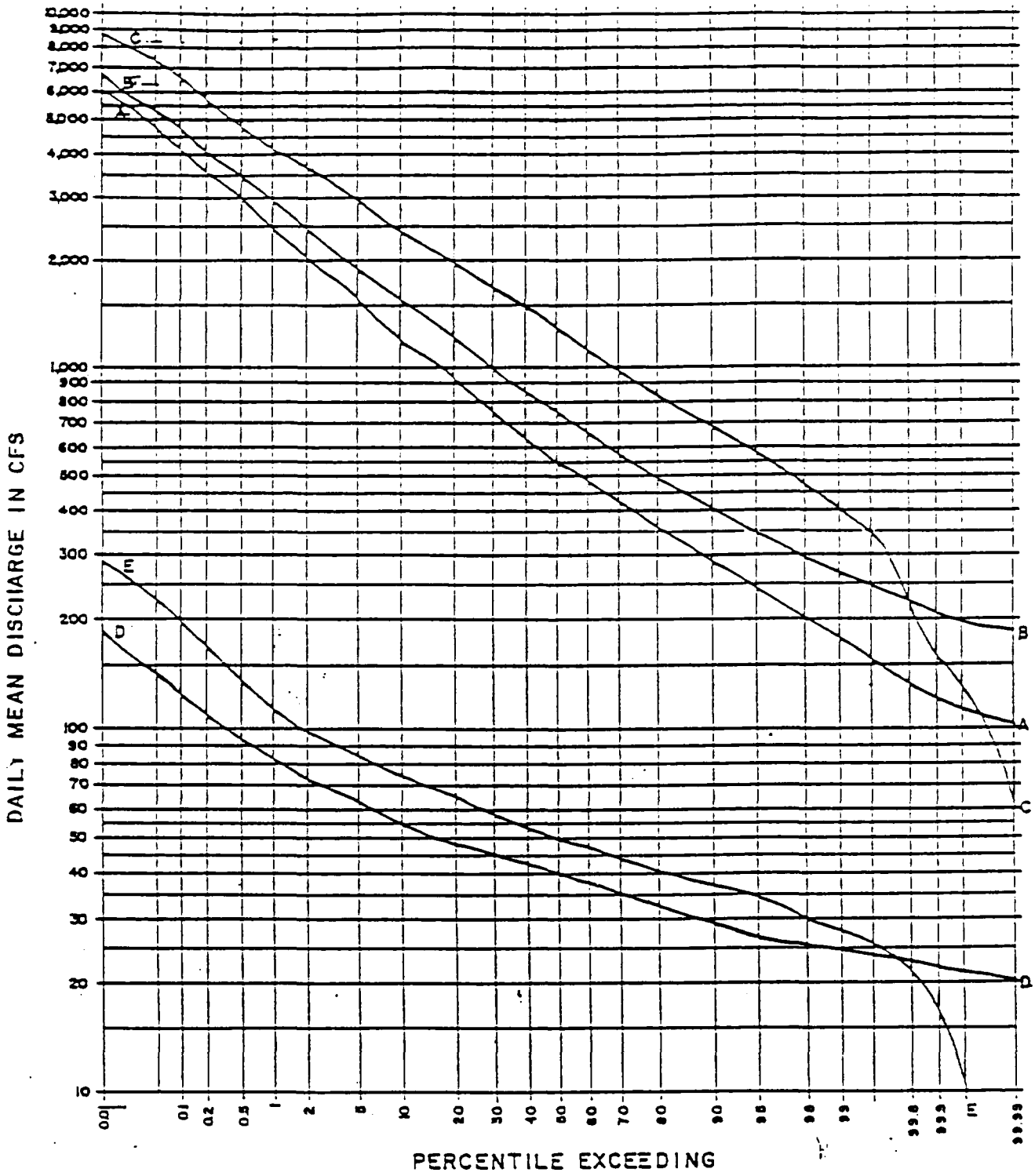

Note: Data provided by US Geological Survey, Lansing, Michigan

LEGEND:

A-A KALAMAZOO BATTLE CREEK
B-B KALAMAZOO COMSTOCK
C-C KALAMAZOO . FENNVILLE
D-D PORTAGE CREEK NEAR KALAMAZOO
E-E PORTAGE CREEK AT KALAMAZOO

04/93 DS4-OJH
64501SAR/64501101.CDR

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & SCIENTISTS

ALLIED PAPER, INC./PORTAGE CREEK/
KALAMAZOO RIVER SUPERFUND SITE
DESCRIPTION OF THE CURRENT
SITUATION ADDENDUM

FLOW DURATION CURVES

FIGURE C-7

KB10205796

PORTAGE CREEK DAILY MEAN FLOW
Measured Flow
Reed Street (4106500)
1950-1959, 1975-1986

1950

Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)
01/01/1950	46	02/01/1950	51	03/01/1950	73	04/01/1950	111	05/01/1950	88	06/01/1950	70	07/01/1950	70	08/01/1950	62	09/01/1950	63	10/01/1950	60	11/01/1950	62	12/01/1950	62
01/02/1950	50	02/02/1950	51	03/02/1950	50	04/02/1950	90	05/02/1950	86	06/02/1950	133	07/02/1950	70	08/02/1950	63	09/02/1950	62	10/02/1950	62	11/02/1950	59	12/02/1950	67
01/03/1950	62	02/03/1950	48	03/03/1950	62	04/03/1950	105	05/03/1950	84	06/03/1950	194	07/03/1950	70	08/03/1950	59	09/03/1950	52	10/03/1950	63	11/03/1950	58	12/03/1950	67
01/04/1950	88	02/04/1950	48	03/04/1950	60	04/04/1950	176	05/04/1950	81	06/04/1950	117	07/04/1950	68	08/04/1950	60	09/04/1950	52	10/04/1950	62	11/04/1950	58	12/04/1950	70
01/05/1950	64	02/05/1950	46	03/05/1950	77	04/05/1950	114	05/05/1950	81	06/05/1950	102	07/05/1950	67	08/05/1950	59	09/05/1950	56	10/05/1950	62	11/05/1950	55	12/05/1950	72
01/06/1950	60	02/06/1950	46	03/06/1950	76	04/06/1950	90	05/06/1950	82	06/06/1950	88	07/06/1950	62	08/06/1950	55	09/06/1950	54	10/06/1950	61	11/06/1950	52	12/06/1950	62
01/07/1950	60	02/07/1950	46	03/07/1950	79	04/07/1950	80	05/07/1950	83	06/07/1950	76	07/07/1950	64	08/07/1950	56	09/07/1950	60	10/07/1950	61	11/07/1950	65	12/07/1950	81
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01/09/1950	51	02/09/1950	47	03/09/1950	82	04/09/1950	73	05/09/1950	77	06/09/1950	72	07/09/1950	62	08/09/1950	60	09/09/1950	57	10/09/1950	64	11/09/1950	69	12/09/1950	67
01/10/1950	67	02/10/1950	46	03/10/1950	74	04/10/1950	85	05/10/1950	77	06/10/1950	73	07/10/1950	59	08/10/1950	59	09/10/1950	57	10/10/1950	64	11/10/1950	66	12/10/1950	69
01/11/1950	49	02/11/1950	46	03/11/1950	73	04/11/1950	94	05/11/1950	74	06/11/1950	71	07/11/1950	59	08/11/1950	59	09/11/1950	62	10/11/1950	63	11/11/1950	60	12/11/1950	66
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01/13/1950	133	02/13/1950	72	03/13/1950	65	04/13/1950	89	05/13/1950	74	06/13/1950	83	07/13/1950	67	08/13/1950	52	09/13/1950	74	10/13/1950	63	11/13/1950	60	12/13/1950	66
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01/30/1950	48			03/30/1950	84	04/30/1950	86	05/30/1950	71	06/30/1950	68	07/30/1950	63	08/30/1950	60	09/30/1950	64	10/30/1950	58	11/30/1950	62	12/30/1950	57
01/31/1950	50			03/31/1950	85			05/31/1950	70			07/31/1950	65	08/31/1950	60			10/31/1950	61			12/31/1950	61

PORTAGE CREEK DAILY MEAN FLOW
Measured Flow
Reed Street (4106500)
1950-1959, 1975-1986

1951

Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)
01/01/1951	86	02/01/1951	63	03/01/1951	70	04/01/1951	75	05/01/1951	68	06/01/1951	89	07/01/1951	56	08/01/1951	62	09/01/1951	59	10/01/1951	63	11/01/1951	62	12/01/1951	74
01/02/1951	111	02/02/1951	56	03/02/1951	71	04/02/1951	78	05/02/1951	68	06/02/1951	66	07/02/1951	50	08/02/1951	62	09/02/1951	45	10/02/1951	63	11/02/1951	62	12/02/1951	59
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01/04/1951	117	02/04/1951	60	03/04/1951	76	04/04/1951	68	05/04/1951	63	06/04/1951	67	07/04/1951	49	08/04/1951	56	09/04/1951	50	10/04/1951	57	11/04/1951	52	12/04/1951	97
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01/06/1951	76	02/06/1951	62	03/06/1951	73	04/06/1951	66	05/06/1951	58	06/06/1951	68	07/06/1951	50	08/06/1951	64	09/06/1951	68	10/06/1951	98	11/06/1951	62	12/06/1951	77
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01/09/1951	59	02/09/1951	59	03/09/1951	66	04/09/1951	82	05/09/1951	61	06/09/1951	61	07/09/1951	80	08/09/1951	57	09/09/1951	45	10/09/1951	79	11/09/1951	68	12/09/1951	62
01/10/1951	66	02/10/1951	60	03/10/1951	67	04/10/1951	75	05/10/1951	97	06/10/1951	57	07/10/1951	61	08/10/1951	55	09/10/1951	91	10/10/1951	73	11/10/1951	63	12/10/1951	71
01/11/1951	63	02/11/1951	64	03/11/1951	57	04/11/1951	71	05/11/1951	93	06/11/1951	58	07/11/1951	61	08/11/1951	47	09/11/1951	71	10/11/1951	68	11/11/1951	63	12/11/1951	66
01/12/1951	57	02/12/1951	78	03/12/1951	64	04/12/1951	81	05/12/1951	79	06/12/1951	60	07/12/1951	65	08/12/1951	40	09/12/1951	68	10/12/1951	66	11/12/1951	90	12/12/1951	66
01/13/1951	57	02/13/1951	71	03/13/1951	69	04/13/1951	78	05/13/1951	68	06/13/1951	61	07/13/1951	61	08/13/1951	52	09/13/1951	68	10/13/1951	62	11/13/1951	114	12/13/1951	65
01/14/1951	60	02/14/1951	64	03/14/1951	80	04/14/1951	72	05/14/1951	70	06/14/1951	58	07/14/1951	57	08/14/1951	55	09/14/1951	64	10/14/1951	49	11/14/1951	126	12/14/1951	59
01/15/1951	60	02/15/1951	59	03/15/1951	79	04/15/1951	71	05/15/1951	68	06/15/1951	58	07/15/1951	48	08/15/1951	76	09/15/1951	58	10/15/1951	62	11/15/1951	97	12/15/1951	66
01/16/1951	66	02/16/1951	56	03/16/1951	76	04/16/1951	73	05/16/1951	64	06/16/1951	56	07/16/1951	56	08/16/1951	78	09/16/1951	49	10/16/1951	62	11/16/1951	82	12/16/1951	66
01/17/1951	66	02/17/1951	56	03/17/1951	79	04/17/1951	72	05/17/1951	67	06/17/1951	63	07/17/1951	50	08/17/1951	90	09/17/1951	57	10/17/1951	59	11/17/1951	72	12/17/1951	66
01/18/1951	68	02/18/1951	80	03/18/1951	68	04/18/1951	68	05/18/1951	67	06/18/1951	96	07/18/1951	51	08/18/1951	60	09/18/1951	55	10/18/1951	62	11/18/1951	59	12/18/1951	66
01/19/1951	69	02/19/1951	114	03/19/1951	68	04/19/1951	68	05/19/1951	65	06/19/1951	76	07/19/1951	54	08/19/1951	5	09/19/1951	54	10/19/1951	60	11/19/1951	72	12/19/1951	67
01/20/1951	77	02/20/1951	93	03/20/1951	66	04/20/1951	66	05/20/1951	60	06/20/1951	61	07/20/1951	54	08/20/1951	76	09/20/1951	57	10/20/1951	57	11/20/1951	68	12/20/1951	65
01/21/1951	60	02/21/1951	83	03/21/1951	65	04/21/1951	63	05/21/1951	63	06/21/1951	60	07/21/1951	90	08/21/1951	96	09/21/1951	55	10/21/1951	63	11/21/1951	65	12/21/1951	65
01/22/1951	60	02/22/1951	79	03/22/1951	65	04/22/1951	67	05/22/1951	60	06/22/1951	75	07/22/1951	272	08/22/1951	78	09/22/1951	63	10/22/1951	62	11/22/1951	75	12/22/1951	65
01/23/1951	60	02/23/1951	82	03/23/1951	65	04/23/1951	68	05/23/1951	62	06/23/1951	57	07/23/1951	131	08/23/1951	65	09/23/1951	57	10/23/1951	131	11/23/1951	82	12/23/1951	65
01/24/1951	60	02/24/1951	80	03/24/1951	63	04/24/1951	63	05/24/1951	64	06/24/1951	57	07/24/1951	113	08/24/1951	65	09/24/1951	57	10/24/1951	162	11/24/1951	73	12/24/1951	60
01/25/1951	62	02/25/1951	69	03/25/1951	63	04/25/1951	69	05/25/1951	55	06/25/1951	65	07/25/1951	88	08/25/1951	56	09/25/1951	56	10/25/1951	102	11/25/1951	74	12/25/1951	60
01/26/1951	62	02/26/1951	76	03/26/1951	65	04/26/1951	68	05/26/1951	61	06/26/1951	66	07/26/1951	80	08/26/1951	52	09/26/1951	73	10/26/1951	91	11/26/1951	78	12/26/1951	60
01/27/1951	62	02/27/1951	76	03/27/1951	63	04/27/1951	68	05/27/1951	60	06/27/1951	68	07/27/1951	67	08/27/1951	64	09/27/1951	78	10/27/1951	77	11/27/1951	73	12/27/1951	60
01/28/1951	53	02/28/1951	72	03/28/1951	68	04/28/1951	69	05/28/1951	63	06/28/1951	61	07/28/1951	60	08/28/1951	66	09/28/1951	65	10/28/1951	68	11/28/1951	76	12/28/1951	60
01/29/1951	52			03/29/1951	71	04/29/1951	79	05/29/1951	69	06/29/1951	58	07/29/1951	60	08/29/1951	62	09/29/1951	59	10/29/1951	68	11/29/1951	74	12/29/1951	60
01/30/1951	60			03/30/1951	77	04/30/1951	76	05/30/1951	59	06/30/1951	52	07/30/1951	66	08/30/1951	58	09/30/1951	52	10/30/1951	67	11/30/1951	74	12/30/1951	60
01/31/1951	59			03/31/1951	77			05/31/1951	55			07/31/1951	64	08/31/1951	59			10/31/1951	64			12/31/1951	91

PORTAGE CREEK DAILY MEAN FLOW
Measured Flow
Reed Street (4106500)
1950-1959, 1975-1986

1952

Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)
01/01/1952	97	02/01/1952	80	03/01/1952	66	04/01/1952	82	05/01/1952	70	06/01/1952	75	07/01/1952	67	08/01/1952	58	09/01/1952	56	10/01/1952	57	11/01/1952	51	12/01/1952	69
01/02/1952	85	02/02/1952	76	03/02/1952	65	04/02/1952	79	05/02/1952	66	06/02/1952	75	07/02/1952	65	08/02/1952	60	09/02/1952	65	10/02/1952	57	11/02/1952	60	12/02/1952	73
01/03/1952	78	02/03/1952	72	03/03/1952	76	04/03/1952	76	05/03/1952	60	06/03/1952	83	07/03/1952	64	08/03/1952	60	09/03/1952	60	10/03/1952	56	11/03/1952	61	12/03/1952	62
01/04/1952	72	02/04/1952	89	03/04/1952	76	04/04/1952	78	05/04/1952	60	06/04/1952	76	07/04/1952	18	08/04/1952	60	09/04/1952	62	10/04/1952	47	11/04/1952	58	12/04/1952	62
01/05/1952	78	02/05/1952	95	03/05/1952	72	04/05/1952	82	05/05/1952	72	06/05/1952	72	07/05/1952	68	08/05/1952	60	09/05/1952	61	10/05/1952	47	11/05/1952	59	12/05/1952	64
01/06/1952	63	02/06/1952	87	03/06/1952	73	04/06/1952	82	05/06/1952	68	06/06/1952	72	07/06/1952	36	08/06/1952	60	09/06/1952	55	10/06/1952	56	11/06/1952	58	12/06/1952	68
01/07/1952	66	02/07/1952	79	03/07/1952	68	04/07/1952	89	05/07/1952	66	06/07/1952	40	07/07/1952	66	08/07/1952	60	09/07/1952	62	10/07/1952	82	11/07/1952	58	12/07/1952	73
01/08/1952	71	02/08/1952	76	03/08/1952	65	04/08/1952	89	05/08/1952	73	06/08/1952	64	07/08/1952	81	08/08/1952	60	09/08/1952	64	10/08/1952	93	11/08/1952	51	12/08/1952	73
01/09/1952	71	02/09/1952	72	03/09/1952	70	04/09/1952	83	05/09/1952	76	06/09/1952	68	07/09/1952	77	08/09/1952	60	09/09/1952	59	10/09/1952	100	11/09/1952	57	12/09/1952	72
01/10/1952	72	02/10/1952	68	03/10/1952	79	04/10/1952	88	05/10/1952	72	06/10/1952	66	07/10/1952	76	08/10/1952	65	09/10/1952	61	10/10/1952	96	11/10/1952	61	12/10/1952	94
01/11/1952	76	02/11/1952	73	03/11/1952	101	04/11/1952	88	05/11/1952	67	06/11/1952	65	07/11/1952	76	08/11/1952	65	09/11/1952	60	10/11/1952	80	11/11/1952	62	12/11/1952	74
01/12/1952	70	02/12/1952	73	03/12/1952	88	04/12/1952	89	05/12/1952	70	06/12/1952	76	07/12/1952	74	08/12/1952	65	09/12/1952	60	10/12/1952	70	11/12/1952	57	12/12/1952	74
01/13/1952	65	02/13/1952	73	03/13/1952	85	04/13/1952	124	05/13/1952	71	06/13/1952	72	07/13/1952	72	08/13/1952	66	09/13/1952	60	10/13/1952	62	11/13/1952	62	12/13/1952	64
01/14/1952	77	02/14/1952	72	03/14/1952	77	04/14/1952	114	05/14/1952	68	06/14/1952	64	07/14/1952	71	08/14/1952	64	09/14/1952	50	10/14/1952	78	11/14/1952	61	12/14/1952	59
01/15/1952	118	02/15/1952	66	03/15/1952	74	04/15/1952	96	05/15/1952	80	06/15/1952	64	07/15/1952	72	08/15/1952	64	09/15/1952	56	10/15/1952	83	11/15/1952	57	12/15/1952	60
01/16/1952	97	02/16/1952	67	03/16/1952	74	04/16/1952	90	05/16/1952	74	06/16/1952	71	07/16/1952	71	08/16/1952	68	09/16/1952	56	10/16/1952	63	11/16/1952	56	12/16/1952	66
01/17/1952	100	02/17/1952	68	03/17/1952	79	04/17/1952	85	05/17/1952	74	06/17/1952	76	07/17/1952	71	08/17/1952	68	09/17/1952	58	10/17/1952	63	11/17/1952	69	12/17/1952	67
01/18/1952	112	02/18/1952	68	03/18/1952	78	04/18/1952	78	05/18/1952	66	06/18/1952	72	07/18/1952	72	08/18/1952	70	09/18/1952	57	10/18/1952	51	11/18/1952	51	12/18/1952	66
01/19/1952	113	02/19/1952	70	03/19/1952	128	04/19/1952	73	05/19/1952	74	06/19/1952	65	07/19/1952	124	08/19/1952	68	09/19/1952	56	10/19/1952	51	11/19/1952	72	12/19/1952	62
01/20/1952	100	02/20/1952	71	03/20/1952	97	04/20/1952	70	05/20/1952	86	06/20/1952	62	07/20/1952	66	08/20/1952	62	09/20/1952	52	10/20/1952	55	11/20/1952	70	12/20/1952	71
01/21/1952	84	02/21/1952	71	03/21/1952	90	04/21/1952	71	05/21/1952	86	06/21/1952	62	07/21/1952	66	08/21/1952	62	09/21/1952	52	10/21/1952	57	11/21/1952	65	12/21/1952	71
01/22/1952	76	02/22/1952	70	03/22/1952	78	04/22/1952	80	05/22/1952	88	06/22/1952	61	07/22/1952	86	08/22/1952	60	09/22/1952	62	10/22/1952	60	11/22/1952	80	12/22/1952	76
01/23/1952	76	02/23/1952	68	03/23/1952	78	04/23/1952	42	05/23/1952	195	06/23/1952	84	07/23/1952	102	08/23/1952	59	09/23/1952	67	10/23/1952	60	11/23/1952	72	12/23/1952	77
01/24/1952	77	02/24/1952	66	03/24/1952	85	04/24/1952	74	05/24/1952	195	06/24/1952	90	07/24/1952	77	08/24/1952	59	09/24/1952	62	10/24/1952	60	11/24/1952	78	12/24/1952	65
01/25/1952	78	02/25/1952	67	03/25/1952	77	04/25/1952	77	05/25/1952	157	06/25/1952	74	07/25/1952	77	08/25/1952	59	09/25/1952	60	10/25/1952	58	11/25/1952	78	12/25/1952	60
01/26/1952	77	02/26/1952	72	03/26/1952	78	04/26/1952	68	05/26/1952	119	06/26/1952	72	07/26/1952	67	08/26/1952	58	09/26/1952	60	10/26/1952	51	11/26/1952	76	12/26/1952	56
01/27/1952	76	02/27/1952	73	03/27/1952	76	04/27/1952	67	05/27/1952	96	06/27/1952	68	07/27/1952	67	08/27/1952	58	09/27/1952	57	10/27/1952	62	11/27/1952	70	12/27/1952	57
01/28/1952	72	02/28/1952	73	03/28/1952	73	04/28/1952	77	05/28/1952	102	06/28/1952	62	07/28/1952	67	08/28/1952	58	09/28/1952	49	10/28/1952	59	11/28/1952	70	12/28/1952	62
01/29/1952	72	02/29/1952	70	03/29/1952	71	04/29/1952	70	05/29/1952	86	06/29/1952	62	07/29/1952	61	08/29/1952	58	09/29/1952	62	10/29/1952	59	11/29/1952	70	12/29/1952	62
01/30/1952	66			03/30/1952	66	04/30/1952	71	05/30/1952	80	06/30/1952	68	07/30/1952	61	08/30/1952	50	09/30/1952	48	10/30/1952	58	11/30/1952	70	12/30/1952	62
01/31/1952	68			03/31/1952	74			05/31/1952	80			07/31/1952	56	08/31/1952	50			10/31/1952	58			12/31/1952	60

PORTAGE CREEK DAILY MEAN FLOW
Measured Flow
Reed Street (4106500)
1950-1959, 1975-1986

1953

Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)
01/01/1953	57	02/01/1953	63	03/01/1953	48	04/01/1953	62	05/01/1953	72	06/01/1953	52	07/01/1953	52	08/01/1953	45	09/01/1953	38	10/01/1953	35	11/01/1953	38	12/01/1953	45
01/02/1953	58	02/02/1953	59	03/02/1953	51	04/02/1953	63	05/02/1953	60	06/02/1953	47	07/02/1953	60	08/02/1953	61	09/02/1953	37	10/02/1953	37	11/02/1953	44	12/02/1953	46
01/03/1953	56	02/03/1953	59	03/03/1953	91	04/03/1953	56	05/03/1953	60	06/03/1953	48	07/03/1953	58	08/03/1953	56	09/03/1953	37	10/03/1953	38	11/03/1953	41	12/03/1953	48
01/04/1953	50	02/04/1953	59	03/04/1953	90	04/04/1953	56	05/04/1953	66	06/04/1953	50	07/04/1953	55	08/04/1953	57	09/04/1953	42	10/04/1953	38	11/04/1953	41	12/04/1953	49
01/05/1953	55	02/05/1953	59	03/05/1953	72	04/05/1953	54	05/05/1953	62	06/05/1953	51	07/05/1953	52	08/05/1953	52	09/05/1953	35	10/05/1953	47	11/05/1953	40	12/05/1953	50
01/06/1953	55	02/06/1953	65	03/06/1953	57	04/06/1953	52	05/06/1953	62	06/06/1953	53	07/06/1953	50	08/06/1953	48	09/06/1953	31	10/06/1953	51	11/06/1953	39	12/06/1953	50
01/07/1953	55	02/07/1953	57	03/07/1953	57	04/07/1953	57	05/07/1953	61	06/07/1953	53	07/07/1953	48	08/07/1953	46	09/07/1953	34	10/07/1953	12	11/07/1953	36	12/07/1953	57
01/08/1953	58	02/08/1953	57	03/08/1953	57	04/08/1953	60	05/08/1953	62	06/08/1953	55	07/08/1953	47	08/08/1953	51	09/08/1953	38	10/08/1953	18	11/08/1953	36	12/08/1953	45
01/09/1953	57	02/09/1953	61	03/09/1953	57	04/09/1953	62	05/09/1953	60	06/09/1953	55	07/09/1953	62	08/09/1953	52	09/09/1953	37	10/09/1953	42	11/09/1953	41	12/09/1953	46
01/10/1953	55	02/10/1953	61	03/10/1953	60	04/10/1953	59	05/10/1953	60	06/10/1953	51	07/10/1953	44	08/10/1953	52	09/10/1953	38	10/10/1953	46	11/10/1953	41	12/10/1953	46
01/11/1953	55	02/11/1953	61	03/11/1953	60	04/11/1953	59	05/11/1953	73	06/11/1953	50	07/11/1953	44	08/11/1953	52	09/11/1953	38	10/11/1953	46	11/11/1953	41	12/11/1953	46
01/12/1953	55	02/12/1953	61	03/12/1953	65	04/12/1953	55	05/12/1953	69	06/12/1953	49	07/12/1953	45	08/12/1953	54	09/12/1953	42	10/12/1953	66	11/12/1953	41	12/12/1953	39
01/13/1953	63	02/13/1953	61	03/13/1953	72	04/13/1953	61	05/13/1953	63	06/13/1953	42	07/13/1953	47	08/13/1953	52	09/13/1953	30	10/13/1953	38	11/13/1953	41	12/13/1953	39
01/14/1953	66	02/14/1953	52	03/14/1953	80	04/14/1953	56	05/14/1953	58	06/14/1953	42	07/14/1953	44	08/14/1953	45	09/14/1953	43	10/14/1953	38	11/14/1953	37	12/14/1953	47
01/15/1953	68	02/15/1953	53	03/15/1953	86	04/15/1953	61	05/15/1953	58	06/15/1953	47	07/15/1953	43	08/15/1953	40	09/15/1953	38	10/15/1953	41	11/15/1953	37	12/15/1953	41
01/16/1953	66	02/16/1953	60	03/16/1953	86	04/16/1953	68	05/16/1953	51	06/16/1953	46	07/16/1953	43	08/16/1953	40	09/16/1953	39	10/16/1953	36	11/16/1953	47	12/16/1953	37
01/17/1953	62	02/17/1953	62	03/17/1953	71	04/17/1953	68	05/17/1953	51	06/17/1953	49	07/17/1953	44	08/17/1953	40	09/17/1953	38	10/17/1953	36	11/17/1953	45	12/17/1953	38
01/18/1953	62	02/18/1953	62	03/18/1953	68	04/18/1953	55	05/18/1953	62	06/18/1953	48	07/18/1953	43	08/18/1953	39	09/18/1953	40	10/18/1953	40	11/18/1953	44	12/18/1953	37
01/19/1953	63	02/19/1953	63	03/19/1953	68	04/19/1953	54	05/19/1953	59	06/19/1953	49	07/19/1953	39	08/19/1953	40	09/19/1953	38	10/19/1953	44	11/19/1953	42	12/19/1953	34
01/20/1953	64	02/20/1953	63	03/20/1953	64	04/20/1953	61	05/20/1953	59	06/20/1953	44	07/20/1953	50	08/20/1953	36	09/20/1953	40	10/20/1953	39	11/20/1953	43	12/20/1953	34
01/21/1953	62	02/21/1953	55	03/21/1953	59	04/21/1953	59	05/21/1953	59	06/21/1953	52	07/21/1953	43	08/21/1953	36	09/21/1953	44	10/21/1953	39	11/21/1953	41	12/21/1953	46
01/22/1953	62	02/22/1953	55	03/22/1953	59	04/22/1953	59	05/22/1953	59	06/22/1953	52	07/22/1953	47	08/22/1953	33	09/22/1953	41	10/22/1953	40	11/22/1953	41	12/22/1953	43
01/23/1953	66	02/23/1953	66	03/23/1953	65	04/23/1953	57	05/23/1953	55	06/23/1953	40	07/23/1953	38	08/23/1953	30	09/23/1953	41	10/23/1953	39	11/23/1953	49	12/23/1953	39
01/24/1953	76	02/24/1953	62	03/24/1953	62	04/24/1953	54	05/24/1953	51	06/24/1953	48	07/24/1953	38	08/24/1953	41	09/24/1953	41	10/24/1953	36	11/24/1953	44	12/24/1953	33
01/25/1953	70	02/25/1953	59	03/25/1953	62	04/25/1953	59	05/25/1953	61	06/25/1953	54	07/25/1953	33	08/25/1953	36	09/25/1953	41	10/25/1953	36	11/25/1953	45	12/25/1953	33
01/26/1953	64	02/26/1953	62	03/26/1953	57	04/26/1953	62	05/26/1953	59	06/26/1953	54	07/26/1953	33	08/26/1953	37	09/26/1953	35	10/26/1953	41	11/26/1953	44	12/26/1953	39
01/27/1953	62	02/27/1953	63	03/27/1953	57	04/27/1953	65	05/27/1953	53	06/27/1953	50	07/27/1953	38	08/27/1953	37	09/27/1953	34	10/27/1953	52	11/27/1953	41	12/27/1953	42
01/28/1953	61	02/28/1953	48	03/28/1953	53	04/28/1953	63	05/28/1953	50	06/28/1953	47	07/28/1953	38	08/28/1953	37	09/28/1953	43	10/28/1953	53	11/28/1953	39	12/28/1953	42
01/29/1953	61			03/29/1953	53	04/29/1953	62	05/29/1953	50	06/29/1953	45	07/29/1953	52	08/29/1953	33	09/29/1953	42	10/29/1953	48	11/29/1953	39	12/29/1953	39
01/30/1953	61			03/30/1953	61	04/30/1953	62	05/30/1953	50	06/30/1953	47	07/30/1953	47	08/30/1953	30	09/30/1953	41	10/30/1953	45	11/30/1953	45	12/30/1953	39
01/31/1953	61			03/31/1953	61			05/31/1953	50			07/31/1953	45	08/31/1953	42			10/31/1953	43			12/31/1953	36

PORTAGE CREEK DAILY MEAN FLOW
Measured Flow
Reed Street (4106500)
1950-1959, 1975-1986

1954

Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)
01/01/1954	36	02/01/1954	42	03/01/1954	48	04/01/1954	53	05/01/1954	45	06/01/1954	63	07/01/1954	45	08/01/1954	43	09/01/1954	50	10/01/1954	43	11/01/1954	52	12/01/1954	49
01/02/1954	36	02/02/1954	4	03/02/1954	51	04/02/1954	42	05/02/1954	45	06/02/1954	52	07/02/1954	41	08/02/1954	43	09/02/1954	45	10/02/1954	70	11/02/1954	52	12/02/1954	48
01/03/1954	36	02/03/1954	44	03/03/1954	52	04/03/1954	42	05/03/1954	63	06/03/1954	58	07/03/1954	50	08/03/1954	45	09/03/1954	45	10/03/1954	74	11/03/1954	49	12/03/1954	41
01/04/1954	41	02/04/1954	41	03/04/1954	45	04/04/1954	42	05/04/1954	57	06/04/1954	74	07/04/1954	50	08/04/1954	43	09/04/1954	43	10/04/1954	67	11/04/1954	50	12/04/1954	41
01/05/1954	41	02/05/1954	10	03/05/1954	45	04/05/1954	50	05/05/1954	59	06/05/1954	45	07/05/1954	45	08/05/1954	49	09/05/1954	41	10/05/1954	61	11/05/1954	49	12/05/1954	41
01/06/1954	41	02/06/1954	25	03/06/1954	45	04/06/1954	53	05/06/1954	63	06/06/1954	45	07/06/1954	45	08/06/1954	45	09/06/1954	52	10/06/1954	53	11/06/1954	45	12/06/1954	79
01/07/1954	41	02/07/1954	35	03/07/1954	45	04/07/1954	55	05/07/1954	57	06/07/1954	52	07/07/1954	50	08/07/1954	41	09/07/1954	52	10/07/1954	50	11/07/1954	42	12/07/1954	40
01/08/1954	36	02/08/1954	43	03/08/1954	54	04/08/1954	52	05/08/1954	41	06/08/1954	52	07/08/1954	50	08/08/1954	45	09/08/1954	48	10/08/1954	49	11/08/1954	65	12/08/1954	39
01/09/1954	33	02/09/1954	43	03/09/1954	52	04/09/1954	48	05/09/1954	41	06/09/1954	52	07/09/1954	50	08/09/1954	48	09/09/1954	49	10/09/1954	45	11/09/1954	64	12/09/1954	39
01/10/1954	30	02/10/1954	39	03/10/1954	54	04/10/1954	59	05/10/1954	100	06/10/1954	42	07/10/1954	45	08/10/1954	50	09/10/1954	46	10/10/1954	45	11/10/1954	46	12/10/1954	41
01/11/1954	39	02/11/1954	38	03/11/1954	50	04/11/1954	55	05/11/1954	54	06/11/1954	41	07/11/1954	48	08/11/1954	45	09/11/1954	48	10/11/1954	67	11/11/1954	46	12/11/1954	41
01/12/1954	37	02/12/1954	44	03/12/1954	45	04/12/1954	79	05/12/1954	54	06/12/1954	44	07/12/1954	50	08/12/1954	43	09/12/1954	37	10/12/1954	67	11/12/1954	46	12/12/1954	42
01/13/1954	40	02/13/1954	44	03/13/1954	45	04/13/1954	86	05/13/1954	14	06/13/1954	39	07/13/1954	51	08/13/1954	45	09/13/1954	50	10/13/1954	67	11/13/1954	41	12/13/1954	41
01/14/1954	38	02/14/1954	44	03/14/1954	45	04/14/1954	68	05/14/1954	55	06/14/1954	46	07/14/1954	43	08/14/1954	48	09/14/1954	52	10/14/1954	67	11/14/1954	20	12/14/1954	41
01/15/1954	38	02/15/1954	54	03/15/1954	45	04/15/1954	60	05/15/1954	40	06/15/1954	47	07/15/1954	45	08/15/1954	51	09/15/1954	54	10/15/1954	74	11/15/1954	3 6	12/15/1954	40
01/16/1954	35	02/16/1954	111	03/16/1954	46	04/16/1954	46	05/16/1954	34	06/16/1954	48	07/16/1954	42	08/16/1954	53	09/16/1954	54	10/16/1954	74	11/16/1954	7 6	12/16/1954	40
01/17/1954	35	02/17/1954	81	03/17/1954	45	04/17/1954	45	05/17/1954	28	06/17/1954	59	07/17/1954	41	08/17/1954	45	09/17/1954	54	10/17/1954	70	11/17/1954	58	12/17/1954	41
01/18/1954	45	02/18/1954	55	03/18/1954	46	04/18/1954	8	05/18/1954	45	06/18/1954	58	07/18/1954	42	08/18/1954	45	09/18/1954	53	10/18/1954	62	11/18/1954	20	12/18/1954	38
01/19/1954	39	02/19/1954	55	03/19/1954	46	04/19/1954	91	05/19/1954	43	06/19/1954	66	07/19/1954	44	08/19/1954	53	09/19/1954	57	10/19/1954	52	11/19/1954	52	12/19/1954	37
01/20/1954	48	02/20/1954	56	03/20/1954	47	04/20/1954	63	05/20/1954	43	06/20/1954	66	07/20/1954	44	08/20/1954	52	09/20/1954	53	10/20/1954	52	11/20/1954	40	12/20/1954	39
01/21/1954	47	02/21/1954	56	03/21/1954	52	04/21/1954	102	05/21/1954	30	06/21/1954	66	07/21/1954	43	08/21/1954	51	09/21/1954	50	10/21/1954	49	11/21/1954	40	12/21/1954	40
01/22/1954	47	02/22/1954	56	03/22/1954	52	04/22/1954	59	05/22/1954	37	06/22/1954	70	07/22/1954	44	08/22/1954	51	09/22/1954	44	10/22/1954	49	11/22/1954	6 1	12/22/1954	43
01/23/1954	37	02/23/1954	56	03/23/1954	49	04/23/1954	59	05/23/1954	37	06/23/1954	58	07/23/1954	41	08/23/1954	51	09/23/1954	42	10/23/1954	41	11/23/1954	6 1	12/23/1954	43
01/24/1954	40	02/24/1954	51	03/24/1954	70	04/24/1954	43	05/24/1954	44	06/24/1954	53	07/24/1954	38	08/24/1954	53	09/24/1954	41	10/24/1954	41	11/24/1954	52	12/24/1954	43
01/25/1954	44	02/25/1954	51	03/25/1954	106	04/25/1954	72	05/25/1954	39	06/25/1954	52	07/25/1954	42	08/25/1954	52	09/25/1954	41	10/25/1954	46	11/25/1954	50	12/25/1954	41
01/26/1954	50	02/26/1954	51	03/26/1954	80	04/26/1954	64	05/26/1954	39	06/26/1954	45	07/26/1954	42	08/26/1954	58	09/26/1954	41	10/26/1954	46	11/26/1954	46	12/26/1954	41
01/27/1954	59	02/27/1954	51	03/27/1954	54	04/27/1954	58	05/27/1954	47	06/27/1954	45	07/27/1954	42	08/27/1954	56	09/27/1954	41	10/27/1954	46	11/27/1954	46	12/27/1954	41
01/28/1954	45	02/28/1954	50	03/28/1954	54	04/28/1954	84	05/28/1954	47	06/28/1954	46	07/28/1954	38	08/28/1954	55	09/28/1954	42	10/28/1954	45	11/28/1954	51	12/28/1954	43
01/29/1954	104			03/29/1954	58	04/29/1954	50	05/29/1954	37	06/29/1954	45	07/29/1954	42	08/29/1954	50	09/29/1954	41	10/29/1954	47	11/29/1954	51	12/29/1954	44
01/30/1954	38			03/30/1954	64	04/30/1954	45	05/30/1954	37	06/30/1954	45	07/30/1954	45	08/30/1954	50	09/30/1954	46	10/30/1954	47	11/30/1954	52	12/30/1954	45
01/31/1954	38			03/31/1954	53			05/31/1954	50			07/31/1954	38	08/31/1954	50			10/31/1954	52			12/31/1954	44

PORTAGE CREEK DAILY MEAN FLOW
Measured Flow
Reed Street (4106500)
1950-1959, 1975-1988

1955

Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)
01/01/1955	45	02/01/1955	47	03/01/1955	64	04/01/1955	56	05/01/1955	45	06/01/1955	49	07/01/1955	57	08/01/1955	45	09/01/1955	35	10/01/1955	15	11/01/1955	52	12/01/1955	47
01/02/1955	50	02/02/1955	42	03/02/1955	64	04/02/1955	54	05/02/1955	56	06/02/1955	45	07/02/1955	50	08/02/1955	41	09/02/1955	35	10/02/1955	36	11/02/1955	54	12/02/1955	52
01/03/1955	58	02/03/1955	42	03/03/1955	61	04/03/1955	50	05/03/1955	52	06/03/1955	43	07/03/1955	50	08/03/1955	41	09/03/1955	35	10/03/1955	37	11/03/1955	78	12/03/1955	52
01/04/1955	64	02/04/1955	42	03/04/1955	54	04/04/1955	50	05/04/1955	49	06/04/1955	41	07/04/1955	50	08/04/1955	40	09/04/1955	35	10/04/1955	38	11/04/1955	54	12/04/1955	53
01/05/1955	64	02/05/1955	42	03/05/1955	54	04/05/1955	50	05/05/1955	48	06/05/1955	50	07/05/1955	45	08/05/1955	37	09/05/1955	35	10/05/1955	108	11/05/1955	54	12/05/1955	54
01/06/1955	65	02/06/1955	41	03/06/1955	54	04/06/1955	49	05/06/1955	47	06/06/1955	57	07/06/1955	45	08/06/1955	55	09/06/1955	35	10/06/1955	118	11/06/1955	47	12/06/1955	52
01/07/1955	65	02/07/1955	45	03/07/1955	54	04/07/1955	49	05/07/1955	41	06/07/1955	58	07/07/1955	45	08/07/1955	41	09/07/1955	36	10/07/1955	80	11/07/1955	47	12/07/1955	50
01/08/1955	56	02/08/1955	45	03/08/1955	52	04/08/1955	49	05/08/1955	41	06/08/1955	62	07/08/1955	45	08/08/1955	41	09/08/1955	34	10/08/1955	79	11/08/1955	50	12/08/1955	50
01/09/1955	56	02/09/1955	49	03/09/1955	52	04/09/1955	45	05/09/1955	47	06/09/1955	57	07/09/1955	45	08/09/1955	40	09/09/1955	36	10/09/1955	63	11/09/1955	50	12/09/1955	48
01/10/1955	55	02/10/1955	49	03/10/1955	53	04/10/1955	45	05/10/1955	50	06/10/1955	55	07/10/1955	40	08/10/1955	39	09/10/1955	36	10/10/1955	52	11/10/1955	49	12/10/1955	46
01/11/1955	55	02/11/1955	42	03/11/1955	52	04/11/1955	52	05/11/1955	49	06/11/1955	53	07/11/1955	40	08/11/1955	38	09/11/1955	36	10/11/1955	50	11/11/1955	48	12/11/1955	44
01/12/1955	53	02/12/1955	42	03/12/1955	51	04/12/1955	54	05/12/1955	49	06/12/1955	53	07/12/1955	40	08/12/1955	36	09/12/1955	36	10/12/1955	50	11/12/1955	45	12/12/1955	47
01/13/1955	52	02/13/1955	42	03/13/1955	51	04/13/1955	56	05/13/1955	49	06/13/1955	53	07/13/1955	41	08/13/1955	36	09/13/1955	41	10/13/1955	50	11/13/1955	48	12/13/1955	48
01/14/1955	52	02/14/1955	43	03/14/1955	48	04/14/1955	54	05/14/1955	43	06/14/1955	40	07/14/1955	39	08/14/1955	35	09/14/1955	41	10/14/1955	47	11/14/1955	49	12/14/1955	50
01/15/1955	45	02/15/1955	44	03/15/1955	49	04/15/1955	52	05/15/1955	43	06/15/1955	3 8	07/15/1955	53	08/15/1955	35	09/15/1955	36	10/15/1955	45	11/15/1955	67	12/15/1955	46
01/16/1955	44	02/16/1955	50	03/16/1955	62	04/16/1955	50	05/16/1955	45	06/16/1955	43	07/16/1955	45	08/16/1955	35	09/16/1955	38	10/16/1955	52	11/16/1955	70	12/16/1955	49
01/17/1955	49	02/17/1955	51	03/17/1955	52	04/17/1955	45	05/17/1955	45	06/17/1955	43	07/17/1955	37	08/17/1955	37	09/17/1955	36	10/17/1955	54	11/17/1955	54	12/17/1955	47
01/18/1955	47	02/18/1955	52	03/18/1955	47	04/18/1955	47	05/18/1955	45	06/18/1955	41	07/18/1955	42	08/18/1955	37	09/18/1955	28	10/18/1955	52	11/18/1955	51	12/18/1955	45
01/19/1955	45	02/19/1955	56	03/19/1955	44	04/19/1955	56	05/19/1955	4	06/19/1955	41	07/19/1955	42	08/19/1955	36	09/19/1955	38	10/19/1955	48	11/19/1955	51	12/19/1955	45
01/20/1955	45	02/20/1955	56	03/20/1955	44	04/20/1955	57	05/20/1955	45	06/20/1955	41	07/20/1955	41	08/20/1955	36	09/20/1955	70	10/20/1955	47	11/20/1955	52	12/20/1955	47
01/21/1955	45	02/21/1955	68	03/21/1955	48	04/21/1955	57	05/21/1955	40	06/21/1955	42	07/21/1955	38	08/21/1955	32	09/21/1955	40	10/21/1955	45	11/21/1955	53	12/21/1955	47
01/22/1955	45	02/22/1955	58	03/22/1955	66	04/22/1955	53	05/22/1955	40	06/22/1955	42	07/22/1955	36	08/22/1955	32	09/22/1955	37	10/22/1955	45	11/22/1955	51	12/22/1955	46
01/23/1955	45	02/23/1955	53	03/23/1955	73	04/23/1955	50	05/23/1955	51	06/23/1955	43	07/23/1955	36	08/23/1955	38	09/23/1955	41	10/23/1955	45	11/23/1955	54	12/23/1955	46
01/24/1955	45	02/24/1955	51	03/24/1955	66	04/24/1955	56	05/24/1955	67	06/24/1955	39	07/24/1955	36	08/24/1955	37	09/24/1955	40	10/24/1955	57	11/24/1955	49	12/24/1955	73
01/25/1955	45	02/25/1955	52	03/25/1955	70	04/25/1955	66	05/25/1955	52	06/25/1955	34	07/25/1955	38	08/25/1955	36	09/25/1955	39	10/25/1955	54	11/25/1955	44	12/25/1955	48
01/26/1955	44	02/26/1955	74	03/26/1955	64	04/26/1955	68	05/26/1955	52	06/26/1955	36	07/26/1955	42	08/26/1955	35	09/26/1955	39	10/26/1955	54	11/26/1955	39	12/26/1955	26
01/27/1955	44	02/27/1955	74	03/27/1955	57	04/27/1955	58	05/27/1955	52	06/27/1955	41	07/27/1955	44	08/27/1955	35	09/27/1955	45	10/27/1955	47	11/27/1955	39	12/27/1955	31
01/28/1955	44	02/28/1955	67	03/28/1955	55	04/28/1955	58	05/28/1955	50	06/28/1955	38	07/28/1955	45	08/28/1955	35	09/28/1955	41	10/28/1955	43	11/28/1955	46	12/28/1955	49
01/29/1955	43			03/29/1955	55	04/29/1955	55	05/29/1955	49	06/29/1955	47	07/29/1955	45	08/29/1955	35	09/29/1955	39	10/29/1955	40	11/29/1955	46	12/29/1955	49
01/30/1955	43			03/30/1955	55	04/30/1955	45	05/30/1955	45	06/30/1955	68	07/30/1955	41	08/30/1955	40	09/30/1955	39	10/30/1955	41	11/30/1955	46	12/30/1955	47
01/31/1955	43			03/31/1955	56			05/31/1955	46			07/31/1955	45	08/31/1955	35			10/31/1955	48			12/31/1955	43

PORTAGE CREEK DAILY MEAN FLOW
Measured Flow
Reed Street (4106500)
1950-1959, 1975-1986

1956

Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)
01/01/1956	40	02/01/1956	46	03/01/1956	83	04/01/1956	46	05/01/1956	91	06/01/1956	60	07/01/1956	51	08/01/1956	55	09/01/1956	57	10/01/1956	58	11/01/1956	47	12/01/1956	46
01/02/1956	45	02/02/1956	48	03/02/1956	110	04/02/1956	59	05/02/1956	82	06/02/1956	64	07/02/1956	45	08/02/1956	52	09/02/1956	50	10/02/1956	56	11/02/1956	47	12/02/1956	47
01/03/1956	43	02/03/1956	46	03/03/1956	74	04/03/1956	60	05/03/1956	72	06/03/1956	65	07/03/1956	41	08/03/1956	49	09/03/1956	43	10/03/1956	53	11/03/1956	44	12/03/1956	48
01/04/1956	44	02/04/1956	44	03/04/1956	59	04/04/1956	52	05/04/1956	78	06/04/1956	64	07/04/1956	29	08/04/1956	48	09/04/1956	49	10/04/1956	47	11/04/1956	41	12/04/1956	46
01/05/1956	42	02/05/1956	41	03/05/1956	62	04/05/1956	55	05/05/1956	68	06/05/1956	62	07/05/1956	76	08/05/1956	45	09/05/1956	50	10/05/1956	48	11/05/1956	43	12/05/1956	46
01/06/1956	43	02/06/1956	49	03/06/1956	64	04/06/1956	54	05/06/1956	68	06/06/1956	59	07/06/1956	28	08/06/1956	45	09/06/1956	49	10/06/1956	47	11/06/1956	45	12/06/1956	46
01/07/1956	41	02/07/1956	50	03/07/1956	81	04/07/1956	62	05/07/1956	73	06/07/1956	56	07/07/1956	48	08/07/1956	47	09/07/1956	54	10/07/1956	45	11/07/1956	43	12/07/1956	48
01/08/1956	40	02/08/1956	53	03/08/1956	72	04/08/1956	55	05/08/1956	58	06/08/1956	57	07/08/1956	45	08/08/1956	49	09/08/1956	54	10/08/1956	47	11/08/1956	43	12/08/1956	46
01/09/1956	42	02/09/1956	58	03/09/1956	74	04/09/1956	55	05/09/1956	65	06/09/1956	52	07/09/1956	52	08/09/1956	50	09/09/1956	52	10/09/1956	49	11/09/1956	42	12/09/1956	41
01/10/1956	42	02/10/1956	55	03/10/1956	66	04/10/1956	52	05/10/1956	109	06/10/1956	51	07/10/1956	51	08/10/1956	50	09/10/1956	52	10/10/1956	48	11/10/1956	42	12/10/1956	41
01/11/1956	45	02/11/1956	52	03/11/1956	53	04/11/1956	55	05/11/1956	107	06/11/1956	50	07/11/1956	50	08/11/1956	56	09/11/1956	52	10/11/1956	51	11/11/1956	43	12/11/1956	44
01/12/1956	45	02/12/1956	47	03/12/1956	53	04/12/1956	52	05/12/1956	97	06/12/1956	54	07/12/1956	90	08/12/1956	62	09/12/1956	51	10/12/1956	51	11/12/1956	44	12/12/1956	43
01/13/1956	45	02/13/1956	50	03/13/1956	54	04/13/1956	51	05/13/1956	80	06/13/1956	55	07/13/1956	70	08/13/1956	56	09/13/1956	51	10/13/1956	49	11/13/1956	44	12/13/1956	42
01/14/1956	43	02/14/1956	55	03/14/1956	50	04/14/1956	50	05/14/1956	76	06/14/1956	60	07/14/1956	62	08/14/1956	56	09/14/1956	51	10/14/1956	46	11/14/1956	45	12/14/1956	45
01/15/1956	40	02/15/1956	49	03/15/1956	49	04/15/1956	47	05/15/1956	73	06/15/1956	59	07/15/1956	56	08/15/1956	55	09/15/1956	48	10/15/1956	45	11/15/1956	50	12/15/1956	47
01/16/1956	44	02/16/1956	45	03/16/1956	49	04/16/1956	51	05/16/1956	74	06/16/1956	61	07/16/1956	54	08/16/1956	54	09/16/1956	45	10/16/1956	45	11/16/1956	50	12/16/1956	45
01/17/1956	44	02/17/1956	43	03/17/1956	48	04/17/1956	52	05/17/1956	78	06/17/1956	68	07/17/1956	52	08/17/1956	54	09/17/1956	49	10/17/1956	45	11/17/1956	50	12/17/1956	45
01/18/1956	44	02/18/1956	39	03/18/1956	46	04/18/1956	48	05/18/1956	84	06/18/1956	104	07/18/1956	50	08/18/1956	50	09/18/1956	52	10/18/1956	45	11/18/1956	51	12/18/1956	45
01/19/1956	45	02/19/1956	38	03/19/1956	46	04/19/1956	49	05/19/1956	76	06/19/1956	80	07/19/1956	50	08/19/1956	54	09/19/1956	51	10/19/1956	45	11/19/1956	51	12/19/1956	45
01/20/1956	45	02/20/1956	44	03/20/1956	47	04/20/1956	49	05/20/1956	70	06/20/1956	73	07/20/1956	65	08/20/1956	52	09/20/1956	52	10/20/1956	45	11/20/1956	52	12/20/1956	42
01/21/1956	45	02/21/1956	43	03/21/1956	22	04/21/1956	46	05/21/1956	80	06/21/1956	69	07/21/1956	56	08/21/1956	53	09/21/1956	52	10/21/1956	45	11/21/1956	52	12/21/1956	50
01/22/1956	41	02/22/1956	45	03/22/1956	39	04/22/1956	45	05/22/1956	70	06/22/1956	70	07/22/1956	52	08/22/1956	52	09/22/1956	52	10/22/1956	45	11/22/1956	52	12/22/1956	83
01/23/1956	42	02/23/1956	50	03/23/1956	50	04/23/1956	45	05/23/1956	62	06/23/1956	90	07/23/1956	50	08/23/1956	52	09/23/1956	54	10/23/1956	45	11/23/1956	52	12/23/1956	37
01/24/1956	44	02/24/1956	60	03/24/1956	49	04/24/1956	49	05/24/1956	59	06/24/1956	53	07/24/1956	50	08/24/1956	52	09/24/1956	60	10/24/1956	45	11/24/1956	52	12/24/1956	37
01/25/1956	46	02/25/1956	86	03/25/1956	46	04/25/1956	58	05/25/1956	57	06/25/1956	61	07/25/1956	56	08/25/1956	50	09/25/1956	62	10/25/1956	45	11/25/1956	49	12/25/1956	49
01/26/1956	45	02/26/1956	60	03/26/1956	52	04/26/1956	64	05/26/1956	59	06/26/1956	68	07/26/1956	50	08/26/1956	48	09/26/1956	62	10/26/1956	45	11/26/1956	46	12/26/1956	51
01/27/1956	45	02/27/1956	58	03/27/1956	60	04/27/1956	87	05/27/1956	60	06/27/1956	58	07/27/1956	50	08/27/1956	45	09/27/1956	62	10/27/1956	45	11/27/1956	44	12/27/1956	49
01/28/1956	45	02/28/1956	50	03/28/1956	59	04/28/1956	125	05/28/1956	60	06/28/1956	55	07/28/1956	49	08/28/1956	49	09/28/1956	63	10/28/1956	45	11/28/1956	42	12/28/1956	52
01/29/1956	43	02/29/1956	50	03/29/1956	58	04/29/1956	157	05/29/1956	61	06/29/1956	53	07/29/1956	48	08/29/1956	50	09/29/1956	60	10/29/1956	45	11/29/1956	46	12/29/1956	49
01/30/1956	47			03/30/1956	55	04/30/1956	118	05/30/1956	64	06/30/1956	80	07/30/1956	50	08/30/1956	50	09/30/1956	56	10/30/1956	46	11/30/1956	46	12/30/1956	44
01/31/1956	49			03/31/1956	45			05/31/1956	60			07/31/1956	54	08/31/1956	57			10/31/1956	46			12/31/1956	48

PORTAGE CREEK DAILY MEAN FLOW
Measured Flow
Reed Street (4106500)
1950-1959, 1975-1986

1957

Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)
01/01/1957	45	02/01/1957	41	03/01/1957	50	04/01/1957	48	05/01/1957	60	06/01/1957	46	07/01/1957	41	08/01/1957	39	09/01/1957	41	10/01/1957	39	11/01/1957	44	12/01/1957	41
01/02/1957	46	02/02/1957	41	03/02/1957	46	04/02/1957	50	05/02/1957	54	06/02/1957	41	07/02/1957	41	08/02/1957	38	09/02/1957	42	10/02/1957	38	11/02/1957	39	12/02/1957	46
01/03/1957	47	02/03/1957	40	03/03/1957	41	04/03/1957	47	05/03/1957	52	06/03/1957	41	07/03/1957	40	08/03/1957	44	09/03/1957	47	10/03/1957	39	11/03/1957	38	12/03/1957	45
01/04/1957	48	02/04/1957	41	03/04/1957	42	04/04/1957	55	05/04/1957	49	06/04/1957	44	07/04/1957	36	08/04/1957	41	09/04/1957	50	10/04/1957	38	11/04/1957	39	12/04/1957	44
01/05/1957	48	02/05/1957	40	03/05/1957	45	04/05/1957	69	05/05/1957	45	06/05/1957	42	07/05/1957	36	08/05/1957	39	09/05/1957	47	10/05/1957	38	11/05/1957	39	12/05/1957	45
01/06/1957	49	02/06/1957	41	03/06/1957	45	04/06/1957	62	05/06/1957	49	06/06/1957	40	07/06/1957	36	08/06/1957	37	09/06/1957	41	10/06/1957	35	11/06/1957	40	12/06/1957	47
01/07/1957	50	02/07/1957	42	03/07/1957	45	04/07/1957	57	05/07/1957	52	06/07/1957	41	07/07/1957	37	08/07/1957	37	09/07/1957	41	10/07/1957	36	11/07/1957	38	12/07/1957	50
01/08/1957	51	02/08/1957	45	03/08/1957	45	04/08/1957	53	05/08/1957	44	06/08/1957	38	07/08/1957	112	08/08/1957	36	09/08/1957	41	10/08/1957	37	11/08/1957	49	12/08/1957	41
01/09/1957	50	02/09/1957	61	03/09/1957	44	04/09/1957	51	05/09/1957	48	06/09/1957	35	07/09/1957	82	08/09/1957	36	09/09/1957	40	10/09/1957	36	11/09/1957	49	12/09/1957	44
01/10/1957	46	02/10/1957	54	03/10/1957	40	04/10/1957	49	05/10/1957	55	06/10/1957	40	07/10/1957	63	08/10/1957	34	09/10/1957	40	10/10/1957	36	11/10/1957	45	12/10/1957	45
01/11/1957	48	02/11/1957	55	03/11/1957	53	04/11/1957	48	05/11/1957	58	06/11/1957	47	07/11/1957	65	08/11/1957	32	09/11/1957	42	10/11/1957	35	11/11/1957	45	12/11/1957	42
01/12/1957	44	02/12/1957	54	03/12/1957	60	04/12/1957	47	05/12/1957	50	06/12/1957	45	07/12/1957	69	08/12/1957	35	09/12/1957	45	10/12/1957	31	11/12/1957	46	12/12/1957	43
01/13/1957	42	02/13/1957	51	03/13/1957	54	04/13/1957	43	05/13/1957	54	06/13/1957	44	07/13/1957	56	08/13/1957	36	09/13/1957	44	10/13/1957	30	11/13/1957	52	12/13/1957	43
01/14/1957	45	02/14/1957	49	03/14/1957	53	04/14/1957	41	05/14/1957	58	06/14/1957	51	07/14/1957	50	08/14/1957	40	09/14/1957	55	10/14/1957	32	11/14/1957	80	12/14/1957	44
01/15/1957	45	02/15/1957	46	03/15/1957	53	04/15/1957	45	05/15/1957	55	06/15/1957	43	07/15/1957	52	08/15/1957	43	09/15/1957	48	10/15/1957	34	11/15/1957	109	12/15/1957	41
01/16/1957	45	02/16/1957	47	03/16/1957	49	04/16/1957	49	05/16/1957	48	06/16/1957	38	07/16/1957	48	08/16/1957	40	09/16/1957	47	10/16/1957	53	11/16/1957	72	12/16/1957	43
01/17/1957	43	02/17/1957	41	03/17/1957	45	04/17/1957	52	05/17/1957	49	06/17/1957	41	07/17/1957	45	08/17/1957	35	09/17/1957	45	10/17/1957	52	11/17/1957	62	12/17/1957	45
01/18/1957	45	02/18/1957	43	03/18/1957	46	04/18/1957	52	05/18/1957	52	06/18/1957	45	07/18/1957	43	08/18/1957	30	09/18/1957	45	10/18/1957	45	11/18/1957	61	12/18/1957	52
01/19/1957	41	02/19/1957	44	03/19/1957	47	04/19/1957	52	05/19/1957	68	06/19/1957	42	07/19/1957	42	08/19/1957	32	09/19/1957	20	10/19/1957	41	11/19/1957	64	12/19/1957	64
01/20/1957	42	02/20/1957	43	03/20/1957	49	04/20/1957	44	05/20/1957	65	06/20/1957	40	07/20/1957	39	08/20/1957	34	09/20/1957	36	10/20/1957	40	11/20/1957	58	12/20/1957	80
01/21/1957	57	02/21/1957	43	03/21/1957	58	04/21/1957	41	05/21/1957	58	06/21/1957	38	07/21/1957	38	08/21/1957	36	09/21/1957	40	10/21/1957	39	11/21/1957	57	12/21/1957	65
01/22/1957	102	02/22/1957	44	03/22/1957	52	04/22/1957	45	05/22/1957	57	06/22/1957	38	07/22/1957	54	08/22/1957	36	09/22/1957	38	10/22/1957	43	11/22/1957	52	12/22/1957	58
01/23/1957	69	02/23/1957	42	03/23/1957	49	04/23/1957	52	05/23/1957	54	06/23/1957	38	07/23/1957	59	08/23/1957	41	09/23/1957	38	10/23/1957	88	11/23/1957	50	12/23/1957	56
01/24/1957	65	02/24/1957	48	03/24/1957	45	04/24/1957	70	05/24/1957	52	06/24/1957	38	07/24/1957	47	08/24/1957	50	09/24/1957	38	10/24/1957	99	11/24/1957	50	12/24/1957	51
01/25/1957	60	02/25/1957	56	03/25/1957	46	04/25/1957	76	05/25/1957	51	06/25/1957	41	07/25/1957	45	08/25/1957	43	09/25/1957	39	10/25/1957	73	11/25/1957	48	12/25/1957	49
01/26/1957	51	02/26/1957	54	03/26/1957	50	04/26/1957	69	05/26/1957	48	06/26/1957	41	07/26/1957	45	08/26/1957	47	09/26/1957	33	10/26/1957	57	11/26/1957	48	12/26/1957	56
01/27/1957	47	02/27/1957	52	03/27/1957	49	04/27/1957	101	05/27/1957	49	06/27/1957	42	07/27/1957	45	08/27/1957	47	09/27/1957	32	10/27/1957	50	11/27/1957	47	12/27/1957	53
01/28/1957	45	02/28/1957	50	03/28/1957	48	04/28/1957	94	05/28/1957	47	06/28/1957	56	07/28/1957	41	08/28/1957	47	09/28/1957	33	10/28/1957	46	11/28/1957	49	12/28/1957	55
01/29/1957	45			03/29/1957	49	04/29/1957	77	05/29/1957	48	06/29/1957	49	07/29/1957	42	08/29/1957	49	09/29/1957	30	10/29/1957	48	11/29/1957	48	12/29/1957	45
01/30/1957	44			03/30/1957	46	04/30/1957	67	05/30/1957	43	06/30/1957	40	07/30/1957	45	08/30/1957	55	09/30/1957	35	10/30/1957	45	11/30/1957	46	12/30/1957	49
01/31/1957	42			03/31/1957	41			05/31/1957	43			07/31/1957	43	08/31/1957	46			10/31/1957	45			12/31/1957	51

PORTAGE CREEK DAILY MEAN FLOW
Measured Flow
Reed Street (4106500)
1950-1959, 1975-1986

1958

Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)
01/01/1958	47	02/01/1958	43	03/01/1958	67	04/01/1958	40	05/01/1958	49	06/01/1958	58	07/01/1958	37	08/01/1958	45	09/01/1958	32	10/01/1958	39	11/01/1958	44	12/01/1958	41
01/02/1958	47	02/02/1958	39	03/02/1958	61	04/02/1958	40	05/02/1958	50	06/02/1958	52	07/02/1958	71	08/02/1958	43	09/02/1958	36	10/02/1958	38	11/02/1958	39	12/02/1958	46
01/03/1958	50	02/03/1958	39	03/03/1958	58	04/03/1958	40	05/03/1958	51	06/03/1958	50	07/03/1958	60	08/03/1958	41	09/03/1958	38	10/03/1958	39	11/03/1958	38	12/03/1958	45
01/04/1958	46	02/04/1958	41	03/04/1958	57	04/04/1958	45	05/04/1958	62	06/04/1958	49	07/04/1958	50	08/04/1958	40	09/04/1958	38	10/04/1958	38	11/04/1958	39	12/04/1958	44
01/05/1958	44	02/05/1958	42	03/05/1958	56	04/05/1958	52	05/05/1958	55	06/05/1958	48	07/05/1958	48	08/05/1958	41	09/05/1958	37	10/05/1958	38	11/05/1958	39	12/05/1958	45
01/06/1958	48	02/06/1958	43	03/06/1958	59	04/06/1958	61	05/06/1958	53	06/06/1958	45	07/06/1958	45	08/06/1958	47	09/06/1958	37	10/06/1958	35	11/06/1958	40	12/06/1958	47
01/07/1958	49	02/07/1958	41	03/07/1958	57	04/07/1958	65	05/07/1958	52	06/07/1958	39	07/07/1958	44	08/07/1958	52	09/07/1958	33	10/07/1958	36	11/07/1958	38	12/07/1958	50
01/08/1958	46	02/08/1958	43	03/08/1958	54	04/08/1958	59	05/08/1958	50	06/08/1958	42	07/08/1958	41	08/08/1958	46	09/08/1958	32	10/08/1958	37	11/08/1958	49	12/08/1958	41
01/09/1958	47	02/09/1958	39	03/09/1958	50	04/09/1958	54	05/09/1958	47	06/09/1958	47	07/09/1958	39	08/09/1958	42	09/09/1958	45	10/09/1958	36	11/09/1958	49	12/09/1958	44
01/10/1958	47	02/10/1958	42	03/10/1958	52	04/10/1958	52	05/10/1958	45	06/10/1958	49	07/10/1958	40	08/10/1958	38	09/10/1958	46	10/10/1958	36	11/10/1958	45	12/10/1958	45
01/11/1958	46	02/11/1958	44	03/11/1958	52	04/11/1958	52	05/11/1958	39	06/11/1958	45	07/11/1958	41	08/11/1958	41	09/11/1958	38	10/11/1958	35	11/11/1958	45	12/11/1958	42
01/12/1958	41	02/12/1958	43	03/12/1958	48	04/12/1958	52	05/12/1958	49	06/12/1958	44	07/12/1958	41	08/12/1958	40	09/12/1958	36	10/12/1958	31	11/12/1958	46	12/12/1958	43
01/13/1958	43	02/13/1958	43	03/13/1958	48	04/13/1958	49	05/13/1958	42	06/13/1958	63	07/13/1958	37	08/13/1958	38	09/13/1958	36	10/13/1958	30	11/13/1958	52	12/13/1958	43
01/14/1958	45	02/14/1958	44	03/14/1958	48	04/14/1958	49	05/14/1958	44	06/14/1958	60	07/14/1958	39	08/14/1958	40	09/14/1958	35	10/14/1958	32	11/14/1958	80	12/14/1958	44
01/15/1958	45	02/15/1958	43	03/15/1958	47	04/15/1958	49	05/15/1958	41	06/15/1958	44	07/15/1958	48	08/15/1958	43	09/15/1958	36	10/15/1958	34	11/15/1958	109	12/15/1958	41
01/16/1958	44	02/16/1958	41	03/16/1958	44	04/16/1958	48	05/16/1958	42	06/16/1958	42	07/16/1958	45	08/16/1958	39	09/16/1958	38	10/16/1958	53	11/16/1958	72	12/16/1958	43
01/17/1958	45	02/17/1958	41	03/17/1958	44	04/17/1958	48	05/17/1958	41	06/17/1958	42	07/17/1958	44	08/17/1958	38	09/17/1958	49	10/17/1958	52	11/17/1958	62	12/17/1958	45
01/18/1958	44	02/18/1958	41	03/18/1958	46	04/18/1958	49	05/18/1958	49	06/18/1958	41	07/18/1958	33	08/18/1958	37	09/18/1958	48	10/18/1958	45	11/18/1958	61	12/18/1958	52
01/19/1958	40	02/19/1958	41	03/19/1958	47	04/19/1958	45	05/19/1958	46	06/19/1958	45	07/19/1958	38	08/19/1958	37	09/19/1958	44	10/19/1958	41	11/19/1958	64	12/19/1958	64
01/20/1958	43	02/20/1958	42	03/20/1958	52	04/20/1958	47	05/20/1958	46	06/20/1958	43	07/20/1958	38	08/20/1958	40	09/20/1958	43	10/20/1958	40	11/20/1958	58	12/20/1958	80
01/21/1958	48	02/21/1958	41	03/21/1958	52	04/21/1958	46	05/21/1958	43	06/21/1958	41	07/21/1958	37	08/21/1958	50	09/21/1958	39	10/21/1958	39	11/21/1958	57	12/21/1958	65
01/22/1958	48	02/22/1958	42	03/22/1958	52	04/22/1958	49	05/22/1958	43	06/22/1958	41	07/22/1958	41	08/22/1958	42	09/22/1958	41	10/22/1958	43	11/22/1958	52	12/22/1958	58
01/23/1958	45	02/23/1958	45	03/23/1958	50	04/23/1958	49	05/23/1958	42	06/23/1958	45	07/23/1958	42	08/23/1958	39	09/23/1958	41	10/23/1958	88	11/23/1958	50	12/23/1958	56
01/24/1958	46	02/24/1958	52	03/24/1958	48	04/24/1958	52	05/24/1958	41	06/24/1958	45	07/24/1958	41	08/24/1958	43	09/24/1958	43	10/24/1958	99	11/24/1958	50	12/24/1958	51
01/25/1958	45	02/25/1958	59	03/25/1958	46	04/25/1958	51	05/25/1958	40	06/25/1958	52	07/25/1958	45	08/25/1958	40	09/25/1958	43	10/25/1958	73	11/25/1958	48	12/25/1958	49
01/26/1958	41	02/26/1958	63	03/26/1958	45	04/26/1958	47	05/26/1958	40	06/26/1958	49	07/26/1958	40	08/26/1958	39	09/26/1958	41	10/26/1958	57	11/26/1958	48	12/26/1958	56
01/27/1958	43	02/27/1958	75	03/27/1958	44	04/27/1958	45	05/27/1958	41	06/27/1958	46	07/27/1958	36	08/27/1958	38	09/27/1958	40	10/27/1958	50	11/27/1958	47	12/27/1958	53
01/28/1958	45	02/28/1958	76	03/28/1958	44	04/28/1958	47	05/28/1958	40	06/28/1958	43	07/28/1958	49	08/28/1958	38	09/28/1958	42	10/28/1958	46	11/28/1958	49	12/28/1958	55
01/29/1958	45			03/29/1958	42	04/29/1958	48	05/29/1958	39	06/29/1958	41	07/29/1958	49	08/29/1958	38	09/29/1958	40	10/29/1958	48	11/29/1958	48	12/29/1958	45
01/30/1958	44			03/30/1958	40	04/30/1958	49	05/30/1958	39	06/30/1958	38	07/30/1958	47	08/30/1958	35	09/30/1958	45	10/30/1958	45	11/30/1958	46	12/30/1958	49
01/31/1958	43			03/31/1958	40			05/31/1958	47			07/31/1958	46	08/31/1958	32			10/31/1958	45			12/31/1958	51

PORTAGE CREEK DAILY MEAN FLOW
Measured Flow
Reed Street (4106500)
1950-1959, 1975-1986

1959

Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)
01/01/1959	47	02/01/1959	43	03/01/1959	67	04/01/1959	40	05/01/1959	49	06/01/1959	58	07/01/1959	37	08/01/1959	45	09/01/1959	32				
01/02/1959	47	02/02/1959	39	03/02/1959	61	04/02/1959	40	05/02/1959	50	06/02/1959	52	07/02/1959	71	08/02/1959	43	09/02/1959	36				
01/03/1959	50	02/03/1959	39	03/03/1959	58	04/03/1959	40	05/03/1959	51	06/03/1959	50	07/03/1959	60	08/03/1959	41	09/03/1959	38				
01/04/1959	46	02/04/1959	41	03/04/1959	57	04/04/1959	45	05/04/1959	62	06/04/1959	49	07/04/1959	50	08/04/1959	40	09/04/1959	38				
01/05/1959	44	02/05/1959	42	03/05/1959	56	04/05/1959	52	05/05/1959	55	06/05/1959	48	07/05/1959	48	08/05/1959	41	09/05/1959	37				
01/06/1959	48	02/06/1959	43	03/06/1959	59	04/06/1959	61	05/06/1959	53	06/06/1959	45	07/06/1959	45	08/06/1959	47	09/06/1959	37				
01/07/1959	49	02/07/1959	41	03/07/1959	57	04/07/1959	65	05/07/1959	52	06/07/1959	39	07/07/1959	44	08/07/1959	52	09/07/1959	33				
01/08/1959	46	02/08/1959	43	03/08/1959	54	04/08/1959	59	05/08/1959	50	06/08/1959	42	07/08/1959	41	08/08/1959	46	09/08/1959	32				
01/09/1959	47	02/09/1959	39	03/09/1959	50	04/09/1959	54	05/09/1959	47	06/09/1959	47	07/09/1959	39	08/09/1959	42	09/09/1959	45				
01/10/1959	47	02/10/1959	42	03/10/1959	52	04/10/1959	52	05/10/1959	45	06/10/1959	49	07/10/1959	40	08/10/1959	38						
01/11/1959	46	02/11/1959	44	03/11/1959	52	04/11/1959	52	05/11/1959	39	06/11/1959	45	07/11/1959	41	08/11/1959	41						
01/12/1959	41	02/12/1959	43	03/12/1959	48	04/12/1959	52	05/12/1959	49	06/12/1959	44	07/12/1959	41	08/12/1959	40						
01/13/1959	43	02/13/1959	43	03/13/1959	48	04/13/1959	49	05/13/1959	42	06/13/1959	63	07/13/1959	37	08/13/1959	38						
01/14/1959	45	02/14/1959	44	03/14/1959	48	04/14/1959	49	05/14/1959	44	06/14/1959	60	07/14/1959	39	08/14/1959	40						
01/15/1959	45	02/15/1959	43	03/15/1959	47	04/15/1959	49	05/15/1959	41	06/15/1959	44	07/15/1959	48	08/15/1959	43						
01/16/1959	44	02/16/1959	41	03/16/1959	44	04/16/1959	48	05/16/1959	42	06/16/1959	42	07/16/1959	45	08/16/1959	39						
01/17/1959	45	02/17/1959	41	03/17/1959	44	04/17/1959	48	05/17/1959	41	06/17/1959	42	07/17/1959	44	08/17/1959	38						
01/18/1959	44	02/18/1959	41	03/18/1959	46	04/18/1959	49	05/18/1959	49	06/18/1959	41	07/18/1959	33	08/18/1959	37						
01/19/1959	40	02/19/1959	41	03/19/1959	47	04/19/1959	45	05/19/1959	46	06/19/1959	45	07/19/1959	38	08/19/1959	37						
01/20/1959	43	02/20/1959	42	03/20/1959	52	04/20/1959	47	05/20/1959	46	06/20/1959	43	07/20/1959	38	08/20/1959	40						
01/21/1959	48	02/21/1959	41	03/21/1959	52	04/21/1959	46	05/21/1959	43	06/21/1959	41	07/21/1959	37	08/21/1959	50						
01/22/1959	48	02/22/1959	42	03/22/1959	52	04/22/1959	49	05/22/1959	43	06/22/1959	41	07/22/1959	41	08/22/1959	42						
01/23/1959	45	02/23/1959	45	03/23/1959	50	04/23/1959	49	05/23/1959	42	06/23/1959	45	07/23/1959	42	08/23/1959	39						
01/24/1959	46	02/24/1959	52	03/24/1959	48	04/24/1959	52	05/24/1959	41	06/24/1959	45	07/24/1959	41	08/24/1959	43						
01/25/1959	45	02/25/1959	59	03/25/1959	46	04/25/1959	51	05/25/1959	40	06/25/1959	52	07/25/1959	45	08/25/1959	40						
01/26/1959	41	02/26/1959	63	03/26/1959	45	04/26/1959	47	05/26/1959	40	06/26/1959	49	07/26/1959	40	08/26/1959	39						
01/27/1959	43	02/27/1959	75	03/27/1959	44	04/27/1959	45	05/27/1959	41	06/27/1959	46	07/27/1959	36	08/27/1959	38						
01/28/1959	45	02/28/1959	76	03/28/1959	44	04/28/1959	47	05/28/1959	40	06/28/1959	43	07/28/1959	49	08/28/1959	38						
01/29/1959	45			03/29/1959	42	04/29/1959	48	05/29/1959	39	06/29/1959	41	07/29/1959	49	08/29/1959	38						
01/30/1959	44			03/30/1959	40	04/30/1959	49	05/30/1959	39	06/30/1959	38	07/30/1959	47	08/30/1959	35						
01/31/1959	43			03/31/1959	40			05/31/1959	47			07/31/1959	46	08/31/1959	32						

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1975

Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)
										06/01/1975	70	07/01/1975	53	08/01/1975	40	09/01/1975	131	10/01/1975	50	11/01/1975	52	12/01/1975	73
										06/02/1975	70	07/02/1975	51	08/02/1975	51	09/02/1975	92	10/02/1975	49	11/02/1975	53	12/02/1975	67
										06/03/1975	75	07/03/1975	50	08/03/1975	53	09/03/1975	77	10/03/1975	48	11/03/1975	58	12/03/1975	64
										06/04/1975	80	07/04/1975	58	08/04/1975	42	09/04/1975	73	10/04/1975	48	11/04/1975	58	12/04/1975	64
										06/05/1975	73	07/05/1975	51	08/05/1975	47	09/05/1975	83	10/05/1975	48	11/05/1975	54	12/05/1975	68
										06/06/1975	68	07/06/1975	50	08/06/1975	44	09/06/1975	75	10/06/1975	47	11/06/1975	56	12/06/1975	113
										06/07/1975	64	07/07/1975	51	08/07/1975	40	09/07/1975	63	10/07/1975	47	11/07/1975	72	12/07/1975	78
										06/08/1975	61	07/08/1975	50	08/08/1975	39	09/08/1975	60	10/08/1975	47	11/08/1975	63	12/08/1975	71
										06/09/1975	61	07/09/1975	48	08/09/1975	38	09/09/1975	59	10/09/1975	47	11/09/1975	60	12/09/1975	73
										06/10/1975	60	07/10/1975	46	08/10/1975	38	09/10/1975	57	10/10/1975	47	11/10/1975	61	12/10/1975	71
										06/11/1975	72	07/11/1975	45	08/11/1975	39	09/11/1975	57	10/11/1975	46	11/11/1975	58	12/11/1975	68
										06/12/1975	70	07/12/1975	45	08/12/1975	37	09/12/1975	56	10/12/1975	47	11/12/1975	61	12/12/1975	69
										06/13/1975	64	07/13/1975	50	08/13/1975	44	09/13/1975	50	10/13/1975	47	11/13/1975	61	12/13/1975	77
										06/14/1975	66	07/14/1975	51	08/14/1975	44	09/14/1975	38	10/14/1975	47	11/14/1975	60	12/14/1975	98
										06/15/1975	87	07/15/1975	48	08/15/1975	44	09/15/1975	62	10/15/1975	47	11/15/1975	58	12/15/1975	128
										06/16/1975	81	07/16/1975	49	08/16/1975	41	09/16/1975	51	10/16/1975	46	11/16/1975	57	12/16/1975	88
										06/17/1975	66	07/17/1975	47	08/17/1975	40	09/17/1975	52	10/17/1975	44	11/17/1975	58	12/17/1975	77
										06/18/1975	65	07/18/1975	47	08/18/1975	40	09/18/1975	51	10/18/1975	44	11/18/1975	59	12/18/1975	69
										06/19/1975	63	07/19/1975	63	08/19/1975	40	09/19/1975	55	10/19/1975	50	11/19/1975	59	12/19/1975	68
										06/20/1975	61	07/20/1975	52	08/20/1975	39	09/20/1975	57	10/20/1975	51	11/20/1975	67	12/20/1975	66
										06/21/1975	60	07/21/1975	47	08/21/1975	99	09/21/1975	56	10/21/1975	49	11/21/1975	66	12/21/1975	60
										06/22/1975	60	07/22/1975	44	08/22/1975	234	09/22/1975	57	10/22/1975	49	11/22/1975	58	12/22/1975	60
										06/23/1975	56	07/23/1975	39	08/23/1975	72	09/23/1975	54	10/23/1975	50	11/23/1975	57	12/23/1975	60
										06/24/1975	68	07/24/1975	47	08/24/1975	57	09/24/1975	53	10/24/1975	50	11/24/1975	56	12/24/1975	62
										06/25/1975	97	07/25/1975	43	08/25/1975	53	09/25/1975	52	10/25/1975	63	11/25/1975	57	12/25/1975	62
										06/26/1975	75	07/26/1975	41	08/26/1975	54	09/26/1975	52	10/26/1975	51	11/26/1975	57	12/26/1975	63
										06/27/1975	63	07/27/1975	40	08/27/1975	49	09/27/1975	49	10/27/1975	49	11/27/1975	59	12/27/1975	61
										06/28/1975	65	07/28/1975	39	08/28/1975	47	09/28/1975	49	10/28/1975	51	11/28/1975	59	12/28/1975	60
										06/29/1975	63	07/29/1975	40	08/29/1975	83	09/29/1975	50	10/29/1975	49	11/29/1975	73	12/29/1975	56
										06/30/1975	55	07/30/1975	40	08/30/1975	231	09/30/1975	53	10/30/1975	47	11/30/1975	88	12/30/1975	66
												07/31/1975	40	08/31/1975	181			10/31/1975	48			12/31/1975	65

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1976

Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)
01/01/1976	63	02/01/1976	50	03/01/1976	77	04/01/1976	62	05/01/1976	67	06/01/1976	65	07/01/1976	65	08/01/1976	47	09/01/1976	43	10/01/1976	47	11/01/1976	45	12/01/1976	43
01/02/1976	63	02/02/1976	49	03/02/1976	94	04/02/1976	63	05/02/1976	81	06/02/1976	62	07/02/1976	53	08/02/1976	44	09/02/1976	42	10/02/1976	45	11/02/1976	44	12/02/1976	42
01/03/1976	60	02/03/1976	48	03/03/1976	97	04/03/1976	62	05/03/1976	72	06/03/1976	59	07/03/1976	48	08/03/1976	39	09/03/1976	42	10/03/1976	46	11/03/1976	45	12/03/1976	40
01/04/1976	54	02/04/1976	49	03/04/1976	82	04/04/1976	64	05/04/1976	68	06/04/1976	57	07/04/1976	47	08/04/1976	41	09/04/1976	40	10/04/1976	46	11/04/1976	45	12/04/1976	39
01/05/1976	57	02/05/1976	49	03/05/1976	127	04/05/1976	62	05/05/1976	66	06/05/1976	54	07/05/1976	45	08/05/1976	46	09/05/1976	40	10/05/1976	50	11/05/1976	45	12/05/1976	40
01/06/1976	58	02/06/1976	49	03/06/1976	84	04/06/1976	61	05/06/1976	98	06/06/1976	50	07/06/1976	44	08/06/1976	46	09/06/1976	38	10/06/1976	75	11/06/1976	50	12/06/1976	40
01/07/1976	60	02/07/1976	47	03/07/1976	73	04/07/1976	62	05/07/1976	105	06/07/1976	54	07/07/1976	42	08/07/1976	44	09/07/1976	44	10/07/1976	55	11/07/1976	50	12/07/1976	41
01/08/1976	59	02/08/1976	49	03/08/1976	68	04/08/1976	59	05/08/1976	75	06/08/1976	55	07/08/1976	44	08/08/1976	45	09/08/1976	56	10/08/1976	51	11/08/1976	48	12/08/1976	40
01/09/1976	59	02/09/1976	48	03/09/1976	65	04/09/1976	58	05/09/1976	69	06/09/1976	55	07/09/1976	44	08/09/1976	45	09/09/1976	45	10/09/1976	47	11/09/1976	49	12/09/1976	40
01/10/1976	56	02/10/1976	58	03/10/1976	65	04/10/1976	57	05/10/1976	64	06/10/1976	60	07/10/1976	40	08/10/1976	44	09/10/1976	41	10/10/1976	45	11/10/1976	44	12/10/1976	41
01/11/1976	59	02/11/1976	62	03/11/1976	62	04/11/1976	65	05/11/1976	61	06/11/1976	57	07/11/1976	40	08/11/1976	45	09/11/1976	41	10/11/1976	47	11/11/1976	44	12/11/1976	40
01/12/1976	59	02/12/1976	60	03/12/1976	69	04/12/1976	59	05/12/1976	58	06/12/1976	51	07/12/1976	39	08/12/1976	45	09/12/1976	42	10/12/1976	47	11/12/1976	43	12/12/1976	39
01/13/1976	60	02/13/1976	69	03/13/1976	71	04/13/1976	58	05/13/1976	58	06/13/1976	49	07/13/1976	38	08/13/1976	46	09/13/1976	41	10/13/1976	46	11/13/1976	42	12/13/1976	38
01/14/1976	60	02/14/1976	64	03/14/1976	65	04/14/1976	57	05/14/1976	58	06/14/1976	52	07/14/1976	39	08/14/1976	52	09/14/1976	41	10/14/1976	45	11/14/1976	42	12/14/1976	38
01/15/1976	60	02/15/1976	68	03/15/1976	63	04/15/1976	65	05/15/1976	60	06/15/1976	57	07/15/1976	41	08/15/1976	45	09/15/1976	44	10/15/1976	46	11/15/1976	41	12/15/1976	38
01/16/1976	61	02/16/1976	83	03/16/1976	63	04/16/1976	73	05/16/1976	76	06/16/1976	58	07/16/1976	43	08/16/1976	44	09/16/1976	43	10/16/1976	44	11/16/1976	41	12/16/1976	37
01/17/1976	57	02/17/1976	76	03/17/1976	61	04/17/1976	61	05/17/1976	82	06/17/1976	56	07/17/1976	40	08/17/1976	47	09/17/1976	43	10/17/1976	43	11/17/1976	40	12/17/1976	37
01/18/1976	56	02/18/1976	74	03/18/1976	61	04/18/1976	62	05/18/1976	62	06/18/1976	57	07/18/1976	39	08/18/1976	47	09/18/1976	41	10/18/1976	42	11/18/1976	39	12/18/1976	37
01/19/1976	56	02/19/1976	68	03/19/1976	65	04/19/1976	70	05/19/1976	58	06/19/1976	60	07/19/1976	38	08/19/1976	47	09/19/1976	40	10/19/1976	45	11/19/1976	40	12/19/1976	39
01/20/1976	57	02/20/1976	63	03/20/1976	66	04/20/1976	62	05/20/1976	65	06/20/1976	46	07/20/1976	51	08/20/1976	48	09/20/1976	49	10/20/1976	46	11/20/1976	39	12/20/1976	42
01/21/1976	55	02/21/1976	135	03/21/1976	68	04/21/1976	73	05/21/1976	60	06/21/1976	46	07/21/1976	79	08/21/1976	46	09/21/1976	60	10/21/1976	52	11/21/1976	40	12/21/1976	38
01/22/1976	55	02/22/1976	100	03/22/1976	63	04/22/1976	70	05/22/1976	58	06/22/1976	47	07/22/1976	50	08/22/1976	45	09/22/1976	48	10/22/1976	50	11/22/1976	39	12/22/1976	38
01/23/1976	56	02/23/1976	74	03/23/1976	66	04/23/1976	63	05/23/1976	57	06/23/1976	46	07/23/1976	48	08/23/1976	47	09/23/1976	45	10/23/1976	46	11/23/1976	39	12/23/1976	40
01/24/1976	54	02/24/1976	69	03/24/1976	70	04/24/1976	85	05/24/1976	56	06/24/1976	62	07/24/1976	44	08/24/1976	46	09/24/1976	46	10/24/1976	47	11/24/1976	38	12/24/1976	39
01/25/1976	56	02/25/1976	67	03/25/1976	64	04/25/1976	176	05/25/1976	56	06/25/1976	57	07/25/1976	41	08/25/1976	47	09/25/1976	44	10/25/1976	45	11/25/1976	40	12/25/1976	39
01/26/1976	56	02/26/1976	64	03/26/1976	60	04/26/1976	147	05/26/1976	56	06/26/1976	47	07/26/1976	42	08/26/1976	50	09/26/1976	42	10/26/1976	45	11/26/1976	63	12/26/1976	40
01/27/1976	55	02/27/1976	60	03/27/1976	75	04/27/1976	93	05/27/1976	56	06/27/1976	45	07/27/1976	76	08/27/1976	47	09/27/1976	48	10/27/1976	44	11/27/1976	72	12/27/1976	40
01/28/1976	55	02/28/1976	57	03/28/1976	78	04/28/1976	79	05/28/1976	56	06/28/1976	44	07/28/1976	47	08/28/1976	41	09/28/1976	88	10/28/1976	42	11/28/1976	51	12/28/1976	40
01/29/1976	55	02/29/1976	59	03/29/1976	72	04/29/1976	72	05/29/1976	62	06/29/1976	48	07/29/1976	48	08/29/1976	37	09/29/1976	50	10/29/1976	45	11/29/1976	45	12/29/1976	40
01/30/1976	55			03/30/1976	69	04/30/1976	69	05/30/1976	76	06/30/1976	69	07/30/1976	43	08/30/1976	38	09/30/1976	48	10/30/1976	47	11/30/1976	45	12/30/1976	40
01/31/1976	50			03/31/1976	66			05/31/1976	77			07/31/1976	52	08/31/1976	41			10/31/1976	52			12/31/1976	39

PORTAGE CREEK DAILY MEAN FLOW
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1977

Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)
01/01/1977	36	02/01/1977	39	03/01/1977	62	04/01/1977	54	05/01/1977	51	06/01/1977	33	07/01/1977	39	08/01/1977	25	09/01/1977	61	10/01/1977	71	11/01/1977	36	12/01/1977	57
01/02/1977	38	02/02/1977	39	03/02/1977	58	04/02/1977	74	05/02/1977	51	06/02/1977	33	07/02/1977	29	08/02/1977	24	09/02/1977	76	10/02/1977	46	11/02/1977	33	12/02/1977	42
01/03/1977	39	02/03/1977	42	03/03/1977	65	04/03/1977	65	05/03/1977	47	06/03/1977	31	07/03/1977	30	08/03/1977	24	09/03/1977	46	10/03/1977	41	11/03/1977	34	12/03/1977	42
01/04/1977	42	02/04/1977	44	03/04/1977	115	04/04/1977	59	05/04/1977	47	06/04/1977	31	07/04/1977	29	08/04/1977	28	09/04/1977	42	10/04/1977	40	11/04/1977	34	12/04/1977	40
01/05/1977	42	02/05/1977	44	03/05/1977	89	04/05/1977	63	05/05/1977	48	06/05/1977	51	07/05/1977	30	08/05/1977	34	09/05/1977	40	10/05/1977	40	11/05/1977	36	12/05/1977	37
01/06/1977	40	02/06/1977	42	03/06/1977	70	04/06/1977	56	05/06/1977	47	06/06/1977	36	07/06/1977	29	08/06/1977	31	09/06/1977	39	10/06/1977	38	11/06/1977	36	12/06/1977	35
01/07/1977	41	02/07/1977	43	03/07/1977	66	04/07/1977	50	05/07/1977	47	06/07/1977	33	07/07/1977	27	08/07/1977	28	09/07/1977	37	10/07/1977	38	11/07/1977	34	12/07/1977	34
01/08/1977	40	02/08/1977	43	03/08/1977	69	04/08/1977	47	05/08/1977	46	06/08/1977	47	07/08/1977	27	08/08/1977	30	09/08/1977	38	10/08/1977	50	11/08/1977	34	12/08/1977	35
01/09/1977	39	02/09/1977	44	03/09/1977	82	04/09/1977	49	05/09/1977	44	06/09/1977	38	07/09/1977	25	08/09/1977	31	09/09/1977	38	10/09/1977	42	11/09/1977	34	12/09/1977	33
01/10/1977	39	02/10/1977	45	03/10/1977	82	04/10/1977	48	05/10/1977	42	06/10/1977	33	07/10/1977	24	08/10/1977	47	09/10/1977	38	10/10/1977	39	11/10/1977	36	12/10/1977	36
01/11/1977	38	02/11/1977	51	03/11/1977	75	04/11/1977	48	05/11/1977	42	06/11/1977	39	07/11/1977	26	08/11/1977	34	09/11/1977	39	10/11/1977	39	11/11/1977	36	12/11/1977	36
01/12/1977	37	02/12/1977	55	03/12/1977	86	04/12/1977	48	05/12/1977	43	06/12/1977	34	07/12/1977	27	08/12/1977	33	09/12/1977	38	10/12/1977	37	11/12/1977	33	12/12/1977	35
01/13/1977	38	02/13/1977	54	03/13/1977	80	04/13/1977	48	05/13/1977	42	06/13/1977	33	07/13/1977	27	08/13/1977	30	09/13/1977	68	10/13/1977	37	11/13/1977	35	12/13/1977	41
01/14/1977	39	02/14/1977	48	03/14/1977	73	04/14/1977	48	05/14/1977	40	06/14/1977	32	07/14/1977	35	08/14/1977	29	09/14/1977	45	10/14/1977	37	11/14/1977	33	12/14/1977	46
01/15/1977	40	02/15/1977	48	03/15/1977	68	04/15/1977	48	05/15/1977	40	06/15/1977	32	07/15/1977	28	08/15/1977	28	09/15/1977	51	10/15/1977	38	11/15/1977	36	12/15/1977	42
01/16/1977	38	02/16/1977	49	03/16/1977	61	04/16/1977	46	05/16/1977	39	06/16/1977	33	07/16/1977	28	08/16/1977	28	09/16/1977	48	10/16/1977	36	11/16/1977	33	12/16/1977	43
01/17/1977	36	02/17/1977	48	03/17/1977	57	04/17/1977	46	05/17/1977	46	06/17/1977	35	07/17/1977	29	08/17/1977	28	09/17/1977	44	10/17/1977	36	11/17/1977	36	12/17/1977	46
01/18/1977	39	02/18/1977	49	03/18/1977	69	04/18/1977	50	05/18/1977	48	06/18/1977	31	07/18/1977	27	08/18/1977	27	09/18/1977	50	10/18/1977	40	11/18/1977	35	12/18/1977	81
01/19/1977	39	02/19/1977	48	03/19/1977	61	04/19/1977	47	05/19/1977	39	06/19/1977	30	07/19/1977	26	08/19/1977	26	09/19/1977	42	10/19/1977	37	11/19/1977	33	12/19/1977	57
01/20/1977	38	02/20/1977	46	03/20/1977	66	04/20/1977	50	05/20/1977	37	06/20/1977	30	07/20/1977	24	08/20/1977	26	09/20/1977	39	10/20/1977	36	11/20/1977	43	12/20/1977	68
01/21/1977	39	02/21/1977	46	03/21/1977	59	04/21/1977	48	05/21/1977	37	06/21/1977	30	07/21/1977	23	08/21/1977	29	09/21/1977	37	10/21/1977	36	11/21/1977	38	12/21/1977	46
01/22/1977	37	02/22/1977	51	03/22/1977	60	04/22/1977	63	05/22/1977	34	06/22/1977	30	07/22/1977	22	08/22/1977	30	09/22/1977	37	10/22/1977	36	11/22/1977	33	12/22/1977	45
01/23/1977	37	02/23/1977	62	03/23/1977	56	04/23/1977	63	05/23/1977	33	06/23/1977	28	07/23/1977	20	08/23/1977	29	09/23/1977	36	10/23/1977	36	11/23/1977	34	12/23/1977	43
01/24/1977	37	02/24/1977	125	03/24/1977	53	04/24/1977	50	05/24/1977	34	06/24/1977	28	07/24/1977	23	08/24/1977	32	09/24/1977	73	10/24/1977	33	11/24/1977	32	12/24/1977	45
01/25/1977	39	02/25/1977	85	03/25/1977	50	04/25/1977	62	05/25/1977	33	06/25/1977	29	07/25/1977	23	08/25/1977	28	09/25/1977	47	10/25/1977	34	11/25/1977	35	12/25/1977	47
01/26/1977	39	02/26/1977	70	03/26/1977	48	04/26/1977	55	05/26/1977	31	06/26/1977	26	07/26/1977	21	08/26/1977	29	09/26/1977	50	10/26/1977	36	11/26/1977	34	12/26/1977	45
01/27/1977	37	02/27/1977	66	03/27/1977	50	04/27/1977	50	05/27/1977	32	06/27/1977	26	07/27/1977	23	08/27/1977	31	09/27/1977	41	10/27/1977	34	11/27/1977	32	12/27/1977	41
01/28/1977	38	02/28/1977	65	03/28/1977	81	04/28/1977	65	05/28/1977	28	06/28/1977	29	07/28/1977	26	08/28/1977	47	09/28/1977	39	10/28/1977	34	11/28/1977	31	12/28/1977	40
01/29/1977	40			03/29/1977	77	04/29/1977	54	05/29/1977	28	06/29/1977	33	07/29/1977	30	08/29/1977	70	09/29/1977	37	10/29/1977	33	11/29/1977	31	12/29/1977	41
01/30/1977	40			03/30/1977	62	04/30/1977	50	05/30/1977	29	06/30/1977	65	07/30/1977	27	08/30/1977	39	09/30/1977	37	10/30/1977	36	11/30/1977	33	12/30/1977	40
01/31/1977	38			03/31/1977	57			05/31/1977	30			07/31/1977	26	08/31/1977	37			10/31/1977	34			12/31/1977	38

PORTAGE CREEK DAILY MEAN FLOW
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1978

Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)
01/01/1978	41	02/01/1978	33	03/01/1978	28	04/01/1978	70	05/01/1978	42	06/01/1978	39	07/01/1978	65	08/01/1978	33	09/01/1978	32	10/01/1978	41	11/01/1978	41	12/01/1978	52
01/02/1978	40	02/02/1978	34	03/02/1978	29	04/02/1978	61	05/02/1978	39	06/02/1978	37	07/02/1978	75	08/02/1978	32	09/02/1978	31	10/02/1978	42	11/02/1978	42	12/02/1978	50
01/03/1978	38	02/03/1978	37	03/03/1978	28	04/03/1978	62	05/03/1978	39	06/03/1978	41	07/03/1978	59	08/03/1978	32	09/03/1978	32	10/03/1978	46	11/03/1978	41	12/03/1978	62
01/04/1978	39	02/04/1978	36	03/04/1978	27	04/04/1978	68	05/04/1978	40	06/04/1978	37	07/04/1978	51	08/04/1978	31	09/04/1978	33	10/04/1978	43	11/04/1978	40	12/04/1978	64
01/05/1978	41	02/05/1978	31	03/05/1978	26	04/05/1978	58	05/05/1978	42	06/05/1978	37	07/05/1978	47	08/05/1978	30	09/05/1978	30	10/05/1978	49	11/05/1978	40	12/05/1978	57
01/06/1978	39	02/06/1978	28	03/06/1978	26	04/06/1978	113	05/06/1978	38	06/06/1978	39	07/06/1978	46	08/06/1978	29	09/06/1978	29	10/06/1978	72	11/06/1978	45	12/06/1978	55
01/07/1978	42	02/07/1978	28	03/07/1978	26	04/07/1978	81	05/07/1978	37	06/07/1978	46	07/07/1978	45	08/07/1978	30	09/07/1978	30	10/07/1978	54	11/07/1978	44	12/07/1978	53
01/08/1978	43	02/08/1978	28	03/08/1978	26	04/08/1978	56	05/08/1978	42	06/08/1978	44	07/08/1978	43	08/08/1978	30	09/08/1978	29	10/08/1978	50	11/08/1978	43	12/08/1978	54
01/09/1978	38	02/09/1978	28	03/09/1978	27	04/09/1978	52	05/09/1978	43	06/09/1978	39	07/09/1978	40	08/09/1978	32	09/09/1978	30	10/09/1978	47	11/09/1978	43	12/09/1978	50
01/10/1978	37	02/10/1978	26	03/10/1978	30	04/10/1978	52	05/10/1978	41	06/10/1978	38	07/10/1978	41	08/10/1978	31	09/10/1978	30	10/10/1978	45	11/10/1978	43	12/10/1978	48
01/11/1978	37	02/11/1978	26	03/11/1978	29	04/11/1978	55	05/11/1978	57	06/11/1978	39	07/11/1978	38	08/11/1978	29	09/11/1978	29	10/11/1978	45	11/11/1978	40	12/11/1978	48
01/12/1978	36	02/12/1978	25	03/12/1978	33	04/12/1978	47	05/12/1978	60	06/12/1978	46	07/12/1978	37	08/12/1978	29	09/12/1978	132	10/12/1978	43	11/12/1978	40	12/12/1978	50
01/13/1978	37	02/13/1978	26	03/13/1978	33	04/13/1978	45	05/13/1978	114	06/13/1978	38	07/13/1978	39	08/13/1978	28	09/13/1978	135	10/13/1978	43	11/13/1978	44	12/13/1978	50
01/14/1978	35	02/14/1978	27	03/14/1978	50	04/14/1978	41	05/14/1978	75	06/14/1978	36	07/14/1978	41	08/14/1978	29	09/14/1978	76	10/14/1978	43	11/14/1978	47	12/14/1978	49
01/15/1978	34	02/15/1978	27	03/15/1978	44	04/15/1978	39	05/15/1978	57	06/15/1978	36	07/15/1978	40	08/15/1978	29	09/15/1978	51	10/15/1978	50	11/15/1978	45	12/15/1978	50
01/16/1978	34	02/16/1978	28	03/16/1978	42	04/16/1978	37	05/16/1978	50	06/16/1978	38	07/16/1978	42	08/16/1978	39	09/16/1978	46	10/16/1978	53	11/16/1978	44	12/16/1978	48
01/17/1978	37	02/17/1978	30	03/17/1978	41	04/17/1978	38	05/17/1978	48	06/17/1978	38	07/17/1978	38	08/17/1978	29	09/17/1978	205	10/17/1978	50	11/17/1978	53	12/17/1978	46
01/18/1978	36	02/18/1978	28	03/18/1978	39	04/18/1978	41	05/18/1978	45	06/18/1978	41	07/18/1978	36	08/18/1978	29	09/18/1978	157	10/18/1978	50	11/18/1978	45	12/18/1978	48
01/19/1978	37	02/19/1978	27	03/19/1978	39	04/19/1978	42	05/19/1978	43	06/19/1978	38	07/19/1978	35	08/19/1978	41	09/19/1978	84	10/19/1978	52	11/19/1978	43	12/19/1978	47
01/20/1978	37	02/20/1978	26	03/20/1978	47	04/20/1978	43	05/20/1978	65	06/20/1978	43	07/20/1978	38	08/20/1978	32	09/20/1978	63	10/20/1978	48	11/20/1978	43	12/20/1978	51
01/21/1978	36	02/21/1978	26	03/21/1978	105	04/21/1978	42	05/21/1978	66	06/21/1978	52	07/21/1978	81	08/21/1978	31	09/21/1978	60	10/21/1978	48	11/21/1978	48	12/21/1978	51
01/22/1978	35	02/22/1978	28	03/22/1978	60	04/22/1978	38	05/22/1978	47	06/22/1978	39	07/22/1978	47	08/22/1978	30	09/22/1978	47	10/22/1978	47	11/22/1978	48	12/22/1978	48
01/23/1978	37	02/23/1978	27	03/23/1978	62	04/23/1978	40	05/23/1978	44	06/23/1978	38	07/23/1978	49	08/23/1978	28	09/23/1978	49	10/23/1978	53	11/23/1978	60	12/23/1978	47
01/24/1978	37	02/24/1978	27	03/24/1978	61	04/24/1978	41	05/24/1978	44	06/24/1978	40	07/24/1978	41	08/24/1978	30	09/24/1978	43	10/24/1978	41	11/24/1978	50	12/24/1978	46
01/25/1978	37	02/25/1978	27	03/25/1978	53	04/25/1978	46	05/25/1978	46	06/25/1978	61	07/25/1978	38	08/25/1978	31	09/25/1978	41	10/25/1978	46	11/25/1978	48	12/25/1978	48
01/26/1978	35	02/26/1978	27	03/26/1978	57	04/26/1978	40	05/26/1978	41	06/26/1978	387	07/26/1978	37	08/26/1978	33	09/26/1978	41	10/26/1978	50	11/26/1978	50	12/26/1978	43
01/27/1978	36	02/27/1978	27	03/27/1978	49	04/27/1978	35	05/27/1978	39	06/27/1978	151	07/27/1978	38	08/27/1978	45	09/27/1978	38	10/27/1978	44	11/27/1978	50	12/27/1978	45
01/28/1978	37	02/28/1978	29	03/28/1978	53	04/28/1978	36	05/28/1978	41	06/28/1978	78	07/28/1978	37	08/28/1978	47	09/28/1978	40	10/28/1978	43	11/28/1978	51	12/28/1978	44
01/29/1978	32			03/29/1978	70	04/29/1978	36	05/29/1978	41	06/29/1978	63	07/29/1978	34	08/29/1978	37	09/29/1978	40	10/29/1978	43	11/29/1978	50	12/29/1978	45
01/30/1978	29			03/30/1978	61	04/30/1978	37	05/30/1978	39	06/30/1978	54	07/30/1978	34	08/30/1978	34	09/30/1978	41	10/30/1978	42	11/30/1978	52	12/30/1978	53
01/31/1978	31			03/31/1978	60			05/31/1978	40			07/31/1978	35	08/31/1978	33			10/31/1978	42			12/31/1978	72

PORTAGE CREEK DAILY MEAN FLOW
Measured Flow
Reed Street (4106500)
1950-1959, 1975-1986

1979

Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)
01/01/1979	70	02/01/1979	45	03/01/1979	49	04/01/1979	64	05/01/1979	66	06/01/1979	60	07/01/1979	76	08/01/1979	46	09/01/1979	40	10/01/1979	34	11/01/1979	62	12/01/1979	51
01/02/1979	51	02/02/1979	45	03/02/1979	50	04/02/1979	72	05/02/1979	63	06/02/1979	55	07/02/1979	61	08/02/1979	46	09/02/1979	37	10/02/1979	43	11/02/1979	45	12/02/1979	46
01/03/1979	47	02/03/1979	45	03/03/1979	70	04/03/1979	66	05/03/1979	101	06/03/1979	52	07/03/1979	57	08/03/1979	42	09/03/1979	36	10/03/1979	36	11/03/1979	41	12/03/1979	45
01/04/1979	45	02/04/1979	43	03/04/1979	110	04/04/1979	60	05/04/1979	74	06/04/1979	50	07/04/1979	99	08/04/1979	44	09/04/1979	36	10/04/1979	36	11/04/1979	41	12/04/1979	47
01/05/1979	45	02/05/1979	43	03/05/1979	95	04/05/1979	60	05/05/1979	66	06/05/1979	50	07/05/1979	65	08/05/1979	60	09/05/1979	37	10/05/1979	35	11/05/1979	41	12/05/1979	48
01/06/1979	43	02/06/1979	45	03/06/1979	75	04/06/1979	58	05/06/1979	60	06/06/1979	50	07/06/1979	58	08/06/1979	44	09/06/1979	30	10/06/1979	41	11/06/1979	42	12/06/1979	51
01/07/1979	39	02/07/1979	46	03/07/1979	72	04/07/1979	54	05/07/1979	59	06/07/1979	93	07/07/1979	54	08/07/1979	47	09/07/1979	35	10/07/1979	49	11/07/1979	41	12/07/1979	57
01/08/1979	39	02/08/1979	45	03/08/1979	70	04/08/1979	56	05/08/1979	59	06/08/1979	158	07/08/1979	50	08/08/1979	42	09/08/1979	39	10/08/1979	39	11/08/1979	44	12/08/1979	55
01/09/1979	40	02/09/1979	43	03/09/1979	74	04/09/1979	60	05/09/1979	57	06/09/1979	76	07/09/1979	50	08/09/1979	41	09/09/1979	34	10/09/1979	38	11/09/1979	45	12/09/1979	47
01/10/1979	40	02/10/1979	45	03/10/1979	66	04/10/1979	58	05/10/1979	57	06/10/1979	71	07/10/1979	50	08/10/1979	70	09/10/1979	35	10/10/1979	40	11/10/1979	45	12/10/1979	46
01/11/1979	39	02/11/1979	42	03/11/1979	62	04/11/1979	58	05/11/1979	66	06/11/1979	61	07/11/1979	49	08/11/1979	46	09/11/1979	35	10/11/1979	42	11/11/1979	42	12/11/1979	48
01/12/1979	40	02/12/1979	42	03/12/1979	60	04/12/1979	64	05/12/1979	67	06/12/1979	60	07/12/1979	49	08/12/1979	40	09/12/1979	35	10/12/1979	41	11/12/1979	41	12/12/1979	55
01/13/1979	42	02/13/1979	42	03/13/1979	67	04/13/1979	60	05/13/1979	61	06/13/1979	56	07/13/1979	47	08/13/1979	40	09/13/1979	37	10/13/1979	40	11/13/1979	42	12/13/1979	47
01/14/1979	40	02/14/1979	46	03/14/1979	71	04/14/1979	56	05/14/1979	65	06/14/1979	53	07/14/1979	44	08/14/1979	42	09/14/1979	36	10/14/1979	37	11/14/1979	40	12/14/1979	46
01/15/1979	37	02/15/1979	42	03/15/1979	62	04/15/1979	52	05/15/1979	61	06/15/1979	49	07/15/1979	41	08/15/1979	39	09/15/1979	33	10/15/1979	37	11/15/1979	41	12/15/1979	46
01/16/1979	37	02/16/1979	43	03/16/1979	58	04/16/1979	54	05/16/1979	58	06/16/1979	48	07/16/1979	40	08/16/1979	36	09/16/1979	32	10/16/1979	37	11/16/1979	41	12/16/1979	44
01/17/1979	40	02/17/1979	40	03/17/1979	58	04/17/1979	56	05/17/1979	57	06/17/1979	45	07/17/1979	38	08/17/1979	52	09/17/1979	32	10/17/1979	38	11/17/1979	41	12/17/1979	40
01/18/1979	39	02/18/1979	40	03/18/1979	60	04/18/1979	54	05/18/1979	57	06/18/1979	41	07/18/1979	37	08/18/1979	68	09/18/1979	32	10/18/1979	40	11/18/1979	38	12/18/1979	41
01/19/1979	39	02/19/1979	39	03/19/1979	70	04/19/1979	54	05/19/1979	57	06/19/1979	42	07/19/1979	36	08/19/1979	50	09/19/1979	33	10/19/1979	39	11/19/1979	39	12/19/1979	41
01/20/1979	40	02/20/1979	43	03/20/1979	66	04/20/1979	54	05/20/1979	55	06/20/1979	79	07/20/1979	37	08/20/1979	85	09/20/1979	35	10/20/1979	38	11/20/1979	40	12/20/1979	42
01/21/1979	39	02/21/1979	47	03/21/1979	64	04/21/1979	56	05/21/1979	53	06/21/1979	64	07/21/1979	37	08/21/1979	60	09/21/1979	35	10/21/1979	36	11/21/1979	66	12/21/1979	43
01/22/1979	39	02/22/1979	49	03/22/1979	60	04/22/1979	56	05/22/1979	53	06/22/1979	48	07/22/1979	36	08/22/1979	49	09/22/1979	35	10/22/1979	47	11/22/1979	70	12/22/1979	44
01/23/1979	45	02/23/1979	58	03/23/1979	64	04/23/1979	52	05/23/1979	54	06/23/1979	48	07/23/1979	36	08/23/1979	56	09/23/1979	33	10/23/1979	55	11/23/1979	63	12/23/1979	53
01/24/1979	45	02/24/1979	54	03/24/1979	64	04/24/1979	60	05/24/1979	54	06/24/1979	43	07/24/1979	35	08/24/1979	53	09/24/1979	32	10/24/1979	44	11/24/1979	57	12/24/1979	102
01/25/1979	44	02/25/1979	47	03/25/1979	55	04/25/1979	70	05/25/1979	53	06/25/1979	43	07/25/1979	40	08/25/1979	45	09/25/1979	34	10/25/1979	43	11/25/1979	58	12/25/1979	148
01/26/1979	44	02/26/1979	48	03/26/1979	52	04/26/1979	78	05/26/1979	53	06/26/1979	45	07/26/1979	38	08/26/1979	43	09/26/1979	33	10/26/1979	42	11/26/1979	127	12/26/1979	82
01/27/1979	46	02/27/1979	49	03/27/1979	50	04/27/1979	72	05/27/1979	50	06/27/1979	46	07/27/1979	38	08/27/1979	41	09/27/1979	34	10/27/1979	40	11/27/1979	70	12/27/1979	70
01/28/1979	45	02/28/1979	49	03/28/1979	52	04/28/1979	68	05/28/1979	49	06/28/1979	53	07/28/1979	38	08/28/1979	40	09/28/1979	33	10/28/1979	39	11/28/1979	66	12/28/1979	62
01/29/1979	43			03/29/1979	60	04/29/1979	64	05/29/1979	50	06/29/1979	82	07/29/1979	36	08/29/1979	50	09/29/1979	33	10/29/1979	39	11/29/1979	58	12/29/1979	60
01/30/1979	44			03/30/1979	88	04/30/1979	74	05/30/1979	60	06/30/1979	140	07/30/1979	55	08/30/1979	43	09/30/1979	31	10/30/1979	39	11/30/1979	55	12/30/1979	55
01/31/1979	43			03/31/1979	80			05/31/1979	58			07/31/1979	50	08/31/1979	42			10/31/1979	40			12/31/1979	50

PORTAGE CREEK DAILY MEAN FLOW
Measured Flow
Reed Street (4106500)
1950-1959, 1975-1986

1980

Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)
01/01/1980	38	02/01/1980	43	03/01/1980	44	04/01/1980	56	05/01/1980	57	06/01/1980	53	07/01/1980	46	08/01/1980	41	09/01/1980	83	10/01/1980	53	11/01/1980	50	12/01/1980	56
01/02/1980	64	02/02/1980	45	03/02/1980	42	04/02/1980	61	05/02/1980	58	06/02/1980	53	07/02/1980	40	08/02/1980	88	09/02/1980	81	10/02/1980	55	11/02/1980	47	12/02/1980	85
01/03/1980	64	02/03/1980	45	03/03/1980	43	04/03/1980	75	05/03/1980	59	06/03/1980	116	07/03/1980	36	08/03/1980	122	09/03/1980	68	10/03/1980	56	11/03/1980	46	12/03/1980	62
01/04/1980	51	02/04/1980	43	03/04/1980	48	04/04/1980	83	05/04/1980	56	06/04/1980	58	07/04/1980	37	08/04/1980	70	09/04/1980	61	10/04/1980	52	11/04/1980	52	12/04/1980	57
01/05/1980	50	02/05/1980	45	03/05/1980	51	04/05/1980	63	05/05/1980	56	06/05/1980	55	07/05/1980	60	08/05/1980	62	09/05/1980	58	10/05/1980	46	11/05/1980	49	12/05/1980	59
01/06/1980	46	02/06/1980	45	03/06/1980	44	04/06/1980	54	05/06/1980	56	06/06/1980	60	07/06/1980	44	08/06/1980	58	09/06/1980	55	10/06/1980	48	11/06/1980	50	12/06/1980	59
01/07/1980	48	02/07/1980	43	03/07/1980	41	04/07/1980	53	05/07/1980	53	06/07/1980	105	07/07/1980	44	08/07/1980	51	09/07/1980	54	10/07/1980	50	11/07/1980	50	12/07/1980	73
01/08/1980	55	02/08/1980	42	03/08/1980	66	04/08/1980	82	05/08/1980	54	06/08/1980	121	07/08/1980	41	08/08/1980	49	09/08/1980	54	10/08/1980	50	11/08/1980	49	12/08/1980	83
01/09/1980	56	02/09/1980	44	03/09/1980	73	04/09/1980	106	05/09/1980	50	06/09/1980	71	07/09/1980	49	08/09/1980	47	09/09/1980	58	10/09/1980	50	11/09/1980	47	12/09/1980	78
01/10/1980	56	02/10/1980	44	03/10/1980	60	04/10/1980	87	05/10/1980	51	06/10/1980	63	07/10/1980	40	08/10/1980	53	09/10/1980	54	10/10/1980	47	11/10/1980	46	12/10/1980	64
01/11/1980	81	02/11/1980	45	03/11/1980	57	04/11/1980	68	05/11/1980	56	06/11/1980	54	07/11/1980	37	08/11/1980	53	09/11/1980	53	10/11/1980	48	11/11/1980	47	12/11/1980	58
01/12/1980	66	02/12/1980	48	03/12/1980	46	04/12/1980	66	05/12/1980	51	06/12/1980	54	07/12/1980	65	08/12/1980	52	09/12/1980	56	10/12/1980	47	11/12/1980	50	12/12/1980	56
01/13/1980	58	02/13/1980	46	03/13/1980	50	04/13/1980	52	05/13/1980	64	06/13/1980	51	07/13/1980	61	08/13/1980	48	09/13/1980	58	10/13/1980	48	11/13/1980	52	12/13/1980	55
01/14/1980	58	02/14/1980	46	03/14/1980	57	04/14/1980	67	05/14/1980	53	06/14/1980	54	07/14/1980	44	08/14/1980	107	09/14/1980	53	10/14/1980	49	11/14/1980	53	12/14/1980	51
01/15/1980	49	02/15/1980	51	03/15/1980	54	04/15/1980	71	05/15/1980	52	06/15/1980	71	07/15/1980	43	08/15/1980	79	09/15/1980	51	10/15/1980	49	11/15/1980	50	12/15/1980	50
01/16/1980	65	02/16/1980	50	03/16/1980	57	04/16/1980	56	05/16/1980	51	06/16/1980	59	07/16/1980	73	08/16/1980	57	09/16/1980	55	10/16/1980	53	11/16/1980	49	12/16/1980	51
01/17/1980	61	02/17/1980	43	03/17/1980	126	04/17/1980	59	05/17/1980	68	06/17/1980	54	07/17/1980	47	08/17/1980	69	09/17/1980	95	10/17/1980	66	11/17/1980	50	12/17/1980	50
01/18/1980	56	02/18/1980	44	03/18/1980	92	04/18/1980	58	05/18/1980	89	06/18/1980	52	07/18/1980	42	08/18/1980	63	09/18/1980	62	10/18/1980	56	11/18/1980	49	12/18/1980	53
01/19/1980	51	02/19/1980	49	03/19/1980	72	04/19/1980	56	05/19/1980	60	06/19/1980	54	07/19/1980	39	08/19/1980	62	09/19/1980	55	10/19/1980	50	11/19/1980	49	12/19/1980	48
01/20/1980	48	02/20/1980	55	03/20/1980	69	04/20/1980	54	05/20/1980	55	06/20/1980	50	07/20/1980	38	08/20/1980	101	09/20/1980	55	10/20/1980	49	11/20/1980	50	12/20/1980	45
01/21/1980	48	02/21/1980	59	03/21/1980	85	04/21/1980	54	05/21/1980	48	06/21/1980	47	07/21/1980	40	08/21/1980	119	09/21/1980	52	10/21/1980	51	11/21/1980	50	12/21/1980	45
01/22/1980	52	02/22/1980	116	03/22/1980	69	04/22/1980	57	05/22/1980	47	06/22/1980	45	07/22/1980	39	08/22/1980	82	09/22/1980	56	10/22/1980	49	11/22/1980	46	12/22/1980	45
01/23/1980	46	02/23/1980	98	03/23/1980	65	04/23/1980	55	05/23/1980	46	06/23/1980	44	07/23/1980	37	08/23/1980	62	09/23/1980	61	10/23/1980	49	11/23/1980	46	12/23/1980	48
01/24/1980	45	02/24/1980	67	03/24/1980	67	04/24/1980	56	05/24/1980	46	06/24/1980	46	07/24/1980	36	08/24/1980	57	09/24/1980	55	10/24/1980	54	11/24/1980	51	12/24/1980	47
01/25/1980	48	02/25/1980	58	03/25/1980	63	04/25/1980	55	05/25/1980	43	06/25/1980	45	07/25/1980	35	08/25/1980	56	09/25/1980	51	10/25/1980	60	11/25/1980	49	12/25/1980	45
01/26/1980	45	02/26/1980	48	03/26/1980	57	04/26/1980	54	05/26/1980	41	06/26/1980	46	07/26/1980	33	08/26/1980	55	09/26/1980	52	10/26/1980	53	11/26/1980	50	12/26/1980	45
01/27/1980	43	02/27/1980	52	03/27/1980	55	04/27/1980	53	05/27/1980	39	06/27/1980	39	07/27/1980	45	08/27/1980	54	09/27/1980	51	10/27/1980	51	11/27/1980	49	12/27/1980	44
01/28/1980	45	02/28/1980	50	03/28/1980	57	04/28/1980	56	05/28/1980	39	06/28/1980	35	07/28/1980	57	08/28/1980	52	09/28/1980	51	10/28/1980	53	11/28/1980	53	12/28/1980	44
01/29/1980	48	02/29/1980	46	03/29/1980	71	04/29/1980	60	05/29/1980	45	06/29/1980	33	07/29/1980	44	08/29/1980	52	09/29/1980	52	10/29/1980	52	11/29/1980	55	12/29/1980	49
01/30/1980	46			03/30/1980	58	04/30/1980	65	05/30/1980	47	06/30/1980	34	07/30/1980	40	08/30/1980	49	09/30/1980	53	10/30/1980	50	11/30/1980	52	12/30/1980	50
01/31/1980	44			03/31/1980	66			05/31/1980	51			07/31/1980	38	08/31/1980	58			10/31/1980	50			12/31/1980	53

PORTAGE CREEK DAILY MEAN FLOW
Measured Flow
Reed Street (4106500)
1950-1959, 1975-1986

1981

Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)
01/01/1981	50	02/01/1981	50	03/01/1981	57	04/01/1981	57	05/01/1981	58	06/01/1981	53	07/01/1981	41	08/01/1981	32	09/01/1981	108	10/01/1981	109	11/01/1981	44	12/01/1981	56
01/02/1981	48	02/02/1981	50	03/02/1981	55	04/02/1981	51	05/02/1981	54	06/02/1981	54	07/02/1981	42	08/02/1981	31	09/02/1981	59	10/02/1981	72	11/02/1981	44	12/02/1981	56
01/03/1981	48	02/03/1981	50	03/03/1981	57	04/03/1981	50	05/03/1981	50	06/03/1981	52	07/03/1981	41	08/03/1981	38	09/03/1981	53	10/03/1981	53	11/03/1981	44	12/03/1981	55
01/04/1981	46	02/04/1981	50	03/04/1981	56	04/04/1981	50	05/04/1981	50	06/04/1981	52	07/04/1981	40	08/04/1981	34	09/04/1981	53	10/04/1981	48	11/04/1981	44	12/04/1981	56
01/05/1981	47	02/05/1981	50	03/05/1981	57	04/05/1981	44	05/05/1981	51	06/05/1981	50	07/05/1981	40	08/05/1981	32	09/05/1981	45	10/05/1981	47	11/05/1981	42	12/05/1981	55
01/06/1981	50	02/06/1981	51	03/06/1981	54	04/06/1981	44	05/06/1981	48	06/06/1981	47	07/06/1981	40	08/06/1981	31	09/06/1981	43	10/06/1981	46	11/06/1981	43	12/06/1981	50
01/07/1981	50	02/07/1981	53	03/07/1981	51	04/07/1981	42	05/07/1981	47	06/07/1981	40	07/07/1981	39	08/07/1981	39	09/07/1981	42	10/07/1981	45	11/07/1981	40	12/07/1981	48
01/08/1981	49	02/08/1981	48	03/08/1981	49	04/08/1981	42	05/08/1981	48	06/08/1981	43	07/08/1981	38	08/08/1981	36	09/08/1981	43	10/08/1981	45	11/08/1981	39	12/08/1981	51
01/09/1981	49	02/09/1981	48	03/09/1981	49	04/09/1981	57	05/09/1981	47	06/09/1981	51	07/09/1981	35	08/09/1981	31	09/09/1981	42	10/09/1981	45	11/09/1981	38	12/09/1981	53
01/10/1981	49	02/10/1981	53	03/10/1981	51	04/10/1981	46	05/10/1981	96	06/10/1981	47	07/10/1981	38	08/10/1981	32	09/10/1981	40	10/10/1981	42	11/10/1981	40	12/10/1981	49
01/11/1981	47	02/11/1981	58	03/11/1981	51	04/11/1981	61	05/11/1981	119	06/11/1981	46	07/11/1981	34	08/11/1981	31	09/11/1981	40	10/11/1981	40	11/11/1981	41	12/11/1981	47
01/12/1981	47	02/12/1981	51	03/12/1981	53	04/12/1981	62	05/12/1981	72	06/12/1981	45	07/12/1981	32	08/12/1981	35	09/12/1981	38	10/12/1981	41	11/12/1981	42	12/12/1981	47
01/13/1981	49	02/13/1981	50	03/13/1981	53	04/13/1981	52	05/13/1981	62	06/13/1981	95	07/13/1981	42	08/13/1981	32	09/13/1981	36	10/13/1981	43	11/13/1981	41	12/13/1981	45
01/14/1981	48	02/14/1981	51	03/14/1981	53	04/14/1981	68	05/14/1981	67	06/14/1981	90	07/14/1981	36	08/14/1981	33	09/14/1981	39	10/14/1981	45	11/14/1981	41	12/14/1981	46
01/15/1981	50	02/15/1981	53	03/15/1981	50	04/15/1981	54	05/15/1981	63	06/15/1981	64	07/15/1981	34	08/15/1981	38	09/15/1981	39	10/15/1981	46	11/15/1981	41	12/15/1981	46
01/16/1981	49	02/16/1981	67	03/16/1981	49	04/16/1981	53	05/16/1981	56	06/16/1981	71	07/16/1981	34	08/16/1981	32	09/16/1981	37	10/16/1981	44	11/16/1981	42	12/16/1981	46
01/17/1981	48	02/17/1981	78	03/17/1981	51	04/17/1981	51	05/17/1981	52	06/17/1981	54	07/17/1981	33	08/17/1981	31	09/17/1981	42	10/17/1981	46	11/17/1981	43	12/17/1981	45
01/18/1981	36	02/18/1981	86	03/18/1981	49	04/18/1981	48	05/18/1981	51	06/18/1981	50	07/18/1981	30	08/18/1981	31	09/18/1981	41	10/18/1981	66	11/18/1981	43	12/18/1981	42
01/19/1981	69	02/19/1981	94	03/19/1981	50	04/19/1981	51	05/19/1981	50	06/19/1981	48	07/19/1981	30	08/19/1981	30	09/19/1981	39	10/19/1981	65	11/19/1981	51	12/19/1981	42
01/20/1981	47	02/20/1981	90	03/20/1981	50	04/20/1981	51	05/20/1981	48	06/20/1981	47	07/20/1981	33	08/20/1981	31	09/20/1981	36	10/20/1981	52	11/20/1981	69	12/20/1981	40
01/21/1981	48	02/21/1981	82	03/21/1981	49	04/21/1981	46	05/21/1981	47	06/21/1981	49	07/21/1981	33	08/21/1981	30	09/21/1981	51	10/21/1981	55	11/21/1981	65	12/21/1981	42
01/22/1981	49	02/22/1981	74	03/22/1981	46	04/22/1981	53	05/22/1981	45	06/22/1981	66	07/22/1981	32	08/22/1981	28	09/22/1981	99	10/22/1981	59	11/22/1981	56	12/22/1981	43
01/23/1981	48	02/23/1981	76	03/23/1981	47	04/23/1981	153	05/23/1981	43	06/23/1981	49	07/23/1981	31	08/23/1981	27	09/23/1981	45	10/23/1981	52	11/23/1981	49	12/23/1981	44
01/24/1981	49	02/24/1981	75	03/24/1981	49	04/24/1981	87	05/24/1981	63	06/24/1981	50	07/24/1981	28	08/24/1981	28	09/24/1981	42	10/24/1981	50	11/24/1981	51	12/24/1981	41
01/25/1981	47	02/25/1981	71	03/25/1981	46	04/25/1981	61	05/25/1981	67	06/25/1981	47	07/25/1981	28	08/25/1981	29	09/25/1981	44	10/25/1981	47	11/25/1981	48	12/25/1981	42
01/26/1981	50	02/26/1981	63	03/26/1981	62	04/26/1981	57	05/26/1981	59	06/26/1981	45	07/26/1981	29	08/26/1981	31	09/26/1981	52	10/26/1981	47	11/26/1981	56	12/26/1981	42
01/27/1981	50	02/27/1981	62	03/27/1981	52	04/27/1981	55	05/27/1981	52	06/27/1981	43	07/27/1981	29	08/27/1981	57	09/27/1981	103	10/27/1981	48	11/27/1981	70	12/27/1981	42
01/28/1981	50	02/28/1981	62	03/28/1981	49	04/28/1981	65	05/28/1981	50	06/28/1981	41	07/28/1981	55	08/28/1981	51	09/28/1981	58	10/28/1981	46	11/28/1981	60	12/28/1981	43
01/29/1981	49			03/29/1981	47	04/29/1981	84	05/29/1981	51	06/29/1981	41	07/29/1981	40	08/29/1981	39	09/29/1981	49	10/29/1981	45	11/29/1981	54	12/29/1981	45
01/30/1981	49			03/30/1981	42	04/30/1981	63	05/30/1981	85	06/30/1981	41	07/30/1981	33	08/30/1981	40	09/30/1981	120	10/30/1981	45	11/30/1981	53	12/30/1981	44
01/31/1981	50			03/31/1981	66			05/31/1981	56			07/31/1981	33	08/31/1981	146			10/31/1981	44			12/31/1981	46

PORTAGE CREEK DAILY MEAN FLOW
Measured Flow
Reed Street (4106500)
1950-1959, 1975-1986

1982

Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)
01/01/1982	48	02/01/1982	45	03/01/1982	48	04/01/1982	98	05/01/1982	58	06/01/1982	107	07/01/1982	48	08/01/1982	40	09/01/1982	41	10/01/1982	42	11/01/1982	58	12/01/1982	48
01/02/1982	45	02/02/1982	46	03/02/1982	50	04/02/1982	77	05/02/1982	57	06/02/1982	88	07/02/1982	48	08/02/1982	55	09/02/1982	40	10/02/1982	39	11/02/1982	79	12/02/1982	54
01/03/1982	50	02/03/1982	46	03/03/1982	48	04/03/1982	86	05/03/1982	57	06/03/1982	66	07/03/1982	66	08/03/1982	48	09/03/1982	40	10/03/1982	39	11/03/1982	64	12/03/1982	106
01/04/1982	79	02/04/1982	46	03/04/1982	50	04/04/1982	81	05/04/1982	58	06/04/1982	63	07/04/1982	52	08/04/1982	50	09/04/1982	39	10/04/1982	40	11/04/1982	50	12/04/1982	98
01/05/1982	95	02/05/1982	46	03/05/1982	50	04/05/1982	75	05/05/1982	58	06/05/1982	60	07/05/1982	50	08/05/1982	54	09/05/1982	39	10/05/1982	41	11/05/1982	47	12/05/1982	86
01/06/1982	65	02/06/1982	45	03/06/1982	49	04/06/1982	72	05/06/1982	58	06/06/1982	54	07/06/1982	48	08/06/1982	53	09/06/1982	39	10/06/1982	42	11/06/1982	46	12/06/1982	80
01/07/1982	57	02/07/1982	43	03/07/1982	47	04/07/1982	73	05/07/1982	65	06/07/1982	59	07/07/1982	53	08/07/1982	52	09/07/1982	41	10/07/1982	45	11/07/1982	43	12/07/1982	64
01/08/1982	54	02/08/1982	43	03/08/1982	48	04/08/1982	70	05/08/1982	61	06/08/1982	58	07/08/1982	49	08/08/1982	54	09/08/1982	41	10/08/1982	43	11/08/1982	42	12/08/1982	57
01/09/1982	52	02/09/1982	45	03/09/1982	50	04/09/1982	71	05/09/1982	58	06/09/1982	66	07/09/1982	47	08/09/1982	51	09/09/1982	42	10/09/1982	47	11/09/1982	56	12/09/1982	54
01/10/1982	49	02/10/1982	45	03/10/1982	52	04/10/1982	72	05/10/1982	55	06/10/1982	77	07/10/1982	54	08/10/1982	46	09/10/1982	39	10/10/1982	44	11/10/1982	51	12/10/1982	52
01/11/1982	47	02/11/1982	43	03/11/1982	71	04/11/1982	69	05/11/1982	55	06/11/1982	55	07/11/1982	70	08/11/1982	46	09/11/1982	39	10/11/1982	44	11/11/1982	57	12/11/1982	48
01/12/1982	49	02/12/1982	42	03/12/1982	72	04/12/1982	68	05/12/1982	55	06/12/1982	51	07/12/1982	53	08/12/1982	45	09/12/1982	38	10/12/1982	44	11/12/1982	68	12/12/1982	43
01/13/1982	49	02/13/1982	41	03/13/1982	133	04/13/1982	76	05/13/1982	52	06/13/1982	48	07/13/1982	50	08/13/1982	44	09/13/1982	38	10/13/1982	44	11/13/1982	54	12/13/1982	46
01/14/1982	50	02/14/1982	40	03/14/1982	117	04/14/1982	71	05/14/1982	47	06/14/1982	47	07/14/1982	60	08/14/1982	42	09/14/1982	41	10/14/1982	45	11/14/1982	46	12/14/1982	46
01/15/1982	51	02/15/1982	46	03/15/1982	99	04/15/1982	69	05/15/1982	46	06/15/1982	60	07/15/1982	52	08/15/1982	42	09/15/1982	43	10/15/1982	44	11/15/1982	45	12/15/1982	52
01/16/1982	53	02/16/1982	53	03/16/1982	100	04/16/1982	67	05/16/1982	51	06/16/1982	57	07/16/1982	49	08/16/1982	41	09/16/1982	46	10/16/1982	42	11/16/1982	44	12/16/1982	60
01/17/1982	51	02/17/1982	51	03/17/1982	107	04/17/1982	69	05/17/1982	51	06/17/1982	54	07/17/1982	261	08/17/1982	37	09/17/1982	46	10/17/1982	41	11/17/1982	43	12/17/1982	54
01/18/1982	50	02/18/1982	51	03/18/1982	95	04/18/1982	64	05/18/1982	49	06/18/1982	56	07/18/1982	147	08/18/1982	37	09/18/1982	68	10/18/1982	42	11/18/1982	42	12/18/1982	51
01/19/1982	52	02/19/1982	52	03/19/1982	85	04/19/1982	65	05/19/1982	58	06/19/1982	73	07/19/1982	106	08/19/1982	37	09/19/1982	45	10/19/1982	41	11/19/1982	42	12/19/1982	49
01/20/1982	52	02/20/1982	52	03/20/1982	89	04/20/1982	66	05/20/1982	46	06/20/1982	63	07/20/1982	95	08/20/1982	53	09/20/1982	46	10/20/1982	52	11/20/1982	85	12/20/1982	51
01/21/1982	51	02/21/1982	51	03/21/1982	86	04/21/1982	62	05/21/1982	57	06/21/1982	64	07/21/1982	69	08/21/1982	38	09/21/1982	47	10/21/1982	44	11/21/1982	62	12/21/1982	53
01/22/1982	49	02/22/1982	50	03/22/1982	78	04/22/1982	60	05/22/1982	86	06/22/1982	58	07/22/1982	58	08/22/1982	35	09/22/1982	48	10/22/1982	42	11/22/1982	51	12/22/1982	51
01/23/1982	51	02/23/1982	50	03/23/1982	78	04/23/1982	61	05/23/1982	73	06/23/1982	57	07/23/1982	54	08/23/1982	35	09/23/1982	48	10/23/1982	39	11/23/1982	55	12/23/1982	52
01/24/1982	46	02/24/1982	51	03/24/1982	80	04/24/1982	60	05/24/1982	59	06/24/1982	56	07/24/1982	47	08/24/1982	35	09/24/1982	51	10/24/1982	38	11/24/1982	55	12/24/1982	54
01/25/1982	45	02/25/1982	51	03/25/1982	76	04/25/1982	59	05/25/1982	56	06/25/1982	55	07/25/1982	43	08/25/1982	37	09/25/1982	48	10/25/1982	39	11/25/1982	48	12/25/1982	91
01/26/1982	46	02/26/1982	49	03/26/1982	70	04/26/1982	64	05/26/1982	57	06/26/1982	52	07/26/1982	41	08/26/1982	40	09/26/1982	46	10/26/1982	41	11/26/1982	46	12/26/1982	70
01/27/1982	46	02/27/1982	48	03/27/1982	64	04/27/1982	60	05/27/1982	71	06/27/1982	52	07/27/1982	42	08/27/1982	41	09/27/1982	46	10/27/1982	39	11/27/1982	45	12/27/1982	58
01/28/1982	47	02/28/1982	46	03/28/1982	61	04/28/1982	59	05/28/1982	86	06/28/1982	61	07/28/1982	41	08/28/1982	39	09/28/1982	48	10/28/1982	40	11/28/1982	54	12/28/1982	65
01/29/1982	45			03/29/1982	63	04/29/1982	61	05/29/1982	64	06/29/1982	52	07/29/1982	42	08/29/1982	37	09/29/1982	47	10/29/1982	39	11/29/1982	56	12/29/1982	55
01/30/1982	46			03/30/1982	79	04/30/1982	61	05/30/1982	67	06/30/1982	51	07/30/1982	41	08/30/1982	39	09/30/1982	42	10/30/1982	39	11/30/1982	50	12/30/1982	51
01/31/1982	45			03/31/1982	123			05/31/1982	66			07/31/1982	41	08/31/1982	40			10/31/1982	40			12/31/1982	49

PORTAGE CREEK DAILY MEAN FLOW
Measured Flow
Reed Street (4106500)
1950-1959, 1975-1986

1983

Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)
01/01/1983	47	02/01/1983	53	03/01/1983	51	04/01/1983	58	05/01/1983	72	06/01/1983	66	07/01/1983	54	08/01/1983	41	09/01/1983	38	10/01/1983	39	11/01/1983	48	12/01/1983	44
01/02/1983	46	02/02/1983	74	03/02/1983	51	04/02/1983	81	05/02/1983	154	06/02/1983	65	07/02/1983	52	08/02/1983	39	09/02/1983	38	10/02/1983	38	11/02/1983	67	12/02/1983	45
01/03/1983	46	02/03/1983	54	03/03/1983	52	04/03/1983	77	05/03/1983	94	06/03/1983	71	07/03/1983	49	08/03/1983	39	09/03/1983	36	10/03/1983	38	11/03/1983	57	12/03/1983	44
01/04/1983	46	02/04/1983	51	03/04/1983	52	04/04/1983	64	05/04/1983	68	06/04/1983	67	07/04/1983	47	08/04/1983	59	09/04/1983	36	10/04/1983	37	11/04/1983	51	12/04/1983	45
01/05/1983	47	02/05/1983	48	03/05/1983	51	04/05/1983	63	05/05/1983	61	06/05/1983	62	07/05/1983	44	08/05/1983	47	09/05/1983	35	10/05/1983	37	11/05/1983	50	12/05/1983	46
01/06/1983	47	02/06/1983	49	03/06/1983	52	04/06/1983	65	05/06/1983	61	06/06/1983	66	07/06/1983	45	08/06/1983	41	09/06/1983	43	10/06/1983	36	11/06/1983	46	12/06/1983	56
01/07/1983	47	02/07/1983	49	03/07/1983	63	04/07/1983	71	05/07/1983	70	06/07/1983	64	07/07/1983	43	08/07/1983	39	09/07/1983	40	10/07/1983	37	11/07/1983	48	12/07/1983	51
01/08/1983	46	02/08/1983	50	03/08/1983	66	04/08/1983	62	05/08/1983	76	06/08/1983	62	07/08/1983	44	08/08/1983	38	09/08/1983	39	10/08/1983	39	11/08/1983	49	12/08/1983	46
01/09/1983	43	02/09/1983	49	03/09/1983	54	04/09/1983	63	05/09/1983	61	06/09/1983	60	07/09/1983	43	08/09/1983	39	09/09/1983	38	10/09/1983	36	11/09/1983	48	12/09/1983	45
01/10/1983	50	02/10/1983	47	03/10/1983	53	04/10/1983	62	05/10/1983	58	06/10/1983	59	07/10/1983	42	08/10/1983	41	09/10/1983	35	10/10/1983	36	11/10/1983	48	12/10/1983	46
01/11/1983	52	02/11/1983	46	03/11/1983	52	04/11/1983	57	05/11/1983	56	06/11/1983	56	07/11/1983	42	08/11/1983	101	09/11/1983	39	10/11/1983	42	11/11/1983	42	12/11/1983	50
01/12/1983	51	02/12/1983	44	03/12/1983	50	04/12/1983	55	05/12/1983	55	06/12/1983	54	07/12/1983	42	08/12/1983	47	09/12/1983	35	10/12/1983	41	11/12/1983	37	12/12/1983	70
01/13/1983	50	02/13/1983	47	03/13/1983	49	04/13/1983	68	05/13/1983	54	06/13/1983	55	07/13/1983	41	08/13/1983	41	09/13/1983	35	10/13/1983	54	11/13/1983	36	12/13/1983	63
01/14/1983	48	02/14/1983	50	03/14/1983	50	04/14/1983	104	05/14/1983	54	06/14/1983	54	07/14/1983	40	08/14/1983	39	09/14/1983	34	10/14/1983	49	11/14/1983	38	12/14/1983	60
01/15/1983	46	02/15/1983	51	03/15/1983	49	04/15/1983	90	05/15/1983	52	06/15/1983	55	07/15/1983	39	08/15/1983	39	09/15/1983	36	10/15/1983	42	11/15/1983	42	12/15/1983	61
01/16/1983	44	02/16/1983	53	03/16/1983	49	04/16/1983	64	05/16/1983	52	06/16/1983	56	07/16/1983	39	08/16/1983	40	09/16/1983	44	10/16/1983	41	11/16/1983	48	12/16/1983	56
01/17/1983	44	02/17/1983	51	03/17/1983	48	04/17/1983	58	05/17/1983	50	06/17/1983	53	07/17/1983	44	08/17/1983	46	09/17/1983	36	10/17/1983	41	11/17/1983	41	12/17/1983	48
01/18/1983	44	02/18/1983	50	03/18/1983	53	04/18/1983	55	05/18/1983	50	06/18/1983	49	07/18/1983	42	08/18/1983	43	09/18/1983	40	10/18/1983	41	11/18/1983	39	12/18/1983	46
01/19/1983	43	02/19/1983	50	03/19/1983	64	04/19/1983	54	05/19/1983	82	06/19/1983	46	07/19/1983	43	08/19/1983	42	09/19/1983	82	10/19/1983	41	11/19/1983	55	12/19/1983	45
01/20/1983	43	02/20/1983	52	03/20/1983	50	04/20/1983	52	05/20/1983	68	06/20/1983	48	07/20/1983	42	08/20/1983	40	09/20/1983	55	10/20/1983	45	11/20/1983	45	12/20/1983	50
01/21/1983	43	02/21/1983	55	03/21/1983	53	04/21/1983	54	05/21/1983	57	06/21/1983	48	07/21/1983	48	08/21/1983	39	09/21/1983	70	10/21/1983	49	11/21/1983	41	12/21/1983	49
01/22/1983	44	02/22/1983	57	03/22/1983	57	04/22/1983	51	05/22/1983	85	06/22/1983	43	07/22/1983	53	08/22/1983	42	09/22/1983	56	10/22/1983	60	11/22/1983	42	12/22/1983	50
01/23/1983	48	02/23/1983	54	03/23/1983	55	04/23/1983	51	05/23/1983	70	06/23/1983	44	07/23/1983	39	08/23/1983	40	09/23/1983	54	10/23/1983	74	11/23/1983	53	12/23/1983	48
01/24/1983	48	02/24/1983	51	03/24/1983	53	04/24/1983	48	05/24/1983	65	06/24/1983	42	07/24/1983	37	08/24/1983	36	09/24/1983	48	10/24/1983	54	11/24/1983	47	12/24/1983	45
01/25/1983	48	02/25/1983	50	03/25/1983	51	04/25/1983	51	05/25/1983	65	06/25/1983	42	07/25/1983	36	08/25/1983	39	09/25/1983	45	10/25/1983	50	11/25/1983	42	12/25/1983	45
01/26/1983	47	02/26/1983	48	03/26/1983	50	04/26/1983	49	05/26/1983	59	06/26/1983	40	07/26/1983	38	08/26/1983	38	09/26/1983	44	10/26/1983	47	11/26/1983	41	12/26/1983	43
01/27/1983	45	02/27/1983	49	03/27/1983	61	04/27/1983	50	05/27/1983	59	06/27/1983	48	07/27/1983	37	08/27/1983	39	09/27/1983	44	10/27/1983	48	11/27/1983	45	12/27/1983	44
01/28/1983	47	02/28/1983	51	03/28/1983	116	04/28/1983	71	05/28/1983	57	06/28/1983	87	07/28/1983	37	08/28/1983	37	09/28/1983	42	10/28/1983	49	11/28/1983	69	12/28/1983	45
01/29/1983	50			03/29/1983	82	04/29/1983	60	05/29/1983	79	06/29/1983	54	07/29/1983	38	08/29/1983	38	09/29/1983	42	10/29/1983	47	11/29/1983	50	12/29/1983	47
01/30/1983	50			03/30/1983	65	04/30/1983	69	05/30/1983	73	06/30/1983	48	07/30/1983	42	08/30/1983	38	09/30/1983	42	10/30/1983	46	11/30/1983	48	12/30/1983	46
01/31/1983	48			03/31/1983	60			05/31/1983	68			07/31/1983	46	08/31/1983	39			10/31/1983	47			12/31/1983	45

PORTAGE CREEK DAILY MEAN FLOW
Measured Flow
Reed Street (4106500)
1950-1959, 1975-1986

1984

Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)
01/01/1984	44	02/01/1984	48	03/01/1984	46	04/01/1984	47	05/01/1984	51	06/01/1984	52	07/01/1984	40	08/01/1984	30	09/01/1984	35	10/01/1984	38	11/01/1984	88	12/01/1984	39
01/02/1984	46	02/02/1984	50	03/02/1984	45	04/02/1984	47	05/02/1984	49	06/02/1984	51	07/02/1984	41	08/02/1984	30	09/02/1984	30	10/02/1984	38	11/02/1984	71	12/02/1984	41
01/03/1984	47	02/03/1984	60	03/03/1984	45	04/03/1984	50	05/03/1984	49	06/03/1984	47	07/03/1984	41	08/03/1984	28	09/03/1984	29	10/03/1984	36	11/03/1984	48	12/03/1984	58
01/04/1984	48	02/04/1984	51	03/04/1984	45	04/04/1984	50	05/04/1984	52	06/04/1984	45	07/04/1984	43	08/04/1984	61	09/04/1984	33	10/04/1984	36	11/04/1984	44	12/04/1984	42
01/05/1984	59	02/05/1984	48	03/05/1984	46	04/05/1984	48	05/05/1984	53	06/05/1984	45	07/05/1984	43	08/05/1984	55	09/05/1984	35	10/05/1984	35	11/05/1984	41	12/05/1984	41
01/06/1984	53	02/06/1984	47	03/06/1984	47	04/06/1984	33	05/06/1984	51	06/06/1984	45	07/06/1984	41	08/06/1984	31	09/06/1984	31	10/06/1984	34	11/06/1984	39	12/06/1984	40
01/07/1984	50	02/07/1984	47	03/07/1984	44	04/07/1984	71	05/07/1984	50	06/07/1984	45	07/07/1984	39	08/07/1984	29	09/07/1984	39	10/07/1984	49	11/07/1984	38	12/07/1984	40
01/08/1984	49	02/08/1984	46	03/08/1984	40	04/08/1984	48	05/08/1984	49	06/08/1984	43	07/08/1984	37	08/08/1984	28	09/08/1984	32	10/08/1984	45	11/08/1984	39	12/08/1984	40
01/09/1984	49	02/09/1984	48	03/09/1984	40	04/09/1984	44	05/09/1984	51	06/09/1984	42	07/09/1984	65	08/09/1984	28	09/09/1984	51	10/09/1984	40	11/09/1984	46	12/09/1984	38
01/10/1984	50	02/10/1984	49	03/10/1984	40	04/10/1984	40	05/10/1984	50	06/10/1984	43	07/10/1984	49	08/10/1984	29	09/10/1984	33	10/10/1984	37	11/10/1984	45	12/10/1984	43
01/11/1984	48	02/11/1984	52	03/11/1984	40	04/11/1984	42	05/11/1984	49	06/11/1984	42	07/11/1984	60	08/11/1984	27	09/11/1984	60	10/11/1984	37	11/11/1984	47	12/11/1984	44
01/12/1984	47	02/12/1984	58	03/12/1984	38	04/12/1984	51	05/12/1984	47	06/12/1984	43	07/12/1984	48	08/12/1984	26	09/12/1984	35	10/12/1984	37	11/12/1984	42	12/12/1984	50
01/13/1984	48	02/13/1984	88	03/13/1984	41	04/13/1984	55	05/13/1984	54	06/13/1984	43	07/13/1984	45	08/13/1984	26	09/13/1984	38	10/13/1984	39	11/13/1984	40	12/13/1984	49
01/14/1984	46	02/14/1984	80	03/14/1984	44	04/14/1984	63	05/14/1984	50	06/14/1984	42	07/14/1984	39	08/14/1984	27	09/14/1984	39	10/14/1984	45	11/14/1984	40	12/14/1984	59
01/15/1984	45	02/15/1984	65	03/15/1984	53	04/15/1984	90	05/15/1984	48	06/15/1984	42	07/15/1984	37	08/15/1984	26	09/15/1984	36	10/15/1984	40	11/15/1984	40	12/15/1984	49
01/16/1984	45	02/16/1984	61	03/16/1984	141	04/16/1984	73	05/16/1984	46	06/16/1984	42	07/16/1984	36	08/16/1984	27	09/16/1984	33	10/16/1984	39	11/16/1984	38	12/16/1984	44
01/17/1984	47	02/17/1984	64	03/17/1984	98	04/17/1984	62	05/17/1984	46	06/17/1984	41	07/17/1984	36	08/17/1984	28	09/17/1984	35	10/17/1984	37	11/17/1984	37	12/17/1984	42
01/18/1984	46	02/18/1984	59	03/18/1984	63	04/18/1984	67	05/18/1984	48	06/18/1984	42	07/18/1984	37	08/18/1984	26	09/18/1984	33	10/18/1984	37	11/18/1984	35	12/18/1984	41
01/19/1984	47	02/19/1984	59	03/19/1984	57	04/19/1984	58	05/19/1984	78	06/19/1984	42	07/19/1984	36	08/19/1984	26	09/19/1984	32	10/19/1984	50	11/19/1984	36	12/19/1984	41
01/20/1984	45	02/20/1984	56	03/20/1984	74	04/20/1984	54	05/20/1984	63	06/20/1984	42	07/20/1984	35	08/20/1984	26	09/20/1984	33	10/20/1984	41	11/20/1984	34	12/20/1984	39
01/21/1984	42	02/21/1984	54	03/21/1984	65	04/21/1984	51	05/21/1984	52	06/21/1984	43	07/21/1984	34	08/21/1984	28	09/21/1984	30	10/21/1984	95	11/21/1984	35	12/21/1984	51
01/22/1984	44	02/22/1984	52	03/22/1984	63	04/22/1984	56	05/22/1984	64	06/22/1984	44	07/22/1984	32	08/22/1984	28	09/22/1984	28	10/22/1984	53	11/22/1984	35	12/22/1984	53
01/23/1984	43	02/23/1984	51	03/23/1984	58	04/23/1984	61	05/23/1984	97	06/23/1984	46	07/23/1984	33	08/23/1984	27	09/23/1984	47	10/23/1984	45	11/23/1984	35	12/23/1984	40
01/24/1984	47	02/24/1984	49	03/24/1984	56	04/24/1984	51	05/24/1984	74	06/24/1984	44	07/24/1984	49	08/24/1984	26	09/24/1984	36	10/24/1984	42	11/24/1984	35	12/24/1984	41
01/25/1984	40	02/25/1984	47	03/25/1984	54	04/25/1984	51	05/25/1984	59	06/25/1984	44	07/25/1984	39	08/25/1984	27	09/25/1984	89	10/25/1984	42	11/25/1984	36	12/25/1984	37
01/26/1984	48	02/26/1984	47	03/26/1984	54	04/26/1984	49	05/26/1984	72	06/26/1984	45	07/26/1984	38	08/26/1984	24	09/26/1984	101	10/26/1984	42	11/26/1984	35	12/26/1984	37
01/27/1984	50	02/27/1984	45	03/27/1984	54	04/27/1984	47	05/27/1984	57	06/27/1984	44	07/27/1984	38	08/27/1984	24	09/27/1984	50	10/27/1984	42	11/27/1984	40	12/27/1984	39
01/28/1984	47	02/28/1984	48	03/28/1984	52	04/28/1984	62	05/28/1984	57	06/28/1984	42	07/28/1984	35	08/28/1984	28	09/28/1984	44	10/28/1984	39	11/28/1984	56	12/28/1984	62
01/29/1984	47	02/29/1984	47	03/29/1984	51	04/29/1984	48	05/29/1984	74	06/29/1984	41	07/29/1984	31	08/29/1984	27	09/29/1984	41	10/29/1984	38	11/29/1984	43	12/29/1984	67
01/30/1984	47			03/30/1984	50	04/30/1984	59	05/30/1984	60	06/30/1984	40	07/30/1984	31	08/30/1984	41	09/30/1984	39	10/30/1984	39	11/30/1984	41	12/30/1984	61
01/31/1984	48			03/31/1984	48			05/31/1984	55			07/31/1984	33	08/31/1984	30			10/31/1984	44			12/31/1984	52

PORTAGE CREEK DAILY MEAN FLOW
Measured Flow
Reed Street (4106500)
1950-1959, 1975-1986

1985

Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)
01/01/1985	109	02/01/1985	39	03/01/1985	84	04/01/1985	84	05/01/1985	67	06/01/1985	63	07/01/1985	43	08/01/1985	45	09/01/1985	38	10/01/1985	47	11/01/1985	50	12/01/1985	70
01/02/1985	91	02/02/1985	40	03/02/1985	80	04/02/1985	80	05/02/1985	66	06/02/1985	54	07/02/1985	43	08/02/1985	42	09/02/1985	38	10/02/1985	46	11/02/1985	57	12/02/1985	74
01/03/1985	61	02/03/1985	39	03/03/1985	75	04/03/1985	84	05/03/1985	62	06/03/1985	51	07/03/1985	43	08/03/1985	39	09/03/1985	39	10/03/1985	45	11/03/1985	48	12/03/1985	69
01/04/1985	50	02/04/1985	39	03/04/1985	82	04/04/1985	80	05/04/1985	59	06/04/1985	51	07/04/1985	45	08/04/1985	37	09/04/1985	41	10/04/1985	50	11/04/1985	48	12/04/1985	68
01/05/1985	49	02/05/1985	40	03/05/1985	112	04/05/1985	118	05/05/1985	63	06/05/1985	50	07/05/1985	40	08/05/1985	43	09/05/1985	40	10/05/1985	52	11/05/1985	48	12/05/1985	65
01/06/1985	47	02/06/1985	41	03/06/1985	90	04/06/1985	153	05/06/1985	82	06/06/1985	48	07/06/1985	41	08/06/1985	54	09/06/1985	39	10/06/1985	45	11/06/1985	47	12/06/1985	65
01/07/1985	46	02/07/1985	41	03/07/1985	83	04/07/1985	120	05/07/1985	68	06/07/1985	47	07/07/1985	42	08/07/1985	47	09/07/1985	37	10/07/1985	44	11/07/1985	49	12/07/1985	65
01/08/1985	45	02/08/1985	40	03/08/1985	84	04/08/1985	90	05/08/1985	65	06/08/1985	45	07/08/1985	41	08/08/1985	43	09/08/1985	56	10/08/1985	45	11/08/1985	48	12/08/1985	62
01/09/1985	43	02/09/1985	39	03/09/1985	87	04/09/1985	84	05/09/1985	65	06/09/1985	45	07/09/1985	44	08/09/1985	41	09/09/1985	88	10/09/1985	50	11/09/1985	58	12/09/1985	63
01/10/1985	44	02/10/1985	38	03/10/1985	84	04/10/1985	79	05/10/1985	65	06/10/1985	44	07/10/1985	66	08/10/1985	39	09/10/1985	56	10/10/1985	46	11/10/1985	98	12/10/1985	65
01/11/1985	43	02/11/1985	41	03/11/1985	84	04/11/1985	80	05/11/1985	61	06/11/1985	55	07/11/1985	43	08/11/1985	37	09/11/1985	46	10/11/1985	46	11/11/1985	63	12/11/1985	67
01/12/1985	40	02/12/1985	45	03/12/1985	85	04/12/1985	80	05/12/1985	60	06/12/1985	57	07/12/1985	41	08/12/1985	37	09/12/1985	44	10/12/1985	52	11/12/1985	58	12/12/1985	65
01/13/1985	38	02/13/1985	46	03/13/1985	82	04/13/1985	78	05/13/1985	58	06/13/1985	49	07/13/1985	39	08/13/1985	42	09/13/1985	42	10/13/1985	45	11/13/1985	67	12/13/1985	62
01/14/1985	40	02/14/1985	45	03/14/1985	77	04/14/1985	84	05/14/1985	60	06/14/1985	47	07/14/1985	70	08/14/1985	45	09/14/1985	43	10/14/1985	46	11/14/1985	60	12/14/1985	54
01/15/1985	43	02/15/1985	40	03/15/1985	74	04/15/1985	92	05/15/1985	61	06/15/1985	59	07/15/1985	41	08/15/1985	65	09/15/1985	43	10/15/1985	48	11/15/1985	59	12/15/1985	53
01/16/1985	42	02/16/1985	39	03/16/1985	70	04/16/1985	85	05/16/1985	58	06/16/1985	59	07/16/1985	44	08/16/1985	47	09/16/1985	43	10/16/1985	45	11/16/1985	79	12/16/1985	55
01/17/1985	42	02/17/1985	38	03/17/1985	67	04/17/1985	81	05/17/1985	60	06/17/1985	60	07/17/1985	43	08/17/1985	45	09/17/1985	44	10/17/1985	44	11/17/1985	64	12/17/1985	55
01/18/1985	42	02/18/1985	39	03/18/1985	63	04/18/1985	80	05/18/1985	64	06/18/1985	55	07/18/1985	41	08/18/1985	50	09/18/1985	44	10/18/1985	63	11/18/1985	77	12/18/1985	52
01/19/1985	41	02/19/1985	40	03/19/1985	64	04/19/1985	79	05/19/1985	58	06/19/1985	54	07/19/1985	40	08/19/1985	47	09/19/1985	43	10/19/1985	172	11/19/1985	158	12/19/1985	51
01/20/1985	42	02/20/1985	41	03/20/1985	64	04/20/1985	72	05/20/1985	62	06/20/1985	50	07/20/1985	40	08/20/1985	47	09/20/1985	42	10/20/1985	114	11/20/1985	139	12/20/1985	50
01/21/1985	37	02/21/1985	44	03/21/1985	63	04/21/1985	70	05/21/1985	63	06/21/1985	48	07/21/1985	38	08/21/1985	45	09/21/1985	41	10/21/1985	69	11/21/1985	103	12/21/1985	50
01/22/1985	41	02/22/1985	74	03/22/1985	62	04/22/1985	69	05/22/1985	59	06/22/1985	53	07/22/1985	37	08/22/1985	42	09/22/1985	40	10/22/1985	61	11/22/1985	79	12/22/1985	48
01/23/1985	40	02/23/1985	154	03/23/1985	64	04/23/1985	71	05/23/1985	56	06/23/1985	50	07/23/1985	38	08/23/1985	42	09/23/1985	43	10/23/1985	58	11/23/1985	71	12/23/1985	49
01/24/1985	42	02/24/1985	191	03/24/1985	66	04/24/1985	75	05/24/1985	54	06/24/1985	50	07/24/1985	37	08/24/1985	49	09/24/1985	43	10/24/1985	62	11/24/1985	65	12/24/1985	48
01/25/1985	41	02/25/1985	114	03/25/1985	71	04/25/1985	77	05/25/1985	54	06/25/1985	48	07/25/1985	44	08/25/1985	48	09/25/1985	43	10/25/1985	55	11/25/1985	65	12/25/1985	46
01/26/1985	40	02/26/1985	98	03/26/1985	63	04/26/1985	75	05/26/1985	52	06/26/1985	46	07/26/1985	49	08/26/1985	42	09/26/1985	46	10/26/1985	50	11/26/1985	82	12/26/1985	47
01/27/1985	38	02/27/1985	104	03/27/1985	82	04/27/1985	67	05/27/1985	91	06/27/1985	46	07/27/1985	37	08/27/1985	44	09/27/1985	44	10/27/1985	48	11/27/1985	68	12/27/1985	49
01/28/1985	39	02/28/1985	91	03/28/1985	122	04/28/1985	66	05/28/1985	73	06/28/1985	45	07/28/1985	35	08/28/1985	42	09/28/1985	43	10/28/1985	47	11/28/1985	66	12/28/1985	48
01/29/1985	40			03/29/1985	139	04/29/1985	67	05/29/1985	62	06/29/1985	44	07/29/1985	35	08/29/1985	40	09/29/1985	42	10/29/1985	50	11/29/1985	64	12/29/1985	47
01/30/1985	38			03/30/1985	108	04/30/1985	68	05/30/1985	61	06/30/1985	41	07/30/1985	37	08/30/1985	43	09/30/1985	50	10/30/1985	48	11/30/1985	62	12/30/1985	48
01/31/1985	40			03/31/1985	89			05/31/1985	105			07/31/1985	50	08/31/1985	41			10/31/1985	47			12/31/1985	50

PORTAGE CREEK DAILY MEAN FLOW
Measured Flow
Reed Street (4106500)
1950-1959, 1975-1986

1986

Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)
01/01/1986	48	02/01/1986	61	03/01/1986	52	04/01/1986	59	05/01/1986	53	06/01/1986	40	07/01/1986	41	08/01/1986	40	09/01/1986	34				
01/02/1986	49	02/02/1986	55	03/02/1986	53	04/02/1986	56	05/02/1986	50	06/02/1986	39	07/02/1986	41	08/02/1986	39	09/02/1986	34				
01/03/1986	52	02/03/1986	51	03/03/1986	57	04/03/1986	53	05/03/1986	46	06/03/1986	39	07/03/1986	41	08/03/1986	38	09/03/1986	35				
01/04/1986	51	02/04/1986	80	03/04/1986	59	04/04/1986	66	05/04/1986	45	06/04/1986	40	07/04/1986	38	08/04/1986	39	09/04/1986	57				
01/05/1986	49	02/05/1986	83	03/05/1986	60	04/05/1986	61	05/05/1986	45	06/05/1986	83	07/05/1986	35	08/05/1986	37	09/05/1986	40				
01/06/1986	50	02/06/1986	61	03/06/1986	66	04/06/1986	59	05/06/1986	48	06/06/1986	62	07/06/1986	35	08/06/1986	41	09/06/1986	36				
01/07/1986	49	02/07/1986	52	03/07/1986	57	04/07/1986	55	05/07/1986	45	06/07/1986	53	07/07/1986	35	08/07/1986	44	09/07/1986	34				
01/08/1986	48	02/08/1986	51	03/08/1986	51	04/08/1986	50	05/08/1986	44	06/08/1986	56	07/08/1986	49	08/08/1986	41	09/08/1986	34				
01/09/1986	49	02/09/1986	52	03/09/1986	58	04/09/1986	50	05/09/1986	44	06/09/1986	47	07/09/1986	53	08/09/1986	38	09/09/1986	35				
01/10/1986	48	02/10/1986	52	03/10/1986	89	04/10/1986	50	05/10/1986	42	06/10/1986	50	07/10/1986	41	08/10/1986	39	09/10/1986	36				
01/11/1986	48	02/11/1986	49	03/11/1986	114	04/11/1986	50	05/11/1986	41	06/11/1986	53	07/11/1986	55	08/11/1986	39	09/11/1986	53				
01/12/1986	47	02/12/1986	47	03/12/1986	84	04/12/1986	49	05/12/1986	41	06/12/1986	51	07/12/1986	100	08/12/1986	37	09/12/1986	45				
01/13/1986	47	02/13/1986	46	03/13/1986	91	04/13/1986	47	05/13/1986	43	06/13/1986	48	07/13/1986	56	08/13/1986	37	09/13/1986	38				
01/14/1986	48	02/14/1986	47	03/14/1986	88	04/14/1986	55	05/14/1986	42	06/14/1986	46	07/14/1986	46	08/14/1986	38	09/14/1986	36				
01/15/1986	48	02/15/1986	46	03/15/1986	79	04/15/1986	67	05/15/1986	45	06/15/1986	53	07/15/1986	47	08/15/1986	36	09/15/1986	35				
01/16/1986	47	02/16/1986	45	03/16/1986	72	04/16/1986	62	05/16/1986	57	06/16/1986	47	07/16/1986	160	08/16/1986	33	09/16/1986	36				
01/17/1986	54	02/17/1986	48	03/17/1986	68	04/17/1986	59	05/17/1986	61	06/17/1986	45	07/17/1986	116	08/17/1986	32	09/17/1986	34				
01/18/1986	61	02/18/1986	59	03/18/1986	73	04/18/1986	54	05/18/1986	55	06/18/1986	44	07/18/1986	66	08/18/1986	33	09/18/1986	40				
01/19/1986	61	02/19/1986	74	03/19/1986	90	04/19/1986	53	05/19/1986	69	06/19/1986	73	07/19/1986	52	08/19/1986	34	09/19/1986	36				
01/20/1986	57	02/20/1986	74	03/20/1986	70	04/20/1986	53	05/20/1986	58	06/20/1986	86	07/20/1986	56	08/20/1986	33	09/20/1986	36				
01/21/1986	56	02/21/1986	74	03/21/1986	67	04/21/1986	55	05/21/1986	54	06/21/1986	51	07/21/1986	50	08/21/1986	33	09/21/1986	34				
01/22/1986	57	02/22/1986	61	03/22/1986	64	04/22/1986	54	05/22/1986	51	06/22/1986	46	07/22/1986	46	08/22/1986	32	09/22/1986	37				
01/23/1986	55	02/23/1986	62	03/23/1986	62	04/23/1986	53	05/23/1986	47	06/23/1986	44	07/23/1986	45	08/23/1986	32	09/23/1986	75				
01/24/1986	52	02/24/1986	60	03/24/1986	61	04/24/1986	55	05/24/1986	46	06/24/1986	44	07/24/1986	41	08/24/1986	31	09/24/1986	46				
01/25/1986	55	02/25/1986	58	03/25/1986	61	04/25/1986	51	05/25/1986	44	06/25/1986	45	07/25/1986	53	08/25/1986	32	09/25/1986	153				
01/26/1986	51	02/26/1986	59	03/26/1986	67	04/26/1986	54	05/26/1986	43	06/26/1986	43	07/26/1986	44	08/26/1986	76	09/26/1986	113				
01/27/1986	49	02/27/1986	57	03/27/1986	62	04/27/1986	48	05/27/1986	63	06/27/1986	50	07/27/1986	41	08/27/1986	76	09/27/1986	99				
01/28/1986	50	02/28/1986	55	03/28/1986	60	04/28/1986	51	05/28/1986	52	06/28/1986	43	07/28/1986	56	08/28/1986	41	09/28/1986	61				
01/29/1986	49			03/29/1986	60	04/29/1986	49	05/29/1986	48	06/29/1986	41	07/29/1986	44	08/29/1986	38	09/29/1986	109				
01/30/1986	48			03/30/1986	59	04/30/1986	66	05/30/1986	46	06/30/1986	42	07/30/1986	40	08/30/1986	34	09/30/1986	156				
01/31/1986	47			03/31/1986	59			05/31/1986	43			07/31/1986	40	08/31/1986	34						

PORTAGE CREEK DAILY MEAN FLOW
Measured Flow
Lovers Lane (USGS Gage No. 04106300)
October 1964 - December 1994

1964

Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)
																10/01/1964	30	11/01/1964	25	12/01/1964	31
																10/02/1964	28	11/02/1964	25	12/02/1964	30
																10/03/1964	26	11/03/1964	26	12/03/1964	29
																10/04/1964	25	11/04/1964	27	12/04/1964	29
																10/05/1964	25	11/05/1964	27	12/05/1964	29
																10/06/1964	25	11/06/1964	28	12/06/1964	28
																10/07/1964	26	11/07/1964	28	12/07/1964	27
																10/08/1964	26	11/08/1964	28	12/08/1964	27
																10/09/1964	26	11/09/1964	28	12/09/1964	27
																10/10/1964	26	11/10/1964	28	12/10/1964	28
																10/11/1964	27	11/11/1964	28	12/11/1964	40
																10/12/1964	27	11/12/1964	28	12/12/1964	38
																10/13/1964	26	11/13/1964	30	12/13/1964	35
																10/14/1964	25	11/14/1964	31	12/14/1964	32
																10/15/1964	25	11/15/1964	33	12/15/1964	30
																10/16/1964	25	11/16/1964	35	12/16/1964	29
																10/17/1964	25	11/17/1964	33	12/17/1964	28
																10/18/1964	25	11/18/1964	32	12/18/1964	28
																10/19/1964	24	11/19/1964	30	12/19/1964	26
																10/20/1964	23	11/20/1964	29	12/20/1964	25
																10/21/1964	23	11/21/1964	29	12/21/1964	27
																10/22/1964	24	11/22/1964	29	12/22/1964	28
																10/23/1964	24	11/23/1964	28	12/23/1964	28
																10/24/1964	24	11/24/1964	29	12/24/1964	31
																10/25/1964	25	11/25/1964	29	12/25/1964	30
																10/26/1964	25	11/26/1964	29	12/26/1964	31
																10/27/1964	25	11/27/1964	30	12/27/1964	29
																10/28/1964	25	11/28/1964	50	12/28/1964	29
																10/29/1964	25	11/29/1964	40	12/29/1964	29
																10/30/1964	25	11/30/1964	33	12/30/1964	30
																10/31/1964	25			12/31/1964	28

PORTAGE CREEK DAILY MEAN FLOW
Measured Flow
Lovers Lane (USGS Gage No. 04106300)
October 1964 - December 1994

1965

Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)
01/01/1965	29	02/01/1965	27	03/01/1965	38	04/01/1965	42	05/01/1965	36	06/01/1965	36	07/01/1965	33	08/01/1965	41	09/01/1965	36	10/01/1965	44	11/01/1965	33	12/01/1965	32
01/02/1965	46	02/02/1965	27	03/02/1965	38	04/02/1965	42	05/02/1965	34	06/02/1965	63	07/02/1965	32	08/02/1965	36	09/02/1965	34	10/02/1965	35	11/02/1965	35	12/02/1965	32
01/03/1965	36	02/03/1965	27	03/03/1965	38	04/03/1965	41	05/03/1965	38	06/03/1965	47	07/03/1965	31	08/03/1965	35	09/03/1965	34	10/03/1965	32	11/03/1965	34	12/03/1965	35
01/04/1965	33	02/04/1965	26	03/04/1965	56	04/04/1965	40	05/04/1965	37	06/04/1965	40	07/04/1965	30	08/04/1965	38	09/04/1965	34	10/04/1965	30	11/04/1965	32	12/04/1965	35
01/05/1965	31	02/05/1965	24	03/05/1965	60	04/05/1965	44	05/05/1965	37	06/05/1965	37	07/05/1965	32	08/05/1965	35	09/05/1965	40	10/05/1965	28	11/05/1965	30	12/05/1965	32
01/06/1965	30	02/06/1965	34	03/06/1965	43	04/06/1965	56	05/06/1965	38	06/06/1965	37	07/06/1965	33	08/06/1965	34	09/06/1965	34	10/06/1965	28	11/06/1965	30	12/06/1965	32
01/07/1965	32	02/07/1965	38	03/07/1965	38	04/07/1965	52	05/07/1965	38	06/07/1965	37	07/07/1965	37	08/07/1965	32	09/07/1965	36	10/07/1965	28	11/07/1965	30	12/07/1965	32
01/08/1965	36	02/08/1965	38	03/08/1965	38	04/08/1965	46	05/08/1965	35	06/08/1965	38	07/08/1965	34	08/08/1965	32	09/08/1965	36	10/08/1965	34	11/08/1965	30	12/08/1965	32
01/09/1965	34	02/09/1965	39	03/09/1965	38	04/09/1965	46	05/09/1965	33	06/09/1965	40	07/09/1965	34	08/09/1965	36	09/09/1965	36	10/09/1965	37	11/09/1965	30	12/09/1965	32
01/10/1965	29	02/10/1965	58	03/10/1965	36	04/10/1965	42	05/10/1965	36	06/10/1965	39	07/10/1965	31	08/10/1965	36	09/10/1965	36	10/10/1965	33	11/10/1965	30	12/10/1965	34
01/11/1965	29	02/11/1965	39	03/11/1965	33	04/11/1965	40	05/11/1965	34	06/11/1965	38	07/11/1965	30	08/11/1965	34	09/11/1965	32	10/11/1965	32	11/11/1965	30	12/11/1965	46
01/12/1965	29	02/12/1965	36	03/12/1965	34	04/12/1965	40	05/12/1965	34	06/12/1965	33	07/12/1965	31	08/12/1965	34	09/12/1965	30	10/12/1965	30	11/12/1965	34	12/12/1965	50
01/13/1965	28	02/13/1965	34	03/13/1965	34	04/13/1965	39	05/13/1965	32	06/13/1965	32	07/13/1965	30	08/13/1965	34	09/13/1965	33	10/13/1965	28	11/13/1965	36	12/13/1965	57
01/14/1965	28	02/14/1965	30	03/14/1965	31	04/14/1965	40	05/14/1965	34	06/14/1965	35	07/14/1965	30	08/14/1965	32	09/14/1965	39	10/14/1965	28	11/14/1965	32	12/14/1965	45
01/15/1965	27	02/15/1965	30	03/15/1965	34	04/15/1965	42	05/15/1965	32	06/15/1965	33	07/15/1965	29	08/15/1965	31	09/15/1965	57	10/15/1965	28	11/15/1965	32	12/15/1965	40
01/16/1965	26	02/16/1965	29	03/16/1965	34	04/16/1965	40	05/16/1965	32	06/16/1965	36	07/16/1965	31	08/16/1965	34	09/16/1965	42	10/16/1965	28	11/16/1965	36	12/16/1965	37
01/17/1965	24	02/17/1965	29	03/17/1965	37	04/17/1965	44	05/17/1965	34	06/17/1965	36	07/17/1965	31	08/17/1965	34	09/17/1965	42	10/17/1965	28	11/17/1965	32	12/17/1965	36
01/18/1965	27	02/18/1965	29	03/18/1965	38	04/18/1965	38	05/18/1965	34	06/18/1965	37	07/18/1965	30	08/18/1965	34	09/18/1965	40	10/18/1965	28	11/18/1965	31	12/18/1965	35
01/19/1965	26	02/19/1965	29	03/19/1965	35	04/19/1965	39	05/19/1965	34	06/19/1965	35	07/19/1965	30	08/19/1965	34	09/19/1965	38	10/19/1965	34	11/19/1965	31	12/19/1965	34
01/20/1965	26	02/20/1965	29	03/20/1965	34	04/20/1965	38	05/20/1965	32	06/20/1965	36	07/20/1965	31	08/20/1965	34	09/20/1965	40	10/20/1965	44	11/20/1965	30	12/20/1965	33
01/21/1965	24	02/21/1965	27	03/21/1965	32	04/21/1965	38	05/21/1965	34	06/21/1965	40	07/21/1965	30	08/21/1965	32	09/21/1965	45	10/21/1965	38	11/21/1965	29	12/21/1965	32
01/22/1965	41	02/22/1965	28	03/22/1965	35	04/22/1965	36	05/22/1965	35	06/22/1965	38	07/22/1965	30	08/22/1965	30	09/22/1965	60	10/22/1965	40	11/22/1965	31	12/22/1965	32
01/23/1965	42	02/23/1965	27	03/23/1965	36	04/23/1965	42	05/23/1965	34	06/23/1965	41	07/23/1965	32	08/23/1965	32	09/23/1965	58	10/23/1965	40	11/23/1965	30	12/23/1965	32
01/24/1965	32	02/24/1965	28	03/24/1965	34	04/24/1965	36	05/24/1965	42	06/24/1965	39	07/24/1965	32	08/24/1965	32	09/24/1965	43	10/24/1965	36	11/24/1965	30	12/24/1965	60
01/25/1965	31	02/25/1965	26	03/25/1965	33	04/25/1965	36	05/25/1965	38	06/25/1965	39	07/25/1965	29	08/25/1965	36	09/25/1965	38	10/25/1965	34	11/25/1965	30	12/25/1965	85
01/26/1965	35	02/26/1965	29	03/26/1965	35	04/26/1965	38	05/26/1965	46	06/26/1965	37	07/26/1965	31	08/26/1965	38	09/26/1965	34	10/26/1965	33	11/26/1965	36	12/26/1965	75
01/27/1965	30	02/27/1965	29	03/27/1965	33	04/27/1965	38	05/27/1965	40	06/27/1965	37	07/27/1965	30	08/27/1965	42	09/27/1965	35	10/27/1965	32	11/27/1965	39	12/27/1965	60
01/28/1965	28	02/28/1965	30	03/28/1965	34	04/28/1965	36	05/28/1965	36	06/28/1965	40	07/28/1965	30	08/28/1965	34	09/28/1965	38	10/28/1965	30	11/28/1965	32	12/28/1965	50
01/29/1965	28			03/29/1965	41	04/29/1965	36	05/29/1965	32	06/29/1965	38	07/29/1965	30	08/29/1965	31	09/29/1965	38	10/29/1965	31	11/29/1965	32	12/29/1965	50
01/30/1965	26			03/30/1965	42	04/30/1965	38	05/30/1965	31	06/30/1965	35	07/30/1965	30	08/30/1965	33	09/30/1965	46	10/30/1965	32	11/30/1965	32	12/30/1965	50
01/31/1965	26			03/31/1965	43			05/31/1965	32			07/31/1965	31	08/31/1965	37			10/31/1965	32			12/31/1965	55

PORTAGE CREEK DAILY MEAN FLOW
Measured Flow
Lovers Lane (USGS Gage No. 04106300)
October 1964 - December 1994

1966

Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)
01/01/1966	50	02/01/1966	35	03/01/1966	40	04/01/1966	38	05/01/1966	44	06/01/1966	36	07/01/1966	42	08/01/1966	34	09/01/1966	36	10/01/1966	36	11/01/1966	36	12/01/1966	38
01/02/1966	48	02/02/1966	34	03/02/1966	38	04/02/1966	38	05/02/1966	44	06/02/1966	37	07/02/1966	40	08/02/1966	41	09/02/1966	36	10/02/1966	35	11/02/1966	33	12/02/1966	38
01/03/1966	47	02/03/1966	32	03/03/1966	45	04/03/1966	37	05/03/1966	42	06/03/1966	39	07/03/1966	38	08/03/1966	36	09/03/1966	34	10/03/1966	38	11/03/1966	34	12/03/1966	37
01/04/1966	44	02/04/1966	33	03/04/1966	55	04/04/1966	37	05/04/1966	41	06/04/1966	38	07/04/1966	39	08/04/1966	36	09/04/1966	34	10/04/1966	38	11/04/1966	36	12/04/1966	33
01/05/1966	41	02/05/1966	31	03/05/1966	44	04/05/1966	37	05/05/1966	42	06/05/1966	37	07/05/1966	39	08/05/1966	36	09/05/1966	32	10/05/1966	36	11/05/1966	35	12/05/1966	46
01/06/1966	38	02/06/1966	31	03/06/1966	42	04/06/1966	37	05/06/1966	42	06/06/1966	38	07/06/1966	42	08/06/1966	35	09/06/1966	33	10/06/1966	36	11/06/1966	35	12/06/1966	58
01/07/1966	38	02/07/1966	32	03/07/1966	41	04/07/1966	37	05/07/1966	40	06/07/1966	38	07/07/1966	40	08/07/1966	34	09/07/1966	34	10/07/1966	36	11/07/1966	42	12/07/1966	84
01/08/1966	37	02/08/1966	37	03/08/1966	40	04/08/1966	35	05/08/1966	38	06/08/1966	38	07/08/1966	42	08/08/1966	35	09/08/1966	34	10/08/1966	36	11/08/1966	50	12/08/1966	88
01/09/1966	37	02/09/1966	50	03/09/1966	40	04/09/1966	35	05/09/1966	38	06/09/1966	40	07/09/1966	47	08/09/1966	38	09/09/1966	36	10/09/1966	36	11/09/1966	67	12/09/1966	66
01/10/1966	37	02/10/1966	70	03/10/1966	41	04/10/1966	34	05/10/1966	38	06/10/1966	40	07/10/1966	46	08/10/1966	38	09/10/1966	36	10/10/1966	35	11/10/1966	74	12/10/1966	54
01/11/1966	36	02/11/1966	65	03/11/1966	44	04/11/1966	34	05/11/1966	43	06/11/1966	36	07/11/1966	46	08/11/1966	41	09/11/1966	33	10/11/1966	34	11/11/1966	52	12/11/1966	48
01/12/1966	36	02/12/1966	50	03/12/1966	50	04/12/1966	34	05/12/1966	94	06/12/1966	37	07/12/1966	47	08/12/1966	40	09/12/1966	34	10/12/1966	34	11/12/1966	44	12/12/1966	46
01/13/1966	36	02/13/1966	43	03/13/1966	45	04/13/1966	34	05/13/1966	71	06/13/1966	44	07/13/1966	43	08/13/1966	36	09/13/1966	34	10/13/1966	36	11/13/1966	40	12/13/1966	44
01/14/1966	36	02/14/1966	41	03/14/1966	44	04/14/1966	34	05/14/1966	57	06/14/1966	42	07/14/1966	43	08/14/1966	36	09/14/1966	36	10/14/1966	39	11/14/1966	37	12/14/1966	43
01/15/1966	36	02/15/1966	40	03/15/1966	40	04/15/1966	40	05/15/1966	50	06/15/1966	41	07/15/1966	42	08/15/1966	38	09/15/1966	35	10/15/1966	42	11/15/1966	36	12/15/1966	41
01/16/1966	35	02/16/1966	38	03/16/1966	40	04/16/1966	40	05/16/1966	57	06/16/1966	47	07/16/1966	38	08/16/1966	86	09/16/1966	36	10/16/1966	36	11/16/1966	37	12/16/1966	43
01/17/1966	35	02/17/1966	37	03/17/1966	40	04/17/1966	40	05/17/1966	52	06/17/1966	44	07/17/1966	37	08/17/1966	52	09/17/1966	34	10/17/1966	36	11/17/1966	38	12/17/1966	40
01/18/1966	35	02/18/1966	35	03/18/1966	42	04/18/1966	44	05/18/1966	60	06/18/1966	41	07/18/1966	38	08/18/1966	43	09/18/1966	33	10/18/1966	38	11/18/1966	36	12/18/1966	40
01/19/1966	35	02/19/1966	33	03/19/1966	44	04/19/1966	45	05/19/1966	52	06/19/1966	38	07/19/1966	39	08/19/1966	42	09/19/1966	36	10/19/1966	37	11/19/1966	35	12/19/1966	40
01/20/1966	35	02/20/1966	33	03/20/1966	44	04/20/1966	50	05/20/1966	58	06/20/1966	40	07/20/1966	39	08/20/1966	42	09/20/1966	41	10/20/1966	37	11/20/1966	34	12/20/1966	41
01/21/1966	35	02/21/1966	32	03/21/1966	44	04/21/1966	64	05/21/1966	50	06/21/1966	40	07/21/1966	36	08/21/1966	61	09/21/1966	41	10/21/1966	36	11/21/1966	36	12/21/1966	40
01/22/1966	35	02/22/1966	32	03/22/1966	54	04/22/1966	50	05/22/1966	44	06/22/1966	41	07/22/1966	37	08/22/1966	69	09/22/1966	42	10/22/1966	36	11/22/1966	36	12/22/1966	40
01/23/1966	35	02/23/1966	32	03/23/1966	50	04/23/1966	64	05/23/1966	46	06/23/1966	40	07/23/1966	37	08/23/1966	47	09/23/1966	42	10/23/1966	32	11/23/1966	37	12/23/1966	38
01/24/1966	35	02/24/1966	33	03/24/1966	46	04/24/1966	62	05/24/1966	46	06/24/1966	40	07/24/1966	36	08/24/1966	40	09/24/1966	40	10/24/1966	34	11/24/1966	36	12/24/1966	37
01/25/1966	35	02/25/1966	33	03/25/1966	43	04/25/1966	50	05/25/1966	43	06/25/1966	40	07/25/1966	38	08/25/1966	39	09/25/1966	38	10/25/1966	33	11/25/1966	42	12/25/1966	36
01/26/1966	35	02/26/1966	33	03/26/1966	42	04/26/1966	44	05/26/1966	44	06/26/1966	38	07/26/1966	37	08/26/1966	38	09/26/1966	38	10/26/1966	34	11/26/1966	36	12/26/1966	36
01/27/1966	35	02/27/1966	32	03/27/1966	40	04/27/1966	46	05/27/1966	44	06/27/1966	40	07/27/1966	38	08/27/1966	36	09/27/1966	40	10/27/1966	32	11/27/1966	46	12/27/1966	39
01/28/1966	35	02/28/1966	35	03/28/1966	38	04/28/1966	56	05/28/1966	40	06/28/1966	47	07/28/1966	38	08/28/1966	34	09/28/1966	38	10/28/1966	36	11/28/1966	46	12/28/1966	40
01/29/1966	35			03/29/1966	38	04/29/1966	52	05/29/1966	38	06/29/1966	43	07/29/1966	36	08/29/1966	36	09/29/1966	41	10/29/1966	36	11/29/1966	42	12/29/1966	40
01/30/1966	35			03/30/1966	38	04/30/1966	51	05/30/1966	38	06/30/1966	42	07/30/1966	35	08/30/1966	36	09/30/1966	39	10/30/1966	33	11/30/1966	40	12/30/1966	40
01/31/1966	35			03/31/1966	38			05/31/1966	36			07/31/1966	33	08/31/1966	36			10/31/1966	35			12/31/1966	36

PORTAGE CREEK DAILY MEAN FLOW
Measured Flow
Lovers Lane (USGS Gage No. 04106300)
October 1964 - December 1994

1967

Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)
01/01/1967	36	02/01/1967	40	03/01/1967	40	04/01/1967	56	05/01/1967	62	06/01/1967	40	07/01/1967	42	08/01/1967	38	09/01/1967	34	10/01/1967	39	11/01/1967	46	12/01/1967	36
01/02/1967	36	02/02/1967	42	03/02/1967	42	04/02/1967	66	05/02/1967	54	06/02/1967	40	07/02/1967	40	08/02/1967	38	09/02/1967	34	10/02/1967	43	11/02/1967	47	12/02/1967	35
01/03/1967	38	02/03/1967	40	03/03/1967	43	04/03/1967	68	05/03/1967	50	06/03/1967	40	07/03/1967	40	08/03/1967	36	09/03/1967	32	10/03/1967	42	11/03/1967	45	12/03/1967	38
01/04/1967	38	02/04/1967	41	03/04/1967	42	04/04/1967	56	05/04/1967	50	06/04/1967	38	07/04/1967	40	08/04/1967	38	09/04/1967	32	10/04/1967	43	11/04/1967	46	12/04/1967	36
01/05/1967	38	02/05/1967	40	03/05/1967	39	04/05/1967	56	05/05/1967	49	06/05/1967	38	07/05/1967	40	08/05/1967	34	09/05/1967	34	10/05/1967	41	11/05/1967	42	12/05/1967	38
01/06/1967	38	02/06/1967	39	03/06/1967	40	04/06/1967	68	05/06/1967	49	06/06/1967	40	07/06/1967	42	08/06/1967	32	09/06/1967	33	10/06/1967	39	11/06/1967	42	12/06/1967	41
01/07/1967	40	02/07/1967	38	03/07/1967	40	04/07/1967	56	05/07/1967	48	06/07/1967	42	07/07/1967	42	08/07/1967	36	09/07/1967	33	10/07/1967	38	11/07/1967	41	12/07/1967	42
01/08/1967	38	02/08/1967	36	03/08/1967	38	04/08/1967	52	05/08/1967	53	06/08/1967	50	07/08/1967	42	08/08/1967	34	09/08/1967	34	10/08/1967	40	11/08/1967	40	12/08/1967	40
01/09/1967	38	02/09/1967	38	03/09/1967	38	04/09/1967	58	05/09/1967	50	06/09/1967	46	07/09/1967	42	08/09/1967	36	09/09/1967	31	10/09/1967	43	11/09/1967	41	12/09/1967	38
01/10/1967	40	02/10/1967	41	03/10/1967	42	04/10/1967	54	05/10/1967	50	06/10/1967	45	07/10/1967	48	08/10/1967	31	09/10/1967	29	10/10/1967	41	11/10/1967	43	12/10/1967	42
01/11/1967	40	02/11/1967	40	03/11/1967	53	04/11/1967	48	05/11/1967	58	06/11/1967	44	07/11/1967	48	08/11/1967	31	09/11/1967	30	10/11/1967	40	11/11/1967	47	12/11/1967	51
01/12/1967	40	02/12/1967	38	03/12/1967	55	04/12/1967	47	05/12/1967	56	06/12/1967	43	07/12/1967	44	08/12/1967	32	09/12/1967	31	10/12/1967	38	11/12/1967	42	12/12/1967	73
01/13/1967	40	02/13/1967	38	03/13/1967	56	04/13/1967	52	05/13/1967	52	06/13/1967	44	07/13/1967	42	08/13/1967	30	09/13/1967	32	10/13/1967	35	11/13/1967	40	12/13/1967	50
01/14/1967	38	02/14/1967	43	03/14/1967	60	04/14/1967	60	05/14/1967	50	06/14/1967	48	07/14/1967	42	08/14/1967	34	09/14/1967	31	10/14/1967	34	11/14/1967	40	12/14/1967	45
01/15/1967	36	02/15/1967	46	03/15/1967	60	04/15/1967	55	05/15/1967	48	06/15/1967	45	07/15/1967	42	08/15/1967	34	09/15/1967	31	10/15/1967	38	11/15/1967	38	12/15/1967	43
01/16/1967	34	02/16/1967	50	03/16/1967	53	04/16/1967	57	05/16/1967	50	06/16/1967	44	07/16/1967	41	08/16/1967	34	09/16/1967	30	10/16/1967	46	11/16/1967	34	12/16/1967	41
01/17/1967	36	02/17/1967	45	03/17/1967	50	04/17/1967	56	05/17/1967	48	06/17/1967	47	07/17/1967	44	08/17/1967	36	09/17/1967	29	10/17/1967	44	11/17/1967	40	12/17/1967	41
01/18/1967	36	02/18/1967	43	03/18/1967	47	04/18/1967	50	05/18/1967	48	06/18/1967	46	07/18/1967	44	08/18/1967	37	09/18/1967	31	10/18/1967	41	11/18/1967	40	12/18/1967	42
01/19/1967	35	02/19/1967	42	03/19/1967	46	04/19/1967	50	05/19/1967	48	06/19/1967	43	07/19/1967	42	08/19/1967	36	09/19/1967	32	10/19/1967	40	11/19/1967	38	12/19/1967	41
01/20/1967	35	02/20/1967	42	03/20/1967	48	04/20/1967	53	05/20/1967	47	06/20/1967	44	07/20/1967	42	08/20/1967	36	09/20/1967	34	10/20/1967	38	11/20/1967	36	12/20/1967	41
01/21/1967	36	02/21/1967	42	03/21/1967	58	04/21/1967	74	05/21/1967	43	06/21/1967	44	07/21/1967	43	08/21/1967	36	09/21/1967	54	10/21/1967	36	11/21/1967	36	12/21/1967	88
01/22/1967	36	02/22/1967	41	03/22/1967	53	04/22/1967	60	05/22/1967	43	06/22/1967	58	07/22/1967	42	08/22/1967	36	09/22/1967	38	10/22/1967	35	11/22/1967	39	12/22/1967	62
01/23/1967	54	02/23/1967	40	03/23/1967	56	04/23/1967	56	05/23/1967	43	06/23/1967	50	07/23/1967	44	08/23/1967	35	09/23/1967	38	10/23/1967	36	11/23/1967	38	12/23/1967	48
01/24/1967	53	02/24/1967	40	03/24/1967	55	04/24/1967	57	05/24/1967	45	06/24/1967	48	07/24/1967	44	08/24/1967	34	09/24/1967	36	10/24/1967	38	11/24/1967	38	12/24/1967	44
01/25/1967	51	02/25/1967	38	03/25/1967	58	04/25/1967	56	05/25/1967	46	06/25/1967	75	07/25/1967	42	08/25/1967	36	09/25/1967	38	10/25/1967	42	11/25/1967	38	12/25/1967	44
01/26/1967	45	02/26/1967	38	03/26/1967	62	04/26/1967	53	05/26/1967	47	06/26/1967	53	07/26/1967	40	08/26/1967	38	09/26/1967	40	10/26/1967	39	11/26/1967	36	12/26/1967	43
01/27/1967	41	02/27/1967	38	03/27/1967	62	04/27/1967	51	05/27/1967	46	06/27/1967	48	07/27/1967	40	08/27/1967	38	09/27/1967	41	10/27/1967	54	11/27/1967	38	12/27/1967	43
01/28/1967	42	02/28/1967	38	03/28/1967	56	04/28/1967	50	05/28/1967	44	06/28/1967	46	07/28/1967	38	08/28/1967	39	09/28/1967	36	10/28/1967	44	11/28/1967	38	12/28/1967	43
01/29/1967	41			03/29/1967	53	04/29/1967	52	05/29/1967	41	06/29/1967	46	07/29/1967	37	08/29/1967	38	09/29/1967	38	10/29/1967	36	11/29/1967	38	12/29/1967	43
01/30/1967	40			03/30/1967	51	04/30/1967	50	05/30/1967	43	06/30/1967	45	07/30/1967	36	08/30/1967	40	09/30/1967	40	10/30/1967	38	11/30/1967	38	12/30/1967	42
01/31/1967	40			03/31/1967	54			05/31/1967	39			07/31/1967	38	08/31/1967	35			10/31/1967	36			12/31/1967	42

PORTAGE CREEK DAILY MEAN FLOW
Measured Flow
Lovers Lane (USGS Gage No. 04106300)
October 1964 - December 1994

1968

Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)
01/01/1968	41	02/01/1968	87	03/01/1968	37	04/01/1968	39	05/01/1968	40	06/01/1968	31	07/01/1968	38	08/01/1968	33	09/01/1968	31	10/01/1968	33	11/01/1968	40	12/01/1968	42
01/02/1968	40	02/02/1968	94	03/02/1968	36	04/02/1968	40	05/02/1968	40	06/02/1968	30	07/02/1968	36	08/02/1968	34	09/02/1968	32	10/02/1968	34	11/02/1968	36	12/02/1968	45
01/03/1968	40	02/03/1968	62	03/03/1968	34	04/03/1968	43	05/03/1968	41	06/03/1968	31	07/03/1968	34	08/03/1968	32	09/03/1968	32	10/03/1968	32	11/03/1968	34	12/03/1968	48
01/04/1968	40	02/04/1968	50	03/04/1968	36	04/04/1968	68	05/04/1968	37	06/04/1968	30	07/04/1968	30	08/04/1968	31	09/04/1968	32	10/04/1968	33	11/04/1968	38	12/04/1968	45
01/05/1968	40	02/05/1968	48	03/05/1968	38	04/05/1968	48	05/05/1968	34	06/05/1968	30	07/05/1968	31	08/05/1968	36	09/05/1968	32	10/05/1968	32	11/05/1968	41	12/05/1968	43
01/06/1968	40	02/06/1968	46	03/06/1968	36	04/06/1968	44	05/06/1968	37	06/06/1968	30	07/06/1968	31	08/06/1968	36	09/06/1968	32	10/06/1968	32	11/06/1968	42	12/06/1968	42
01/07/1968	40	02/07/1968	45	03/07/1968	38	04/07/1968	41	05/07/1968	37	06/07/1968	32	07/07/1968	31	08/07/1968	36	09/07/1968	29	10/07/1968	33	11/07/1968	45	12/07/1968	40
01/08/1968	40	02/08/1968	44	03/08/1968	39	04/08/1968	42	05/08/1968	36	06/08/1968	30	07/08/1968	34	08/08/1968	39	09/08/1968	29	10/08/1968	33	11/08/1968	43	12/08/1968	39
01/09/1968	40	02/09/1968	43	03/09/1968	43	04/09/1968	41	05/09/1968	34	06/09/1968	30	07/09/1968	38	08/09/1968	41	09/09/1968	34	10/09/1968	34	11/09/1968	44	12/09/1968	39
01/10/1968	40	02/10/1968	41	03/10/1968	40	04/10/1968	40	05/10/1968	34	06/10/1968	31	07/10/1968	40	08/10/1968	36	09/10/1968	38	10/10/1968	38	11/10/1968	41	12/10/1968	39
01/11/1968	40	02/11/1968	40	03/11/1968	40	04/11/1968	40	05/11/1968	34	06/11/1968	31	07/11/1968	38	08/11/1968	32	09/11/1968	34	10/11/1968	33	11/11/1968	41	12/11/1968	40
01/12/1968	40	02/12/1968	41	03/12/1968	40	04/12/1968	41	05/12/1968	33	06/12/1968	32	07/12/1968	36	08/12/1968	32	09/12/1968	31	10/12/1968	32	11/12/1968	40	12/12/1968	43
01/13/1968	40	02/13/1968	41	03/13/1968	40	04/13/1968	39	05/13/1968	34	06/13/1968	30	07/13/1968	34	08/13/1968	33	09/13/1968	32	10/13/1968	32	11/13/1968	39	12/13/1968	46
01/14/1968	40	02/14/1968	41	03/14/1968	39	04/14/1968	61	05/14/1968	40	06/14/1968	31	07/14/1968	34	08/14/1968	32	09/14/1968	29	10/14/1968	35	11/14/1968	38	12/14/1968	41
01/15/1968	40	02/15/1968	41	03/15/1968	40	04/15/1968	62	05/15/1968	32	06/15/1968	30	07/15/1968	38	08/15/1968	32	09/15/1968	28	10/15/1968	35	11/15/1968	55	12/15/1968	40
01/16/1968	40	02/16/1968	41	03/16/1968	40	04/16/1968	48	05/16/1968	41	06/16/1968	29	07/16/1968	36	08/16/1968	34	09/16/1968	32	10/16/1968	36	11/16/1968	48	12/16/1968	39
01/17/1968	39	02/17/1968	40	03/17/1968	40	04/17/1968	46	05/17/1968	34	06/17/1968	30	07/17/1968	32	08/17/1968	38	09/17/1968	30	10/17/1968	36	11/17/1968	47	12/17/1968	37
01/18/1968	41	02/18/1968	38	03/18/1968	41	04/18/1968	47	05/18/1968	32	06/18/1968	30	07/18/1968	33	08/18/1968	33	09/18/1968	34	10/18/1968	44	11/18/1968	50	12/18/1968	36
01/19/1968	42	02/19/1968	41	03/19/1968	42	04/19/1968	45	05/19/1968	33	06/19/1968	30	07/19/1968	33	08/19/1968	34	09/19/1968	38	10/19/1968	36	11/19/1968	50	12/19/1968	39
01/20/1968	41	02/20/1968	39	03/20/1968	43	04/20/1968	43	05/20/1968	32	06/20/1968	29	07/20/1968	31	08/20/1968	36	09/20/1968	38	10/20/1968	32	11/20/1968	49	12/20/1968	40
01/21/1968	40	02/21/1968	37	03/21/1968	43	04/21/1968	41	05/21/1968	30	06/21/1968	33	07/21/1968	29	08/21/1968	35	09/21/1968	34	10/21/1968	34	11/21/1968	47	12/21/1968	41
01/22/1968	41	02/22/1968	36	03/22/1968	41	04/22/1968	41	05/22/1968	31	06/22/1968	33	07/22/1968	35	08/22/1968	35	09/22/1968	37	10/22/1968	38	11/22/1968	44	12/22/1968	42
01/23/1968	41	02/23/1968	37	03/23/1968	41	04/23/1968	42	05/23/1968	31	06/23/1968	32	07/23/1968	41	08/23/1968	34	09/23/1968	38	10/23/1968	34	11/23/1968	41	12/23/1968	44
01/24/1968	40	02/24/1968	36	03/24/1968	41	04/24/1968	41	05/24/1968	31	06/24/1968	41	07/24/1968	114	08/24/1968	32	09/24/1968	41	10/24/1968	34	11/24/1968	38	12/24/1968	41
01/25/1968	38	02/25/1968	35	03/25/1968	45	04/25/1968	42	05/25/1968	29	06/25/1968	90	07/25/1968	52	08/25/1968	29	09/25/1968	37	10/25/1968	35	11/25/1968	36	12/25/1968	40
01/26/1968	39	02/26/1968	36	03/26/1968	48	04/26/1968	42	05/26/1968	31	06/26/1968	95	07/26/1968	41	08/26/1968	31	09/26/1968	35	10/26/1968	33	11/26/1968	36	12/26/1968	40
01/27/1968	41	02/27/1968	38	03/27/1968	46	04/27/1968	41	05/27/1968	36	06/27/1968	65	07/27/1968	46	08/27/1968	30	09/27/1968	34	10/27/1968	33	11/27/1968	40	12/27/1968	43
01/28/1968	49	02/28/1968	38	03/28/1968	44	04/28/1968	38	05/28/1968	34	06/28/1968	49	07/28/1968	41	08/28/1968	30	09/28/1968	32	10/28/1968	38	11/28/1968	60	12/28/1968	52
01/29/1968	58	02/29/1968	35	03/29/1968	44	04/29/1968	41	05/29/1968	34	06/29/1968	44	07/29/1968	38	08/29/1968	29	09/29/1968	31	10/29/1968	39	11/29/1968	60	12/29/1968	58
01/30/1968	59			03/30/1968	41	04/30/1968	40	05/30/1968	32	06/30/1968	40	07/30/1968	35	08/30/1968	31	09/30/1968	33	10/30/1968	38	11/30/1968	46	12/30/1968	66
01/31/1968	49			03/31/1968	40			05/31/1968	31			07/31/1968	36	08/31/1968	28			10/31/1968	38			12/31/1968	66

PORTAGE CREEK DAILY MEAN FLOW
Measured Flow
Lovers Lane (USGS Gage No. 04106300)
October 1964 - December 1994

1969

Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)
01/01/1969	56	02/01/1969	65	03/01/1969	47	04/01/1969	50	05/01/1969	48	06/01/1969	66	07/01/1969	44	08/01/1969	60	09/01/1969	33	10/01/1969	32	11/01/1969	48	12/01/1969	41
01/02/1969	50	02/02/1969	62	03/02/1969	45	04/02/1969	70	05/02/1969	50	06/02/1969	69	07/02/1969	43	08/02/1969	57	09/02/1969	33	10/02/1969	38	11/02/1969	41	12/02/1969	41
01/03/1969	45	02/03/1969	58	03/03/1969	47	04/03/1969	57	05/03/1969	49	06/03/1969	50	07/03/1969	41	08/03/1969	54	09/03/1969	33	10/03/1969	38	11/03/1969	40	12/03/1969	40
01/04/1969	40	02/04/1969	55	03/04/1969	47	04/04/1969	69	05/04/1969	47	06/04/1969	50	07/04/1969	45	08/04/1969	51	09/04/1969	34	10/04/1969	38	11/04/1969	40	12/04/1969	40
01/05/1969	39	02/05/1969	52	03/05/1969	48	04/05/1969	75	05/05/1969	48	06/05/1969	65	07/05/1969	52	08/05/1969	49	09/05/1969	38	10/05/1969	35	11/05/1969	40	12/05/1969	40
01/06/1969	43	02/06/1969	48	03/06/1969	48	04/06/1969	56	05/06/1969	58	06/06/1969	53	07/06/1969	46	08/06/1969	47	09/06/1969	43	10/06/1969	38	11/06/1969	39	12/06/1969	40
01/07/1969	45	02/07/1969	45	03/07/1969	48	04/07/1969	56	05/07/1969	62	06/07/1969	48	07/07/1969	49	08/07/1969	45	09/07/1969	48	10/07/1969	48	11/07/1969	39	12/07/1969	40
01/08/1969	43	02/08/1969	43	03/08/1969	48	04/08/1969	53	05/08/1969	74	06/08/1969	83	07/08/1969	47	08/08/1969	50	09/08/1969	50	10/08/1969	39	11/08/1969	37	12/08/1969	40
01/09/1969	40	02/09/1969	43	03/09/1969	45	04/09/1969	55	05/09/1969	66	06/09/1969	76	07/09/1969	48	08/09/1969	60	09/09/1969	47	10/09/1969	37	11/09/1969	37	12/09/1969	40
01/10/1969	38	02/10/1969	45	03/10/1969	47	04/10/1969	59	05/10/1969	60	06/10/1969	60	07/10/1969	48	08/10/1969	56	09/10/1969	40	10/10/1969	38	11/10/1969	40	12/10/1969	40
01/11/1969	36	02/11/1969	50	03/11/1969	45	04/11/1969	53	05/11/1969	56	06/11/1969	54	07/11/1969	47	08/11/1969	53	09/11/1969	38	10/11/1969	66	11/11/1969	42	12/11/1969	39
01/12/1969	37	02/12/1969	50	03/12/1969	46	04/12/1969	50	05/12/1969	53	06/12/1969	59	07/12/1969	44	08/12/1969	51	09/12/1969	37	10/12/1969	51	11/12/1969	43	12/12/1969	38
01/13/1969	39	02/13/1969	46	03/13/1969	45	04/13/1969	48	05/13/1969	55	06/13/1969	60	07/13/1969	43	08/13/1969	50	09/13/1969	36	10/13/1969	56	11/13/1969	41	12/13/1969	38
01/14/1969	44	02/14/1969	43	03/14/1969	46	04/14/1969	49	05/14/1969	53	06/14/1969	50	07/14/1969	43	08/14/1969	47	09/14/1969	35	10/14/1969	43	11/14/1969	42	12/14/1969	38
01/15/1969	43	02/15/1969	43	03/15/1969	45	04/15/1969	52	05/15/1969	52	06/15/1969	47	07/15/1969	45	08/15/1969	46	09/15/1969	35	10/15/1969	39	11/15/1969	41	12/15/1969	38
01/16/1969	44	02/16/1969	42	03/16/1969	43	04/16/1969	51	05/16/1969	50	06/16/1969	48	07/16/1969	60	08/16/1969	44	09/16/1969	35	10/16/1969	40	11/16/1969	40	12/16/1969	38
01/17/1969	47	02/17/1969	43	03/17/1969	47	04/17/1969	56	05/17/1969	48	06/17/1969	48	07/17/1969	83	08/17/1969	42	09/17/1969	34	10/17/1969	38	11/17/1969	43	12/17/1969	38
01/18/1969	57	02/18/1969	45	03/18/1969	48	04/18/1969	59	05/18/1969	57	06/18/1969	52	07/18/1969	69	08/18/1969	41	09/18/1969	34	10/18/1969	37	11/18/1969	50	12/18/1969	38
01/19/1969	45	02/19/1969	44	03/19/1969	50	04/19/1969	59	05/19/1969	53	06/19/1969	50	07/19/1969	68	08/19/1969	40	09/19/1969	34	10/19/1969	41	11/19/1969	63	12/19/1969	38
01/20/1969	44	02/20/1969	44	03/20/1969	50	04/20/1969	50	05/20/1969	50	06/20/1969	62	07/20/1969	62	08/20/1969	40	09/20/1969	34	10/20/1969	56	11/20/1969	48	12/20/1969	38
01/21/1969	46	02/21/1969	44	03/21/1969	50	04/21/1969	50	05/21/1969	46	06/21/1969	48	07/21/1969	59	08/21/1969	39	09/21/1969	34	10/21/1969	45	11/21/1969	44	12/21/1969	37
01/22/1969	48	02/22/1969	44	03/22/1969	48	04/22/1969	48	05/22/1969	48	06/22/1969	46	07/22/1969	57	08/22/1969	38	09/22/1969	34	10/22/1969	42	11/22/1969	43	12/22/1969	37
01/23/1969	50	02/23/1969	43	03/23/1969	46	04/23/1969	48	05/23/1969	47	06/23/1969	50	07/23/1969	54	08/23/1969	37	09/23/1969	35	10/23/1969	39	11/23/1969	43	12/23/1969	37
01/24/1969	50	02/24/1969	45	03/24/1969	59	04/24/1969	50	05/24/1969	44	06/24/1969	50	07/24/1969	52	08/24/1969	36	09/24/1969	36	10/24/1969	40	11/24/1969	44	12/24/1969	37
01/25/1969	50	02/25/1969	46	03/25/1969	78	04/25/1969	50	05/25/1969	44	06/25/1969	50	07/25/1969	50	08/25/1969	36	09/25/1969	34	10/25/1969	40	11/25/1969	43	12/25/1969	37
01/26/1969	50	02/26/1969	47	03/26/1969	66	04/26/1969	48	05/26/1969	44	06/26/1969	50	07/26/1969	52	08/26/1969	35	09/26/1969	34	10/26/1969	39	11/26/1969	43	12/26/1969	36
01/27/1969	50	02/27/1969	47	03/27/1969	58	04/27/1969	48	05/27/1969	44	06/27/1969	48	07/27/1969	56	08/27/1969	35	09/27/1969	34	10/27/1969	39	11/27/1969	42	12/27/1969	36
01/28/1969	52	02/28/1969	47	03/28/1969	58	04/28/1969	54	05/28/1969	44	06/28/1969	42	07/28/1969	58	08/28/1969	35	09/28/1969	32	10/28/1969	39	11/28/1969	41	12/28/1969	36
01/29/1969	60			03/29/1969	54	04/29/1969	52	05/29/1969	43	06/29/1969	41	07/29/1969	60	08/29/1969	35	09/29/1969	34	10/29/1969	40	11/29/1969	41	12/29/1969	36
01/30/1969	70			03/30/1969	49	04/30/1969	49	05/30/1969	41	06/30/1969	46	07/30/1969	60	08/30/1969	35	09/30/1969	38	10/30/1969	39	11/30/1969	41	12/30/1969	36
01/31/1969	68			03/31/1969	48			05/31/1969	45			07/31/1969	60	08/31/1969	34			10/31/1969	39			12/31/1969	36

PORTAGE CREEK DAILY MEAN FLOW
Measured Flow
Lovers Lane (USGS Gage No. 04106300)
October 1964 - December 1994

1970

Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)
01/01/1970	36	02/01/1970	41	03/01/1970	37	04/01/1970	43	05/01/1970	48	06/01/1970	54	07/01/1970	43	08/01/1970	46	09/01/1970	33	10/01/1970	33	11/01/1970	31	12/01/1970	48
01/02/1970	36	02/02/1970	38	03/02/1970	39	04/02/1970	44	05/02/1970	43	06/02/1970	60	07/02/1970	53	08/02/1970	41	09/02/1970	34	10/02/1970	34	11/02/1970	32	12/02/1970	42
01/03/1970	36	02/03/1970	37	03/03/1970	47	04/03/1970	46	05/03/1970	42	06/03/1970	49	07/03/1970	47	08/03/1970	49	09/03/1970	37	10/03/1970	31	11/03/1970	37	12/03/1970	43
01/04/1970	36	02/04/1970	37	03/04/1970	57	04/04/1970	45	05/04/1970	44	06/04/1970	46	07/04/1970	43	08/04/1970	44	09/04/1970	41	10/04/1970	30	11/04/1970	39	12/04/1970	42
01/05/1970	36	02/05/1970	38	03/05/1970	45	04/05/1970	47	05/05/1970	43	06/05/1970	46	07/05/1970	41	08/05/1970	42	09/05/1970	33	10/05/1970	33	11/05/1970	37	12/05/1970	41
01/06/1970	37	02/06/1970	37	03/06/1970	42	04/06/1970	57	05/06/1970	42	06/06/1970	43	07/06/1970	43	08/06/1970	42	09/06/1970	33	10/06/1970	34	11/06/1970	37	12/06/1970	40
01/07/1970	37	02/07/1970	36	03/07/1970	42	04/07/1970	59	05/07/1970	42	06/07/1970	41	07/07/1970	47	08/07/1970	43	09/07/1970	39	10/07/1970	34	11/07/1970	36	12/07/1970	42
01/08/1970	37	02/08/1970	38	03/08/1970	40	04/08/1970	58	05/08/1970	45	06/08/1970	43	07/08/1970	50	08/08/1970	42	09/08/1970	40	10/08/1970	35	11/08/1970	34	12/08/1970	43
01/09/1970	37	02/09/1970	38	03/09/1970	41	04/09/1970	53	05/09/1970	43	06/09/1970	44	07/09/1970	50	08/09/1970	40	09/09/1970	37	10/09/1970	42	11/09/1970	36	12/09/1970	43
01/10/1970	37	02/10/1970	37	03/10/1970	41	04/10/1970	47	05/10/1970	42	06/10/1970	43	07/10/1970	48	08/10/1970	40	09/10/1970	37	10/10/1970	35	11/10/1970	37	12/10/1970	44
01/11/1970	37	02/11/1970	37	03/11/1970	40	04/11/1970	45	05/11/1970	43	06/11/1970	42	07/11/1970	47	08/11/1970	41	09/11/1970	35	10/11/1970	32	11/11/1970	34	12/11/1970	61
01/12/1970	37	02/12/1970	36	03/12/1970	40	04/12/1970	44	05/12/1970	67	06/12/1970	44	07/12/1970	46	08/12/1970	41	09/12/1970	32	10/12/1970	35	11/12/1970	32	12/12/1970	54
01/13/1970	37	02/13/1970	34	03/13/1970	38	04/13/1970	49	05/13/1970	57	06/13/1970	42	07/13/1970	47	08/13/1970	42	09/13/1970	32	10/13/1970	37	11/13/1970	33	12/13/1970	48
01/14/1970	37	02/14/1970	33	03/14/1970	35	04/14/1970	48	05/14/1970	66	06/14/1970	40	07/14/1970	47	08/14/1970	42	09/14/1970	35	10/14/1970	57	11/14/1970	33	12/14/1970	50
01/15/1970	37	02/15/1970	35	03/15/1970	35	04/15/1970	46	05/15/1970	73	06/15/1970	43	07/15/1970	46	08/15/1970	42	09/15/1970	42	10/15/1970	41	11/15/1970	31	12/15/1970	51
01/16/1970	37	02/16/1970	36	03/16/1970	36	04/16/1970	46	05/16/1970	59	06/16/1970	45	07/16/1970	45	08/16/1970	41	09/16/1970	38	10/16/1970	38	11/16/1970	30	12/16/1970	51
01/17/1970	37	02/17/1970	39	03/17/1970	37	04/17/1970	45	05/17/1970	47	06/17/1970	44	07/17/1970	44	08/17/1970	40	09/17/1970	36	10/17/1970	30	11/17/1970	31	12/17/1970	49
01/18/1970	37	02/18/1970	38	03/18/1970	37	04/18/1970	43	05/18/1970	46	06/18/1970	43	07/18/1970	46	08/18/1970	41	09/18/1970	36	10/18/1970	30	11/18/1970	36	12/18/1970	48
01/19/1970	37	02/19/1970	36	03/19/1970	37	04/19/1970	55	05/19/1970	48	06/19/1970	41	07/19/1970	85	08/19/1970	42	09/19/1970	32	10/19/1970	36	11/19/1970	38	12/19/1970	49
01/20/1970	36	02/20/1970	34	03/20/1970	41	04/20/1970	63	05/20/1970	47	06/20/1970	39	07/20/1970	98	08/20/1970	43	09/20/1970	33	10/20/1970	40	11/20/1970	50	12/20/1970	45
01/21/1970	37	02/21/1970	31	03/21/1970	41	04/21/1970	64	05/21/1970	46	06/21/1970	45	07/21/1970	59	08/21/1970	39	09/21/1970	36	10/21/1970	39	11/21/1970	45	12/21/1970	45
01/22/1970	37	02/22/1970	35	03/22/1970	40	04/22/1970	54	05/22/1970	47	06/22/1970	43	07/22/1970	50	08/22/1970	36	09/22/1970	36	10/22/1970	35	11/22/1970	42	12/22/1970	44
01/23/1970	37	02/23/1970	38	03/23/1970	41	04/23/1970	53	05/23/1970	49	06/23/1970	42	07/23/1970	49	08/23/1970	34	09/23/1970	36	10/23/1970	36	11/23/1970	41	12/23/1970	46
01/24/1970	35	02/24/1970	39	03/24/1970	39	04/24/1970	49	05/24/1970	45	06/24/1970	42	07/24/1970	50	08/24/1970	39	09/24/1970	37	10/24/1970	32	11/24/1970	41	12/24/1970	44
01/25/1970	37	02/25/1970	39	03/25/1970	39	04/25/1970	46	05/25/1970	50	06/25/1970	40	07/25/1970	47	08/25/1970	39	09/25/1970	37	10/25/1970	30	11/25/1970	42	12/25/1970	44
01/26/1970	37	02/26/1970	38	03/26/1970	41	04/26/1970	44	05/26/1970	46	06/26/1970	48	07/26/1970	43	08/26/1970	39	09/26/1970	35	10/26/1970	32	11/26/1970	40	12/26/1970	44
01/27/1970	41	02/27/1970	38	03/27/1970	41	04/27/1970	45	05/27/1970	44	06/27/1970	41	07/27/1970	45	08/27/1970	39	09/27/1970	32	10/27/1970	33	11/27/1970	45	12/27/1970	45
01/28/1970	44	02/28/1970	37	03/28/1970	41	04/28/1970	49	05/28/1970	44	06/28/1970	40	07/28/1970	45	08/28/1970	40	09/28/1970	33	10/28/1970	38	11/28/1970	53	12/28/1970	45
01/29/1970	40			03/29/1970	38	04/29/1970	49	05/29/1970	42	06/29/1970	42	07/29/1970	51	08/29/1970	36	09/29/1970	33	10/29/1970	42	11/29/1970	47	12/29/1970	43
01/30/1970	39			03/30/1970	39	04/30/1970	50	05/30/1970	41	06/30/1970	43	07/30/1970	50	08/30/1970	36	09/30/1970	34	10/30/1970	36	11/30/1970	48	12/30/1970	39
01/31/1970	39			03/31/1970	40			05/31/1970	41			07/31/1970	48	08/31/1970	35			10/31/1970	34			12/31/1970	39

PORTAGE CREEK DAILY MEAN FLOW
Measured Flow
Lovers Lane (USGS Gage No. 04106300)
October 1964 - December 1994

1971

Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)
01/01/1971	38	02/01/1971	45	03/01/1971	49	04/01/1971	51	05/01/1971	46	06/01/1971	33	07/01/1971	27	08/01/1971	27	09/01/1971	24	10/01/1971	24	11/01/1971	26	12/01/1971	26
01/02/1971	38	02/02/1971	45	03/02/1971	48	04/02/1971	48	05/02/1971	43	06/02/1971	38	07/02/1971	25	08/02/1971	28	09/02/1971	30	10/02/1971	25	11/02/1971	25	12/02/1971	26
01/03/1971	35	02/03/1971	46	03/03/1971	47	04/03/1971	49	05/03/1971	45	06/03/1971	33	07/03/1971	24	08/03/1971	28	09/03/1971	28	10/03/1971	27	11/03/1971	24	12/03/1971	26
01/04/1971	44	02/04/1971	48	03/04/1971	45	04/04/1971	46	05/04/1971	46	06/04/1971	35	07/04/1971	25	08/04/1971	28	09/04/1971	26	10/04/1971	31	11/04/1971	24	12/04/1971	26
01/05/1971	43	02/05/1971	65	03/05/1971	45	04/05/1971	49	05/05/1971	44	06/05/1971	36	07/05/1971	40	08/05/1971	28	09/05/1971	30	10/05/1971	28	11/05/1971	24	12/05/1971	26
01/06/1971	39	02/06/1971	57	03/06/1971	50	04/06/1971	48	05/06/1971	46	06/06/1971	38	07/06/1971	32	08/06/1971	28	09/06/1971	33	10/06/1971	28	11/06/1971	24	12/06/1971	27
01/07/1971	34	02/07/1971	51	03/07/1971	49	04/07/1971	48	05/07/1971	48	06/07/1971	39	07/07/1971	31	08/07/1971	26	09/07/1971	30	10/07/1971	28	11/07/1971	24	12/07/1971	29
01/08/1971	36	02/08/1971	49	03/08/1971	49	04/08/1971	49	05/08/1971	47	06/08/1971	35	07/08/1971	41	08/08/1971	27	09/08/1971	32	10/08/1971	28	11/08/1971	24	12/08/1971	32
01/09/1971	37	02/09/1971	50	03/09/1971	49	04/09/1971	51	05/09/1971	43	06/09/1971	34	07/09/1971	34	08/09/1971	27	09/09/1971	29	10/09/1971	30	11/09/1971	24	12/09/1971	37
01/10/1971	38	02/10/1971	49	03/10/1971	50	04/10/1971	48	05/10/1971	45	06/10/1971	35	07/10/1971	30	08/10/1971	28	09/10/1971	30	10/10/1971	30	11/10/1971	24	12/10/1971	42
01/11/1971	39	02/11/1971	48	03/11/1971	50	04/11/1971	47	05/11/1971	45	06/11/1971	35	07/11/1971	28	08/11/1971	29	09/11/1971	27	10/11/1971	29	11/11/1971	24	12/11/1971	50
01/12/1971	41	02/12/1971	49	03/12/1971	49	04/12/1971	52	05/12/1971	42	06/12/1971	33	07/12/1971	27	08/12/1971	28	09/12/1971	26	10/12/1971	29	11/12/1971	25	12/12/1971	55
01/13/1971	45	02/13/1971	50	03/13/1971	50	04/13/1971	56	05/13/1971	42	06/13/1971	33	07/13/1971	28	08/13/1971	27	09/13/1971	28	10/13/1971	30	11/13/1971	25	12/13/1971	57
01/14/1971	46	02/14/1971	48	03/14/1971	58	04/14/1971	52	05/14/1971	43	06/14/1971	35	07/14/1971	27	08/14/1971	26	09/14/1971	27	10/14/1971	30	11/14/1971	26	12/14/1971	57
01/15/1971	47	02/15/1971	48	03/15/1971	78	04/15/1971	53	05/15/1971	40	06/15/1971	32	07/15/1971	52	08/15/1971	26	09/15/1971	25	10/15/1971	29	11/15/1971	26	12/15/1971	56
01/16/1971	46	02/16/1971	48	03/16/1971	67	04/16/1971	55	05/16/1971	38	06/16/1971	33	07/16/1971	40	08/16/1971	27	09/16/1971	25	10/16/1971	29	11/16/1971	27	12/16/1971	54
01/17/1971	45	02/17/1971	51	03/17/1971	62	04/17/1971	51	05/17/1971	40	06/17/1971	32	07/17/1971	35	08/17/1971	27	09/17/1971	25	10/17/1971	29	11/17/1971	27	12/17/1971	52
01/18/1971	46	02/18/1971	54	03/18/1971	60	04/18/1971	48	05/18/1971	39	06/18/1971	30	07/18/1971	29	08/18/1971	32	09/18/1971	24	10/18/1971	29	11/18/1971	28	12/18/1971	50
01/19/1971	45	02/19/1971	71	03/19/1971	64	04/19/1971	51	05/19/1971	41	06/19/1971	27	07/19/1971	52	08/19/1971	33	09/19/1971	26	10/19/1971	29	11/19/1971	28	12/19/1971	47
01/20/1971	45	02/20/1971	76	03/20/1971	59	04/20/1971	52	05/20/1971	37	06/20/1971	28	07/20/1971	37	08/20/1971	30	09/20/1971	33	10/20/1971	29	11/20/1971	29	12/20/1971	44
01/21/1971	46	02/21/1971	66	03/21/1971	55	04/21/1971	52	05/21/1971	35	06/21/1971	33	07/21/1971	32	08/21/1971	28	09/21/1971	26	10/21/1971	30	11/21/1971	29	12/21/1971	40
01/22/1971	46	02/22/1971	61	03/22/1971	56	04/22/1971	49	05/22/1971	31	06/22/1971	31	07/22/1971	29	08/22/1971	26	09/22/1971	25	10/22/1971	31	11/22/1971	29	12/22/1971	38
01/23/1971	44	02/23/1971	56	03/23/1971	55	04/23/1971	48	05/23/1971	31	06/23/1971	30	07/23/1971	30	08/23/1971	26	09/23/1971	26	10/23/1971	35	11/23/1971	29	12/23/1971	36
01/24/1971	44	02/24/1971	47	03/24/1971	54	04/24/1971	47	05/24/1971	39	06/24/1971	28	07/24/1971	28	08/24/1971	24	09/24/1971	25	10/24/1971	41	11/24/1971	29	12/24/1971	35
01/25/1971	46	02/25/1971	46	03/25/1971	54	04/25/1971	46	05/25/1971	39	06/25/1971	27	07/25/1971	31	08/25/1971	25	09/25/1971	24	10/25/1971	40	11/25/1971	29	12/25/1971	34
01/26/1971	48	02/26/1971	50	03/26/1971	54	04/26/1971	48	05/26/1971	35	06/26/1971	26	07/26/1971	43	08/26/1971	25	09/26/1971	24	10/26/1971	36	11/26/1971	29	12/26/1971	33
01/27/1971	49	02/27/1971	60	03/27/1971	52	04/27/1971	47	05/27/1971	35	06/27/1971	25	07/27/1971	31	08/27/1971	25	09/27/1971	28	10/27/1971	33	11/27/1971	29	12/27/1971	32
01/28/1971	49	02/28/1971	49	03/28/1971	50	04/28/1971	46	05/28/1971	37	06/28/1971	27	07/28/1971	39	08/28/1971	24	09/28/1971	29	10/28/1971	31	11/28/1971	28	12/28/1971	32
01/29/1971	48			03/29/1971	53	04/29/1971	46	05/29/1971	33	06/29/1971	26	07/29/1971	35	08/29/1971	24	09/29/1971	26	10/29/1971	29	11/29/1971	28	12/29/1971	32
01/30/1971	46			03/30/1971	51	04/30/1971	47	05/30/1971	33	06/30/1971	27	07/30/1971	32	08/30/1971	25	09/30/1971	25	10/30/1971	28	11/30/1971	27	12/30/1971	32
01/31/1971	45			03/31/1971	50			05/31/1971	32			07/31/1971	28	08/31/1971	24			10/31/1971	27			12/31/1971	60

PORTAGE CREEK DAILY MEAN FLOW
Measured Flow
Lovers Lane (USGS Gage No. 04106300)
October 1964 - December 1994

1972

Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)
01/01/1972	55	02/01/1972	26	03/01/1972	30	04/01/1972	34	05/01/1972	47	06/01/1972	42	07/01/1972	26	08/01/1972	34	09/01/1972	33	10/01/1972	36	11/01/1972	40	12/01/1972	30
01/02/1972	50	02/02/1972	27	03/02/1972	40	04/02/1972	33	05/02/1972	48	06/02/1972	38	07/02/1972	27	08/02/1972	36	09/02/1972	32	10/02/1972	36	11/02/1972	42	12/02/1972	31
01/03/1972	46	02/03/1972	28	03/03/1972	36	04/03/1972	34	05/03/1972	47	06/03/1972	36	07/03/1972	27	08/03/1972	36	09/03/1972	31	10/03/1972	36	11/03/1972	42	12/03/1972	30
01/04/1972	43	02/04/1972	27	03/04/1972	33	04/04/1972	36	05/04/1972	45	06/04/1972	36	07/04/1972	26	08/04/1972	34	09/04/1972	31	10/04/1972	36	11/04/1972	40	12/04/1972	29
01/05/1972	40	02/05/1972	25	03/05/1972	32	04/05/1972	34	05/05/1972	44	06/05/1972	35	07/05/1972	28	08/05/1972	32	09/05/1972	33	10/05/1972	36	11/05/1972	39	12/05/1972	29
01/06/1972	37	02/06/1972	25	03/06/1972	31	04/06/1972	37	05/06/1972	45	06/06/1972	35	07/06/1972	29	08/06/1972	32	09/06/1972	33	10/06/1972	36	11/06/1972	38	12/06/1972	38
01/07/1972	35	02/07/1972	26	03/07/1972	31	04/07/1972	36	05/07/1972	52	06/07/1972	34	07/07/1972	30	08/07/1972	35	09/07/1972	36	10/07/1972	34	11/07/1972	37	12/07/1972	32
01/08/1972	34	02/08/1972	26	03/08/1972	32	04/08/1972	31	05/08/1972	54	06/08/1972	31	07/08/1972	32	08/08/1972	36	09/08/1972	38	10/08/1972	33	11/08/1972	41	12/08/1972	31
01/09/1972	33	02/09/1972	26	03/09/1972	31	04/09/1972	32	05/09/1972	52	06/09/1972	28	07/09/1972	30	08/09/1972	34	09/09/1972	32	10/09/1972	34	11/09/1972	36	12/09/1972	29
01/10/1972	32	02/10/1972	26	03/10/1972	30	04/10/1972	33	05/10/1972	50	06/10/1972	26	07/10/1972	31	08/10/1972	33	09/10/1972	31	10/10/1972	34	11/10/1972	34	12/10/1972	29
01/11/1972	31	02/11/1972	26	03/11/1972	32	04/11/1972	34	05/11/1972	46	06/11/1972	26	07/11/1972	31	08/11/1972	34	09/11/1972	40	10/11/1972	37	11/11/1972	34	12/11/1972	29
01/12/1972	30	02/12/1972	27	03/12/1972	32	04/12/1972	34	05/12/1972	43	06/12/1972	33	07/12/1972	30	08/12/1972	33	09/12/1972	36	10/12/1972	36	11/12/1972	32	12/12/1972	36
01/13/1972	29	02/13/1972	27	03/13/1972	77	04/13/1972	36	05/13/1972	43	06/13/1972	43	07/13/1972	36	08/13/1972	32	09/13/1972	40	10/13/1972	36	11/13/1972	36	12/13/1972	41
01/14/1972	28	02/14/1972	28	03/14/1972	57	04/14/1972	35	05/14/1972	47	06/14/1972	42	07/14/1972	35	08/14/1972	32	09/14/1972	44	10/14/1972	34	11/14/1972	38	12/14/1972	34
01/15/1972	27	02/15/1972	27	03/15/1972	48	04/15/1972	38	05/15/1972	48	06/15/1972	52	07/15/1972	34	08/15/1972	34	09/15/1972	40	10/15/1972	33	11/15/1972	34	12/15/1972	32
01/16/1972	26	02/16/1972	25	03/16/1972	50	04/16/1972	65	05/16/1972	47	06/16/1972	40	07/16/1972	32	08/16/1972	38	09/16/1972	36	10/16/1972	36	11/16/1972	31	12/16/1972	30
01/17/1972	26	02/17/1972	26	03/17/1972	46	04/17/1972	80	05/17/1972	45	06/17/1972	36	07/17/1972	33	08/17/1972	41	09/17/1972	40	10/17/1972	34	11/17/1972	32	12/17/1972	29
01/18/1972	27	02/18/1972	27	03/18/1972	43	04/18/1972	85	05/18/1972	43	06/18/1972	34	07/18/1972	44	08/18/1972	42	09/18/1972	70	10/18/1972	34	11/18/1972	31	12/18/1972	30
01/19/1972	28	02/19/1972	26	03/19/1972	40	04/19/1972	80	05/19/1972	40	06/19/1972	38	07/19/1972	38	08/19/1972	38	09/19/1972	50	10/19/1972	34	11/19/1972	30	12/19/1972	31
01/20/1972	34	02/20/1972	24	03/20/1972	41	04/20/1972	75	05/20/1972	38	06/20/1972	39	07/20/1972	34	08/20/1972	30	09/20/1972	44	10/20/1972	33	11/20/1972	34	12/20/1972	31
01/21/1972	32	02/21/1972	25	03/21/1972	43	04/21/1972	70	05/21/1972	36	06/21/1972	36	07/21/1972	34	08/21/1972	31	09/21/1972	40	10/21/1972	36	11/21/1972	34	12/21/1972	31
01/22/1972	36	02/22/1972	24	03/22/1972	43	04/22/1972	65	05/22/1972	35	06/22/1972	35	07/22/1972	32	08/22/1972	32	09/22/1972	36	10/22/1972	40	11/22/1972	33	12/22/1972	30
01/23/1972	33	02/23/1972	24	03/23/1972	40	04/23/1972	60	05/23/1972	33	06/23/1972	28	07/23/1972	30	08/23/1972	41	09/23/1972	34	10/23/1972	50	11/23/1972	32	12/23/1972	29
01/24/1972	32	02/24/1972	24	03/24/1972	38	04/24/1972	55	05/24/1972	32	06/24/1972	27	07/24/1972	32	08/24/1972	75	09/24/1972	33	10/24/1972	56	11/24/1972	30	12/24/1972	29
01/25/1972	29	02/25/1972	24	03/25/1972	36	04/25/1972	50	05/25/1972	31	06/25/1972	28	07/25/1972	32	08/25/1972	43	09/25/1972	37	10/25/1972	52	11/25/1972	30	12/25/1972	29
01/26/1972	28	02/26/1972	24	03/26/1972	35	04/26/1972	48	05/26/1972	29	06/26/1972	29	07/26/1972	33	08/26/1972	36	09/26/1972	39	10/26/1972	48	11/26/1972	33	12/26/1972	30
01/27/1972	29	02/27/1972	25	03/27/1972	37	04/27/1972	46	05/27/1972	28	06/27/1972	28	07/27/1972	35	08/27/1972	33	09/27/1972	36	10/27/1972	45	11/27/1972	33	12/27/1972	31
01/28/1972	28	02/28/1972	25	03/28/1972	38	04/28/1972	44	05/28/1972	28	06/28/1972	28	07/28/1972	34	08/28/1972	34	09/28/1972	36	10/28/1972	44	11/28/1972	31	12/28/1972	30
01/29/1972	27	02/29/1972	25	03/29/1972	38	04/29/1972	44	05/29/1972	35	06/29/1972	31	07/29/1972	33	08/29/1972	32	09/29/1972	48	10/29/1972	43	11/29/1972	30	12/29/1972	32
01/30/1972	26			03/30/1972	36	04/30/1972	45	05/30/1972	50	06/30/1972	32	07/30/1972	32	08/30/1972	33	09/30/1972	38	10/30/1972	42	11/30/1972	31	12/30/1972	72
01/31/1972	26			03/31/1972	33			05/31/1972	47			07/31/1972	33	08/31/1972	33			10/31/1972	41			12/31/1972	78

PORTAGE CREEK DAILY MEAN FLOW
Measured Flow
Lovers Lane (USGS Gage No. 04106300)
October 1964 - December 1994

1973

Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)
01/01/1973	48	02/01/1973	38	03/01/1973	42	04/01/1973	63	05/01/1973	58	06/01/1973	59	07/01/1973	38	08/01/1973	50	09/01/1973	33	10/01/1973	43	11/01/1973	42	12/01/1973	43
01/02/1973	41	02/02/1973	40	03/02/1973	43	04/02/1973	57	05/02/1973	53	06/02/1973	53	07/02/1973	48	08/02/1973	44	09/02/1973	32	10/02/1973	47	11/02/1973	40	12/02/1973	39
01/03/1973	43	02/03/1973	42	03/03/1973	45	04/03/1973	51	05/03/1973	46	06/03/1973	62	07/03/1973	49	08/03/1973	41	09/03/1973	32	10/03/1973	42	11/03/1973	38	12/03/1973	39
01/04/1973	48	02/04/1973	45	03/04/1973	46	04/04/1973	51	05/04/1973	44	06/04/1973	57	07/04/1973	46	08/04/1973	36	09/04/1973	35	10/04/1973	41	11/04/1973	37	12/04/1973	44
01/05/1973	41	02/05/1973	44	03/05/1973	46	04/05/1973	51	05/05/1973	43	06/05/1973	54	07/05/1973	44	08/05/1973	34	09/05/1973	35	10/05/1973	39	11/05/1973	38	12/05/1973	42
01/06/1973	41	02/06/1973	43	03/06/1973	46	04/06/1973	49	05/06/1973	40	06/06/1973	53	07/06/1973	44	08/06/1973	38	09/06/1973	35	10/06/1973	37	11/06/1973	37	12/06/1973	39
01/07/1973	38	02/07/1973	40	03/07/1973	46	04/07/1973	46	05/07/1973	46	06/07/1973	50	07/07/1973	41	08/07/1973	38	09/07/1973	33	10/07/1973	40	11/07/1973	36	12/07/1973	37
01/08/1973	38	02/08/1973	39	03/08/1973	46	04/08/1973	44	05/08/1973	50	06/08/1973	47	07/08/1973	39	08/08/1973	37	09/08/1973	31	10/08/1973	41	11/08/1973	36	12/08/1973	36
01/09/1973	38	02/09/1973	38	03/09/1973	46	04/09/1973	50	05/09/1973	45	06/09/1973	46	07/09/1973	43	08/09/1973	52	09/09/1973	32	10/09/1973	40	11/09/1973	35	12/09/1973	35
01/10/1973	38	02/10/1973	40	03/10/1973	47	04/10/1973	49	05/10/1973	46	06/10/1973	42	07/10/1973	44	08/10/1973	42	09/10/1973	34	10/10/1973	39	11/10/1973	34	12/10/1973	36
01/11/1973	38	02/11/1973	40	03/11/1973	52	04/11/1973	47	05/11/1973	47	06/11/1973	45	07/11/1973	39	08/11/1973	38	09/11/1973	33	10/11/1973	38	11/11/1973	33	12/11/1973	36
01/12/1973	36	02/12/1973	42	03/12/1973	57	04/12/1973	48	05/12/1973	45	06/12/1973	45	07/12/1973	36	08/12/1973	36	09/12/1973	34	10/12/1973	38	11/12/1973	35	12/12/1973	36
01/13/1973	37	02/13/1973	41	03/13/1973	53	04/13/1973	45	05/13/1973	43	06/13/1973	44	07/13/1973	37	08/13/1973	38	09/13/1973	34	10/13/1973	50	11/13/1973	35	12/13/1973	40
01/14/1973	35	02/14/1973	43	03/14/1973	56	04/14/1973	47	05/14/1973	46	06/14/1973	43	07/14/1973	38	08/14/1973	37	09/14/1973	34	10/14/1973	43	11/14/1973	34	12/14/1973	37
01/15/1973	37	02/15/1973	44	03/15/1973	58	04/15/1973	43	05/15/1973	47	06/15/1973	42	07/15/1973	35	08/15/1973	37	09/15/1973	32	10/15/1973	41	11/15/1973	55	12/15/1973	34
01/16/1973	39	02/16/1973	43	03/16/1973	54	04/16/1973	50	05/16/1973	47	06/16/1973	41	07/16/1973	37	08/16/1973	38	09/16/1973	32	10/16/1973	38	11/16/1973	43	12/16/1973	32
01/17/1973	42	02/17/1973	41	03/17/1973	56	04/17/1973	47	05/17/1973	45	06/17/1973	39	07/17/1973	37	08/17/1973	37	09/17/1973	40	10/17/1973	38	11/17/1973	39	12/17/1973	34
01/18/1973	49	02/18/1973	42	03/18/1973	56	04/18/1973	49	05/18/1973	46	06/18/1973	44	07/18/1973	35	08/18/1973	35	09/18/1973	38	10/18/1973	37	11/18/1973	36	12/18/1973	34
01/19/1973	53	02/19/1973	42	03/19/1973	54	04/19/1973	52	05/19/1973	48	06/19/1973	48	07/19/1973	36	08/19/1973	33	09/19/1973	36	10/19/1973	36	11/19/1973	36	12/19/1973	35
01/20/1973	46	02/20/1973	43	03/20/1973	52	04/20/1973	50	05/20/1973	45	06/20/1973	49	07/20/1973	36	08/20/1973	46	09/20/1973	36	10/20/1973	35	11/20/1973	38	12/20/1973	36
01/21/1973	41	02/21/1973	41	03/21/1973	50	04/21/1973	52	05/21/1973	47	06/21/1973	44	07/21/1973	34	08/21/1973	38	09/21/1973	35	10/21/1973	34	11/21/1973	41	12/21/1973	35
01/22/1973	48	02/22/1973	39	03/22/1973	49	04/22/1973	88	05/22/1973	52	06/22/1973	40	07/22/1973	34	08/22/1973	37	09/22/1973	40	10/22/1973	35	11/22/1973	37	12/22/1973	34
01/23/1973	48	02/23/1973	39	03/23/1973	48	04/23/1973	67	05/23/1973	78	06/23/1973	41	07/23/1973	36	08/23/1973	36	09/23/1973	36	10/23/1973	36	11/23/1973	35	12/23/1973	34
01/24/1973	44	02/24/1973	40	03/24/1973	47	04/24/1973	55	05/24/1973	60	06/24/1973	43	07/24/1973	36	08/24/1973	38	09/24/1973	36	10/24/1973	36	11/24/1973	40	12/24/1973	34
01/25/1973	43	02/25/1973	40	03/25/1973	46	04/25/1973	51	05/25/1973	72	06/25/1973	41	07/25/1973	38	08/25/1973	36	09/25/1973	37	10/25/1973	37	11/25/1973	37	12/25/1973	48
01/26/1973	43	02/26/1973	41	03/26/1973	48	04/26/1973	49	05/26/1973	64	06/26/1973	41	07/26/1973	38	08/26/1973	35	09/26/1973	36	10/26/1973	35	11/26/1973	37	12/26/1973	50
01/27/1973	43	02/27/1973	41	03/27/1973	45	04/27/1973	47	05/27/1973	57	06/27/1973	41	07/27/1973	40	08/27/1973	36	09/27/1973	39	10/27/1973	34	11/27/1973	38	12/27/1973	58
01/28/1973	40	02/28/1973	41	03/28/1973	46	04/28/1973	43	05/28/1973	71	06/28/1973	45	07/28/1973	54	08/28/1973	36	09/28/1973	49	10/28/1973	36	11/28/1973	57	12/28/1973	47
01/29/1973	40			03/29/1973	58	04/29/1973	40	05/29/1973	62	06/29/1973	42	07/29/1973	42	08/29/1973	35	09/29/1973	75	10/29/1973	36	11/29/1973	49	12/29/1973	45
01/30/1973	40			03/30/1973	62	04/30/1973	54	05/30/1973	77	06/30/1973	40	07/30/1973	38	08/30/1973	35	09/30/1973	49	10/30/1973	37	11/30/1973	45	12/30/1973	42
01/31/1973	39			03/31/1973	53			05/31/1973	68			07/31/1973	48	08/31/1973	36			10/31/1973	38			12/31/1973	41

PORTAGE CREEK DAILY MEAN FLOW
Measured Flow
Lovers Lane (USGS Gage No. 04106300)
October 1964 - December 1994

1974

Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)
01/01/1974	40	02/01/1974	48	03/01/1974	51	04/01/1974	54	05/01/1974	50	06/01/1974	49	07/01/1974	44	08/01/1974	38	09/01/1974	35	10/01/1974	32	11/01/1974	38	12/01/1974	32
01/02/1974	41	02/02/1974	45	03/02/1974	51	04/02/1974	57	05/02/1974	49	06/02/1974	46	07/02/1974	46	08/02/1974	41	09/02/1974	38	10/02/1974	31	11/02/1974	36	12/02/1974	34
01/03/1974	41	02/03/1974	43	03/03/1974	53	04/03/1974	60	05/03/1974	49	06/03/1974	48	07/03/1974	46	08/03/1974	38	09/03/1974	40	10/03/1974	30	11/03/1974	43	12/03/1974	34
01/04/1974	41	02/04/1974	45	03/04/1974	68	04/04/1974	75	05/04/1974	47	06/04/1974	49	07/04/1974	52	08/04/1974	38	09/04/1974	39	10/04/1974	30	11/04/1974	40	12/04/1974	34
01/05/1974	39	02/05/1974	45	03/05/1974	72	04/05/1974	57	05/05/1974	46	06/05/1974	54	07/05/1974	46	08/05/1974	40	09/05/1974	38	10/05/1974	30	11/05/1974	54	12/05/1974	34
01/06/1974	39	02/06/1974	46	03/06/1974	59	04/06/1974	51	05/06/1974	46	06/06/1974	56	07/06/1974	43	08/06/1974	39	09/06/1974	38	10/06/1974	30	11/06/1974	41	12/06/1974	33
01/07/1974	38	02/07/1974	45	03/07/1974	55	04/07/1974	54	05/07/1974	46	06/07/1974	52	07/07/1974	42	08/07/1974	39	09/07/1974	37	10/07/1974	30	11/07/1974	39	12/07/1974	35
01/08/1974	36	02/08/1974	44	03/08/1974	58	04/08/1974	55	05/08/1974	57	06/08/1974	55	07/08/1974	46	08/08/1974	43	09/08/1974	36	10/08/1974	30	11/08/1974	37	12/08/1974	36
01/09/1974	37	02/09/1974	44	03/09/1974	63	04/09/1974	51	05/09/1974	53	06/09/1974	77	07/09/1974	46	08/09/1974	47	09/09/1974	38	10/09/1974	30	11/09/1974	36	12/09/1974	34
01/10/1974	37	02/10/1974	43	03/10/1974	53	04/10/1974	49	05/10/1974	49	06/10/1974	58	07/10/1974	49	08/10/1974	41	09/10/1974	38	10/10/1974	30	11/10/1974	34	12/10/1974	34
01/11/1974	37	02/11/1974	44	03/11/1974	52	04/11/1974	52	05/11/1974	63	06/11/1974	54	07/11/1974	45	08/11/1974	41	09/11/1974	39	10/11/1974	32	11/11/1974	38	12/11/1974	34
01/12/1974	36	02/12/1974	46	03/12/1974	50	04/12/1974	58	05/12/1974	60	06/12/1974	52	07/12/1974	43	08/12/1974	41	09/12/1974	46	10/12/1974	33	11/12/1974	37	12/12/1974	37
01/13/1974	34	02/13/1974	45	03/13/1974	48	04/13/1974	54	05/13/1974	53	06/13/1974	50	07/13/1974	38	08/13/1974	41	09/13/1974	49	10/13/1974	30	11/13/1974	38	12/13/1974	36
01/14/1974	37	02/14/1974	43	03/14/1974	48	04/14/1974	52	05/14/1974	53	06/14/1974	52	07/14/1974	37	08/14/1974	41	09/14/1974	39	10/14/1974	41	11/14/1974	38	12/14/1974	36
01/15/1974	39	02/15/1974	43	03/15/1974	49	04/15/1974	51	05/15/1974	66	06/15/1974	63	07/15/1974	37	08/15/1974	40	09/15/1974	37	10/15/1974	34	11/15/1974	36	12/15/1974	40
01/16/1974	39	02/16/1974	43	03/16/1974	52	04/16/1974	49	05/16/1974	90	06/16/1974	45	07/16/1974	36	08/16/1974	51	09/16/1974	37	10/16/1974	33	11/16/1974	37	12/16/1974	42
01/17/1974	38	02/17/1974	41	03/17/1974	47	04/17/1974	49	05/17/1974	102	06/17/1974	48	07/17/1974	37	08/17/1974	48	09/17/1974	38	10/17/1974	31	11/17/1974	39	12/17/1974	39
01/18/1974	37	02/18/1974	45	03/18/1974	49	04/18/1974	51	05/18/1974	74	06/18/1974	49	07/18/1974	37	08/18/1974	38	09/18/1974	36	10/18/1974	30	11/18/1974	39	12/18/1974	36
01/19/1974	37	02/19/1974	52	03/19/1974	52	04/19/1974	53	05/19/1974	59	06/19/1974	53	07/19/1974	38	08/19/1974	38	09/19/1974	36	10/19/1974	30	11/19/1974	39	12/19/1974	35
01/20/1974	61	02/20/1974	48	03/20/1974	48	04/20/1974	50	05/20/1974	56	06/20/1974	52	07/20/1974	35	08/20/1974	38	09/20/1974	36	10/20/1974	30	11/20/1974	39	12/20/1974	35
01/21/1974	85	02/21/1974	51	03/21/1974	49	04/21/1974	48	05/21/1974	55	06/21/1974	73	07/21/1974	34	08/21/1974	37	09/21/1974	35	10/21/1974	32	11/21/1974	37	12/21/1974	34
01/22/1974	69	02/22/1974	98	03/22/1974	50	04/22/1974	50	05/22/1974	56	06/22/1974	52	07/22/1974	36	08/22/1974	37	09/22/1974	33	10/22/1974	34	11/22/1974	35	12/22/1974	32
01/23/1974	71	02/23/1974	64	03/23/1974	48	04/23/1974	47	05/23/1974	53	06/23/1974	47	07/23/1974	38	08/23/1974	37	09/23/1974	34	10/23/1974	34	11/23/1974	36	12/23/1974	34
01/24/1974	57	02/24/1974	49	03/24/1974	44	04/24/1974	47	05/24/1974	51	06/24/1974	49	07/24/1974	38	08/24/1974	36	09/24/1974	34	10/24/1974	35	11/24/1974	35	12/24/1974	34
01/25/1974	52	02/25/1974	48	03/25/1974	46	04/25/1974	48	05/25/1974	48	06/25/1974	47	07/25/1974	37	08/25/1974	36	09/25/1974	35	10/25/1974	35	11/25/1974	35	12/25/1974	32
01/26/1974	54	02/26/1974	47	03/26/1974	48	04/26/1974	49	05/26/1974	45	06/26/1974	48	07/26/1974	38	08/26/1974	37	09/26/1974	34	10/26/1974	33	11/26/1974	34	12/26/1974	33
01/27/1974	67	02/27/1974	48	03/27/1974	48	04/27/1974	47	05/27/1974	46	06/27/1974	47	07/27/1974	37	08/27/1974	39	09/27/1974	35	10/27/1974	32	11/27/1974	34	12/27/1974	33
01/28/1974	57	02/28/1974	52	03/28/1974	53	04/28/1974	48	05/28/1974	49	06/28/1974	46	07/28/1974	35	08/28/1974	38	09/28/1974	35	10/28/1974	34	11/28/1974	34	12/28/1974	32
01/29/1974	51			03/29/1974	52	04/29/1974	56	05/29/1974	62	06/29/1974	45	07/29/1974	40	08/29/1974	36	09/29/1974	37	10/29/1974	38	11/29/1974	32	12/29/1974	32
01/30/1974	51			03/30/1974	64	04/30/1974	56	05/30/1974	55	06/30/1974	43	07/30/1974	38	08/30/1974	37	09/30/1974	33	10/30/1974	43	11/30/1974	33	12/30/1974	34
01/31/1974	50			03/31/1974	54			05/31/1974	53			07/31/1974	38	08/31/1974	36			10/31/1974	38			12/31/1974	34

PORTAGE CREEK DAILY MEAN FLOW
Measured Flow
Lovers Lane (USGS Gage No. 04106300)
October 1964 - December 1994

1975

Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)
01/01/1975	32	02/01/1975	34	03/01/1975	42	04/01/1975	44	05/01/1975	45	06/01/1975	45	07/01/1975	41	08/01/1975	39	09/01/1975	79	10/01/1975	38	11/01/1975	40	12/01/1975	49
01/02/1975	34	02/02/1975	33	03/02/1975	40	04/02/1975	42	05/02/1975	44	06/02/1975	44	07/02/1975	38	08/02/1975	43	09/02/1975	58	10/02/1975	37	11/02/1975	40	12/02/1975	46
01/03/1975	34	02/03/1975	34	03/03/1975	41	04/03/1975	40	05/03/1975	42	06/03/1975	43	07/03/1975	39	08/03/1975	42	09/03/1975	50	10/03/1975	37	11/03/1975	44	12/03/1975	45
01/04/1975	33	02/04/1975	34	03/04/1975	42	04/04/1975	38	05/04/1975	41	06/04/1975	47	07/04/1975	41	08/04/1975	38	09/04/1975	48	10/04/1975	35	11/04/1975	44	12/04/1975	45
01/05/1975	32	02/05/1975	36	03/05/1975	42	04/05/1975	36	05/05/1975	43	06/05/1975	48	07/05/1975	38	08/05/1975	41	09/05/1975	54	10/05/1975	35	11/05/1975	42	12/05/1975	46
01/06/1975	34	02/06/1975	38	03/06/1975	43	04/06/1975	38	05/06/1975	79	06/06/1975	44	07/06/1975	37	08/06/1975	38	09/06/1975	47	10/06/1975	37	11/06/1975	43	12/06/1975	69
01/07/1975	34	02/07/1975	38	03/07/1975	55	04/07/1975	40	05/07/1975	56	06/07/1975	40	07/07/1975	40	08/07/1975	38	09/07/1975	41	10/07/1975	36	11/07/1975	54	12/07/1975	50
01/08/1975	59	02/08/1975	38	03/08/1975	44	04/08/1975	40	05/08/1975	48	06/08/1975	37	07/08/1975	40	08/08/1975	37	09/08/1975	41	10/08/1975	36	11/08/1975	49	12/08/1975	49
01/09/1975	56	02/09/1975	35	03/09/1975	40	04/09/1975	40	05/09/1975	46	06/09/1975	40	07/09/1975	40	08/09/1975	36	09/09/1975	40	10/09/1975	36	11/09/1975	47	12/09/1975	48
01/10/1975	75	02/10/1975	37	03/10/1975	42	04/10/1975	38	05/10/1975	42	06/10/1975	39	07/10/1975	40	08/10/1975	36	09/10/1975	40	10/10/1975	36	11/10/1975	45	12/10/1975	48
01/11/1975	68	02/11/1975	38	03/11/1975	42	04/11/1975	36	05/11/1975	40	06/11/1975	48	07/11/1975	38	08/11/1975	37	09/11/1975	41	10/11/1975	35	11/11/1975	44	12/11/1975	45
01/12/1975	44	02/12/1975	38	03/12/1975	45	04/12/1975	35	05/12/1975	47	06/12/1975	45	07/12/1975	37	08/12/1975	37	09/12/1975	38	10/12/1975	35	11/12/1975	48	12/12/1975	47
01/13/1975	39	02/13/1975	37	03/13/1975	44	04/13/1975	33	05/13/1975	42	06/13/1975	42	07/13/1975	40	08/13/1975	41	09/13/1975	34	10/13/1975	36	11/13/1975	46	12/13/1975	51
01/14/1975	36	02/14/1975	36	03/14/1975	43	04/14/1975	35	05/14/1975	41	06/14/1975	41	07/14/1975	41	08/14/1975	39	09/14/1975	33	10/14/1975	36	11/14/1975	45	12/14/1975	64
01/15/1975	36	02/15/1975	38	03/15/1975	42	04/15/1975	35	05/15/1975	41	06/15/1975	58	07/15/1975	42	08/15/1975	40	09/15/1975	36	10/15/1975	36	11/15/1975	43	12/15/1975	82
01/16/1975	38	02/16/1975	38	03/16/1975	41	04/16/1975	36	05/16/1975	40	06/16/1975	51	07/16/1975	41	08/16/1975	36	09/16/1975	38	10/16/1975	36	11/16/1975	42	12/16/1975	57
01/17/1975	39	02/17/1975	46	03/17/1975	44	04/17/1975	36	05/17/1975	40	06/17/1975	46	07/17/1975	40	08/17/1975	35	09/17/1975	37	10/17/1975	34	11/17/1975	46	12/17/1975	49
01/18/1975	40	02/18/1975	44	03/18/1975	48	04/18/1975	78	05/18/1975	38	06/18/1975	44	07/18/1975	40	08/18/1975	36	09/18/1975	38	10/18/1975	34	11/18/1975	45	12/18/1975	47
01/19/1975	37	02/19/1975	43	03/19/1975	52	04/19/1975	103	05/19/1975	39	06/19/1975	44	07/19/1975	45	08/19/1975	37	09/19/1975	39	10/19/1975	38	11/19/1975	44	12/19/1975	45
01/20/1975	38	02/20/1975	42	03/20/1975	49	04/20/1975	54	05/20/1975	41	06/20/1975	42	07/20/1975	39	08/20/1975	35	09/20/1975	37	10/20/1975	39	11/20/1975	50	12/20/1975	43
01/21/1975	39	02/21/1975	42	03/21/1975	51	04/21/1975	47	05/21/1975	58	06/21/1975	41	07/21/1975	40	08/21/1975	56	09/21/1975	36	10/21/1975	38	11/21/1975	46	12/21/1975	41
01/22/1975	38	02/22/1975	51	03/22/1975	52	04/22/1975	45	05/22/1975	49	06/22/1975	39	07/22/1975	38	08/22/1975	125	09/22/1975	40	10/22/1975	38	11/22/1975	42	12/22/1975	42
01/23/1975	39	02/23/1975	60	03/23/1975	46	04/23/1975	53	05/23/1975	45	06/23/1975	40	07/23/1975	37	08/23/1975	50	09/23/1975	39	10/23/1975	39	11/23/1975	40	12/23/1975	41
01/24/1975	39	02/24/1975	66	03/24/1975	48	04/24/1975	48	05/24/1975	41	06/24/1975	44	07/24/1975	39	08/24/1975	41	09/24/1975	38	10/24/1975	39	11/24/1975	41	12/24/1975	43
01/25/1975	48	02/25/1975	54	03/25/1975	45	04/25/1975	42	05/25/1975	47	06/25/1975	61	07/25/1975	38	08/25/1975	40	09/25/1975	39	10/25/1975	48	11/25/1975	41	12/25/1975	41
01/26/1975	40	02/26/1975	47	03/26/1975	42	04/26/1975	40	05/26/1975	47	06/26/1975	54	07/26/1975	36	08/26/1975	40	09/26/1975	39	10/26/1975	41	11/26/1975	41	12/26/1975	41
01/27/1975	40	02/27/1975	44	03/27/1975	42	04/27/1975	40	05/27/1975	43	06/27/1975	47	07/27/1975	35	08/27/1975	37	09/27/1975	36	10/27/1975	38	11/27/1975	41	12/27/1975	40
01/28/1975	37	02/28/1975	44	03/28/1975	44	04/28/1975	57	05/28/1975	41	06/28/1975	53	07/28/1975	37	08/28/1975	36	09/28/1975	35	10/28/1975	39	11/28/1975	40	12/28/1975	40
01/29/1975	56			03/29/1975	46	04/29/1975	49	05/29/1975	41	06/29/1975	45	07/29/1975	40	08/29/1975	56	09/29/1975	38	10/29/1975	37	11/29/1975	50	12/29/1975	41
01/30/1975	40			03/30/1975	42	04/30/1975	46	05/30/1975	48	06/30/1975	42	07/30/1975	39	08/30/1975	138	09/30/1975	39	10/30/1975	36	11/30/1975	58	12/30/1975	45
01/31/1975	36			03/31/1975	42			05/31/1975	53			07/31/1975	38	08/31/1975	112			10/31/1975	36			12/31/1975	44

PORTAGE CREEK DAILY MEAN FLOW
Measured Flow
Lovers Lane (USGS Gage No. 04106300)
October 1964 - December 1994

1976

Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)
01/01/1976	41	02/01/1976	36	03/01/1976	53	04/01/1976	46	05/01/1976	48	06/01/1976	50	07/01/1976	46	08/01/1976	33	09/01/1976	35	10/01/1976	31	11/01/1976	29	12/01/1976	29
01/02/1976	41	02/02/1976	37	03/02/1976	64	04/02/1976	48	05/02/1976	56	06/02/1976	47	07/02/1976	39	08/02/1976	34	09/02/1976	34	10/02/1976	30	11/02/1976	29	12/02/1976	29
01/03/1976	42	02/03/1976	36	03/03/1976	67	04/03/1976	46	05/03/1976	54	06/03/1976	45	07/03/1976	34	08/03/1976	32	09/03/1976	36	10/03/1976	28	11/03/1976	28	12/03/1976	28
01/04/1976	40	02/04/1976	37	03/04/1976	61	04/04/1976	45	05/04/1976	51	06/04/1976	43	07/04/1976	33	08/04/1976	34	09/04/1976	32	10/04/1976	30	11/04/1976	28	12/04/1976	27
01/05/1976	41	02/05/1976	36	03/05/1976	80	04/05/1976	45	05/05/1976	51	06/05/1976	40	07/05/1976	32	08/05/1976	36	09/05/1976	31	10/05/1976	33	11/05/1976	30	12/05/1976	27
01/06/1976	41	02/06/1976	37	03/06/1976	58	04/06/1976	47	05/06/1976	72	06/06/1976	38	07/06/1976	36	08/06/1976	37	09/06/1976	32	10/06/1976	51	11/06/1976	32	12/06/1976	29
01/07/1976	44	02/07/1976	36	03/07/1976	49	04/07/1976	46	05/07/1976	73	06/07/1976	40	07/07/1976	43	08/07/1976	35	09/07/1976	33	10/07/1976	34	11/07/1976	32	12/07/1976	29
01/08/1976	43	02/08/1976	35	03/08/1976	48	04/08/1976	44	05/08/1976	55	06/08/1976	41	07/08/1976	40	08/08/1976	34	09/08/1976	33	10/08/1976	33	11/08/1976	33	12/08/1976	28
01/09/1976	43	02/09/1976	37	03/09/1976	48	04/09/1976	44	05/09/1976	49	06/09/1976	41	07/09/1976	34	08/09/1976	36	09/09/1976	36	10/09/1976	30	11/09/1976	31	12/09/1976	28
01/10/1976	40	02/10/1976	42	03/10/1976	47	04/10/1976	43	05/10/1976	49	06/10/1976	44	07/10/1976	31	08/10/1976	35	09/10/1976	39	10/10/1976	30	11/10/1976	28	12/10/1976	29
01/11/1976	41	02/11/1976	43	03/11/1976	46	04/11/1976	45	05/11/1976	47	06/11/1976	42	07/11/1976	31	08/11/1976	37	09/11/1976	33	10/11/1976	32	11/11/1976	28	12/11/1976	27
01/12/1976	43	02/12/1976	44	03/12/1976	52	04/12/1976	44	05/12/1976	46	06/12/1976	37	07/12/1976	32	08/12/1976	37	09/12/1976	32	10/12/1976	32	11/12/1976	28	12/12/1976	26
01/13/1976	44	02/13/1976	50	03/13/1976	49	04/13/1976	45	05/13/1976	46	06/13/1976	35	07/13/1976	32	08/13/1976	38	09/13/1976	33	10/13/1976	32	11/13/1976	27	12/13/1976	27
01/14/1976	44	02/14/1976	45	03/14/1976	46	04/14/1976	46	05/14/1976	47	06/14/1976	37	07/14/1976	32	08/14/1976	39	09/14/1976	33	10/14/1976	31	11/14/1976	25	12/14/1976	27
01/15/1976	42	02/15/1976	50	03/15/1976	46	04/15/1976	46	05/15/1976	46	06/15/1976	42	07/15/1976	33	08/15/1976	35	09/15/1976	34	10/15/1976	31	11/15/1976	27	12/15/1976	27
01/16/1976	45	02/16/1976	57	03/16/1976	48	04/16/1976	51	05/16/1976	56	06/16/1976	43	07/16/1976	32	08/16/1976	38	09/16/1976	33	10/16/1976	29	11/16/1976	27	12/16/1976	27
01/17/1976	40	02/17/1976	52	03/17/1976	46	04/17/1976	45	05/17/1976	61	06/17/1976	40	07/17/1976	31	08/17/1976	41	09/17/1976	34	10/17/1976	28	11/17/1976	27	12/17/1976	27
01/18/1976	39	02/18/1976	51	03/18/1976	45	04/18/1976	43	05/18/1976	48	06/18/1976	41	07/18/1976	31	08/18/1976	41	09/18/1976	32	10/18/1976	29	11/18/1976	27	12/18/1976	25
01/19/1976	41	02/19/1976	47	03/19/1976	47	04/19/1976	49	05/19/1976	47	06/19/1976	42	07/19/1976	33	08/19/1976	40	09/19/1976	31	10/19/1976	30	11/19/1976	27	12/19/1976	25
01/20/1976	43	02/20/1976	45	03/20/1976	49	04/20/1976	46	05/20/1976	49	06/20/1976	34	07/20/1976	38	08/20/1976	41	09/20/1976	34	10/20/1976	31	11/20/1976	26	12/20/1976	28
01/21/1976	41	02/21/1976	81	03/21/1976	45	04/21/1976	53	05/21/1976	47	06/21/1976	36	07/21/1976	48	08/21/1976	38	09/21/1976	33	10/21/1976	32	11/21/1976	26	12/21/1976	26
01/22/1976	42	02/22/1976	64	03/22/1976	44	04/22/1976	51	05/22/1976	43	06/22/1976	37	07/22/1976	40	08/22/1976	37	09/22/1976	32	10/22/1976	31	11/22/1976	26	12/22/1976	26
01/23/1976	42	02/23/1976	53	03/23/1976	44	04/23/1976	48	05/23/1976	42	06/23/1976	36	07/23/1976	37	08/23/1976	39	09/23/1976	32	10/23/1976	29	11/23/1976	26	12/23/1976	26
01/24/1976	40	02/24/1976	50	03/24/1976	46	04/24/1976	60	05/24/1976	43	06/24/1976	45	07/24/1976	34	08/24/1976	39	09/24/1976	32	10/24/1976	29	11/24/1976	26	12/24/1976	26
01/25/1976	39	02/25/1976	48	03/25/1976	45	04/25/1976	124	05/25/1976	43	06/25/1976	41	07/25/1976	31	08/25/1976	41	09/25/1976	30	10/25/1976	30	11/25/1976	26	12/25/1976	26
01/26/1976	42	02/26/1976	45	03/26/1976	46	04/26/1976	86	05/26/1976	44	06/26/1976	35	07/26/1976	34	08/26/1976	41	09/26/1976	37	10/26/1976	29	11/26/1976	35	12/26/1976	26
01/27/1976	41	02/27/1976	44	03/27/1976	55	04/27/1976	63	05/27/1976	43	06/27/1976	32	07/27/1976	45	08/27/1976	37	09/27/1976	36	10/27/1976	29	11/27/1976	43	12/27/1976	27
01/28/1976	41	02/28/1976	42	03/28/1976	48	04/28/1976	55	05/28/1976	43	06/28/1976	34	07/28/1976	35	08/28/1976	32	09/28/1976	33	10/28/1976	28	11/28/1976	32	12/28/1976	26
01/29/1976	41	02/29/1976	42	03/29/1976	46	04/29/1976	52	05/29/1976	45	06/29/1976	35	07/29/1976	35	08/29/1976	30	09/29/1976	32	10/29/1976	29	11/29/1976	31	12/29/1976	26
01/30/1976	41			03/30/1976	47	04/30/1976	51	05/30/1976	53	06/30/1976	49	07/30/1976	33	08/30/1976	34	09/30/1976	32	10/30/1976	29	11/30/1976	30	12/30/1976	27
01/31/1976	36			03/31/1976	44			05/31/1976	54			07/31/1976	37	08/31/1976	34			10/31/1976	30			12/31/1976	30

PORTAGE CREEK DAILY MEAN FLOW
Measured Flow
Lovers Lane (USGS Gage No. 04106300)
October 1964 - December 1994

1977

Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)
01/01/1977	27	02/01/1977	37	03/01/1977	40	04/01/1977	34	05/01/1977	34	06/01/1977	30	07/01/1977	32	08/01/1977	24	09/01/1977	39	10/01/1977	47	11/01/1977	32	12/01/1977	46
01/02/1977	27	02/02/1977	37	03/02/1977	39	04/02/1977	47	05/02/1977	36	06/02/1977	30	07/02/1977	28	08/02/1977	23	09/02/1977	47	10/02/1977	33	11/02/1977	30	12/02/1977	36
01/03/1977	29	02/03/1977	38	03/03/1977	44	04/03/1977	41	05/03/1977	34	06/03/1977	29	07/03/1977	27	08/03/1977	24	09/03/1977	30	10/03/1977	33	11/03/1977	30	12/03/1977	34
01/04/1977	31	02/04/1977	38	03/04/1977	79	04/04/1977	40	05/04/1977	34	06/04/1977	29	07/04/1977	26	08/04/1977	27	09/04/1977	27	10/04/1977	33	11/04/1977	31	12/04/1977	30
01/05/1977	29	02/05/1977	36	03/05/1977	58	04/05/1977	42	05/05/1977	34	06/05/1977	39	07/05/1977	29	08/05/1977	31	09/05/1977	27	10/05/1977	33	11/05/1977	30	12/05/1977	31
01/06/1977	29	02/06/1977	34	03/06/1977	45	04/06/1977	37	05/06/1977	34	06/06/1977	33	07/06/1977	29	08/06/1977	28	09/06/1977	28	10/06/1977	32	11/06/1977	30	12/06/1977	30
01/07/1977	30	02/07/1977	36	03/07/1977	45	04/07/1977	34	05/07/1977	33	06/07/1977	31	07/07/1977	28	08/07/1977	25	09/07/1977	27	10/07/1977	32	11/07/1977	30	12/07/1977	30
01/08/1977	28	02/08/1977	36	03/08/1977	50	04/08/1977	33	05/08/1977	32	06/08/1977	33	07/08/1977	28	08/08/1977	28	09/08/1977	28	10/08/1977	35	11/08/1977	31	12/08/1977	30
01/09/1977	28	02/09/1977	37	03/09/1977	54	04/09/1977	32	05/09/1977	32	06/09/1977	33	07/09/1977	27	08/09/1977	27	09/09/1977	28	10/09/1977	31	11/09/1977	31	12/09/1977	31
01/10/1977	29	02/10/1977	38	03/10/1977	54	04/10/1977	33	05/10/1977	31	06/10/1977	31	07/10/1977	25	08/10/1977	39	09/10/1977	28	10/10/1977	32	11/10/1977	32	12/10/1977	31
01/11/1977	28	02/11/1977	41	03/11/1977	53	04/11/1977	35	05/11/1977	31	06/11/1977	34	07/11/1977	27	08/11/1977	31	09/11/1977	27	10/11/1977	32	11/11/1977	32	12/11/1977	29
01/12/1977	29	02/12/1977	41	03/12/1977	57	04/12/1977	34	05/12/1977	31	06/12/1977	30	07/12/1977	28	08/12/1977	29	09/12/1977	28	10/12/1977	30	11/12/1977	30	12/12/1977	31
01/13/1977	30	02/13/1977	38	03/13/1977	53	04/13/1977	34	05/13/1977	32	06/13/1977	31	07/13/1977	27	08/13/1977	27	09/13/1977	43	10/13/1977	31	11/13/1977	29	12/13/1977	35
01/14/1977	31	02/14/1977	37	03/14/1977	48	04/14/1977	34	05/14/1977	30	06/14/1977	31	07/14/1977	32	08/14/1977	25	09/14/1977	33	10/14/1977	31	11/14/1977	30	12/14/1977	36
01/15/1977	31	02/15/1977	37	03/15/1977	42	04/15/1977	34	05/15/1977	29	06/15/1977	31	07/15/1977	29	08/15/1977	26	09/15/1977	38	10/15/1977	30	11/15/1977	31	12/15/1977	34
01/16/1977	29	02/16/1977	37	03/16/1977	38	04/16/1977	31	05/16/1977	31	06/16/1977	31	07/16/1977	28	08/16/1977	26	09/16/1977	34	10/16/1977	29	11/16/1977	31	12/16/1977	35
01/17/1977	30	02/17/1977	36	03/17/1977	37	04/17/1977	31	05/17/1977	34	06/17/1977	31	07/17/1977	27	08/17/1977	25	09/17/1977	31	10/17/1977	30	11/17/1977	32	12/17/1977	37
01/18/1977	32	02/18/1977	36	03/18/1977	43	04/18/1977	32	05/18/1977	33	06/18/1977	30	07/18/1977	27	08/18/1977	24	09/18/1977	33	10/18/1977	31	11/18/1977	32	12/18/1977	46
01/19/1977	31	02/19/1977	35	03/19/1977	40	04/19/1977	32	05/19/1977	30	06/19/1977	28	07/19/1977	26	08/19/1977	24	09/19/1977	32	10/19/1977	31	11/19/1977	30	12/19/1977	39
01/20/1977	31	02/20/1977	33	03/20/1977	43	04/20/1977	33	05/20/1977	30	06/20/1977	29	07/20/1977	26	08/20/1977	23	09/20/1977	31	10/20/1977	31	11/20/1977	33	12/20/1977	42
01/21/1977	31	02/21/1977	34	03/21/1977	39	04/21/1977	32	05/21/1977	28	06/21/1977	30	07/21/1977	24	08/21/1977	24	09/21/1977	30	10/21/1977	30	11/21/1977	32	12/21/1977	37
01/22/1977	30	02/22/1977	37	03/22/1977	40	04/22/1977	37	05/22/1977	28	06/22/1977	30	07/22/1977	23	08/22/1977	25	09/22/1977	30	10/22/1977	29	11/22/1977	29	12/22/1977	35
01/23/1977	29	02/23/1977	45	03/23/1977	38	04/23/1977	37	05/23/1977	28	06/23/1977	29	07/23/1977	21	08/23/1977	25	09/23/1977	29	10/23/1977	28	11/23/1977	30	12/23/1977	34
01/24/1977	30	02/24/1977	83	03/24/1977	36	04/24/1977	32	05/24/1977	28	06/24/1977	29	07/24/1977	21	08/24/1977	26	09/24/1977	47	10/24/1977	30	11/24/1977	28	12/24/1977	33
01/25/1977	32	02/25/1977	57	03/25/1977	36	04/25/1977	38	05/25/1977	28	06/25/1977	28	07/25/1977	24	08/25/1977	24	09/25/1977	33	10/25/1977	30	11/25/1977	30	12/25/1977	32
01/26/1977	32	02/26/1977	46	03/26/1977	34	04/26/1977	35	05/26/1977	27	06/26/1977	26	07/26/1977	22	08/26/1977	25	09/26/1977	35	10/26/1977	32	11/26/1977	28	12/26/1977	33
01/27/1977	31	02/27/1977	42	03/27/1977	34	04/27/1977	35	05/27/1977	28	06/27/1977	27	07/27/1977	23	08/27/1977	24	09/27/1977	33	10/27/1977	30	11/27/1977	28	12/27/1977	32
01/28/1977	33	02/28/1977	43	03/28/1977	55	04/28/1977	43	05/28/1977	25	06/28/1977	28	07/28/1977	23	08/28/1977	25	09/28/1977	31	10/28/1977	30	11/28/1977	30	12/28/1977	32
01/29/1977	33			03/29/1977	51	04/29/1977	39	05/29/1977	25	06/29/1977	32	07/29/1977	25	08/29/1977	44	09/29/1977	30	10/29/1977	29	11/29/1977	29	12/29/1977	32
01/30/1977	34			03/30/1977	41	04/30/1977	35	05/30/1977	25	06/30/1977	47	07/30/1977	24	08/30/1977	28	09/30/1977	31	10/30/1977	28	11/30/1977	32	12/30/1977	32
01/31/1977	36			03/31/1977	37			05/31/1977	28			07/31/1977	24	08/31/1977	26			10/31/1977	30			12/31/1977	30

PORTAGE CREEK DAILY MEAN FLOW
Measured Flow
Lovers Lane (USGS Gage No. 04106300)
October 1964 - December 1994

1978

Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)
01/01/1978	30	02/01/1978	28	03/01/1978	28	04/01/1978	49	05/01/1978	32	06/01/1978	34	07/01/1978	53	08/01/1978	32	09/01/1978	36	10/01/1978	34	11/01/1978	37	12/01/1978	43
01/02/1978	30	02/02/1978	30	03/02/1978	28	04/02/1978	41	05/02/1978	31	06/02/1978	34	07/02/1978	57	08/02/1978	32	09/02/1978	34	10/02/1978	35	11/02/1978	37	12/02/1978	41
01/03/1978	30	02/03/1978	31	03/03/1978	28	04/03/1978	42	05/03/1978	32	06/03/1978	35	07/03/1978	45	08/03/1978	32	09/03/1978	34	10/03/1978	38	11/03/1978	37	12/03/1978	48
01/04/1978	30	02/04/1978	29	03/04/1978	27	04/04/1978	45	05/04/1978	32	06/04/1978	32	07/04/1978	40	08/04/1978	32	09/04/1978	33	10/04/1978	36	11/04/1978	34	12/04/1978	50
01/05/1978	31	02/05/1978	28	03/05/1978	26	04/05/1978	40	05/05/1978	32	06/05/1978	34	07/05/1978	41	08/05/1978	29	09/05/1978	33	10/05/1978	41	11/05/1978	33	12/05/1978	45
01/06/1978	31	02/06/1978	29	03/06/1978	27	04/06/1978	69	05/06/1978	32	06/06/1978	35	07/06/1978	40	08/06/1978	29	09/06/1978	32	10/06/1978	55	11/06/1978	38	12/06/1978	44
01/07/1978	30	02/07/1978	29	03/07/1978	26	04/07/1978	51	05/07/1978	31	06/07/1978	37	07/07/1978	41	08/07/1978	31	09/07/1978	33	10/07/1978	45	11/07/1978	38	12/07/1978	43
01/08/1978	30	02/08/1978	29	03/08/1978	27	04/08/1978	39	05/08/1978	33	06/08/1978	42	07/08/1978	38	08/08/1978	31	09/08/1978	33	10/08/1978	40	11/08/1978	37	12/08/1978	42
01/09/1978	30	02/09/1978	30	03/09/1978	28	04/09/1978	36	05/09/1978	33	06/09/1978	37	07/09/1978	36	08/09/1978	32	09/09/1978	33	10/09/1978	38	11/09/1978	37	12/09/1978	39
01/10/1978	29	02/10/1978	28	03/10/1978	28	04/10/1978	38	05/10/1978	33	06/10/1978	35	07/10/1978	38	08/10/1978	31	09/10/1978	31	10/10/1978	37	11/10/1978	36	12/10/1978	37
01/11/1978	29	02/11/1978	26	03/11/1978	27	04/11/1978	41	05/11/1978	40	06/11/1978	34	07/11/1978	36	08/11/1978	31	09/11/1978	31	10/11/1978	38	11/11/1978	34	12/11/1978	39
01/12/1978	29	02/12/1978	25	03/12/1978	28	04/12/1978	37	05/12/1978	38	06/12/1978	39	07/12/1978	35	08/12/1978	30	09/12/1978	87	10/12/1978	36	11/12/1978	33	12/12/1978	41
01/13/1978	29	02/13/1978	27	03/13/1978	30	04/13/1978	36	05/13/1978	65	06/13/1978	35	07/13/1978	38	08/13/1978	28	09/13/1978	92	10/13/1978	38	11/13/1978	36	12/13/1978	42
01/14/1978	27	02/14/1978	27	03/14/1978	38	04/14/1978	34	05/14/1978	49	06/14/1978	34	07/14/1978	40	08/14/1978	30	09/14/1978	63	10/14/1978	38	11/14/1978	40	12/14/1978	42
01/15/1978	26	02/15/1978	27	03/15/1978	35	04/15/1978	32	05/15/1978	42	06/15/1978	34	07/15/1978	37	08/15/1978	30	09/15/1978	47	10/15/1978	38	11/15/1978	37	12/15/1978	42
01/16/1978	29	02/16/1978	28	03/16/1978	34	04/16/1978	31	05/16/1978	38	06/16/1978	37	07/16/1978	37	08/16/1978	38	09/16/1978	42	10/16/1978	44	11/16/1978	37	12/16/1978	38
01/17/1978	30	02/17/1978	30	03/17/1978	33	04/17/1978	33	05/17/1978	37	06/17/1978	36	07/17/1978	36	08/17/1978	35	09/17/1978	113	10/17/1978	40	11/17/1978	42	12/17/1978	39
01/18/1978	30	02/18/1978	27	03/18/1978	30	04/18/1978	34	05/18/1978	36	06/18/1978	34	07/18/1978	34	08/18/1978	35	09/18/1978	90	10/18/1978	41	11/18/1978	36	12/18/1978	41
01/19/1978	30	02/19/1978	27	03/19/1978	30	04/19/1978	34	05/19/1978	36	06/19/1978	34	07/19/1978	34	08/19/1978	43	09/19/1978	62	10/19/1978	42	11/19/1978	34	12/19/1978	39
01/20/1978	30	02/20/1978	27	03/20/1978	35	04/20/1978	35	05/20/1978	59	06/20/1978	36	07/20/1978	35	08/20/1978	36	09/20/1978	49	10/20/1978	42	11/20/1978	37	12/20/1978	43
01/21/1978	29	02/21/1978	27	03/21/1978	60	04/21/1978	35	05/21/1978	56	06/21/1978	39	07/21/1978	72	08/21/1978	35	09/21/1978	49	10/21/1978	39	11/21/1978	41	12/21/1978	43
01/22/1978	27	02/22/1978	28	03/22/1978	46	04/22/1978	33	05/22/1978	47	06/22/1978	33	07/22/1978	46	08/22/1978	34	09/22/1978	42	10/22/1978	38	11/22/1978	41	12/22/1978	42
01/23/1978	30	02/23/1978	27	03/23/1978	46	04/23/1978	32	05/23/1978	43	06/23/1978	33	07/23/1978	43	08/23/1978	33	09/23/1978	40	10/23/1978	41	11/23/1978	46	12/23/1978	39
01/24/1978	30	02/24/1978	28	03/24/1978	43	04/24/1978	37	05/24/1978	42	06/24/1978	33	07/24/1978	38	08/24/1978	34	09/24/1978	37	10/24/1978	36	11/24/1978	41	12/24/1978	39
01/25/1978	31	02/25/1978	27	03/25/1978	38	04/25/1978	38	05/25/1978	39	06/25/1978	41	07/25/1978	35	08/25/1978	35	09/25/1978	37	10/25/1978	39	11/25/1978	41	12/25/1978	37
01/26/1978	27	02/26/1978	26	03/26/1978	38	04/26/1978	33	05/26/1978	37	06/26/1978	195	07/26/1978	36	08/26/1978	37	09/26/1978	37	10/26/1978	44	11/26/1978	40	12/26/1978	39
01/27/1978	31	02/27/1978	28	03/27/1978	36	04/27/1978	32	05/27/1978	34	06/27/1978	104	07/27/1978	36	08/27/1978	43	09/27/1978	36	10/27/1978	38	11/27/1978	41	12/27/1978	39
01/28/1978	30	02/28/1978	29	03/28/1978	42	04/28/1978	32	05/28/1978	32	06/28/1978	66	07/28/1978	35	08/28/1978	46	09/28/1978	36	10/28/1978	36	11/28/1978	42	12/28/1978	39
01/29/1978	27			03/29/1978	44	04/29/1978	31	05/29/1978	33	06/29/1978	52	07/29/1978	32	08/29/1978	40	09/29/1978	35	10/29/1978	35	11/29/1978	42	12/29/1978	40
01/30/1978	28			03/30/1978	43	04/30/1978	32	05/30/1978	35	06/30/1978	43	07/30/1978	31	08/30/1978	37	09/30/1978	36	10/30/1978	37	11/30/1978	43	12/30/1978	44
01/31/1978	28			03/31/1978	45			05/31/1978	35			07/31/1978	33	08/31/1978	36			10/31/1978	37			12/31/1978	57

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Lovers Lane (USGS Gage No. 04106300)
October 1964 - December 1994

1979

Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)
01/01/1979	55	02/01/1979	38	03/01/1979	42	04/01/1979	52	05/01/1979	54	06/01/1979	50	07/01/1979	60	08/01/1979	42	09/01/1979	30	10/01/1979	28	11/01/1979	45	12/01/1979	37
01/02/1979	46	02/02/1979	38	03/02/1979	43	04/02/1979	63	05/02/1979	52	06/02/1979	44	07/02/1979	52	08/02/1979	43	09/02/1979	29	10/02/1979	32	11/02/1979	35	12/02/1979	33
01/03/1979	43	02/03/1979	37	03/03/1979	51	04/03/1979	55	05/03/1979	78	06/03/1979	42	07/03/1979	50	08/03/1979	38	09/03/1979	29	10/03/1979	30	11/03/1979	33	12/03/1979	35
01/04/1979	42	02/04/1979	35	03/04/1979	95	04/04/1979	52	05/04/1979	60	06/04/1979	44	07/04/1979	78	08/04/1979	39	09/04/1979	29	10/04/1979	29	11/04/1979	30	12/04/1979	35
01/05/1979	41	02/05/1979	37	03/05/1979	74	04/05/1979	52	05/05/1979	55	06/05/1979	42	07/05/1979	59	08/05/1979	47	09/05/1979	30	10/05/1979	30	11/05/1979	32	12/05/1979	38
01/06/1979	40	02/06/1979	38	03/06/1979	59	04/06/1979	48	05/06/1979	48	06/06/1979	44	07/06/1979	53	08/06/1979	42	09/06/1979	30	10/06/1979	31	11/06/1979	33	12/06/1979	40
01/07/1979	38	02/07/1979	39	03/07/1979	55	04/07/1979	45	05/07/1979	51	06/07/1979	73	07/07/1979	48	08/07/1979	38	09/07/1979	30	10/07/1979	35	11/07/1979	33	12/07/1979	43
01/08/1979	39	02/08/1979	36	03/08/1979	54	04/08/1979	49	05/08/1979	52	06/08/1979	89	07/08/1979	45	08/08/1979	38	09/08/1979	29	10/08/1979	31	11/08/1979	35	12/08/1979	40
01/09/1979	38	02/09/1979	37	03/09/1979	60	04/09/1979	53	05/09/1979	50	06/09/1979	56	07/09/1979	48	08/09/1979	37	09/09/1979	28	10/09/1979	30	11/09/1979	36	12/09/1979	35
01/10/1979	35	02/10/1979	37	03/10/1979	54	04/10/1979	48	05/10/1979	51	06/10/1979	51	07/10/1979	49	08/10/1979	49	09/10/1979	30	10/10/1979	29	11/10/1979	36	12/10/1979	37
01/11/1979	36	02/11/1979	35	03/11/1979	46	04/11/1979	50	05/11/1979	56	06/11/1979	49	07/11/1979	49	08/11/1979	37	09/11/1979	30	10/11/1979	31	11/11/1979	34	12/11/1979	37
01/12/1979	38	02/12/1979	38	03/12/1979	47	04/12/1979	56	05/12/1979	55	06/12/1979	48	07/12/1979	47	08/12/1979	34	09/12/1979	30	10/12/1979	29	11/12/1979	33	12/12/1979	41
01/13/1979	38	02/13/1979	38	03/13/1979	52	04/13/1979	51	05/13/1979	51	06/13/1979	49	07/13/1979	44	08/13/1979	36	09/13/1979	31	10/13/1979	28	11/13/1979	33	12/13/1979	37
01/14/1979	36	02/14/1979	37	03/14/1979	58	04/14/1979	46	05/14/1979	55	06/14/1979	48	07/14/1979	41	08/14/1979	37	09/14/1979	31	10/14/1979	27	11/14/1979	32	12/14/1979	37
01/15/1979	37	02/15/1979	34	03/15/1979	49	04/15/1979	43	05/15/1979	52	06/15/1979	46	07/15/1979	40	08/15/1979	34	09/15/1979	30	10/15/1979	27	11/15/1979	33	12/15/1979	35
01/16/1979	37	02/16/1979	34	03/16/1979	49	04/16/1979	44	05/16/1979	49	06/16/1979	44	07/16/1979	39	08/16/1979	32	09/16/1979	29	10/16/1979	27	11/16/1979	33	12/16/1979	33
01/17/1979	35	02/17/1979	33	03/17/1979	49	04/17/1979	46	05/17/1979	49	06/17/1979	42	07/17/1979	38	08/17/1979	43	09/17/1979	29	10/17/1979	28	11/17/1979	31	12/17/1979	33
01/18/1979	32	02/18/1979	32	03/18/1979	55	04/18/1979	47	05/18/1979	52	06/18/1979	42	07/18/1979	37	08/18/1979	51	09/18/1979	29	10/18/1979	29	11/18/1979	29	12/18/1979	32
01/19/1979	32	02/19/1979	34	03/19/1979	62	04/19/1979	46	05/19/1979	49	06/19/1979	42	07/19/1979	37	08/19/1979	37	09/19/1979	31	10/19/1979	29	11/19/1979	32	12/19/1979	32
01/20/1979	32	02/20/1979	37	03/20/1979	57	04/20/1979	48	05/20/1979	45	06/20/1979	66	07/20/1979	38	08/20/1979	55	09/20/1979	31	10/20/1979	28	11/20/1979	32	12/20/1979	33
01/21/1979	31	02/21/1979	42	03/21/1979	52	04/21/1979	49	05/21/1979	46	06/21/1979	52	07/21/1979	38	08/21/1979	39	09/21/1979	31	10/21/1979	27	11/21/1979	48	12/21/1979	34
01/22/1979	33	02/22/1979	42	03/22/1979	51	04/22/1979	46	05/22/1979	47	06/22/1979	45	07/22/1979	37	08/22/1979	35	09/22/1979	29	10/22/1979	35	11/22/1979	52	12/22/1979	34
01/23/1979	37	02/23/1979	51	03/23/1979	57	04/23/1979	47	05/23/1979	47	06/23/1979	41	07/23/1979	39	08/23/1979	39	09/23/1979	27	10/23/1979	40	11/23/1979	49	12/23/1979	39
01/24/1979	38	02/24/1979	46	03/24/1979	51	04/24/1979	54	05/24/1979	46	06/24/1979	38	07/24/1979	38	08/24/1979	36	09/24/1979	28	10/24/1979	34	11/24/1979	39	12/24/1979	66
01/25/1979	37	02/25/1979	39	03/25/1979	45	04/25/1979	63	05/25/1979	46	06/25/1979	40	07/25/1979	42	08/25/1979	32	09/25/1979	29	10/25/1979	33	11/25/1979	43	12/25/1979	79
01/26/1979	38	02/26/1979	40	03/26/1979	44	04/26/1979	67	05/26/1979	43	06/26/1979	42	07/26/1979	42	08/26/1979	31	09/26/1979	27	10/26/1979	32	11/26/1979	85	12/26/1979	51
01/27/1979	39	02/27/1979	42	03/27/1979	43	04/27/1979	58	05/27/1979	40	06/27/1979	43	07/27/1979	41	08/27/1979	32	09/27/1979	28	10/27/1979	31	11/27/1979	50	12/27/1979	44
01/28/1979	35	02/28/1979	41	03/28/1979	46	04/28/1979	59	05/28/1979	40	06/28/1979	48	07/28/1979	39	08/28/1979	31	09/28/1979	27	10/28/1979	30	11/28/1979	47	12/28/1979	43
01/29/1979	36			03/29/1979	65	04/29/1979	51	05/29/1979	43	06/29/1979	61	07/29/1979	38	08/29/1979	33	09/29/1979	26	10/29/1979	30	11/29/1979	41	12/29/1979	41
01/30/1979	37			03/30/1979	76	04/30/1979	61	05/30/1979	50	06/30/1979	101	07/30/1979	51	08/30/1979	32	09/30/1979	26	10/30/1979	31	11/30/1979	39	12/30/1979	38
01/31/1979	37			03/31/1979	67			05/31/1979	49			07/31/1979	47	08/31/1979	32			10/31/1979	31			12/31/1979	36

PORTAGE CREEK DAILY MEAN FLOW
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1980

Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)
01/01/1980	36	02/01/1980	37	03/01/1980	38	04/01/1980	46	05/01/1980	48	06/01/1980	41	07/01/1980	34	08/01/1980	35	09/01/1980	61	10/01/1980	45	11/01/1980	44	12/01/1980	48
01/02/1980	38	02/02/1980	37	03/02/1980	36	04/02/1980	48	05/02/1980	46	06/02/1980	41	07/02/1980	33	08/02/1980	85	09/02/1980	63	10/02/1980	46	11/02/1980	41	12/02/1980	69
01/03/1980	38	02/03/1980	35	03/03/1980	38	04/03/1980	53	05/03/1980	49	06/03/1980	85	07/03/1980	31	08/03/1980	79	09/03/1980	52	10/03/1980	47	11/03/1980	44	12/03/1980	52
01/04/1980	40	02/04/1980	37	03/04/1980	41	04/04/1980	57	05/04/1980	45	06/04/1980	47	07/04/1980	28	08/04/1980	48	09/04/1980	49	10/04/1980	42	11/04/1980	47	12/04/1980	49
01/05/1980	38	02/05/1980	38	03/05/1980	40	04/05/1980	50	05/05/1980	47	06/05/1980	43	07/05/1980	42	08/05/1980	49	09/05/1980	45	10/05/1980	37	11/05/1980	46	12/05/1980	50
01/06/1980	36	02/06/1980	38	03/06/1980	41	04/06/1980	45	05/06/1980	46	06/06/1980	46	07/06/1980	33	08/06/1980	42	09/06/1980	44	10/06/1980	41	11/06/1980	47	12/06/1980	48
01/07/1980	42	02/07/1980	37	03/07/1980	42	04/07/1980	48	05/07/1980	45	06/07/1980	83	07/07/1980	34	08/07/1980	40	09/07/1980	41	10/07/1980	42	11/07/1980	47	12/07/1980	56
01/08/1980	46	02/08/1980	37	03/08/1980	42	04/08/1980	61	05/08/1980	44	06/08/1980	84	07/08/1980	34	08/08/1980	38	09/08/1980	44	10/08/1980	42	11/08/1980	46	12/08/1980	69
01/09/1980	45	02/09/1980	36	03/09/1980	40	04/09/1980	65	05/09/1980	41	06/09/1980	57	07/09/1980	36	08/09/1980	36	09/09/1980	44	10/09/1980	43	11/09/1980	42	12/09/1980	57
01/10/1980	46	02/10/1980	35	03/10/1980	44	04/10/1980	61	05/10/1980	41	06/10/1980	50	07/10/1980	34	08/10/1980	39	09/10/1980	43	10/10/1980	41	11/10/1980	44	12/10/1980	49
01/11/1980	58	02/11/1980	37	03/11/1980	42	04/11/1980	53	05/11/1980	43	06/11/1980	45	07/11/1980	32	08/11/1980	40	09/11/1980	44	10/11/1980	40	11/11/1980	44	12/11/1980	45
01/12/1980	47	02/12/1980	40	03/12/1980	39	04/12/1980	52	05/12/1980	41	06/12/1980	43	07/12/1980	46	08/12/1980	41	09/12/1980	47	10/12/1980	40	11/12/1980	46	12/12/1980	44
01/13/1980	42	02/13/1980	39	03/13/1980	42	04/13/1980	46	05/13/1980	49	06/13/1980	41	07/13/1980	47	08/13/1980	39	09/13/1980	46	10/13/1980	42	11/13/1980	48	12/13/1980	42
01/14/1980	45	02/14/1980	40	03/14/1980	44	04/14/1980	54	05/14/1980	43	06/14/1980	43	07/14/1980	36	08/14/1980	90	09/14/1980	42	10/14/1980	44	11/14/1980	46	12/14/1980	38
01/15/1980	45	02/15/1980	42	03/15/1980	42	04/15/1980	55	05/15/1980	42	06/15/1980	52	07/15/1980	35	08/15/1980	53	09/15/1980	41	10/15/1980	44	11/15/1980	44	12/15/1980	40
01/16/1980	47	02/16/1980	39	03/16/1980	43	04/16/1980	48	05/16/1980	42	06/16/1980	45	07/16/1980	54	08/16/1980	43	09/16/1980	42	10/16/1980	46	11/16/1980	43	12/16/1980	40
01/17/1980	51	02/17/1980	36	03/17/1980	74	04/17/1980	48	05/17/1980	52	06/17/1980	43	07/17/1980	37	08/17/1980	50	09/17/1980	68	10/17/1980	55	11/17/1980	45	12/17/1980	41
01/18/1980	48	02/18/1980	38	03/18/1980	57	04/18/1980	47	05/18/1980	61	06/18/1980	42	07/18/1980	34	08/18/1980	48	09/18/1980	46	10/18/1980	46	11/18/1980	44	12/18/1980	39
01/19/1980	43	02/19/1980	40	03/19/1980	50	04/19/1980	45	05/19/1980	46	06/19/1980	43	07/19/1980	33	08/19/1980	51	09/19/1980	41	10/19/1980	43	11/19/1980	45	12/19/1980	38
01/20/1980	41	02/20/1980	41	03/20/1980	51	04/20/1980	43	05/20/1980	41	06/20/1980	41	07/20/1980	31	08/20/1980	98	09/20/1980	43	10/20/1980	44	11/20/1980	44	12/20/1980	36
01/21/1980	46	02/21/1980	42	03/21/1980	57	04/21/1980	44	05/21/1980	35	06/21/1980	38	07/21/1980	33	08/21/1980	78	09/21/1980	39	10/21/1980	45	11/21/1980	44	12/21/1980	34
01/22/1980	59	02/22/1980	72	03/22/1980	49	04/22/1980	46	05/22/1980	35	06/22/1980	36	07/22/1980	33	08/22/1980	57	09/22/1980	44	10/22/1980	43	11/22/1980	40	12/22/1980	37
01/23/1980	45	02/23/1980	55	03/23/1980	46	04/23/1980	44	05/23/1980	34	06/23/1980	39	07/23/1980	31	08/23/1980	49	09/23/1980	48	10/23/1980	43	11/23/1980	40	12/23/1980	38
01/24/1980	42	02/24/1980	47	03/24/1980	49	04/24/1980	46	05/24/1980	33	06/24/1980	40	07/24/1980	32	08/24/1980	43	09/24/1980	45	10/24/1980	49	11/24/1980	46	12/24/1980	37
01/25/1980	42	02/25/1980	45	03/25/1980	47	04/25/1980	45	05/25/1980	30	06/25/1980	39	07/25/1980	30	08/25/1980	43	09/25/1980	41	10/25/1980	52	11/25/1980	44	12/25/1980	33
01/26/1980	39	02/26/1980	40	03/26/1980	45	04/26/1980	43	05/26/1980	29	06/26/1980	37	07/26/1980	29	08/26/1980	42	09/26/1980	42	10/26/1980	47	11/26/1980	44	12/26/1980	34
01/27/1980	38	02/27/1980	40	03/27/1980	45	04/27/1980	42	05/27/1980	32	06/27/1980	32	07/27/1980	41	08/27/1980	42	09/27/1980	43	10/27/1980	45	11/27/1980	41	12/27/1980	32
01/28/1980	39	02/28/1980	40	03/28/1980	45	04/28/1980	46	05/28/1980	32	06/28/1980	29	07/28/1980	48	08/28/1980	41	09/28/1980	42	10/28/1980	45	11/28/1980	47	12/28/1980	32
01/29/1980	40	02/29/1980	40	03/29/1980	51	04/29/1980	50	05/29/1980	35	06/29/1980	28	07/29/1980	35	08/29/1980	42	09/29/1980	45	10/29/1980	45	11/29/1980	45	12/29/1980	39
01/30/1980	40			03/30/1980	46	04/30/1980	54	05/30/1980	37	06/30/1980	30	07/30/1980	32	08/30/1980	38	09/30/1980	46	10/30/1980	45	11/30/1980	42	12/30/1980	39
01/31/1980	38			03/31/1980	49			05/31/1980	40			07/31/1980	32	08/31/1980	41			10/31/1980	45			12/31/1980	40

PORTAGE CREEK DAILY MEAN FLOW
Measured Flow
Lovers Lane (USGS Gage No. 04106300)
October 1964 - December 1994

1981

Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)
01/01/1981	35	02/01/1981	38	03/01/1981	42	04/01/1981	49	05/01/1981	43	06/01/1981	42	07/01/1981	37	08/01/1981	31	09/01/1981	59	10/01/1981	68	11/01/1981	34	12/01/1981	44
01/02/1981	35	02/02/1981	41	03/02/1981	43	04/02/1981	44	05/02/1981	38	06/02/1981	44	07/02/1981	38	08/02/1981	30	09/02/1981	42	10/02/1981	52	11/02/1981	36	12/02/1981	44
01/03/1981	36	02/03/1981	42	03/03/1981	44	04/03/1981	44	05/03/1981	36	06/03/1981	42	07/03/1981	35	08/03/1981	36	09/03/1981	42	10/03/1981	43	11/03/1981	35	12/03/1981	41
01/04/1981	34	02/04/1981	40	03/04/1981	44	04/04/1981	43	05/04/1981	38	06/04/1981	42	07/04/1981	35	08/04/1981	33	09/04/1981	39	10/04/1981	39	11/04/1981	35	12/04/1981	43
01/05/1981	37	02/05/1981	40	03/05/1981	46	04/05/1981	37	05/05/1981	38	06/05/1981	41	07/05/1981	35	08/05/1981	31	09/05/1981	35	10/05/1981	39	11/05/1981	34	12/05/1981	39
01/06/1981	39	02/06/1981	42	03/06/1981	42	04/06/1981	38	05/06/1981	36	06/06/1981	37	07/06/1981	36	08/06/1981	34	09/06/1981	34	10/06/1981	38	11/06/1981	34	12/06/1981	37
01/07/1981	39	02/07/1981	42	03/07/1981	41	04/07/1981	35	05/07/1981	37	06/07/1981	32	07/07/1981	35	08/07/1981	36	09/07/1981	33	10/07/1981	37	11/07/1981	32	12/07/1981	39
01/08/1981	40	02/08/1981	36	03/08/1981	38	04/08/1981	35	05/08/1981	37	06/08/1981	36	07/08/1981	36	08/08/1981	32	09/08/1981	34	10/08/1981	37	11/08/1981	31	12/08/1981	41
01/09/1981	39	02/09/1981	39	03/09/1981	40	04/09/1981	44	05/09/1981	36	06/09/1981	43	07/09/1981	36	08/09/1981	30	09/09/1981	34	10/09/1981	37	11/09/1981	31	12/09/1981	39
01/10/1981	38	02/10/1981	43	03/10/1981	42	04/10/1981	38	05/10/1981	75	06/10/1981	38	07/10/1981	35	08/10/1981	32	09/10/1981	33	10/10/1981	34	11/10/1981	32	12/10/1981	38
01/11/1981	36	02/11/1981	47	03/11/1981	41	04/11/1981	42	05/11/1981	74	06/11/1981	38	07/11/1981	34	08/11/1981	31	09/11/1981	34	10/11/1981	33	11/11/1981	33	12/11/1981	37
01/12/1981	38	02/12/1981	42	03/12/1981	43	04/12/1981	48	05/12/1981	51	06/12/1981	36	07/12/1981	33	08/12/1981	34	09/12/1981	32	10/12/1981	34	11/12/1981	34	12/12/1981	35
01/13/1981	38	02/13/1981	41	03/13/1981	44	04/13/1981	42	05/13/1981	45	06/13/1981	69	07/13/1981	42	08/13/1981	32	09/13/1981	31	10/13/1981	35	11/13/1981	34	12/13/1981	34
01/14/1981	38	02/14/1981	40	03/14/1981	41	04/14/1981	55	05/14/1981	48	06/14/1981	65	07/14/1981	35	08/14/1981	32	09/14/1981	34	10/14/1981	37	11/14/1981	34	12/14/1981	37
01/15/1981	40	02/15/1981	40	03/15/1981	39	04/15/1981	44	05/15/1981	45	06/15/1981	51	07/15/1981	34	08/15/1981	35	09/15/1981	33	10/15/1981	35	11/15/1981	32	12/15/1981	36
01/16/1981	39	02/16/1981	53	03/16/1981	40	04/16/1981	44	05/16/1981	40	06/16/1981	53	07/16/1981	34	08/16/1981	30	09/16/1981	33	10/16/1981	35	11/16/1981	34	12/16/1981	35
01/17/1981	37	02/17/1981	60	03/17/1981	41	04/17/1981	42	05/17/1981	37	06/17/1981	43	07/17/1981	34	08/17/1981	31	09/17/1981	36	10/17/1981	36	11/17/1981	34	12/17/1981	34
01/18/1981	36	02/18/1981	70	03/18/1981	41	04/18/1981	38	05/18/1981	37	06/18/1981	39	07/18/1981	31	08/18/1981	31	09/18/1981	35	10/18/1981	53	11/18/1981	38	12/18/1981	34
01/19/1981	37	02/19/1981	74	03/19/1981	41	04/19/1981	41	05/19/1981	37	06/19/1981	40	07/19/1981	31	08/19/1981	31	09/19/1981	32	10/19/1981	46	11/19/1981	41	12/19/1981	32
01/20/1981	39	02/20/1981	67	03/20/1981	42	04/20/1981	40	05/20/1981	37	06/20/1981	37	07/20/1981	34	08/20/1981	31	09/20/1981	32	10/20/1981	40	11/20/1981	64	12/20/1981	30
01/21/1981	40	02/21/1981	60	03/21/1981	41	04/21/1981	38	05/21/1981	36	06/21/1981	38	07/21/1981	34	08/21/1981	29	09/21/1981	44	10/21/1981	45	11/21/1981	44	12/21/1981	33
01/22/1981	41	02/22/1981	56	03/22/1981	37	04/22/1981	43	05/22/1981	35	06/22/1981	53	07/22/1981	33	08/22/1981	27	09/22/1981	56	10/22/1981	43	11/22/1981	39	12/22/1981	34
01/23/1981	40	02/23/1981	61	03/23/1981	41	04/23/1981	106	05/23/1981	33	06/23/1981	42	07/23/1981	32	08/23/1981	26	09/23/1981	36	10/23/1981	41	11/23/1981	40	12/23/1981	33
01/24/1981	39	02/24/1981	58	03/24/1981	42	04/24/1981	54	05/24/1981	51	06/24/1981	41	07/24/1981	31	08/24/1981	28	09/24/1981	35	10/24/1981	38	11/24/1981	40	12/24/1981	30
01/25/1981	37	02/25/1981	52	03/25/1981	40	04/25/1981	45	05/25/1981	49	06/25/1981	40	07/25/1981	30	08/25/1981	29	09/25/1981	37	10/25/1981	35	11/25/1981	39	12/25/1981	30
01/26/1981	42	02/26/1981	49	03/26/1981	51	04/26/1981	41	05/26/1981	45	06/26/1981	38	07/26/1981	31	08/26/1981	32	09/26/1981	40	10/26/1981	36	11/26/1981	51	12/26/1981	31
01/27/1981	42	02/27/1981	48	03/27/1981	45	04/27/1981	41	05/27/1981	40	06/27/1981	36	07/27/1981	32	08/27/1981	51	09/27/1981	75	10/27/1981	37	11/27/1981	52	12/27/1981	33
01/28/1981	42	02/28/1981	48	03/28/1981	42	04/28/1981	53	05/28/1981	38	06/28/1981	34	07/28/1981	51	08/28/1981	43	09/28/1981	45	10/28/1981	36	11/28/1981	42	12/28/1981	34
01/29/1981	41			03/29/1981	40	04/29/1981	62	05/29/1981	40	06/29/1981	36	07/29/1981	36	08/29/1981	34	09/29/1981	41	10/29/1981	36	11/29/1981	41	12/29/1981	35
01/30/1981	42			03/30/1981	47	04/30/1981	47	05/30/1981	71	06/30/1981	37	07/30/1981	34	08/30/1981	32	09/30/1981	92	10/30/1981	36	11/30/1981	42	12/30/1981	35
01/31/1981	39			03/31/1981	45			05/31/1981	44			07/31/1981	34	08/31/1981	118			10/31/1981	34			12/31/1981	37

PORTAGE CREEK DAILY MEAN FLOW
Measured Flow
Lovers Lane (USGS Gage No. 04106300)
October 1964 - December 1994

1982

Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)
01/01/1982	37	02/01/1982	36	03/01/1982	41	04/01/1982	65	05/01/1982	46	06/01/1982	85	07/01/1982	41	08/01/1982	33	09/01/1982	32	10/01/1982	32	11/01/1982	44	12/01/1982	31
01/02/1982	35	02/02/1982	37	03/02/1982	42	04/02/1982	61	05/02/1982	46	06/02/1982	58	07/02/1982	40	08/02/1982	40	09/02/1982	31	10/02/1982	29	11/02/1982	55	12/02/1982	36
01/03/1982	40	02/03/1982	37	03/03/1982	40	04/03/1982	71	05/03/1982	49	06/03/1982	51	07/03/1982	52	08/03/1982	45	09/03/1982	31	10/03/1982	29	11/03/1982	43	12/03/1982	71
01/04/1982	76	02/04/1982	37	03/04/1982	43	04/04/1982	63	05/04/1982	48	06/04/1982	50	07/04/1982	41	08/04/1982	48	09/04/1982	30	10/04/1982	31	11/04/1982	32	12/04/1982	47
01/05/1982	48	02/05/1982	37	03/05/1982	42	04/05/1982	61	05/05/1982	50	06/05/1982	45	07/05/1982	39	08/05/1982	41	09/05/1982	30	10/05/1982	31	11/05/1982	31	12/05/1982	53
01/06/1982	44	02/06/1982	35	03/06/1982	41	04/06/1982	61	05/06/1982	49	06/06/1982	41	07/06/1982	41	08/06/1982	42	09/06/1982	30	10/06/1982	33	11/06/1982	28	12/06/1982	45
01/07/1982	40	02/07/1982	35	03/07/1982	39	04/07/1982	61	05/07/1982	55	06/07/1982	45	07/07/1982	46	08/07/1982	40	09/07/1982	32	10/07/1982	34	11/07/1982	26	12/07/1982	38
01/08/1982	39	02/08/1982	37	03/08/1982	41	04/08/1982	60	05/08/1982	48	06/08/1982	45	07/08/1982	41	08/08/1982	40	09/08/1982	32	10/08/1982	32	11/08/1982	27	12/08/1982	37
01/09/1982	35	02/09/1982	36	03/09/1982	42	04/09/1982	61	05/09/1982	45	06/09/1982	56	07/09/1982	41	08/09/1982	40	09/09/1982	32	10/09/1982	31	11/09/1982	38	12/09/1982	34
01/10/1982	36	02/10/1982	37	03/10/1982	44	04/10/1982	60	05/10/1982	48	06/10/1982	53	07/10/1982	47	08/10/1982	37	09/10/1982	30	10/10/1982	28	11/10/1982	33	12/10/1982	36
01/11/1982	37	02/11/1982	38	03/11/1982	59	04/11/1982	57	05/11/1982	47	06/11/1982	47	07/11/1982	55	08/11/1982	36	09/11/1982	30	10/11/1982	32	11/11/1982	41	12/11/1982	32
01/12/1982	36	02/12/1982	38	03/12/1982	58	04/12/1982	62	05/12/1982	48	06/12/1982	42	07/12/1982	46	08/12/1982	36	09/12/1982	30	10/12/1982	32	11/12/1982	45	12/12/1982	31
01/13/1982	38	02/13/1982	37	03/13/1982	100	04/13/1982	67	05/13/1982	43	06/13/1982	40	07/13/1982	43	08/13/1982	32	09/13/1982	30	10/13/1982	29	11/13/1982	36	12/13/1982	32
01/14/1982	38	02/14/1982	35	03/14/1982	73	04/14/1982	61	05/14/1982	40	06/14/1982	41	07/14/1982	53	08/14/1982	30	09/14/1982	32	10/14/1982	31	11/14/1982	31	12/14/1982	33
01/15/1982	40	02/15/1982	42	03/15/1982	67	04/15/1982	60	05/15/1982	39	06/15/1982	49	07/15/1982	61	08/15/1982	30	09/15/1982	33	10/15/1982	28	11/15/1982	31	12/15/1982	38
01/16/1982	37	02/16/1982	43	03/16/1982	83	04/16/1982	57	05/16/1982	44	06/16/1982	44	07/16/1982	45	08/16/1982	30	09/16/1982	38	10/16/1982	27	11/16/1982	31	12/16/1982	43
01/17/1982	36	02/17/1982	43	03/17/1982	77	04/17/1982	55	05/17/1982	41	06/17/1982	46	07/17/1982	175	08/17/1982	29	09/17/1982	38	10/17/1982	26	11/17/1982	29	12/17/1982	38
01/18/1982	38	02/18/1982	43	03/18/1982	67	04/18/1982	51	05/18/1982	41	06/18/1982	49	07/18/1982	81	08/18/1982	30	09/18/1982	50	10/18/1982	27	11/18/1982	27	12/18/1982	34
01/19/1982	40	02/19/1982	43	03/19/1982	63	04/19/1982	54	05/19/1982	45	06/19/1982	58	07/19/1982	70	08/19/1982	31	09/19/1982	35	10/19/1982	28	11/19/1982	28	12/19/1982	34
01/20/1982	39	02/20/1982	42	03/20/1982	72	04/20/1982	54	05/20/1982	36	06/20/1982	52	07/20/1982	60	08/20/1982	32	09/20/1982	36	10/20/1982	36	11/20/1982	55	12/20/1982	38
01/21/1982	38	02/21/1982	40	03/21/1982	63	04/21/1982	50	05/21/1982	47	06/21/1982	51	07/21/1982	55	08/21/1982	30	09/21/1982	36	10/21/1982	29	11/21/1982	40	12/21/1982	40
01/22/1982	38	02/22/1982	41	03/22/1982	63	04/22/1982	49	05/22/1982	66	06/22/1982	49	07/22/1982	50	08/22/1982	28	09/22/1982	37	10/22/1982	27	11/22/1982	32	12/22/1982	38
01/23/1982	38	02/23/1982	41	03/23/1982	64	04/23/1982	50	05/23/1982	50	06/23/1982	48	07/23/1982	45	08/23/1982	28	09/23/1982	38	10/23/1982	22	11/23/1982	36	12/23/1982	38
01/24/1982	34	02/24/1982	42	03/24/1982	65	04/24/1982	48	05/24/1982	47	06/24/1982	47	07/24/1982	40	08/24/1982	28	09/24/1982	40	10/24/1982	24	11/24/1982	34	12/24/1982	40
01/25/1982	35	02/25/1982	41	03/25/1982	60	04/25/1982	46	05/25/1982	45	06/25/1982	47	07/25/1982	35	08/25/1982	29	09/25/1982	38	10/25/1982	28	11/25/1982	28	12/25/1982	61
01/26/1982	35	02/26/1982	41	03/26/1982	57	04/26/1982	51	05/26/1982	46	06/26/1982	43	07/26/1982	34	08/26/1982	31	09/26/1982	36	10/26/1982	27	11/26/1982	28	12/26/1982	41
01/27/1982	36	02/27/1982	39	03/27/1982	52	04/27/1982	51	05/27/1982	63	06/27/1982	45	07/27/1982	33	08/27/1982	31	09/27/1982	35	10/27/1982	27	11/27/1982	27	12/27/1982	38
01/28/1982	36	02/28/1982	38	03/28/1982	49	04/28/1982	50	05/28/1982	61	06/28/1982	49	07/28/1982	33	08/28/1982	30	09/28/1982	37	10/28/1982	28	11/28/1982	34	12/28/1982	44
01/29/1982	35			03/29/1982	51	04/29/1982	50	05/29/1982	49	06/29/1982	43	07/29/1982	33	08/29/1982	29	09/29/1982	35	10/29/1982	32	11/29/1982	37	12/29/1982	40
01/30/1982	35			03/30/1982	77	04/30/1982	50	05/30/1982	52	06/30/1982	42	07/30/1982	33	08/30/1982	30	09/30/1982	33	10/30/1982	29	11/30/1982	32	12/30/1982	38
01/31/1982	34			03/31/1982	89			05/31/1982	48			07/31/1982	33	08/31/1982	31			10/31/1982	28			12/31/1982	37

PORTAGE CREEK DAILY MEAN FLOW
Measured Flow
Lovers Lane (USGS Gage No. 04106300)
October 1964 - December 1994

1983

Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)
01/01/1983	36	02/01/1983	40	03/01/1983	43	04/01/1983	45	05/01/1983	55	06/01/1983	54	07/01/1983	44	08/01/1983	36	09/01/1983	30	10/01/1983	34	11/01/1983	34	12/01/1983	33
01/02/1983	36	02/02/1983	54	03/02/1983	44	04/02/1983	64	05/02/1983	117	06/02/1983	53	07/02/1983	38	08/02/1983	34	09/02/1983	30	10/02/1983	31	11/02/1983	44	12/02/1983	33
01/03/1983	37	02/03/1983	45	03/03/1983	44	04/03/1983	54	05/03/1983	58	06/03/1983	55	07/03/1983	36	08/03/1983	33	09/03/1983	29	10/03/1983	33	11/03/1983	38	12/03/1983	32
01/04/1983	37	02/04/1983	43	03/04/1983	44	04/04/1983	53	05/04/1983	50	06/04/1983	51	07/04/1983	33	08/04/1983	51	09/04/1983	29	10/04/1983	32	11/04/1983	34	12/04/1983	32
01/05/1983	38	02/05/1983	38	03/05/1983	41	04/05/1983	51	05/05/1983	47	06/05/1983	48	07/05/1983	34	08/05/1983	41	09/05/1983	28	10/05/1983	33	11/05/1983	33	12/05/1983	35
01/06/1983	37	02/06/1983	37	03/06/1983	44	04/06/1983	54	05/06/1983	48	06/06/1983	51	07/06/1983	34	08/06/1983	33	09/06/1983	34	10/06/1983	31	11/06/1983	32	12/06/1983	41
01/07/1983	40	02/07/1983	40	03/07/1983	53	04/07/1983	58	05/07/1983	54	06/07/1983	51	07/07/1983	34	08/07/1983	32	09/07/1983	32	10/07/1983	31	11/07/1983	34	12/07/1983	35
01/08/1983	36	02/08/1983	40	03/08/1983	50	04/08/1983	50	05/08/1983	54	06/08/1983	48	07/08/1983	37	08/08/1983	34	09/08/1983	31	10/08/1983	29	11/08/1983	36	12/08/1983	34
01/09/1983	34	02/09/1983	40	03/09/1983	43	04/09/1983	50	05/09/1983	48	06/09/1983	47	07/09/1983	34	08/09/1983	34	09/09/1983	30	10/09/1983	26	11/09/1983	34	12/09/1983	33
01/10/1983	41	02/10/1983	40	03/10/1983	41	04/10/1983	47	05/10/1983	47	06/10/1983	47	07/10/1983	34	08/10/1983	33	09/10/1983	28	10/10/1983	29	11/10/1983	38	12/10/1983	32
01/11/1983	43	02/11/1983	37	03/11/1983	41	04/11/1983	47	05/11/1983	45	06/11/1983	43	07/11/1983	37	08/11/1983	64	09/11/1983	31	10/11/1983	33	11/11/1983	38	12/11/1983	39
01/12/1983	40	02/12/1983	34	03/12/1983	38	04/12/1983	45	05/12/1983	47	06/12/1983	43	07/12/1983	36	08/12/1983	34	09/12/1983	29	10/12/1983	29	11/12/1983	35	12/12/1983	49
01/13/1983	40	02/13/1983	33	03/13/1983	38	04/13/1983	60	05/13/1983	45	06/13/1983	44	07/13/1983	34	08/13/1983	31	09/13/1983	28	10/13/1983	38	11/13/1983	33	12/13/1983	41
01/14/1983	38	02/14/1983	38	03/14/1983	41	04/14/1983	88	05/14/1983	45	06/14/1983	43	07/14/1983	33	08/14/1983	28	09/14/1983	27	10/14/1983	38	11/14/1983	36	12/14/1983	41
01/15/1983	36	02/15/1983	38	03/15/1983	40	04/15/1983	57	05/15/1983	43	06/15/1983	43	07/15/1983	33	08/15/1983	29	09/15/1983	29	10/15/1983	36	11/15/1983	39	12/15/1983	39
01/16/1983	34	02/16/1983	40	03/16/1983	40	04/16/1983	47	05/16/1983	44	06/16/1983	43	07/16/1983	33	08/16/1983	33	09/16/1983	35	10/16/1983	34	11/16/1983	42	12/16/1983	35
01/17/1983	36	02/17/1983	43	03/17/1983	40	04/17/1983	45	05/17/1983	44	06/17/1983	43	07/17/1983	36	08/17/1983	36	09/17/1983	29	10/17/1983	34	11/17/1983	34	12/17/1983	31
01/18/1983	36	02/18/1983	41	03/18/1983	43	04/18/1983	43	05/18/1983	44	06/18/1983	38	07/18/1983	37	08/18/1983	36	09/18/1983	37	10/18/1983	33	11/18/1983	33	12/18/1983	30
01/19/1983	36	02/19/1983	40	03/19/1983	48	04/19/1983	43	05/19/1983	66	06/19/1983	37	07/19/1983	38	08/19/1983	37	09/19/1983	65	10/19/1983	31	11/19/1983	40	12/19/1983	32
01/20/1983	34	02/20/1983	40	03/20/1983	37	04/20/1983	43	05/20/1983	53	06/20/1983	38	07/20/1983	38	08/20/1983	36	09/20/1983	53	10/20/1983	32	11/20/1983	34	12/20/1983	33
01/21/1983	37	02/21/1983	45	03/21/1983	41	04/21/1983	43	05/21/1983	45	06/21/1983	38	07/21/1983	43	08/21/1983	32	09/21/1983	52	10/21/1983	32	11/21/1983	33	12/21/1983	35
01/22/1983	36	02/22/1983	47	03/22/1983	43	04/22/1983	41	05/22/1983	64	06/22/1983	34	07/22/1983	43	08/22/1983	31	09/22/1983	48	10/22/1983	37	11/22/1983	34	12/22/1983	38
01/23/1983	37	02/23/1983	48	03/23/1983	43	04/23/1983	41	05/23/1983	55	06/23/1983	34	07/23/1983	32	08/23/1983	31	09/23/1983	47	10/23/1983	41	11/23/1983	41	12/23/1983	34
01/24/1983	37	02/24/1983	45	03/24/1983	41	04/24/1983	40	05/24/1983	53	06/24/1983	33	07/24/1983	29	08/24/1983	30	09/24/1983	40	10/24/1983	37	11/24/1983	35	12/24/1983	33
01/25/1983	38	02/25/1983	43	03/25/1983	40	04/25/1983	41	05/25/1983	53	06/25/1983	33	07/25/1983	32	08/25/1983	30	09/25/1983	37	10/25/1983	34	11/25/1983	34	12/25/1983	31
01/26/1983	40	02/26/1983	40	03/26/1983	38	04/26/1983	41	05/26/1983	50	06/26/1983	32	07/26/1983	32	08/26/1983	30	09/26/1983	38	10/26/1983	34	11/26/1983	33	12/26/1983	31
01/27/1983	37	02/27/1983	38	03/27/1983	55	04/27/1983	41	05/27/1983	50	06/27/1983	40	07/27/1983	32	08/27/1983	30	09/27/1983	37	10/27/1983	34	11/27/1983	34	12/27/1983	32
01/28/1983	38	02/28/1983	41	03/28/1983	85	04/28/1983	55	05/28/1983	48	06/28/1983	58	07/28/1983	33	08/28/1983	30	09/28/1983	36	10/28/1983	34	11/28/1983	50	12/28/1983	34
01/29/1983	37			03/29/1983	54	04/29/1983	45	05/29/1983	63	06/29/1983	40	07/29/1983	34	08/29/1983	30	09/29/1983	36	10/29/1983	32	11/29/1983	38	12/29/1983	34
01/30/1983	41			03/30/1983	50	04/30/1983	54	05/30/1983	57	06/30/1983	37	07/30/1983	37	08/30/1983	30	09/30/1983	36	10/30/1983	31	11/30/1983	36	12/30/1983	33
01/31/1983	40			03/31/1983	47			05/31/1983	58			07/31/1983	37	08/31/1983	30			10/31/1983	33			12/31/1983	32

PORTAGE CREEK DAILY MEAN FLOW
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Lovers Lane (USGS Gage No. 04106300)
October 1964 - December 1994

1984

Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)
01/01/1984	35	02/01/1984	38	03/01/1984	41	04/01/1984	40	05/01/1984	44	06/01/1984	39	07/01/1984	31	08/01/1984	28	09/01/1984	33	10/01/1984	30	11/01/1984	65	12/01/1984	29
01/02/1984	36	02/02/1984	41	03/02/1984	41	04/02/1984	42	05/02/1984	43	06/02/1984	38	07/02/1984	32	08/02/1984	28	09/02/1984	28	10/02/1984	30	11/02/1984	44	12/02/1984	28
01/03/1984	37	02/03/1984	47	03/03/1984	41	04/03/1984	44	05/03/1984	44	06/03/1984	34	07/03/1984	33	08/03/1984	26	09/03/1984	29	10/03/1984	30	11/03/1984	34	12/03/1984	42
01/04/1984	39	02/04/1984	41	03/04/1984	39	04/04/1984	45	05/04/1984	45	06/04/1984	34	07/04/1984	32	08/04/1984	41	09/04/1984	33	10/04/1984	30	11/04/1984	30	12/04/1984	31
01/05/1984	39	02/05/1984	39	03/05/1984	42	04/05/1984	44	05/05/1984	43	06/05/1984	36	07/05/1984	36	08/05/1984	30	09/05/1984	30	10/05/1984	29	11/05/1984	29	12/05/1984	30
01/06/1984	40	02/06/1984	39	03/06/1984	43	04/06/1984	44	05/06/1984	41	06/06/1984	34	07/06/1984	34	08/06/1984	26	09/06/1984	29	10/06/1984	29	11/06/1984	28	12/06/1984	28
01/07/1984	37	02/07/1984	40	03/07/1984	39	04/07/1984	42	05/07/1984	41	06/07/1984	34	07/07/1984	32	08/07/1984	23	09/07/1984	35	10/07/1984	35	11/07/1984	27	12/07/1984	27
01/08/1984	36	02/08/1984	40	03/08/1984	35	04/08/1984	41	05/08/1984	41	06/08/1984	35	07/08/1984	30	08/08/1984	23	09/08/1984	29	10/08/1984	37	11/08/1984	29	12/08/1984	27
01/09/1984	37	02/09/1984	42	03/09/1984	35	04/09/1984	37	05/09/1984	43	06/09/1984	36	07/09/1984	47	08/09/1984	24	09/09/1984	42	10/09/1984	33	11/09/1984	32	12/09/1984	27
01/10/1984	38	02/10/1984	42	03/10/1984	34	04/10/1984	34	05/10/1984	41	06/10/1984	32	07/10/1984	35	08/10/1984	26	09/10/1984	32	10/10/1984	30	11/10/1984	31	12/10/1984	33
01/11/1984	37	02/11/1984	43	03/11/1984	33	04/11/1984	36	05/11/1984	40	06/11/1984	31	07/11/1984	42	08/11/1984	22	09/11/1984	45	10/11/1984	29	11/11/1984	33	12/11/1984	34
01/12/1984	36	02/12/1984	50	03/12/1984	35	04/12/1984	43	05/12/1984	38	06/12/1984	32	07/12/1984	36	08/12/1984	22	09/12/1984	29	10/12/1984	30	11/12/1984	30	12/12/1984	41
01/13/1984	36	02/13/1984	77	03/13/1984	37	04/13/1984	44	05/13/1984	44	06/13/1984	32	07/13/1984	34	08/13/1984	24	09/13/1984	32	10/13/1984	30	11/13/1984	29	12/13/1984	40
01/14/1984	34	02/14/1984	63	03/14/1984	37	04/14/1984	52	05/14/1984	43	06/14/1984	32	07/14/1984	27	08/14/1984	27	09/14/1984	31	10/14/1984	32	11/14/1984	29	12/14/1984	47
01/15/1984	34	02/15/1984	54	03/15/1984	47	04/15/1984	63	05/15/1984	40	06/15/1984	32	07/15/1984	27	08/15/1984	25	09/15/1984	27	10/15/1984	31	11/15/1984	29	12/15/1984	38
01/16/1984	36	02/16/1984	51	03/16/1984	113	04/16/1984	58	05/16/1984	38	06/16/1984	30	07/16/1984	27	08/16/1984	25	09/16/1984	26	10/16/1984	29	11/16/1984	28	12/16/1984	34
01/17/1984	36	02/17/1984	51	03/17/1984	59	04/17/1984	53	05/17/1984	38	06/17/1984	29	07/17/1984	29	08/17/1984	27	09/17/1984	28	10/17/1984	26	11/17/1984	26	12/17/1984	34
01/18/1984	36	02/18/1984	46	03/18/1984	50	04/18/1984	47	05/18/1984	40	06/18/1984	31	07/18/1984	28	08/18/1984	25	09/18/1984	27	10/18/1984	26	11/18/1984	23	12/18/1984	33
01/19/1984	37	02/19/1984	46	03/19/1984	49	04/19/1984	48	05/19/1984	60	06/19/1984	30	07/19/1984	27	08/19/1984	24	09/19/1984	28	10/19/1984	36	11/19/1984	25	12/19/1984	33
01/20/1984	33	02/20/1984	46	03/20/1984	58	04/20/1984	46	05/20/1984	46	06/20/1984	32	07/20/1984	27	08/20/1984	26	09/20/1984	28	10/20/1984	29	11/20/1984	24	12/20/1984	31
01/21/1984	33	02/21/1984	44	03/21/1984	53	04/21/1984	43	05/21/1984	43	06/21/1984	33	07/21/1984	28	08/21/1984	28	09/21/1984	26	10/21/1984	59	11/21/1984	25	12/21/1984	39
01/22/1984	34	02/22/1984	44	03/22/1984	50	04/22/1984	48	05/22/1984	65	06/22/1984	35	07/22/1984	26	08/22/1984	28	09/22/1984	25	10/22/1984	38	11/22/1984	23	12/22/1984	39
01/23/1984	36	02/23/1984	43	03/23/1984	48	04/23/1984	48	05/23/1984	63	06/23/1984	34	07/23/1984	28	08/23/1984	28	09/23/1984	36	10/23/1984	32	11/23/1984	23	12/23/1984	32
01/24/1984	40	02/24/1984	42	03/24/1984	46	04/24/1984	44	05/24/1984	46	06/24/1984	32	07/24/1984	42	08/24/1984	28	09/24/1984	32	10/24/1984	32	11/24/1984	24	12/24/1984	29
01/25/1984	38	02/25/1984	39	03/25/1984	45	04/25/1984	43	05/25/1984	47	06/25/1984	34	07/25/1984	31	08/25/1984	27	09/25/1984	70	10/25/1984	29	11/25/1984	23	12/25/1984	26
01/26/1984	38	02/26/1984	39	03/26/1984	46	04/26/1984	42	05/26/1984	51	06/26/1984	34	07/26/1984	30	08/26/1984	22	09/26/1984	60	10/26/1984	30	11/26/1984	25	12/26/1984	28
01/27/1984	40	02/27/1984	41	03/27/1984	46	04/27/1984	41	05/27/1984	39	06/27/1984	35	07/27/1984	30	08/27/1984	24	09/27/1984	39	10/27/1984	31	11/27/1984	28	12/27/1984	29
01/28/1984	38	02/28/1984	43	03/28/1984	44	04/28/1984	49	05/28/1984	44	06/28/1984	33	07/28/1984	28	08/28/1984	29	09/28/1984	33	10/28/1984	28	11/28/1984	42	12/28/1984	44
01/29/1984	37	02/29/1984	41	03/29/1984	43	04/29/1984	38	05/29/1984	51	06/29/1984	31	07/29/1984	26	08/29/1984	26	09/29/1984	30	10/29/1984	29	11/29/1984	33	12/29/1984	50
01/30/1984	38			03/30/1984	43	04/30/1984	50	05/30/1984	44	06/30/1984	31	07/30/1984	27	08/30/1984	41	09/30/1984	30	10/30/1984	31	11/30/1984	32	12/30/1984	38
01/31/1984	38			03/31/1984	41			05/31/1984	40			07/31/1984	29	08/31/1984	30			10/31/1984	37			12/31/1984	37

PORTAGE CREEK DAILY MEAN FLOW
Measured Flow
Lovers Lane (USGS Gage No. 04106300)
October 1964 - December 1994

1985

Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)
01/01/1985	84	02/01/1985	30	03/01/1985	59	04/01/1985	63	05/01/1985	55	06/01/1985	42	07/01/1985	37	08/01/1985	32	09/01/1985	30	10/01/1985	31	11/01/1985	32	12/01/1985	50
01/02/1985	48	02/02/1985	31	03/02/1985	56	04/02/1985	60	05/02/1985	52	06/02/1985	39	07/02/1985	38	08/02/1985	31	09/02/1985	30	10/02/1985	30	11/02/1985	36	12/02/1985	52
01/03/1985	38	02/03/1985	29	03/03/1985	55	04/03/1985	64	05/03/1985	49	06/03/1985	40	07/03/1985	38	08/03/1985	28	09/03/1985	34	10/03/1985	31	11/03/1985	29	12/03/1985	51
01/04/1985	34	02/04/1985	29	03/04/1985	83	04/04/1985	63	05/04/1985	46	06/04/1985	40	07/04/1985	34	08/04/1985	27	09/04/1985	34	10/04/1985	35	11/04/1985	30	12/04/1985	50
01/05/1985	32	02/05/1985	30	03/05/1985	76	04/05/1985	104	05/05/1985	51	06/05/1985	39	07/05/1985	33	08/05/1985	34	09/05/1985	33	10/05/1985	36	11/05/1985	31	12/05/1985	48
01/06/1985	31	02/06/1985	31	03/06/1985	62	04/06/1985	97	05/06/1985	62	06/06/1985	37	07/06/1985	33	08/06/1985	38	09/06/1985	33	10/06/1985	30	11/06/1985	32	12/06/1985	47
01/07/1985	34	02/07/1985	31	03/07/1985	59	04/07/1985	68	05/07/1985	54	06/07/1985	37	07/07/1985	34	08/07/1985	33	09/07/1985	29	10/07/1985	30	11/07/1985	35	12/07/1985	46
01/08/1985	34	02/08/1985	30	03/08/1985	68	04/08/1985	63	05/08/1985	52	06/08/1985	35	07/08/1985	36	08/08/1985	31	09/08/1985	38	10/08/1985	31	11/08/1985	35	12/08/1985	45
01/09/1985	34	02/09/1985	29	03/09/1985	66	04/09/1985	59	05/09/1985	52	06/09/1985	35	07/09/1985	38	08/09/1985	31	09/09/1985	44	10/09/1985	34	11/09/1985	43	12/09/1985	48
01/10/1985	34	02/10/1985	27	03/10/1985	62	04/10/1985	57	05/10/1985	51	06/10/1985	36	07/10/1985	41	08/10/1985	28	09/10/1985	36	10/10/1985	31	11/10/1985	64	12/10/1985	50
01/11/1985	32	02/11/1985	32	03/11/1985	67	04/11/1985	58	05/11/1985	48	06/11/1985	45	07/11/1985	36	08/11/1985	27	09/11/1985	31	10/11/1985	32	11/11/1985	44	12/11/1985	51
01/12/1985	26	02/12/1985	37	03/12/1985	63	04/12/1985	59	05/12/1985	48	06/12/1985	43	07/12/1985	34	08/12/1985	32	09/12/1985	30	10/12/1985	32	11/12/1985	40	12/12/1985	50
01/13/1985	26	02/13/1985	36	03/13/1985	58	04/13/1985	57	05/13/1985	48	06/13/1985	40	07/13/1985	33	08/13/1985	36	09/13/1985	29	10/13/1985	27	11/13/1985	44	12/13/1985	46
01/14/1985	30	02/14/1985	36	03/14/1985	56	04/14/1985	67	05/14/1985	49	06/14/1985	40	07/14/1985	43	08/14/1985	36	09/14/1985	30	10/14/1985	30	11/14/1985	40	12/14/1985	39
01/15/1985	32	02/15/1985	31	03/15/1985	55	04/15/1985	68	05/15/1985	50	06/15/1985	52	07/15/1985	35	08/15/1985	45	09/15/1985	29	10/15/1985	32	11/15/1985	41	12/15/1985	38
01/16/1985	31	02/16/1985	29	03/16/1985	54	04/16/1985	62	05/16/1985	47	06/16/1985	45	07/16/1985	33	08/16/1985	36	09/16/1985	31	10/16/1985	30	11/16/1985	53	12/16/1985	41
01/17/1985	31	02/17/1985	29	03/17/1985	51	04/17/1985	59	05/17/1985	50	06/17/1985	49	07/17/1985	33	08/17/1985	34	09/17/1985	32	10/17/1985	30	11/17/1985	42	12/17/1985	42
01/18/1985	30	02/18/1985	31	03/18/1985	52	04/18/1985	61	05/18/1985	50	06/18/1985	46	07/18/1985	31	08/18/1985	37	09/18/1985	32	10/18/1985	42	11/18/1985	54	12/18/1985	42
01/19/1985	30	02/19/1985	31	03/19/1985	52	04/19/1985	62	05/19/1985	47	06/19/1985	45	07/19/1985	31	08/19/1985	37	09/19/1985	31	10/19/1985	119	11/19/1985	113	12/19/1985	42
01/20/1985	30	02/20/1985	32	03/20/1985	52	04/20/1985	58	05/20/1985	52	06/20/1985	41	07/20/1985	30	08/20/1985	36	09/20/1985	30	10/20/1985	53	11/20/1985	79	12/20/1985	40
01/21/1985	31	02/21/1985	34	03/21/1985	51	04/21/1985	57	05/21/1985	50	06/21/1985	40	07/21/1985	29	08/21/1985	35	09/21/1985	28	10/21/1985	41	11/21/1985	54	12/21/1985	39
01/22/1985	31	02/22/1985	57	03/22/1985	52	04/22/1985	58	05/22/1985	48	06/22/1985	42	07/22/1985	31	08/22/1985	32	09/22/1985	28	10/22/1985	36	11/22/1985	49	12/22/1985	37
01/23/1985	31	02/23/1985	125	03/23/1985	53	04/23/1985	58	05/23/1985	46	06/23/1985	39	07/23/1985	32	08/23/1985	33	09/23/1985	32	10/23/1985	34	11/23/1985	45	12/23/1985	39
01/24/1985	32	02/24/1985	120	03/24/1985	53	04/24/1985	60	05/24/1985	46	06/24/1985	41	07/24/1985	29	08/24/1985	38	09/24/1985	30	10/24/1985	36	11/24/1985	41	12/24/1985	36
01/25/1985	32	02/25/1985	73	03/25/1985	54	04/25/1985	60	05/25/1985	44	06/25/1985	39	07/25/1985	33	08/25/1985	35	09/25/1985	31	10/25/1985	33	11/25/1985	45	12/25/1985	33
01/26/1985	31	02/26/1985	69	03/26/1985	52	04/26/1985	59	05/26/1985	43	06/26/1985	37	07/26/1985	35	08/26/1985	34	09/26/1985	33	10/26/1985	29	11/26/1985	57	12/26/1985	37
01/27/1985	27	02/27/1985	70	03/27/1985	68	04/27/1985	51	05/27/1985	69	06/27/1985	38	07/27/1985	27	08/27/1985	35	09/27/1985	32	10/27/1985	28	11/27/1985	46	12/27/1985	37
01/28/1985	29	02/28/1985	62	03/28/1985	97	04/28/1985	51	05/28/1985	56	06/28/1985	37	07/28/1985	26	08/28/1985	34	09/28/1985	30	10/28/1985	30	11/28/1985	45	12/28/1985	36
01/29/1985	31			03/29/1985	89	04/29/1985	54	05/29/1985	50	06/29/1985	35	07/29/1985	28	08/29/1985	33	09/29/1985	28	10/29/1985	33	11/29/1985	44	12/29/1985	36
01/30/1985	29			03/30/1985	66	04/30/1985	54	05/30/1985	50	06/30/1985	34	07/30/1985	30	08/30/1985	35	09/30/1985	34	10/30/1985	32	11/30/1985	42	12/30/1985	39
01/31/1985	31			03/31/1985	63			05/31/1985	70			07/31/1985	38	08/31/1985	32			10/31/1985	31			12/31/1985	40

PORTAGE CREEK DAILY MEAN FLOW
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1986

Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)
01/01/1986	37	02/01/1986	41	03/01/1986	39	04/01/1986	45	05/01/1986	39	06/01/1986	26	07/01/1986	30	08/01/1986	30	09/01/1986	26	10/01/1986	77	11/01/1986	35	12/01/1986	37
01/02/1986	40	02/02/1986	35	03/02/1986	39	04/02/1986	44	05/02/1986	35	06/02/1986	26	07/02/1986	32	08/02/1986	28	09/02/1986	28	10/02/1986	62	11/02/1986	35	12/02/1986	44
01/03/1986	43	02/03/1986	36	03/03/1986	42	04/03/1986	44	05/03/1986	31	06/03/1986	25	07/03/1986	32	08/03/1986	28	09/03/1986	30	10/03/1986	128	11/03/1986	37	12/03/1986	44
01/04/1986	40	02/04/1986	59	03/04/1986	44	04/04/1986	49	05/04/1986	30	06/04/1986	28	07/04/1986	27	08/04/1986	28	09/04/1986	46	10/04/1986	93	11/04/1986	37	12/04/1986	41
01/05/1986	39	02/05/1986	52	03/05/1986	44	04/05/1986	48	05/05/1986	34	06/05/1986	59	07/05/1986	26	08/05/1986	28	09/05/1986	33	10/05/1986	61	11/05/1986	37	12/05/1986	39
01/06/1986	42	02/06/1986	42	03/06/1986	49	04/06/1986	45	05/06/1986	34	06/06/1986	39	07/06/1986	26	08/06/1986	32	09/06/1986	28	10/06/1986	56	11/06/1986	37	12/06/1986	38
01/07/1986	42	02/07/1986	37	03/07/1986	40	04/07/1986	41	05/07/1986	33	06/07/1986	41	07/07/1986	29	08/07/1986	36	09/07/1986	27	10/07/1986	52	11/07/1986	36	12/07/1986	44
01/08/1986	40	02/08/1986	33	03/08/1986	37	04/08/1986	37	05/08/1986	32	06/08/1986	40	07/08/1986	40	08/08/1986	32	09/08/1986	29	10/08/1986	51	11/08/1986	36	12/08/1986	49
01/09/1986	41	02/09/1986	33	03/09/1986	43	04/09/1986	37	05/09/1986	32	06/09/1986	36	07/09/1986	44	08/09/1986	30	09/09/1986	30	10/09/1986	52	11/09/1986	34	12/09/1986	50
01/10/1986	39	02/10/1986	36	03/10/1986	73	04/10/1986	37	05/10/1986	28	06/10/1986	37	07/10/1986	35	08/10/1986	29	09/10/1986	30	10/10/1986	48	11/10/1986	37	12/10/1986	46
01/11/1986	37	02/11/1986	34	03/11/1986	72	04/11/1986	37	05/11/1986	27	06/11/1986	45	07/11/1986	47	08/11/1986	30	09/11/1986	43	10/11/1986	43	11/11/1986	38	12/11/1986	43
01/12/1986	35	02/12/1986	34	03/12/1986	57	04/12/1986	34	05/12/1986	29	06/12/1986	40	07/12/1986	71	08/12/1986	30	09/12/1986	35	10/12/1986	45	11/12/1986	36	12/12/1986	41
01/13/1986	36	02/13/1986	32	03/13/1986	67	04/13/1986	34	05/13/1986	30	06/13/1986	37	07/13/1986	42	08/13/1986	32	09/13/1986	28	10/13/1986	50	11/13/1986	36	12/13/1986	36
01/14/1986	38	02/14/1986	33	03/14/1986	63	04/14/1986	45	05/14/1986	30	06/14/1986	34	07/14/1986	38	08/14/1986	32	09/14/1986	25	10/14/1986	50	11/14/1986	36	12/14/1986	36
01/15/1986	38	02/15/1986	30	03/15/1986	57	04/15/1986	49	05/15/1986	32	06/15/1986	38	07/15/1986	40	08/15/1986	29	09/15/1986	25	10/15/1986	46	11/15/1986	33	12/15/1986	39
01/16/1986	37	02/16/1986	29	03/16/1986	51	04/16/1986	48	05/16/1986	41	06/16/1986	37	07/16/1986	146	08/16/1986	25	09/16/1986	25	10/16/1986	43	11/16/1986	34	12/16/1986	41
01/17/1986	42	02/17/1986	38	03/17/1986	50	04/17/1986	44	05/17/1986	47	06/17/1986	35	07/17/1986	71	08/17/1986	26	09/17/1986	25	10/17/1986	41	11/17/1986	37	12/17/1986	44
01/18/1986	47	02/18/1986	44	03/18/1986	54	04/18/1986	40	05/18/1986	40	06/18/1986	34	07/18/1986	45	08/18/1986	30	09/18/1986	28	10/18/1986	36	11/18/1986	38	12/18/1986	43
01/19/1986	46	02/19/1986	54	03/19/1986	65	04/19/1986	38	05/19/1986	53	06/19/1986	62	07/19/1986	36	08/19/1986	30	09/19/1986	25	10/19/1986	36	11/19/1986	39	12/19/1986	39
01/20/1986	43	02/20/1986	54	03/20/1986	51	04/20/1986	37	05/20/1986	42	06/20/1986	49	07/20/1986	41	08/20/1986	29	09/20/1986	22	10/20/1986	39	11/20/1986	42	12/20/1986	36
01/21/1986	42	02/21/1986	53	03/21/1986	48	04/21/1986	40	05/21/1986	38	06/21/1986	33	07/21/1986	36	08/21/1986	29	09/21/1986	21	10/21/1986	39	11/21/1986	41	12/21/1986	36
01/22/1986	43	02/22/1986	45	03/22/1986	46	04/22/1986	38	05/22/1986	35	06/22/1986	31	07/22/1986	32	08/22/1986	30	09/22/1986	24	10/22/1986	38	11/22/1986	39	12/22/1986	38
01/23/1986	41	02/23/1986	44	03/23/1986	45	04/23/1986	38	05/23/1986	31	06/23/1986	31	07/23/1986	32	08/23/1986	29	09/23/1986	52	10/23/1986	38	11/23/1986	44	12/23/1986	38
01/24/1986	39	02/24/1986	45	03/24/1986	47	04/24/1986	39	05/24/1986	29	06/24/1986	32	07/24/1986	30	08/24/1986	28	09/24/1986	29	10/24/1986	37	11/24/1986	44	12/24/1986	34
01/25/1986	41	02/25/1986	44	03/25/1986	46	04/25/1986	37	05/25/1986	27	06/25/1986	36	07/25/1986	39	08/25/1986	30	09/25/1986	103	10/25/1986	37	11/25/1986	40	12/25/1986	32
01/26/1986	38	02/26/1986	44	03/26/1986	49	04/26/1986	37	05/26/1986	28	06/26/1986	33	07/26/1986	30	08/26/1986	65	09/26/1986	53	10/26/1986	39	11/26/1986	62	12/26/1986	33
01/27/1986	38	02/27/1986	43	03/27/1986	46	04/27/1986	32	05/27/1986	42	06/27/1986	38	07/27/1986	29	08/27/1986	42	09/27/1986	46	10/27/1986	40	11/27/1986	47	12/27/1986	33
01/28/1986	36	02/28/1986	41	03/28/1986	45	04/28/1986	36	05/28/1986	36	06/28/1986	31	07/28/1986	38	08/28/1986	32	09/28/1986	31	10/28/1986	38	11/28/1986	39	12/28/1986	33
01/29/1986	35			03/29/1986	46	04/29/1986	34	05/29/1986	34	06/29/1986	31	07/29/1986	32	08/29/1986	27	09/29/1986	70	10/29/1986	40	11/29/1986	36	12/29/1986	41
01/30/1986	35			03/30/1986	43	04/30/1986	47	05/30/1986	31	06/30/1986	33	07/30/1986	28	08/30/1986	24	09/30/1986	91	10/30/1986	37	11/30/1986	35	12/30/1986	45
01/31/1986	34			03/31/1986	47			05/31/1986	27			07/31/1986	29	08/31/1986	23			10/31/1986	37			12/31/1986	46

PORTAGE CREEK DAILY MEAN FLOW
Measured Flow
Lovers Lane (USGS Gage No. 04106300)
October 1964 - December 1994

1987

Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)
01/01/1987	42	02/01/1987	45	03/01/1987	76	04/01/1987	55	05/01/1987	52	06/01/1987	34	07/01/1987	27	08/01/1987	31	09/01/1987	31	10/01/1987	28	11/01/1987	43	12/01/1987	47
01/02/1987	43	02/02/1987	45	03/02/1987	64	04/02/1987	57	05/02/1987	60	06/02/1987	33	07/02/1987	26	08/02/1987	28	09/02/1987	30	10/02/1987	30	11/02/1987	42	12/02/1987	47
01/03/1987	44	02/03/1987	46	03/03/1987	57	04/03/1987	51	05/03/1987	62	06/03/1987	33	07/03/1987	24	08/03/1987	28	09/03/1987	29	10/03/1987	28	11/03/1987	43	12/03/1987	49
01/04/1987	44	02/04/1987	47	03/04/1987	53	04/04/1987	50	05/04/1987	56	06/04/1987	30	07/04/1987	23	08/04/1987	41	09/04/1987	28	10/04/1987	26	11/04/1987	42	12/04/1987	45
01/05/1987	46	02/05/1987	46	03/05/1987	55	04/05/1987	49	05/05/1987	53	06/05/1987	28	07/05/1987	25	08/05/1987	28	09/05/1987	25	10/05/1987	28	11/05/1987	41	12/05/1987	46
01/06/1987	50	02/06/1987	45	03/06/1987	53	04/06/1987	52	05/06/1987	52	06/06/1987	28	07/06/1987	28	08/06/1987	25	09/06/1987	24	10/06/1987	28	11/06/1987	39	12/06/1987	44
01/07/1987	52	02/07/1987	46	03/07/1987	54	04/07/1987	51	05/07/1987	53	06/07/1987	27	07/07/1987	26	08/07/1987	25	09/07/1987	24	10/07/1987	29	11/07/1987	36	12/07/1987	52
01/08/1987	51	02/08/1987	45	03/08/1987	52	04/08/1987	50	05/08/1987	46	06/08/1987	27	07/08/1987	27	08/08/1987	25	09/08/1987	27	10/08/1987	26	11/08/1987	37	12/08/1987	60
01/09/1987	52	02/09/1987	44	03/09/1987	49	04/09/1987	50	05/09/1987	32	06/09/1987	28	07/09/1987	35	08/09/1987	42	09/09/1987	27	10/09/1987	26	11/09/1987	37	12/09/1987	63
01/10/1987	49	02/10/1987	45	03/10/1987	49	04/10/1987	49	05/10/1987	31	06/10/1987	28	07/10/1987	38	08/10/1987	30	09/10/1987	31	10/10/1987	24	11/10/1987	36	12/10/1987	56
01/11/1987	46	02/11/1987	48	03/11/1987	47	04/11/1987	54	05/11/1987	33	06/11/1987	29	07/11/1987	24	08/11/1987	27	09/11/1987	57	10/11/1987	24	11/11/1987	33	12/11/1987	52
01/12/1987	49	02/12/1987	49	03/12/1987	46	04/12/1987	59	05/12/1987	32	06/12/1987	32	07/12/1987	22	08/12/1987	27	09/12/1987	34	10/12/1987	26	11/12/1987	34	12/12/1987	51
01/13/1987	49	02/13/1987	49	03/13/1987	45	04/13/1987	55	05/13/1987	31	06/13/1987	29	07/13/1987	24	08/13/1987	25	09/13/1987	30	10/13/1987	26	11/13/1987	35	12/13/1987	47
01/14/1987	52	02/14/1987	48	03/14/1987	50	04/14/1987	67	05/14/1987	41	06/14/1987	27	07/14/1987	24	08/14/1987	29	09/14/1987	31	10/14/1987	26	11/14/1987	33	12/14/1987	49
01/15/1987	54	02/15/1987	44	03/15/1987	47	04/15/1987	94	05/15/1987	35	06/15/1987	27	07/15/1987	36	08/15/1987	26	09/15/1987	38	10/15/1987	28	11/15/1987	30	12/15/1987	66
01/16/1987	51	02/16/1987	45	03/16/1987	49	04/16/1987	68	05/16/1987	33	06/16/1987	26	07/16/1987	38	08/16/1987	34	09/16/1987	35	10/16/1987	27	11/16/1987	33	12/16/1987	65
01/17/1987	48	02/17/1987	44	03/17/1987	51	04/17/1987	58	05/17/1987	32	06/17/1987	27	07/17/1987	27	08/17/1987	51	09/17/1987	46	10/17/1987	27	11/17/1987	36	12/17/1987	56
01/18/1987	48	02/18/1987	44	03/18/1987	52	04/18/1987	53	05/18/1987	47	06/18/1987	26	07/18/1987	24	08/18/1987	31	09/18/1987	69	10/18/1987	23	11/18/1987	40	12/18/1987	52
01/19/1987	49	02/19/1987	42	03/19/1987	51	04/19/1987	48	05/19/1987	49	06/19/1987	27	07/19/1987	22	08/19/1987	29	09/19/1987	37	10/19/1987	25	11/19/1987	37	12/19/1987	50
01/20/1987	49	02/20/1987	42	03/20/1987	52	04/20/1987	52	05/20/1987	39	06/20/1987	39	07/20/1987	25	08/20/1987	28	09/20/1987	32	10/20/1987	39	11/20/1987	36	12/20/1987	96
01/21/1987	49	02/21/1987	41	03/21/1987	49	04/21/1987	50	05/21/1987	38	06/21/1987	45	07/21/1987	28	08/21/1987	28	09/21/1987	58	10/21/1987	48	11/21/1987	35	12/21/1987	64
01/22/1987	45	02/22/1987	45	03/22/1987	47	04/22/1987	50	05/22/1987	37	06/22/1987	32	07/22/1987	24	08/22/1987	30	09/22/1987	49	10/22/1987	43	11/22/1987	40	12/22/1987	55
01/23/1987	45	02/23/1987	44	03/23/1987	49	04/23/1987	59	05/23/1987	32	06/23/1987	29	07/23/1987	24	08/23/1987	26	09/23/1987	36	10/23/1987	39	11/23/1987	43	12/23/1987	47
01/24/1987	42	02/24/1987	46	03/24/1987	48	04/24/1987	53	05/24/1987	31	06/24/1987	28	07/24/1987	24	08/24/1987	27	09/24/1987	32	10/24/1987	38	11/24/1987	60	12/24/1987	49
01/25/1987	40	02/25/1987	46	03/25/1987	50	04/25/1987	51	05/25/1987	30	06/25/1987	28	07/25/1987	52	08/25/1987	24	09/25/1987	29	10/25/1987	34	11/25/1987	75	12/25/1987	54
01/26/1987	44	02/26/1987	47	03/26/1987	51	04/26/1987	49	05/26/1987	34	06/26/1987	28	07/26/1987	33	08/26/1987	65	09/26/1987	28	10/26/1987	34	11/26/1987	53	12/26/1987	49
01/27/1987	42	02/27/1987	49	03/27/1987	50	04/27/1987	51	05/27/1987	32	06/27/1987	25	07/27/1987	29	08/27/1987	111	09/27/1987	25	10/27/1987	38	11/27/1987	46	12/27/1987	42
01/28/1987	44	02/28/1987	50	03/28/1987	49	04/28/1987	50	05/28/1987	29	06/28/1987	21	07/28/1987	28	08/28/1987	51	09/28/1987	26	10/28/1987	38	11/28/1987	45	12/28/1987	48
01/29/1987	45			03/29/1987	46	04/29/1987	51	05/29/1987	29	06/29/1987	25	07/29/1987	37	08/29/1987	38	09/29/1987	42	10/29/1987	32	11/29/1987	53	12/29/1987	46
01/30/1987	46			03/30/1987	48	04/30/1987	52	05/30/1987	30	06/30/1987	27	07/30/1987	42	08/30/1987	32	09/30/1987	32	10/30/1987	37	11/30/1987	50	12/30/1987	48
01/31/1987	44			03/31/1987	46			05/31/1987	32			07/31/1987	30	08/31/1987	37			10/31/1987	44			12/31/1987	47

PORTAGE CREEK DAILY MEAN FLOW
Measured Flow
Lovers Lane (USGS Gage No. 04106300)
October 1964 - December 1994

1988

Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)
01/01/1988	41	02/01/1988	73	03/01/1988	49	04/01/1988	52	05/01/1988	31	06/01/1988	24	07/01/1988	26	08/01/1988	24	09/01/1988	24	10/01/1988	31	11/01/1988	42	12/01/1988	46
01/02/1988	40	02/02/1988	62	03/02/1988	53	04/02/1988	51	05/02/1988	32	06/02/1988	29	07/02/1988	25	08/02/1988	25	09/02/1988	23	10/02/1988	41	11/02/1988	43	12/02/1988	44
01/03/1988	40	02/03/1988	54	03/03/1988	54	04/03/1988	70	05/03/1988	29	06/03/1988	27	07/03/1988	25	08/03/1988	23	09/03/1988	26	10/03/1988	32	11/03/1988	46	12/03/1988	44
01/04/1988	45	02/04/1988	51	03/04/1988	51	04/04/1988	62	05/04/1988	30	06/04/1988	27	07/04/1988	24	08/04/1988	20	09/04/1988	31	10/04/1988	31	11/04/1988	51	12/04/1988	42
01/05/1988	43	02/05/1988	49	03/05/1988	47	04/05/1988	53	05/05/1988	31	06/05/1988	25	07/05/1988	26	08/05/1988	35	09/05/1988	27	10/05/1988	30	11/05/1988	51	12/05/1988	42
01/06/1988	44	02/06/1988	47	03/06/1988	45	04/06/1988	87	05/06/1988	30	06/06/1988	25	07/06/1988	26	08/06/1988	28	09/06/1988	27	10/06/1988	34	11/06/1988	53	12/06/1988	42
01/07/1988	43	02/07/1988	44	03/07/1988	49	04/07/1988	73	05/07/1988	32	06/07/1988	25	07/07/1988	25	08/07/1988	21	09/07/1988	25	10/07/1988	41	11/07/1988	63	12/07/1988	43
01/08/1988	43	02/08/1988	48	03/08/1988	53	04/08/1988	57	05/08/1988	31	06/08/1988	25	07/08/1988	26	08/08/1988	20	09/08/1988	25	10/08/1988	42	11/08/1988	51	12/08/1988	41
01/09/1988	41	02/09/1988	48	03/09/1988	61	04/09/1988	51	05/09/1988	32	06/09/1988	25	07/09/1988	26	08/09/1988	34	09/09/1988	25	10/09/1988	42	11/09/1988	52	12/09/1988	39
01/10/1988	39	02/10/1988	48	03/10/1988	54	04/10/1988	50	05/10/1988	34	06/10/1988	24	07/10/1988	27	08/10/1988	25	09/10/1988	24	10/10/1988	39	11/10/1988	120	12/10/1988	41
01/11/1988	43	02/11/1988	47	03/11/1988	54	04/11/1988	51	05/11/1988	32	06/11/1988	24	07/11/1988	33	08/11/1988	26	09/11/1988	24	10/11/1988	38	11/11/1988	65	12/11/1988	38
01/12/1988	41	02/12/1988	44	03/12/1988	54	04/12/1988	49	05/12/1988	32	06/12/1988	23	07/12/1988	30	08/12/1988	25	09/12/1988	25	10/12/1988	39	11/12/1988	54	12/12/1988	38
01/13/1988	41	02/13/1988	41	03/13/1988	49	04/13/1988	46	05/13/1988	31	06/13/1988	23	07/13/1988	28	08/13/1988	22	09/13/1988	26	10/13/1988	39	11/13/1988	55	12/13/1988	42
01/14/1988	41	02/14/1988	41	03/14/1988	49	04/14/1988	39	05/14/1988	32	06/14/1988	23	07/14/1988	29	08/14/1988	20	09/14/1988	25	10/14/1988	39	11/14/1988	52	12/14/1988	46
01/15/1988	45	02/15/1988	68	03/15/1988	45	04/15/1988	35	05/15/1988	34	06/15/1988	22	07/15/1988	34	08/15/1988	60	09/15/1988	24	10/15/1988	38	11/15/1988	49	12/15/1988	47
01/16/1988	47	02/16/1988	53	03/16/1988	45	04/16/1988	34	05/16/1988	34	06/16/1988	22	07/16/1988	42	08/16/1988	28	09/16/1988	25	10/16/1988	51	11/16/1988	75	12/16/1988	45
01/17/1988	69	02/17/1988	53	03/17/1988	48	04/17/1988	39	05/17/1988	31	06/17/1988	22	07/17/1988	36	08/17/1988	25	09/17/1988	25	10/17/1988	63	11/17/1988	54	12/17/1988	45
01/18/1988	72	02/18/1988	50	03/18/1988	50	04/18/1988	42	05/18/1988	33	06/18/1988	22	07/18/1988	29	08/18/1988	27	09/18/1988	51	10/18/1988	80	11/18/1988	46	12/18/1988	45
01/19/1988	61	02/19/1988	47	03/19/1988	44	04/19/1988	35	05/19/1988	30	06/19/1988	23	07/19/1988	30	08/19/1988	31	09/19/1988	66	10/19/1988	57	11/19/1988	52	12/19/1988	48
01/20/1988	65	02/20/1988	50	03/20/1988	43	04/20/1988	34	05/20/1988	31	06/20/1988	25	07/20/1988	36	08/20/1988	28	09/20/1988	89	10/20/1988	47	11/20/1988	60	12/20/1988	54
01/21/1988	55	02/21/1988	45	03/21/1988	47	04/21/1988	38	05/21/1988	30	06/21/1988	26	07/21/1988	32	08/21/1988	27	09/21/1988	44	10/21/1988	46	11/21/1988	55	12/21/1988	52
01/22/1988	50	02/22/1988	54	03/22/1988	47	04/22/1988	37	05/22/1988	29	06/22/1988	27	07/22/1988	31	08/22/1988	24	09/22/1988	56	10/22/1988	44	11/22/1988	48	12/22/1988	53
01/23/1988	44	02/23/1988	50	03/23/1988	49	04/23/1988	55	05/23/1988	32	06/23/1988	28	07/23/1988	26	08/23/1988	29	09/23/1988	130	10/23/1988	51	11/23/1988	46	12/23/1988	74
01/24/1988	45	02/24/1988	47	03/24/1988	52	04/24/1988	45	05/24/1988	32	06/24/1988	26	07/24/1988	24	08/24/1988	25	09/24/1988	53	10/24/1988	67	11/24/1988	47	12/24/1988	54
01/25/1988	48	02/25/1988	46	03/25/1988	56	04/25/1988	44	05/25/1988	30	06/25/1988	24	07/25/1988	38	08/25/1988	24	09/25/1988	37	10/25/1988	59	11/25/1988	46	12/25/1988	50
01/26/1988	49	02/26/1988	48	03/26/1988	51	04/26/1988	37	05/26/1988	28	06/26/1988	23	07/26/1988	29	08/26/1988	25	09/26/1988	33	10/26/1988	48	11/26/1988	46	12/26/1988	49
01/27/1988	49	02/27/1988	50	03/27/1988	44	04/27/1988	44	05/27/1988	27	06/27/1988	24	07/27/1988	26	08/27/1988	26	09/27/1988	32	10/27/1988	46	11/27/1988	52	12/27/1988	71
01/28/1988	47	02/28/1988	46	03/28/1988	58	04/28/1988	44	05/28/1988	26	06/28/1988	25	07/28/1988	25	08/28/1988	30	09/28/1988	31	10/28/1988	44	11/28/1988	46	12/28/1988	57
01/29/1988	47	02/29/1988	53	03/29/1988	62	04/29/1988	38	05/29/1988	26	06/29/1988	27	07/29/1988	24	08/29/1988	27	09/29/1988	31	10/29/1988	43	11/29/1988	46	12/29/1988	48
01/30/1988	55			03/30/1988	79	04/30/1988	33	05/30/1988	27	06/30/1988	26	07/30/1988	25	08/30/1988	25	09/30/1988	30	10/30/1988	41	11/30/1988	46	12/30/1988	44
01/31/1988	82			03/31/1988	56			05/31/1988	28			07/31/1988	23	08/31/1988	23			10/31/1988	43			12/31/1988	40

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Lovers Lane (USGS Gage No. 04106300)
October 1964 - December 1994

1989

Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)
01/01/1989	40	02/01/1989	46	03/01/1989	37	04/01/1989	49	05/01/1989	46	06/01/1989	131	07/01/1989	46	08/01/1989	54	09/01/1989	99	10/01/1989	28	11/01/1989	33	12/01/1989	31
01/02/1989	36	02/02/1989	43	03/02/1989	39	04/02/1989	48	05/02/1989	49	06/02/1989	80	07/02/1989	44	08/02/1989	54	09/02/1989	50	10/02/1989	27	11/02/1989	34	12/02/1989	33
01/03/1989	40	02/03/1989	40	03/03/1989	41	04/03/1989	73	05/03/1989	49	06/03/1989	70	07/03/1989	42	08/03/1989	54	09/03/1989	42	10/03/1989	28	11/03/1989	33	12/03/1989	31
01/04/1989	40	02/04/1989	38	03/04/1989	55	04/04/1989	70	05/04/1989	49	06/04/1989	61	07/04/1989	41	08/04/1989	80	09/04/1989	38	10/04/1989	28	11/04/1989	31	12/04/1989	33
01/05/1989	42	02/05/1989	35	03/05/1989	45	04/05/1989	59	05/05/1989	48	06/05/1989	55	07/05/1989	44	08/05/1989	84	09/05/1989	39	10/05/1989	29	11/05/1989	30	12/05/1989	32
01/06/1989	45	02/06/1989	40	03/06/1989	41	04/06/1989	52	05/06/1989	42	06/06/1989	54	07/06/1989	46	08/06/1989	61	09/06/1989	43	10/06/1989	29	11/06/1989	32	12/06/1989	32
01/07/1989	49	02/07/1989	42	03/07/1989	41	04/07/1989	51	05/07/1989	40	06/07/1989	52	07/07/1989	46	08/07/1989	56	09/07/1989	45	10/07/1989	25	11/07/1989	41	12/07/1989	30
01/08/1989	72	02/08/1989	41	03/08/1989	40	04/08/1989	50	05/08/1989	44	06/08/1989	50	07/08/1989	46	08/08/1989	55	09/08/1989	42	10/08/1989	24	11/08/1989	33	12/08/1989	29
01/09/1989	50	02/09/1989	41	03/09/1989	41	04/09/1989	46	05/09/1989	44	06/09/1989	49	07/09/1989	56	08/09/1989	55	09/09/1989	43	10/09/1989	24	11/09/1989	31	12/09/1989	29
01/10/1989	48	02/10/1989	40	03/10/1989	43	04/10/1989	46	05/10/1989	45	06/10/1989	45	07/10/1989	50	08/10/1989	57	09/10/1989	40	10/10/1989	27	11/10/1989	32	12/10/1989	27
01/11/1989	39	02/11/1989	39	03/11/1989	47	04/11/1989	45	05/11/1989	45	06/11/1989	44	07/11/1989	50	08/11/1989	58	09/11/1989	40	10/11/1989	27	11/11/1989	35	12/11/1989	29
01/12/1989	37	02/12/1989	38	03/12/1989	48	04/12/1989	47	05/12/1989	46	06/12/1989	52	07/12/1989	55	08/12/1989	56	09/12/1989	41	10/12/1989	31	11/12/1989	31	12/12/1989	28
01/13/1989	35	02/13/1989	41	03/13/1989	47	04/13/1989	46	05/13/1989	49	06/13/1989	60	07/13/1989	53	08/13/1989	54	09/13/1989	42	10/13/1989	27	11/13/1989	31	12/13/1989	29
01/14/1989	32	02/14/1989	40	03/14/1989	50	04/14/1989	48	05/14/1989	45	06/14/1989	57	07/14/1989	51	08/14/1989	55	09/14/1989	42	10/14/1989	28	11/14/1989	37	12/14/1989	30
01/15/1989	35	02/15/1989	40	03/15/1989	59	04/15/1989	49	05/15/1989	49	06/15/1989	53	07/15/1989	50	08/15/1989	56	09/15/1989	41	10/15/1989	24	11/15/1989	64	12/15/1989	30
01/16/1989	35	02/16/1989	38	03/16/1989	49	04/16/1989	46	05/16/1989	46	06/16/1989	49	07/16/1989	50	08/16/1989	52	09/16/1989	39	10/16/1989	27	11/16/1989	54	12/16/1989	25
01/17/1989	35	02/17/1989	38	03/17/1989	67	04/17/1989	52	05/17/1989	44	06/17/1989	47	07/17/1989	49	08/17/1989	52	09/17/1989	37	10/17/1989	31	11/17/1989	40	12/17/1989	23
01/18/1989	41	02/18/1989	37	03/18/1989	100	04/18/1989	51	05/18/1989	45	06/18/1989	44	07/18/1989	36	08/18/1989	44	09/18/1989	38	10/18/1989	32	11/18/1989	36	12/18/1989	24
01/19/1989	50	02/19/1989	37	03/19/1989	58	04/19/1989	52	05/19/1989	53	06/19/1989	57	07/19/1989	40	08/19/1989	33	09/19/1989	39	10/19/1989	35	11/19/1989	33	12/19/1989	25
01/20/1989	51	02/20/1989	39	03/20/1989	58	04/20/1989	51	05/20/1989	51	06/20/1989	51	07/20/1989	43	08/20/1989	43	09/20/1989	36	10/20/1989	39	11/20/1989	38	12/20/1989	27
01/21/1989	45	02/21/1989	42	03/21/1989	54	04/21/1989	49	05/21/1989	46	06/21/1989	45	07/21/1989	37	08/21/1989	36	09/21/1989	39	10/21/1989	41	11/21/1989	35	12/21/1989	24
01/22/1989	45	02/22/1989	40	03/22/1989	51	04/22/1989	47	05/22/1989	46	06/22/1989	46	07/22/1989	37	08/22/1989	43	09/22/1989	38	10/22/1989	34	11/22/1989	31	12/22/1989	29
01/23/1989	47	02/23/1989	37	03/23/1989	50	04/23/1989	46	05/23/1989	48	06/23/1989	47	07/23/1989	32	08/23/1989	37	09/23/1989	35	10/23/1989	31	11/23/1989	29	12/23/1989	29
01/24/1989	47	02/24/1989	37	03/24/1989	48	04/24/1989	48	05/24/1989	45	06/24/1989	51	07/24/1989	42	08/24/1989	35	09/24/1989	36	10/24/1989	29	11/24/1989	32	12/24/1989	28
01/25/1989	46	02/25/1989	39	03/25/1989	47	04/25/1989	60	05/25/1989	65	06/25/1989	42	07/25/1989	59	08/25/1989	34	09/25/1989	35	10/25/1989	30	11/25/1989	32	12/25/1989	29
01/26/1989	48	02/26/1989	37	03/26/1989	47	04/26/1989	53	05/26/1989	47	06/26/1989	44	07/26/1989	55	08/26/1989	34	09/26/1989	28	10/26/1989	31	11/26/1989	33	12/26/1989	29
01/27/1989	43	02/27/1989	37	03/27/1989	52	04/27/1989	51	05/27/1989	43	06/27/1989	79	07/27/1989	61	08/27/1989	35	09/27/1989	28	10/27/1989	33	11/27/1989	34	12/27/1989	26
01/28/1989	42	02/28/1989	37	03/28/1989	76	04/28/1989	49	05/28/1989	43	06/28/1989	52	07/28/1989	55	08/28/1989	36	09/28/1989	29	10/28/1989	32	11/28/1989	32	12/28/1989	26
01/29/1989	43			03/29/1989	74	04/29/1989	47	05/29/1989	43	06/29/1989	46	07/29/1989	51	08/29/1989	37	09/29/1989	28	10/29/1989	29	11/29/1989	30	12/29/1989	27
01/30/1989	47			03/30/1989	58	04/30/1989	44	05/30/1989	93	06/30/1989	46	07/30/1989	56	08/30/1989	36	09/30/1989	29	10/30/1989	31	11/30/1989	32	12/30/1989	25
01/31/1989	47			03/31/1989	54			05/31/1989	257			07/31/1989	55	08/31/1989	38			10/31/1989	32			12/31/1989	26

PORTAGE CREEK DAILY MEAN FLOW
Measured Flow
Lovers Lane (USGS Gage No. 04106300)
October 1964 - December 1994

1990

Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)
01/01/1990	24	02/01/1990	43	03/01/1990	31	04/01/1990	52	05/01/1990	45	06/01/1990	41	07/01/1990	42	08/01/1990	43	09/01/1990	33	10/01/1990	29	11/01/1990	41	12/01/1990	51
01/02/1990	27	02/02/1990	52	03/02/1990	29	04/02/1990	57	05/02/1990	46	06/02/1990	42	07/02/1990	43	08/02/1990	47	09/02/1990	32	10/02/1990	29	11/02/1990	41	12/02/1990	46
01/03/1990	29	02/03/1990	45	03/03/1990	27	04/03/1990	49	05/03/1990	44	06/03/1990	38	07/03/1990	43	08/03/1990	47	09/03/1990	30	10/03/1990	38	11/03/1990	41	12/03/1990	51
01/04/1990	56	02/04/1990	41	03/04/1990	25	04/04/1990	46	05/04/1990	74	06/04/1990	41	07/04/1990	41	08/04/1990	51	09/04/1990	35	10/04/1990	87	11/04/1990	45	12/04/1990	51
01/05/1990	37	02/05/1990	43	03/05/1990	26	04/05/1990	45	05/05/1990	55	06/05/1990	42	07/05/1990	44	08/05/1990	48	09/05/1990	36	10/05/1990	44	11/05/1990	128	12/05/1990	49
01/06/1990	32	02/06/1990	44	03/06/1990	24	04/06/1990	45	05/06/1990	44	06/06/1990	42	07/06/1990	45	08/06/1990	46	09/06/1990	37	10/06/1990	36	11/06/1990	94	12/06/1990	49
01/07/1990	29	02/07/1990	43	03/07/1990	24	04/07/1990	45	05/07/1990	45	06/07/1990	41	07/07/1990	42	08/07/1990	44	09/07/1990	46	10/07/1990	33	11/07/1990	63	12/07/1990	46
01/08/1990	29	02/08/1990	43	03/08/1990	29	04/08/1990	46	05/08/1990	44	06/08/1990	42	07/08/1990	44	08/08/1990	45	09/08/1990	35	10/08/1990	39	11/08/1990	55	12/08/1990	44
01/09/1990	33	02/09/1990	43	03/09/1990	41	04/09/1990	51	05/09/1990	43	06/09/1990	42	07/09/1990	48	08/09/1990	43	09/09/1990	34	10/09/1990	101	11/09/1990	53	12/09/1990	44
01/10/1990	32	02/10/1990	41	03/10/1990	58	04/10/1990	71	05/10/1990	62	06/10/1990	38	07/10/1990	51	08/10/1990	43	09/10/1990	35	10/10/1990	131	11/10/1990	51	12/10/1990	47
01/11/1990	31	02/11/1990	40	03/11/1990	66	04/11/1990	57	05/11/1990	51	06/11/1990	40	07/11/1990	50	08/11/1990	42	09/11/1990	36	10/11/1990	80	11/11/1990	47	12/11/1990	46
01/12/1990	30	02/12/1990	39	03/12/1990	62	04/12/1990	52	05/12/1990	49	06/12/1990	40	07/12/1990	48	08/12/1990	47	09/12/1990	34	10/12/1990	57	11/12/1990	47	12/12/1990	47
01/13/1990	29	02/13/1990	39	03/13/1990	48	04/13/1990	52	05/13/1990	60	06/13/1990	44	07/13/1990	49	08/13/1990	50	09/13/1990	34	10/13/1990	48	11/13/1990	45	12/13/1990	47
01/14/1990	28	02/14/1990	39	03/14/1990	43	04/14/1990	58	05/14/1990	50	06/14/1990	48	07/14/1990	49	08/14/1990	43	09/14/1990	48	10/14/1990	45	11/14/1990	44	12/14/1990	43
01/15/1990	29	02/15/1990	40	03/15/1990	40	04/15/1990	50	05/15/1990	72	06/15/1990	44	07/15/1990	49	08/15/1990	43	09/15/1990	40	10/15/1990	50	11/15/1990	44	12/15/1990	47
01/16/1990	31	02/16/1990	40	03/16/1990	38	04/16/1990	51	05/16/1990	90	06/16/1990	40	07/16/1990	52	08/16/1990	46	09/16/1990	44	10/16/1990	45	11/16/1990	45	12/16/1990	46
01/17/1990	46	02/17/1990	37	03/17/1990	35	04/17/1990	55	05/17/1990	79	06/17/1990	39	07/17/1990	66	08/17/1990	46	09/17/1990	37	10/17/1990	44	11/17/1990	40	12/17/1990	45
01/18/1990	39	02/18/1990	38	03/18/1990	34	04/18/1990	51	05/18/1990	59	06/18/1990	43	07/18/1990	47	08/18/1990	41	09/18/1990	34	10/18/1990	57	11/18/1990	39	12/18/1990	47
01/19/1990	33	02/19/1990	39	03/19/1990	37	04/19/1990	50	05/19/1990	53	06/19/1990	39	07/19/1990	59	08/19/1990	40	09/19/1990	40	10/19/1990	48	11/19/1990	42	12/19/1990	44
01/20/1990	30	02/20/1990	37	03/20/1990	43	04/20/1990	62	05/20/1990	56	06/20/1990	44	07/20/1990	86	08/20/1990	45	09/20/1990	35	10/20/1990	43	11/20/1990	43	12/20/1990	43
01/21/1990	30	02/21/1990	38	03/21/1990	44	04/21/1990	65	05/21/1990	50	06/21/1990	44	07/21/1990	52	08/21/1990	50	09/21/1990	49	10/21/1990	40	11/21/1990	44	12/21/1990	46
01/22/1990	28	02/22/1990	76	03/22/1990	57	04/22/1990	52	05/22/1990	47	06/22/1990	51	07/22/1990	60	08/22/1990	42	09/22/1990	41	10/22/1990	40	11/22/1990	46	12/22/1990	44
01/23/1990	28	02/23/1990	65	03/23/1990	52	04/23/1990	52	05/23/1990	48	06/23/1990	45	07/23/1990	51	08/23/1990	41	09/23/1990	38	10/23/1990	41	11/23/1990	43	12/23/1990	41
01/24/1990	28	02/24/1990	53	03/24/1990	46	04/24/1990	52	05/24/1990	47	06/24/1990	38	07/24/1990	47	08/24/1990	41	09/24/1990	36	10/24/1990	43	11/24/1990	41	12/24/1990	39
01/25/1990	47	02/25/1990	45	03/25/1990	43	04/25/1990	54	05/25/1990	49	06/25/1990	41	07/25/1990	49	08/25/1990	38	09/25/1990	35	10/25/1990	41	11/25/1990	41	12/25/1990	37
01/26/1990	36	02/26/1990	44	03/26/1990	46	04/26/1990	52	05/26/1990	50	06/26/1990	43	07/26/1990	48	08/26/1990	37	09/26/1990	33	10/26/1990	42	11/26/1990	42	12/26/1990	39
01/27/1990	33	02/27/1990	37	03/27/1990	45	04/27/1990	50	05/27/1990	43	06/27/1990	44	07/27/1990	49	08/27/1990	37	09/27/1990	31	10/27/1990	41	11/27/1990	102	12/27/1990	39
01/28/1990	28	02/28/1990	28	03/28/1990	46	04/28/1990	49	05/28/1990	42	06/28/1990	53	07/28/1990	42	08/28/1990	39	09/28/1990	32	10/28/1990	39	11/28/1990	148	12/28/1990	40
01/29/1990	28			03/29/1990	49	04/29/1990	45	05/29/1990	42	06/29/1990	63	07/29/1990	44	08/29/1990	41	09/29/1990	29	10/29/1990	41	11/29/1990	78	12/29/1990	95
01/30/1990	26			03/30/1990	57	04/30/1990	46	05/30/1990	41	06/30/1990	44	07/30/1990	47	08/30/1990	37	09/30/1990	28	10/30/1990	43	11/30/1990	60	12/30/1990	74
01/31/1990	31			03/31/1990	48			05/31/1990	42			07/31/1990	45	08/31/1990	34			10/31/1990	39			12/31/1990	53

PORTAGE CREEK DAILY MEAN FLOW
Measured Flow
Lovers Lane (USGS Gage No. 04106300)
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1991

Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)
01/01/1991	45	02/01/1991	39	03/01/1991	51	04/01/1991	57	05/01/1991	63	06/01/1991	54	07/01/1991	69	08/01/1991	48	09/01/1991	44	10/01/1991	46	11/01/1991	44	12/01/1991	60
01/02/1991	47	02/02/1991	40	03/02/1991	88	04/02/1991	55	05/02/1991	59	06/02/1991	61	07/02/1991	125	08/02/1991	48	09/02/1991	43	10/02/1991	48	11/02/1991	36	12/02/1991	57
01/03/1991	45	02/03/1991	42	03/03/1991	66	04/03/1991	50	05/03/1991	57	06/03/1991	55	07/03/1991	61	08/03/1991	54	09/03/1991	48	10/03/1991	56	11/03/1991	30	12/03/1991	59
01/04/1991	44	02/04/1991	46	03/04/1991	57	04/04/1991	58	05/04/1991	57	06/04/1991	50	07/04/1991	67	08/04/1991	47	09/04/1991	49	10/04/1991	75	11/04/1991	30	12/04/1991	53
01/05/1991	45	02/05/1991	50	03/05/1991	54	04/05/1991	62	05/05/1991	66	06/05/1991	50	07/05/1991	53	08/05/1991	46	09/05/1991	47	10/05/1991	98	11/05/1991	35	12/05/1991	54
01/06/1991	43	02/06/1991	48	03/06/1991	52	04/06/1991	56	05/06/1991	65	06/06/1991	46	07/06/1991	50	08/06/1991	45	09/06/1991	46	10/06/1991	68	11/06/1991	51	12/06/1991	53
01/07/1991	42	02/07/1991	45	03/07/1991	46	04/07/1991	54	05/07/1991	59	06/07/1991	46	07/07/1991	49	08/07/1991	45	09/07/1991	46	10/07/1991	56	11/07/1991	50	12/07/1991	63
01/08/1991	41	02/08/1991	46	03/08/1991	49	04/08/1991	55	05/08/1991	59	06/08/1991	46	07/08/1991	49	08/08/1991	71	09/08/1991	45	10/08/1991	52	11/08/1991	50	12/08/1991	66
01/09/1991	42	02/09/1991	49	03/09/1991	49	04/09/1991	71	05/09/1991	60	06/09/1991	46	07/09/1991	48	08/09/1991	59	09/09/1991	49	10/09/1991	50	11/09/1991	48	12/09/1991	74
01/10/1991	41	02/10/1991	46	03/10/1991	49	04/10/1991	60	05/10/1991	62	06/10/1991	47	07/10/1991	49	08/10/1991	49	09/10/1991	48	10/10/1991	46	11/10/1991	48	12/10/1991	61
01/11/1991	42	02/11/1991	42	03/11/1991	49	04/11/1991	55	05/11/1991	60	06/11/1991	60	07/11/1991	50	08/11/1991	47	09/11/1991	46	10/11/1991	46	11/11/1991	50	12/11/1991	56
01/12/1991	43	02/12/1991	41	03/12/1991	49	04/12/1991	54	05/12/1991	59	06/12/1991	49	07/12/1991	49	08/12/1991	46	09/12/1991	57	10/12/1991	43	11/12/1991	51	12/12/1991	63
01/13/1991	42	02/13/1991	41	03/13/1991	48	04/13/1991	54	05/13/1991	59	06/13/1991	46	07/13/1991	49	08/13/1991	47	09/13/1991	49	10/13/1991	42	11/13/1991	52	12/13/1991	81
01/14/1991	44	02/14/1991	41	03/14/1991	48	04/14/1991	67	05/14/1991	57	06/14/1991	46	07/14/1991	49	08/14/1991	47	09/14/1991	49	10/14/1991	55	11/14/1991	52	12/14/1991	58
01/15/1991	44	02/15/1991	39	03/15/1991	49	04/15/1991	108	05/15/1991	56	06/15/1991	46	07/15/1991	47	08/15/1991	48	09/15/1991	50	10/15/1991	52	11/15/1991	62	12/15/1991	52
01/16/1991	52	02/16/1991	37	03/16/1991	47	04/16/1991	78	05/16/1991	60	06/16/1991	36	07/16/1991	48	08/16/1991	47	09/16/1991	50	10/16/1991	49	11/16/1991	49	12/16/1991	49
01/17/1991	50	02/17/1991	39	03/17/1991	50	04/17/1991	63	05/17/1991	67	06/17/1991	35	07/17/1991	48	08/17/1991	46	09/17/1991	51	10/17/1991	48	11/17/1991	53	12/17/1991	48
01/18/1991	46	02/18/1991	40	03/18/1991	59	04/18/1991	59	05/18/1991	57	06/18/1991	47	07/18/1991	47	08/18/1991	45	09/18/1991	53	10/18/1991	46	11/18/1991	53	12/18/1991	49
01/19/1991	46	02/19/1991	43	03/19/1991	52	04/19/1991	62	05/19/1991	54	06/19/1991	43	07/19/1991	47	08/19/1991	70	09/19/1991	52	10/19/1991	49	11/19/1991	52	12/19/1991	47
01/20/1991	46	02/20/1991	45	03/20/1991	50	04/20/1991	68	05/20/1991	53	06/20/1991	49	07/20/1991	46	08/20/1991	58	09/20/1991	47	10/20/1991	41	11/20/1991	72	12/20/1991	49
01/21/1991	43	02/21/1991	52	03/21/1991	51	04/21/1991	59	05/21/1991	52	06/21/1991	43	07/21/1991	48	08/21/1991	52	09/21/1991	46	10/21/1991	40	11/21/1991	59	12/21/1991	50
01/22/1991	41	02/22/1991	54	03/22/1991	52	04/22/1991	58	05/22/1991	52	06/22/1991	49	07/22/1991	78	08/22/1991	50	09/22/1991	44	10/22/1991	43	11/22/1991	54	12/22/1991	47
01/23/1991	41	02/23/1991	50	03/23/1991	79	04/23/1991	63	05/23/1991	53	06/23/1991	48	07/23/1991	58	08/23/1991	49	09/23/1991	50	10/23/1991	44	11/23/1991	53	12/23/1991	48
01/24/1991	40	02/24/1991	48	03/24/1991	64	04/24/1991	96	05/24/1991	52	06/24/1991	44	07/24/1991	51	08/24/1991	45	09/24/1991	45	10/24/1991	45	11/24/1991	50	12/24/1991	45
01/25/1991	41	02/25/1991	48	03/25/1991	53	04/25/1991	69	05/25/1991	66	06/25/1991	46	07/25/1991	48	08/25/1991	44	09/25/1991	45	10/25/1991	72	11/25/1991	51	12/25/1991	40
01/26/1991	40	02/26/1991	47	03/26/1991	56	04/26/1991	62	05/26/1991	59	06/26/1991	46	07/26/1991	49	08/26/1991	46	09/26/1991	47	10/26/1991	124	11/26/1991	50	12/26/1991	46
01/27/1991	40	02/27/1991	47	03/27/1991	98	04/27/1991	59	05/27/1991	52	06/27/1991	46	07/27/1991	47	08/27/1991	46	09/27/1991	44	10/27/1991	105	11/27/1991	53	12/27/1991	45
01/28/1991	41	02/28/1991	48	03/28/1991	90	04/28/1991	66	05/28/1991	50	06/28/1991	45	07/28/1991	46	08/28/1991	46	09/28/1991	44	10/28/1991	58	11/28/1991	60	12/28/1991	41
01/29/1991	41			03/29/1991	66	04/29/1991	63	05/29/1991	49	06/29/1991	45	07/29/1991	52	08/29/1991	48	09/29/1991	43	10/29/1991	37	11/29/1991	103	12/29/1991	50
01/30/1991	40			03/30/1991	59	04/30/1991	59	05/30/1991	50	06/30/1991	44	07/30/1991	50	08/30/1991	49	09/30/1991	45	10/30/1991	58	11/30/1991	79	12/30/1991	47
01/31/1991	40			03/31/1991	54			05/31/1991	58			07/31/1991	48	08/31/1991	46			10/31/1991	44			12/31/1991	46

PORTAGE CREEK DAILY MEAN FLOW
Measured Flow
Lovers Lane (USGS Gage No. 04106300)
October 1964 - December 1994

1992

Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)
01/01/1992	43	02/01/1992	46	03/01/1992	46	04/01/1992	49	05/01/1992	47	06/01/1992	48	07/01/1992	43	08/01/1992	54	09/01/1992	44	10/01/1992	45	11/01/1992	52	12/01/1992	45
01/02/1992	49	02/02/1992	45	03/02/1992	49	04/02/1992	47	05/02/1992	48	06/02/1992	51	07/02/1992	44	08/02/1992	46	09/02/1992	48	10/02/1992	46	11/02/1992	91	12/02/1992	47
01/03/1992	53	02/03/1992	46	03/03/1992	48	04/03/1992	47	05/03/1992	46	06/03/1992	52	07/03/1992	42	08/03/1992	42	09/03/1992	48	10/03/1992	46	11/03/1992	63	12/03/1992	46
01/04/1992	52	02/04/1992	48	03/04/1992	49	04/04/1992	46	05/04/1992	45	06/04/1992	66	07/04/1992	44	08/04/1992	41	09/04/1992	45	10/04/1992	44	11/04/1992	57	12/04/1992	47
01/05/1992	50	02/05/1992	47	03/05/1992	49	04/05/1992	45	05/05/1992	48	06/05/1992	61	07/05/1992	74	08/05/1992	40	09/05/1992	45	10/05/1992	44	11/05/1992	49	12/05/1992	47
01/06/1992	50	02/06/1992	47	03/06/1992	52	04/06/1992	46	05/06/1992	46	06/06/1992	52	07/06/1992	50	08/06/1992	39	09/06/1992	53	10/06/1992	45	11/06/1992	47	12/06/1992	46
01/07/1992	50	02/07/1992	46	03/07/1992	49	04/07/1992	48	05/07/1992	45	06/07/1992	60	07/07/1992	51	08/07/1992	37	09/07/1992	51	10/07/1992	44	11/07/1992	46	12/07/1992	45
01/08/1992	56	02/08/1992	47	03/08/1992	48	04/08/1992	48	05/08/1992	44	06/08/1992	54	07/08/1992	55	08/08/1992	58	09/08/1992	59	10/08/1992	47	11/08/1992	45	12/08/1992	45
01/09/1992	59	02/09/1992	46	03/09/1992	50	04/09/1992	49	05/09/1992	44	06/09/1992	52	07/09/1992	51	08/09/1992	41	09/09/1992	71	10/09/1992	48	11/09/1992	45	12/09/1992	45
01/10/1992	54	02/10/1992	47	03/10/1992	59	04/10/1992	48	05/10/1992	46	06/10/1992	51	07/10/1992	49	08/10/1992	36	09/10/1992	82	10/10/1992	46	11/10/1992	48	12/10/1992	47
01/11/1992	50	02/11/1992	48	03/11/1992	54	04/11/1992	53	05/11/1992	46	06/11/1992	51	07/11/1992	48	08/11/1992	38	09/11/1992	55	10/11/1992	45	11/11/1992	50	12/11/1992	47
01/12/1992	49	02/12/1992	48	03/12/1992	48	04/12/1992	47	05/12/1992	46	06/12/1992	50	07/12/1992	66	08/12/1992	35	09/12/1992	49	10/12/1992	43	11/12/1992	92	12/12/1992	46
01/13/1992	48	02/13/1992	46	03/13/1992	45	04/13/1992	47	05/13/1992	47	06/13/1992	50	07/13/1992	57	08/13/1992	40	09/13/1992	46	10/13/1992	44	11/13/1992	72	12/13/1992	45
01/14/1992	46	02/14/1992	45	03/14/1992	45	04/14/1992	49	05/14/1992	42	06/14/1992	49	07/14/1992	75	08/14/1992	40	09/14/1992	45	10/14/1992	56	11/14/1992	57	12/14/1992	46
01/15/1992	47	02/15/1992	61	03/15/1992	43	04/15/1992	50	05/15/1992	41	06/15/1992	49	07/15/1992	63	08/15/1992	38	09/15/1992	47	10/15/1992	71	11/15/1992	52	12/15/1992	49
01/16/1992	46	02/16/1992	53	03/16/1992	45	04/16/1992	66	05/16/1992	41	06/16/1992	50	07/16/1992	53	08/16/1992	37	09/16/1992	50	10/16/1992	78	11/16/1992	48	12/16/1992	55
01/17/1992	44	02/17/1992	51	03/17/1992	51	04/17/1992	55	05/17/1992	41	06/17/1992	55	07/17/1992	46	08/17/1992	37	09/17/1992	48	10/17/1992	56	11/17/1992	49	12/17/1992	45
01/18/1992	44	02/18/1992	53	03/18/1992	47	04/18/1992	51	05/18/1992	37	06/18/1992	55	07/18/1992	51	08/18/1992	40	09/18/1992	59	10/18/1992	53	11/18/1992	46	12/18/1992	40
01/19/1992	43	02/19/1992	57	03/19/1992	46	04/19/1992	51	05/19/1992	39	06/19/1992	50	07/19/1992	49	08/19/1992	41	09/19/1992	46	10/19/1992	50	11/19/1992	44	12/19/1992	40
01/20/1992	42	02/20/1992	58	03/20/1992	47	04/20/1992	57	05/20/1992	41	06/20/1992	48	07/20/1992	46	08/20/1992	40	09/20/1992	44	10/20/1992	47	11/20/1992	45	12/20/1992	39
01/21/1992	47	02/21/1992	56	03/21/1992	45	04/21/1992	52	05/21/1992	41	06/21/1992	47	07/21/1992	43	08/21/1992	40	09/21/1992	62	10/21/1992	50	11/21/1992	47	12/21/1992	35
01/22/1992	46	02/22/1992	56	03/22/1992	47	04/22/1992	49	05/22/1992	43	06/22/1992	46	07/22/1992	34	08/22/1992	41	09/22/1992	55	10/22/1992	49	11/22/1992	56	12/22/1992	35
01/23/1992	53	02/23/1992	57	03/23/1992	46	04/23/1992	58	05/23/1992	39	06/23/1992	46	07/23/1992	58	08/23/1992	42	09/23/1992	46	10/23/1992	45	11/23/1992	58	12/23/1992	33
01/24/1992	50	02/24/1992	56	03/24/1992	49	04/24/1992	82	05/24/1992	37	06/24/1992	46	07/24/1992	42	08/24/1992	42	09/24/1992	46	10/24/1992	46	11/24/1992	48	12/24/1992	32
01/25/1992	49	02/25/1992	56	03/25/1992	51	04/25/1992	56	05/25/1992	36	06/25/1992	47	07/25/1992	39	08/25/1992	45	09/25/1992	46	10/25/1992	44	11/25/1992	48	12/25/1992	31
01/26/1992	49	02/26/1992	48	03/26/1992	51	04/26/1992	51	05/26/1992	38	06/26/1992	48	07/26/1992	75	08/26/1992	43	09/26/1992	50	10/26/1992	44	11/26/1992	47	12/26/1992	31
01/27/1992	48	02/27/1992	49	03/27/1992	53	04/27/1992	59	05/27/1992	41	06/27/1992	45	07/27/1992	42	08/27/1992	45	09/27/1992	71	10/27/1992	45	11/27/1992	44	12/27/1992	31
01/28/1992	48	02/28/1992	51	03/28/1992	49	04/28/1992	53	05/28/1992	41	06/28/1992	46	07/28/1992	43	08/28/1992	70	09/28/1992	52	10/28/1992	47	11/28/1992	45	12/28/1992	33
01/29/1992	48	02/29/1992	47	03/29/1992	47	04/29/1992	51	05/29/1992	41	06/29/1992	46	07/29/1992	45	08/29/1992	48	09/29/1992	48	10/29/1992	49	11/29/1992	45	12/29/1992	40
01/30/1992	48			03/30/1992	48	04/30/1992	49	05/30/1992	51	06/30/1992	45	07/30/1992	47	08/30/1992	43	09/30/1992	45	10/30/1992	47	11/30/1992	45	12/30/1992	70
01/31/1992	46			03/31/1992	49			05/31/1992	49			07/31/1992	91	08/31/1992	43			10/31/1992	45			12/31/1992	66

PORTAGE CREEK DAILY MEAN FLOW
Measured Flow
Lovers Lane (USGS Gage No. 04106300)
October 1964 - December 1994

1993

Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)
01/01/1993	45	02/01/1993	46	03/01/1993	40	04/01/1993	44	05/01/1993	52	06/01/1993	40	07/01/1993	40	08/01/1993	35	09/01/1993	41	10/01/1993	45	11/01/1993	49	12/01/1993	52
01/02/1993	40	02/02/1993	46	03/02/1993	43	04/02/1993	42	05/02/1993	50	06/02/1993	38	07/02/1993	35	08/02/1993	35	09/02/1993	65	10/02/1993	43	11/02/1993	49	12/02/1993	53
01/03/1993	43	02/03/1993	46	03/03/1993	47	04/03/1993	40	05/03/1993	52	06/03/1993	39	07/03/1993	34	08/03/1993	34	09/03/1993	57	10/03/1993	42	11/03/1993	52	12/03/1993	48
01/04/1993	87	02/04/1993	44	03/04/1993	48	04/04/1993	40	05/04/1993	49	06/04/1993	38	07/04/1993	35	08/04/1993	37	09/04/1993	42	10/04/1993	42	11/04/1993	53	12/04/1993	52
01/05/1993	69	02/05/1993	43	03/05/1993	45	04/05/1993	39	05/05/1993	48	06/05/1993	53	07/05/1993	34	08/05/1993	34	09/05/1993	37	10/05/1993	42	11/05/1993	51	12/05/1993	47
01/06/1993	50	02/06/1993	41	03/06/1993	45	04/06/1993	39	05/06/1993	43	06/06/1993	40	07/06/1993	33	08/06/1993	45	09/06/1993	38	10/06/1993	42	11/06/1993	49	12/06/1993	53
01/07/1993	44	02/07/1993	40	03/07/1993	46	04/07/1993	39	05/07/1993	44	06/07/1993	47	07/07/1993	34	08/07/1993	39	09/07/1993	39	10/07/1993	41	11/07/1993	47	12/07/1993	48
01/08/1993	41	02/08/1993	39	03/08/1993	46	04/08/1993	37	05/08/1993	42	06/08/1993	56	07/08/1993	34	08/08/1993	36	09/08/1993	40	10/08/1993	43	11/08/1993	45	12/08/1993	47
01/09/1993	39	02/09/1993	40	03/09/1993	45	04/09/1993	50	05/09/1993	41	06/09/1993	71	07/09/1993	86	08/09/1993	36	09/09/1993	39	10/09/1993	71	11/09/1993	45	12/09/1993	47
01/10/1993	40	02/10/1993	40	03/10/1993	45	04/10/1993	41	05/10/1993	40	06/10/1993	49	07/10/1993	47	08/10/1993	53	09/10/1993	40	10/10/1993	54	11/10/1993	46	12/10/1993	43
01/11/1993	39	02/11/1993	40	03/11/1993	45	04/11/1993	39	05/11/1993	41	06/11/1993	45	07/11/1993	40	08/11/1993	43	09/11/1993	44	10/11/1993	54	11/11/1993	46	12/11/1993	41
01/12/1993	41	02/12/1993	40	03/12/1993	42	04/12/1993	41	05/12/1993	40	06/12/1993	40	07/12/1993	37	08/12/1993	41	09/12/1993	45	10/12/1993	53	11/12/1993	43	12/12/1993	41
01/13/1993	52	02/13/1993	43	03/13/1993	39	04/13/1993	39	05/13/1993	39	06/13/1993	38	07/13/1993	37	08/13/1993	43	09/13/1993	44	10/13/1993	44	11/13/1993	52	12/13/1993	41
01/14/1993	45	02/14/1993	43	03/14/1993	38	04/14/1993	40	05/14/1993	39	06/14/1993	65	07/14/1993	45	08/14/1993	56	09/14/1993	70	10/14/1993	48	11/14/1993	45	12/14/1993	39
01/15/1993	44	02/15/1993	40	03/15/1993	37	04/15/1993	43	05/15/1993	39	06/15/1993	46	07/15/1993	39	08/15/1993	38	09/15/1993	87	10/15/1993	50	11/15/1993	46	12/15/1993	40
01/16/1993	44	02/16/1993	41	03/16/1993	44	04/16/1993	41	05/16/1993	37	06/16/1993	40	07/16/1993	36	08/16/1993	38	09/16/1993	57	10/16/1993	70	11/16/1993	46	12/16/1993	37
01/17/1993	41	02/17/1993	40	03/17/1993	45	04/17/1993	39	05/17/1993	37	06/17/1993	37	07/17/1993	37	08/17/1993	35	09/17/1993	53	10/17/1993	143	11/17/1993	47	12/17/1993	38
01/18/1993	41	02/18/1993	39	03/18/1993	37	04/18/1993	37	05/18/1993	38	06/18/1993	39	07/18/1993	41	08/18/1993	34	09/18/1993	50	10/18/1993	79	11/18/1993	46	12/18/1993	41
01/19/1993	39	02/19/1993	38	03/19/1993	36	04/19/1993	46	05/19/1993	38	06/19/1993	45	07/19/1993	40	08/19/1993	35	09/19/1993	48	10/19/1993	66	11/19/1993	47	12/19/1993	39
01/20/1993	39	02/20/1993	39	03/20/1993	38	04/20/1993	148	05/20/1993	37	06/20/1993	58	07/20/1993	35	08/20/1993	34	09/20/1993	46	10/20/1993	65	11/20/1993	46	12/20/1993	40
01/21/1993	49	02/21/1993	40	03/21/1993	39	04/21/1993	73	05/21/1993	36	06/21/1993	47	07/21/1993	34	08/21/1993	32	09/21/1993	52	10/21/1993	68	11/21/1993	46	12/21/1993	40
01/22/1993	49	02/22/1993	41	03/22/1993	41	04/22/1993	59	05/22/1993	35	06/22/1993	41	07/22/1993	35	08/22/1993	31	09/22/1993	48	10/22/1993	56	11/22/1993	47	12/22/1993	39
01/23/1993	43	02/23/1993	42	03/23/1993	76	04/23/1993	55	05/23/1993	36	06/23/1993	37	07/23/1993	36	08/23/1993	33	09/23/1993	47	10/23/1993	53	11/23/1993	46	12/23/1993	37
01/24/1993	43	02/24/1993	41	03/24/1993	62	04/24/1993	54	05/24/1993	42	06/24/1993	38	07/24/1993	39	08/24/1993	56	09/24/1993	39	10/24/1993	53	11/24/1993	45	12/24/1993	36
01/25/1993	41	02/25/1993	39	03/25/1993	56	04/25/1993	51	05/25/1993	38	06/25/1993	38	07/25/1993	39	08/25/1993	39	09/25/1993	42	10/25/1993	52	11/25/1993	46	12/25/1993	31
01/26/1993	40	02/26/1993	37	03/26/1993	55	04/26/1993	51	05/26/1993	36	06/26/1993	36	07/26/1993	37	08/26/1993	42	09/26/1993	61	10/26/1993	53	11/26/1993	48	12/26/1993	36
01/27/1993	41	02/27/1993	37	03/27/1993	57	04/27/1993	49	05/27/1993	37	06/27/1993	42	07/27/1993	37	08/27/1993	39	09/27/1993	63	10/27/1993	51	11/27/1993	50	12/27/1993	36
01/28/1993	44	02/28/1993	39	03/28/1993	54	04/28/1993	52	05/28/1993	34	06/28/1993	40	07/28/1993	37	08/28/1993	52	09/28/1993	53	10/28/1993	51	11/28/1993	52	12/28/1993	38
01/29/1993	41			03/29/1993	52	04/29/1993	64	05/29/1993	34	06/29/1993	39	07/29/1993	38	08/29/1993	61	09/29/1993	60	10/29/1993	50	11/29/1993	48	12/29/1993	39
01/30/1993	41			03/30/1993	49	04/30/1993	61	05/30/1993	35	06/30/1993	41	07/30/1993	38	08/30/1993	49	09/30/1993	49	10/30/1993	48	11/30/1993	50	12/30/1993	39
01/31/1993	43			03/31/1993	45			05/31/1993	49			07/31/1993	36	08/31/1993	54			10/31/1993	47			12/31/1993	39

PORTAGE CREEK DAILY MEAN FLOW
Measured Flow
Lovers Lane (USGS Gage No. 04106300)
October 1964 - December 1994

1994

Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)	Date	(cfs)
01/01/1994	39	02/01/1994	38	03/01/1994	38	04/01/1994	45	05/01/1994	55	06/01/1994	29	07/01/1994	32	08/01/1994	36	09/01/1994	33	10/01/1994	35	11/01/1994	65	12/01/1994	30
01/02/1994	41	02/02/1994	37	03/02/1994	41	04/02/1994	46	05/02/1994	48	06/02/1994	27	07/02/1994	32	08/02/1994	38	09/02/1994	32	10/02/1994	33	11/02/1994	40	12/02/1994	30
01/03/1994	39	02/03/1994	39	03/03/1994	41	04/03/1994	46	05/03/1994	48	06/03/1994	26	07/03/1994	30	08/03/1994	32	09/03/1994	32	10/03/1994	34	11/03/1994	36	12/03/1994	39
01/04/1994	40	02/04/1994	40	03/04/1994	47	04/04/1994	46	05/04/1994	46	06/04/1994	26	07/04/1994	29	08/04/1994	52	09/04/1994	30	10/04/1994	33	11/04/1994	37	12/04/1994	34
01/05/1994	43	02/05/1994	39	03/05/1994	47	04/05/1994	45	05/05/1994	45	06/05/1994	26	07/05/1994	41	08/05/1994	39	09/05/1994	31	10/05/1994	34	11/05/1994	46	12/05/1994	33
01/06/1994	44	02/06/1994	39	03/06/1994	56	04/06/1994	46	05/06/1994	43	06/06/1994	31	07/06/1994	32	08/06/1994	34	09/06/1994	33	10/06/1994	31	11/06/1994	74	12/06/1994	32
01/07/1994	42	02/07/1994	39	03/07/1994	55	04/07/1994	44	05/07/1994	46	06/07/1994	29	07/07/1994	32	08/07/1994	32	09/07/1994	33	10/07/1994	29	11/07/1994	43	12/07/1994	34
01/08/1994	41	02/08/1994	39	03/08/1994	54	04/08/1994	46	05/08/1994	45	06/08/1994	28	07/08/1994	41	08/08/1994	34	09/08/1994	33	10/08/1994	32	11/08/1994	38	12/08/1994	31
01/09/1994	40	02/09/1994	37	03/09/1994	47	04/09/1994	46	05/09/1994	46	06/09/1994	26	07/09/1994	43	08/09/1994	33	09/09/1994	36	10/09/1994	41	11/09/1994	46	12/09/1994	32
01/10/1994	39	02/10/1994	36	03/10/1994	46	04/10/1994	47	05/10/1994	43	06/10/1994	25	07/10/1994	34	08/10/1994	32	09/10/1994	41	10/10/1994	32	11/10/1994	41	12/10/1994	31
01/11/1994	40	02/11/1994	39	03/11/1994	43	04/11/1994	45	05/11/1994	45	06/11/1994	26	07/11/1994	33	08/11/1994	57	09/11/1994	38	10/11/1994	32	11/11/1994	31	12/11/1994	32
01/12/1994	40	02/12/1994	37	03/12/1994	44	04/12/1994	75	05/12/1994	43	06/12/1994	26	07/12/1994	33	08/12/1994	39	09/12/1994	38	10/12/1994	32	11/12/1994	29	12/12/1994	31
01/13/1994	38	02/13/1994	38	03/13/1994	49	04/13/1994	72	05/13/1994	42	06/13/1994	67	07/13/1994	36	08/13/1994	63	09/13/1994	37	10/13/1994	29	11/13/1994	25	12/13/1994	34
01/14/1994	38	02/14/1994	38	03/14/1994	46	04/14/1994	59	05/14/1994	41	06/14/1994	41	07/14/1994	43	08/14/1994	61	09/14/1994	39	10/14/1994	27	11/14/1994	30	12/14/1994	41
01/15/1994	38	02/15/1994	41	03/15/1994	48	04/15/1994	58	05/15/1994	39	06/15/1994	33	07/15/1994	57	08/15/1994	39	09/15/1994	39	10/15/1994	27	11/15/1994	27	12/15/1994	33
01/16/1994	37	02/16/1994	39	03/16/1994	44	04/16/1994	54	05/16/1994	39	06/16/1994	31	07/16/1994	36	08/16/1994	37	09/16/1994	39	10/16/1994	32	11/16/1994	26	12/16/1994	40
01/17/1994	39	02/17/1994	40	03/17/1994	44	04/17/1994	51	05/17/1994	38	06/17/1994	30	07/17/1994	36	08/17/1994	33	09/17/1994	40	10/17/1994	34	11/17/1994	25	12/17/1994	57
01/18/1994	38	02/18/1994	43	03/18/1994	43	04/18/1994	50	05/18/1994	38	06/18/1994	27	07/18/1994	37	08/18/1994	33	09/18/1994	35	10/18/1994	34	11/18/1994	24	12/18/1994	50
01/19/1994	34	02/19/1994	56	03/19/1994	45	04/19/1994	50	05/19/1994	36	06/19/1994	25	07/19/1994	36	08/19/1994	41	09/19/1994	35	10/19/1994	43	11/19/1994	23	12/19/1994	48
01/20/1994	35	02/20/1994	73	03/20/1994	44	04/20/1994	50	05/20/1994	34	06/20/1994	32	07/20/1994	38	08/20/1994	75	09/20/1994	33	10/20/1994	36	11/20/1994	23	12/20/1994	46
01/21/1994	34	02/21/1994	58	03/21/1994	67	04/21/1994	49	05/21/1994	33	06/21/1994	29	07/21/1994	44	08/21/1994	56	09/21/1994	33	10/21/1994	34	11/21/1994	27	12/21/1994	46
01/22/1994	37	02/22/1994	48	03/22/1994	53	04/22/1994	47	05/22/1994	31	06/22/1994	28	07/22/1994	37	08/22/1994	43	09/22/1994	30	10/22/1994	31	11/22/1994	25	12/22/1994	43
01/23/1994	38	02/23/1994	46	03/23/1994	54	04/23/1994	47	05/23/1994	30	06/23/1994	36	07/23/1994	36	08/23/1994	37	09/23/1994	17	10/23/1994	33	11/23/1994	25	12/23/1994	42
01/24/1994	38	02/24/1994	42	03/24/1994	48	04/24/1994	49	05/24/1994	31	06/24/1994	137	07/24/1994	35	08/24/1994	36	09/24/1994	22	10/24/1994	32	11/24/1994	24	12/24/1994	42
01/25/1994	38	02/25/1994	42	03/25/1994	47	04/25/1994	51	05/25/1994	31	06/25/1994	89	07/25/1994	34	08/25/1994	34	09/25/1994	33	10/25/1994	34	11/25/1994	25	12/25/1994	39
01/26/1994	36	02/26/1994	39	03/26/1994	45	04/26/1994	55	05/26/1994	30	06/26/1994	58	07/26/1994	35	08/26/1994	34	09/26/1994	22	10/26/1994	33	11/26/1994	24	12/26/1994	39
01/27/1994	35	02/27/1994	38	03/27/1994	54	04/27/1994	61	05/27/1994	30	06/27/1994	44	07/27/1994	34	08/27/1994	36	09/27/1994	28	10/27/1994	34	11/27/1994	43	12/27/1994	42
01/28/1994	62	02/28/1994	38	03/28/1994	51	04/28/1994	54	05/28/1994	30	06/28/1994	38	07/28/1994	34	08/28/1994	38	09/28/1994	32	10/28/1994	30	11/28/1994	41	12/28/1994	44
01/29/1994	46			03/29/1994	47	04/29/1994	55	05/29/1994	29	06/29/1994	37	07/29/1994	39	08/29/1994	35	09/29/1994	35	10/29/1994	27	11/29/1994	32	12/29/1994	42
01/30/1994	35			03/30/1994	47	04/30/1994	55	05/30/1994	29	06/30/1994	32	07/30/1994	48	08/30/1994	35	09/30/1994	34	10/30/1994	26	11/30/1994	30	12/30/1994	39
01/31/1994	39			03/31/1994	45			05/31/1994	29			07/31/1994	36	08/31/1994	35			10/31/1994	29			12/31/1994	39

Average Daily Flow Data for USGS Lovers Lane Gage

BLASLAND, BOUCK & LEE, INC.

engineers & scientists

Figure 1
Average Daily Flow, Portage Creek at Lovers Lane (USGS No. 04106300)
August - December

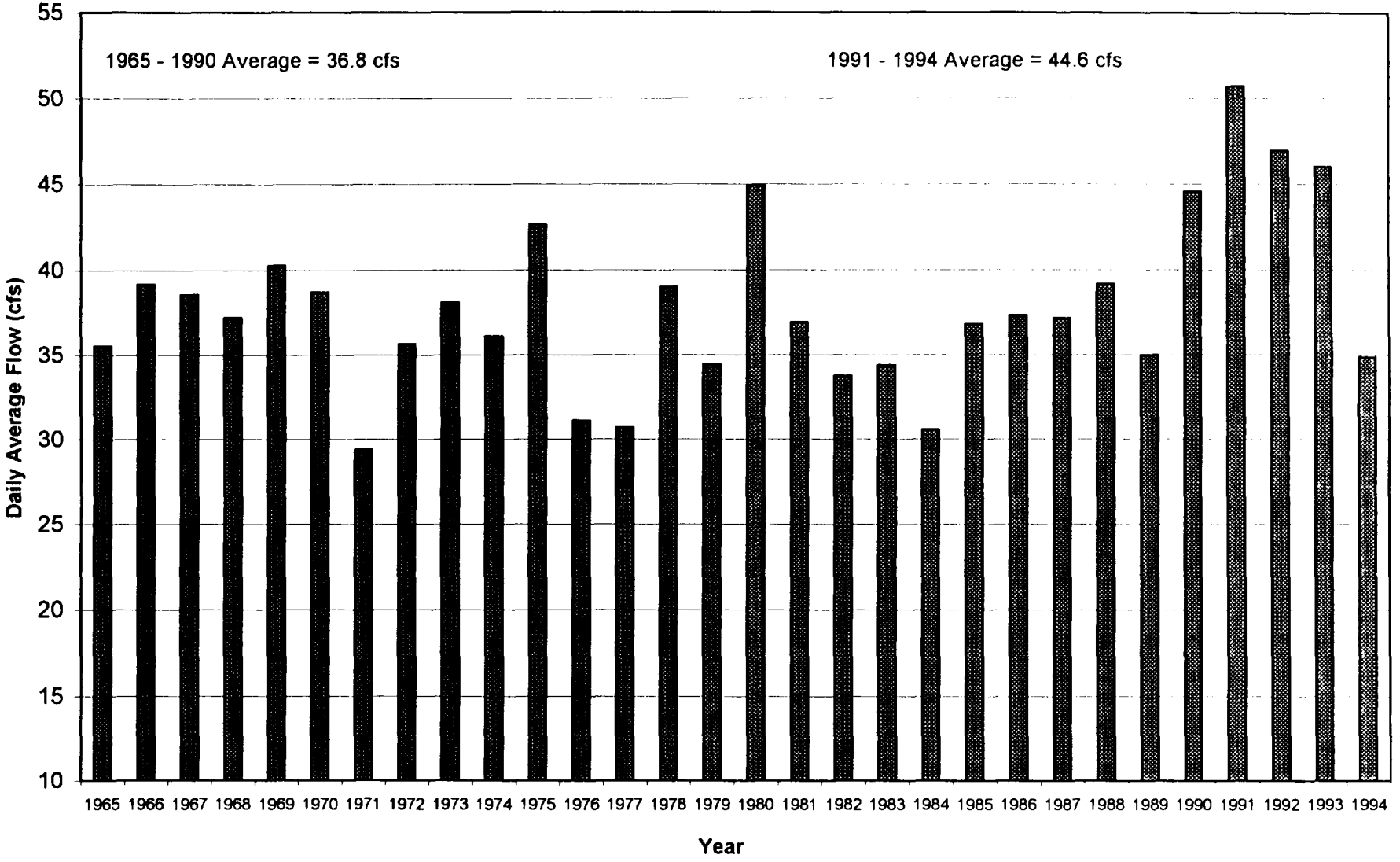
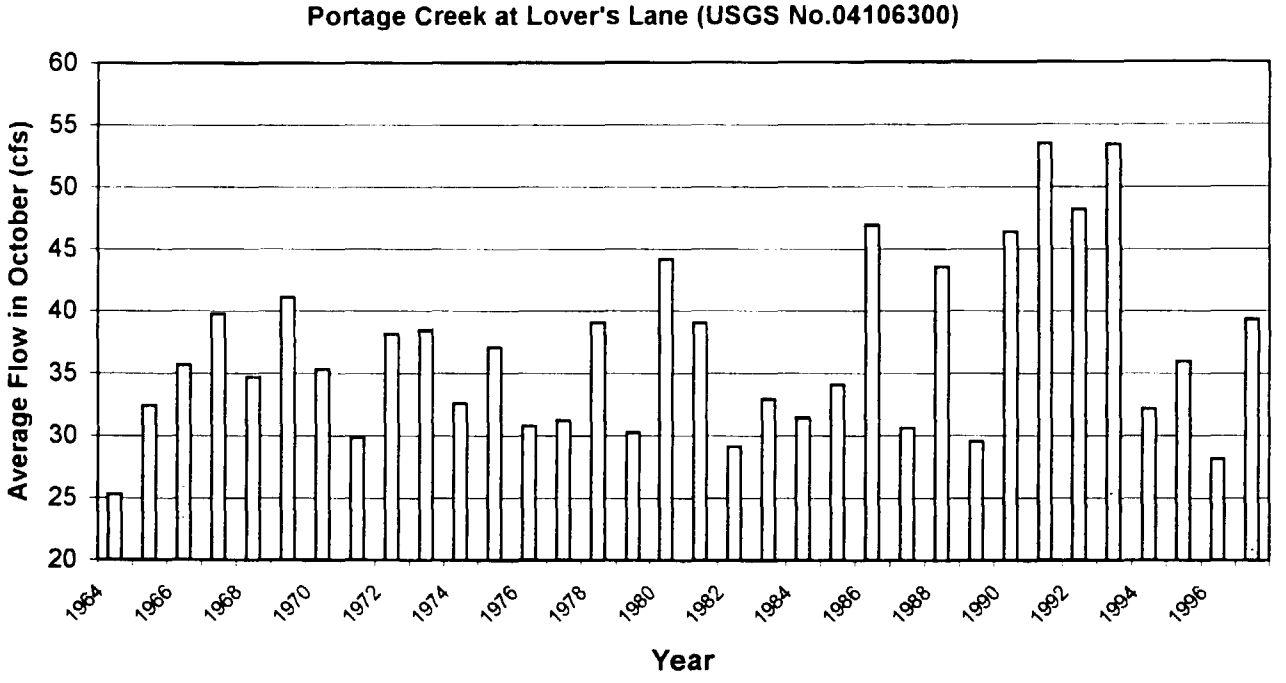


Figure 2


Portage Creek at Lover's Lane (USGS No.04106300)
Average Flow in October (cfs)
60
55
50
45
40
35
30
25
20
1964
1966
1968
1970
1972
1974
1976
1978
1980
1982
1984
1986
1988
1990
1992
1994
1996
Year

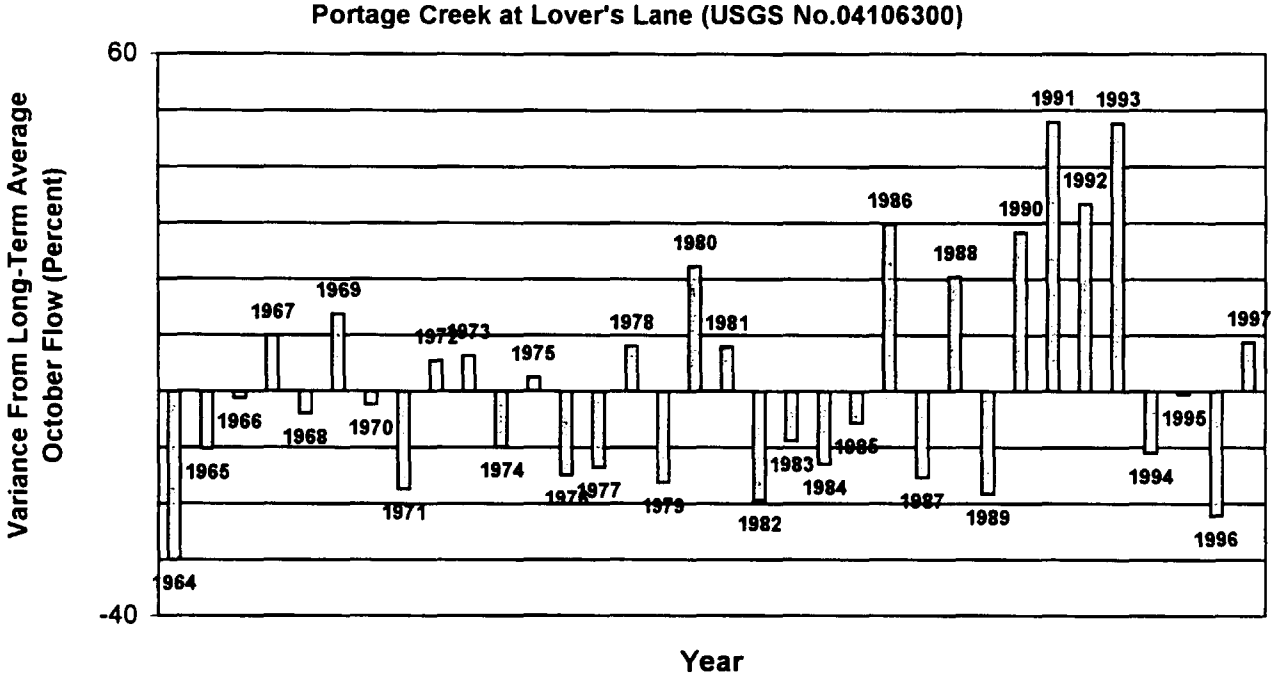
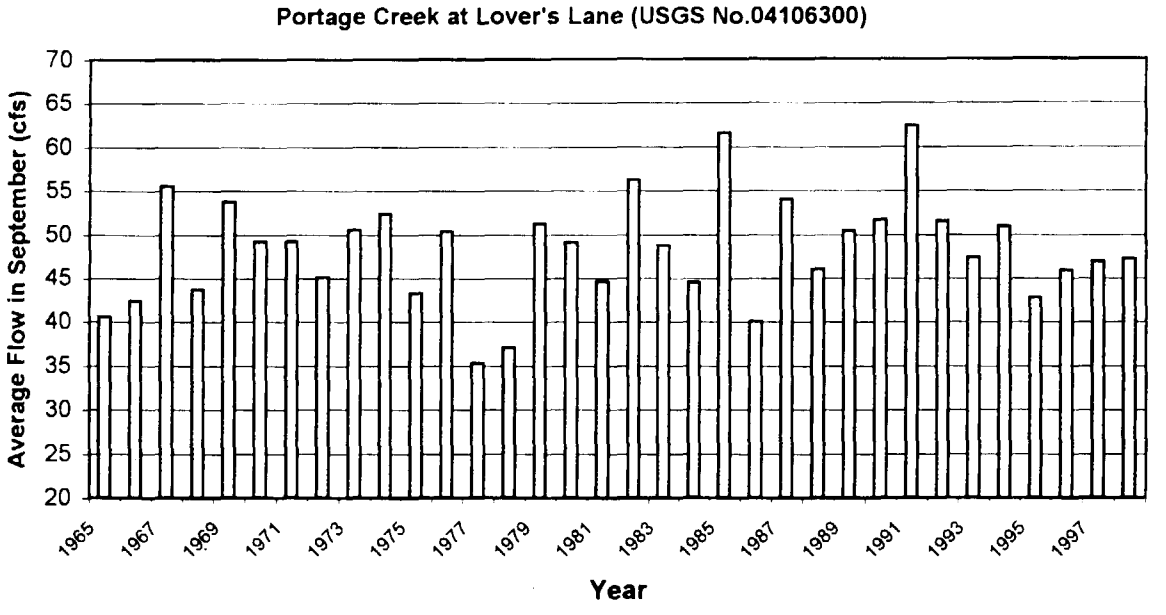
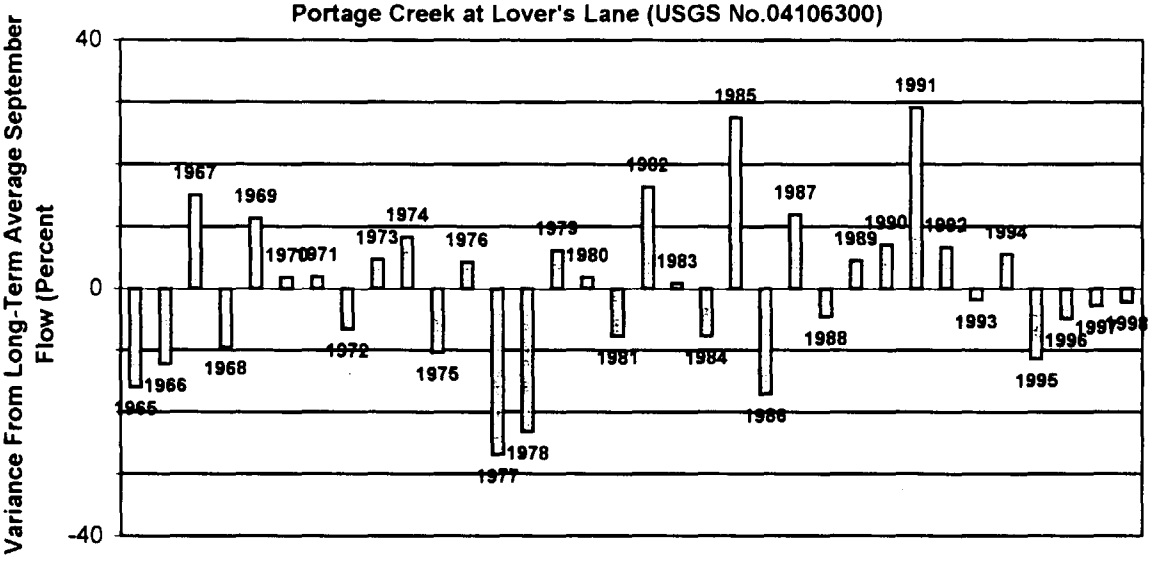

Portage Creek at Lover's Lane (USGS No.04106300)
Variance From Long-Term Average October Flow (Percent)
60
-40
1964
1965
1966
1967
1968
1969
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
Year

Figure 3


Portage Creek at Lover's Lane (USGS No.04106300)
Average Flow in September (cfs)
70
65
60
55
50
45
40
35
30
25
20
1965
1967
1969
1971
1973
1975
1977
1979
1981
1983
1985
1987
1989
1991
1993
1995
1997
Year


Portage Creek at Lover's Lane (USGS No.04106300)
Variance From Long-Term Average September Flow (Percent
40
0
-40
1965
1966
1967
1968
1969
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998

Hourly Flow Data for USGS Lovers Lane Gage for Periods of Higher than Average Flow

BLASLAND, BOUCK & LEE, INC.
engineers & scientists

PORTAGE CREEK HOURLY FLOW
for Periods of Higher than Average Flow
Lovers Lane (USGS Gage No. 04106300)

September 14-18, 1993

Date	Time	(cfs)	Date	Time	(cfs)	Date	Time	(cfs)	Date	Time	(cfs)	Date	Time	(cfs)
09/14/1993	100	54.95	09/15/1993	100	145.5	09/16/1993	100	71.74	09/17/1993	100	63.22	09/18/1993	100	58.23
09/14/1993	200	51.73	09/15/1993	200	145.5	09/16/1993	200	71.74	09/17/1993	200	64.9	09/18/1993	200	56.59
09/14/1993	300	53.34	09/15/1993	300	141.5	09/16/1993	300	70.01	09/17/1993	300	63.22	09/18/1993	300	56.59
09/14/1993	400	53.34	09/15/1993	400	135.4	09/16/1993	400	70.01	09/17/1993	400	63.22	09/18/1993	400	53.34
09/14/1993	500	53.34	09/15/1993	500	125.5	09/16/1993	500	68.3	09/17/1993	500	63.22	09/18/1993	500	53.34
09/14/1993	600	54.95	09/15/1993	600	117.7	09/16/1993	600	68.3	09/17/1993	600	61.54	09/18/1993	600	54.95
09/14/1993	700	54.95	09/15/1993	700	108.1	09/16/1993	700	68.3	09/17/1993	700	61.54	09/18/1993	700	56.59
09/14/1993	800	54.95	09/15/1993	800	100.5	09/16/1993	800	68.3	09/17/1993	800	61.54	09/18/1993	800	56.59
09/14/1993	900	54.95	09/15/1993	900	96.83	09/16/1993	900	68.3	09/17/1993	900	61.54	09/18/1993	900	58.23
09/14/1993	1000	54.95	09/15/1993	1000	93.14	09/16/1993	1000	66.59	09/17/1993	1000	59.88	09/18/1993	1000	58.23
09/14/1993	1100	54.95	09/15/1993	1100	89.48	09/16/1993	1100	66.59	09/17/1993	1100	61.54	09/18/1993	1100	58.23
09/14/1993	1200	56.59	09/15/1993	1200	80.5	09/16/1993	1200	66.59	09/17/1993	1200	61.54	09/18/1993	1200	59.88
09/14/1993	1300	56.59	09/15/1993	1300	80.5	09/16/1993	1300	66.59	09/17/1993	1300	63.22	09/18/1993	1300	59.88
09/14/1993	1400	56.59	09/15/1993	1400	85.86	09/16/1993	1400	68.3	09/17/1993	1400	61.54	09/18/1993	1400	59.88
09/14/1993	1500	66.59	09/15/1993	1500	80.5	09/16/1993	1500	66.59	09/17/1993	1500	61.54	09/18/1993	1500	59.88
09/14/1993	1600	84.06	09/15/1993	1600	80.5	09/16/1993	1600	66.59	09/17/1993	1600	59.88	09/18/1993	1600	59.88
09/14/1993	1700	89.48	09/15/1993	1700	80.5	09/16/1993	1700	66.59	09/17/1993	1700	59.88	09/18/1993	1700	59.88
09/14/1993	1800	110	09/15/1993	1800	80.5	09/16/1993	1800	64.9	09/17/1993	1800	59.88	09/18/1993	1800	59.88
09/14/1993	1900	129.4	09/15/1993	1900	78.72	09/16/1993	1900	63.22	09/17/1993	1900	59.88	09/18/1993	1900	59.88
09/14/1993	2000	141.5	09/15/1993	2000	76.96	09/16/1993	2000	63.22	09/17/1993	2000	59.88	09/18/1993	2000	59.88
09/14/1993	2100	151.7	09/15/1993	2100	75.21	09/16/1993	2100	63.22	09/17/1993	2100	59.88	09/18/1993	2100	59.88
09/14/1993	2200	149.6	09/15/1993	2200	73.47	09/16/1993	2200	64.9	09/17/1993	2200	59.88	09/18/1993	2200	58.23
09/14/1993	2300	147.6	09/15/1993	2300	73.47	09/16/1993	2300	64.9	09/17/1993	2300	59.88	09/18/1993	2300	56.59
09/14/1993	2400	147.6	09/15/1993	2400	71.74	09/16/1993	2400	63.22	09/17/1993	2400	59.88	09/18/1993	2400	58.23

Note: These data are plotted on Figures 5A and 5B

PORTAGE CREEK HOURLY FLOW
for Periods of Higher than Average Flow
Lovers Lane (USGS Gage No. 04106300)

October 16-20, 1993

Date	Time	(cfs)	Date	Time	(cfs)	Date	Time	(cfs)	Date	Time	(cfs)	Date	Time	(cfs)
10/16/1993	100	50.13	10/17/1993	100	149.6	10/18/1993	100	104.3	10/19/1993	100	68.3	10/20/1993	100	64.9
10/16/1993	200	59.88	10/17/1993	200	162	10/18/1993	200	100.5	10/19/1993	200	68.3	10/20/1993	200	64.9
10/16/1993	300	42.33	10/17/1993	300	166.2	10/18/1993	300	96.83	10/19/1993	300	66.59	10/20/1993	300	64.9
10/16/1993	400	48.55	10/17/1993	400	166.2	10/18/1993	400	94.98	10/19/1993	400	66.59	10/20/1993	400	63.22
10/16/1993	500	51.73	10/17/1993	500	162	10/18/1993	500	91.31	10/19/1993	500	66.59	10/20/1993	500	61.54
10/16/1993	600	51.73	10/17/1993	600	157.9	10/18/1993	600	87.67	10/19/1993	600	61.54	10/20/1993	600	61.54
10/16/1993	700	54.95	10/17/1993	700	147.6	10/18/1993	700	85.86	10/19/1993	700	59.88	10/20/1993	700	61.54
10/16/1993	800	58.23	10/17/1993	800	149.6	10/18/1993	800	84.06	10/19/1993	800	63.22	10/20/1993	800	61.54
10/16/1993	900	59.88	10/17/1993	900	159.9	10/18/1993	900	82.28	10/19/1993	900	64.9	10/20/1993	900	61.54
10/16/1993	1000	61.54	10/17/1993	1000	162	10/18/1993	1000	82.28	10/19/1993	1000	66.59	10/20/1993	1000	
10/16/1993	1100	61.54	10/17/1993	1100	164.1	10/18/1993	1100	78.72	10/19/1993	1100	66.59	10/20/1993	1100	
10/16/1993	1200	71.74	10/17/1993	1200	168.3	10/18/1993	1200	78.72	10/19/1993	1200	66.59	10/20/1993	1200	
10/16/1993	1300	76.96	10/17/1993	1300	174.6	10/18/1993	1300	78.72	10/19/1993	1300	66.59	10/20/1993	1300	
10/16/1993	1400	82.28	10/17/1993	1400	178.9	10/18/1993	1400	78.72	10/19/1993	1400	66.59	10/20/1993	1400	
10/16/1993	1500	84.06	10/17/1993	1500	176.8	10/18/1993	1500	75.21	10/19/1993	1500	66.59	10/20/1993	1500	
10/16/1993	1600	82.28	10/17/1993	1600	172.5	10/18/1993	1600	64.9	10/19/1993	1600	68.3	10/20/1993	1600	
10/16/1993	1700	78.72	10/17/1993	1700	164.1	10/18/1993	1700	66.59	10/19/1993	1700	68.3	10/20/1993	1700	
10/16/1993	1800	75.21	10/17/1993	1800	153.7	10/18/1993	1800	71.74	10/19/1993	1800	70.01	10/20/1993	1800	
10/16/1993	1900	78.72	10/17/1993	1900	141.5	10/18/1993	1900	73.47	10/19/1993	1900	68.3	10/20/1993	1900	
10/16/1993	2000	76.96	10/17/1993	2000	131.4	10/18/1993	2000	73.47	10/19/1993	2000	68.3	10/20/1993	2000	
10/16/1993	2100	85.86	10/17/1993	2100	123.5	10/18/1993	2100	70.01	10/19/1993	2100	66.59	10/20/1993	2100	
10/16/1993	2200	108.1	10/17/1993	2200	117.7	10/18/1993	2200	66.59	10/19/1993	2200	66.59	10/20/1993	2200	
10/16/1993	2300	131.4	10/17/1993	2300	111.9	10/18/1993	2300	66.59	10/19/1993	2300	66.59	10/20/1993	2300	
10/16/1993	2400	137.4	10/17/1993	2400	108.1	10/18/1993	2400	68.3	10/19/1993	2400	64.9	10/20/1993	2400	

Note: These data are plotted on Figures 5A and 5B

PORTAGE CREEK HOURLY FLOW
for Periods of Higher than Average Flow
Lovers Lane (USGS Gage No. 04106300)

April 11-14, 1994

Date	Time	(cfs)	Date	Time	(cfs)	Date	Time	(cfs)	Date	Time	(cfs)
04/11/1994	100	43	04/12/1994	100	46	04/13/1994	100	88	04/14/1994	100	60
04/11/1994	200	43	04/12/1994	200	48	04/13/1994	200	84	04/14/1994	200	58
04/11/1994	300	43	04/12/1994	300	48	04/13/1994	300	80	04/14/1994	300	58
04/11/1994	400	45	04/12/1994	400	48	04/13/1994	400	79	04/14/1994	400	57
04/11/1994	500	45	04/12/1994	500	48	04/13/1994	500	79	04/14/1994	500	57
04/11/1994	600	45	04/12/1994	600	54	04/13/1994	600	77	04/14/1994	600	57
04/11/1994	700	42	04/12/1994	700	58	04/13/1994	700	75	04/14/1994	700	57
04/11/1994	800	39	04/12/1994	800	66	04/13/1994	800	77	04/14/1994	800	55
04/11/1994	900	42	04/12/1994	900	80	04/13/1994	900	75	04/14/1994	900	57
04/11/1994	1000	45	04/12/1994	1000	88	04/13/1994	1000	74	04/14/1994	1000	57
04/11/1994	1100	45	04/12/1994	1100	97	04/13/1994	1100	72	04/14/1994	1100	57
04/11/1994	1200	45	04/12/1994	1200	102	04/13/1994	1200	71	04/14/1994	1200	60
04/11/1994	1300	48	04/12/1994	1300	98	04/13/1994	1300	71	04/14/1994	1300	61
04/11/1994	1400	48	04/12/1994	1400	95	04/13/1994	1400	69	04/14/1994	1400	61
04/11/1994	1500	48	04/12/1994	1500	95	04/13/1994	1500	69	04/14/1994	1500	61
04/11/1994	1600	48	04/12/1994	1600	93	04/13/1994	1600	69	04/14/1994	1600	61
04/11/1994	1700	48	04/12/1994	1700	87	04/13/1994	1700	68	04/14/1994	1700	61
04/11/1994	1800	46	04/12/1994	1800	82	04/13/1994	1800	66	04/14/1994	1800	61
04/11/1994	1900	46	04/12/1994	1900	80	04/13/1994	1900	64	04/14/1994	1900	61
04/11/1994	2000	46	04/12/1994	2000	79	04/13/1994	2000	64	04/14/1994	2000	60
04/11/1994	2100	46	04/12/1994	2100	82	04/13/1994	2100	63	04/14/1994	2100	60
04/11/1994	2200	46	04/12/1994	2200	79	04/13/1994	2200	61	04/14/1994	2200	58
04/11/1994	2300	48	04/12/1994	2300	87	04/13/1994	2300	61	04/14/1994	2300	58
04/11/1994	2400	48	04/12/1994	2400	92	04/13/1994	2400	60	04/14/1994	2400	57

Note: These data are plotted on Figure 5A.

Regression of Flow at Cork Street on Flow at Alcott Street

BLASLAND, BOUCK & LEE, INC.
engineers & scientists

Regression of Flow at Cork Street on Flow at Alcott Street

	Alcott Street				Cork Street	
Date	Time	Flow (cfs)		Date	Time	Flow (cfs)
10/17/93	1420	240	Predicted	10/17/93	1445	224
10/17/93	1720	212	Predicted	10/17/93	1745	198
10/19/93	1145	107	Predicted	10/19/93	1240	100
10/19/93	1720	94	Predicted	10/19/93	1745	88
10/20/93	1005	92	Predicted	10/20/93	1045	86
4/11/94	2145	69	Predicted	4/11/94	2215	64
4/12/94	0830	95	Predicted	4/12/94	0900	89
4/12/94	1030	105	Predicted	4/12/94	1110	98
4/12/94	1230	118	Predicted	4/12/94	1300	110
4/12/94	1430	128	Predicted	4/12/94	1500	119
4/12/94	2100	118	Predicted	4/12/94	2130	110
4/13/94	2230	85	Predicted	4/13/94	2300	79
9/8/94	1555	48	Predicted	9/8/94	1640	43
9/21/94	1225	49	Predicted	9/21/94	1300	46
8/24/93	1600	55	Measured	8/24/93	1740	57
9/15/93	1445	100	Measured	9/15/93	1610	90
9/16/93	1000	84	Measured	9/16/93	1040	75
9/16/93	1340	83	Measured	9/16/93	1425	80
9/16/93	1725	83	Measured	9/16/93	1750	80
9/17/93	0850	80	Measured	9/17/93	0915	73
9/17/93	1210	80	Measured	9/17/93	1240	78
9/17/93	1535	83	Measured	9/17/93	1605	78
9/18/93	0905	77	Measured	9/18/93	0950	70
10/18/93	1415	111	Measured	10/18/93	1455	104
10/20/93	1400	87	Measured	10/20/93	1430	85
10/21/93	1110	96	Measured	10/21/93	1140	89
12/2/93	1400	82	Measured	12/2/93	1440	73
12/2/93	1745	81	Measured	12/2/93	1820	75
12/2/93	2115	78	Measured	12/2/93	2145	74
12/3/93	0915	69	Measured	12/3/93	0940	66
12/3/93	1450	66	Measured	12/3/93	1540	64
12/15/93	1145	59	Measured	12/15/93	1230	53
12/28/93	1235	58	Measured	12/28/93	1310	55
6/9/94	1330	40	Measured	6/9/94	1445	35
5/19/97	1155	43	Measured	5/19/97	1700	34

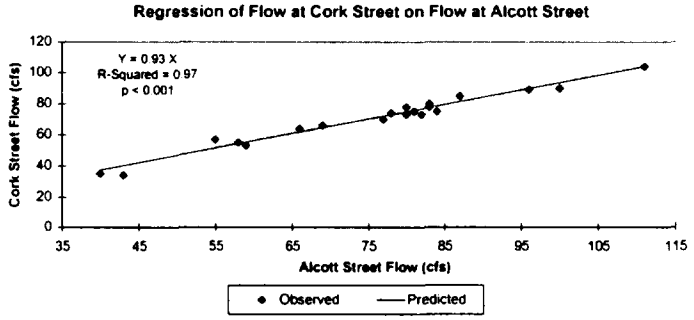
All flow data were rounded to two significant digits
Regression Output - Cork Street Flow as a Function of Measured Flow at Alcott Street

Regression Statistics	
Multiple R	0.984547929
R Square	0.969334624
Adjusted R Square	0.919334624
Standard Error	2.970257364
Observations	21

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	5577.551424	5577.551424	632.201353	4.7921E-16
Residual	20	176.4485761	8.822428806		
Total	21	5754			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95.0%*
Intercept	0	#N/A	#N/A	#N/A	#N/A	#N/A
X Variable 1	0.93	0.008322857	112.3889588	1.719E-29	0.918036083	0.95275842



RESIDUAL OUTPUT

Observation	*Predicted Y*	*Residuals*
1	51.4468488	5.553151229
2	93.539725	-3.539725038
3	78.573369	-3.573369032
4	77.6379718	2.362028219
5	77.6379718	2.362028219
6	74.83178	-1.83178003
7	74.83178	5.16821997
8	77.6379718	0.362028219
9	72.0255883	-2.025588279
10	103.829095	0.170905208
11	81.3795608	3.620439217
12	89.798136	-0.798136036
13	76.7025745	-3.702574531
14	75.7671773	-0.767177281
15	72.9609855	1.03901447
16	64.5424103	1.457589724
17	61.7362185	2.263781475
18	55.1884378	-2.188437772
19	54.2530405	0.746959478
20	37.41589	-2.415890015
21	40.2220818	-5.222081766

Appendix B

Surface Water Sampling Field Documentation

BLASLAND, BOUCK & LEE, INC.
engineers & scientists

LTI – Limno-Tech, Inc.
Memorandum

TO: Rick Difiore **DATE:** September 13, 1993
PROJECT: KZRV1

FROM: Tim Feist

SUBJECT: Field report for August 24, 1993 Portage Creek sampling survey

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This report summarizes the field observations and field data obtained during the August 24, 1993 base flow sampling survey of Portage Creek, and presents suggestions for future surveys. During this survey personnel from Limno-Tech, Inc. (LTI) and Blasland & Bouck Engineers, P.C. (B&B) selected two specific water sampling stations and stream velocity measurement stations on Portage Creek: at Cork Street upstream of the Allied Paper Operable Unit (Allied OU) and near Alcott Street downstream of the Allied OU. LTI personnel obtained water samples, recorded field measurements of water quality parameters, and measured stream discharge at these sites. Representatives from B&B and the Michigan Department of Natural Resources observed the field sampling and measurement at one site.

SURVEY PARTICIPANTS

The survey participants included:

Tim Feist (LTI)
John Peterson (LTI)
Brian Lord (LTI)
Rick Difiore (B&B)
Scott Cornelius (MDNR)
Bonnie ? (MDNR intern)

SITE SELECTION

The Allied OU Work Plan lists two sites for sampling Portage Creek, near Cork Street and near Alcott Street. These sites are upstream and downstream of the Allied OU. LTI and B&B examined these locations and selected specific sampling stations for obtaining water samples and stream discharge measurements.

At the Cork Street site (Station I.D. SWP1) the station selected for obtaining water samples and field measurements of water quality parameters is located at the upstream (south) side of the Portage Creek culvert at Cork Street. This site has relatively easy access to the stream. However, this site is not suitable for stream velocity and discharge measurements due to obstructions in the stream and an uneven stream bottom. Velocity measurements will be obtained at the downstream side of the Cork Street culvert. Gage height will be measured from the top, eastern corner of the upstream side of the concrete foundation surrounding the culvert under Cork Street. LTI will mark this site for future surveying by B&B. Gage height measured from the downstream edge of the culvert might provide a better stage/discharge relationship due to more even flow characteristics than at the selected upstream side of the culvert where the bottom and stream flow is more regular. However, access to the downstream side of the culvert is very difficult due to heavy underbrush and it would not be useful for quick determinations of gage height in the future..

At the Alcott Street site (Station I.D. SWP2), water quality samples and field measurements were obtained in the rectangular concrete channel approximately 200 feet downstream of Alcott Street, just upstream of the Illinois Envelope Company. This site had very easy access to the stream, but an uneven channel bottom and logs in the channel made this site unsuitable for

velocity measurements. A better site for velocity measurements was selected approximately 150 feet downstream of Alcott Street and approximately 50 feet upstream of the water sampling site, in the rectangular concrete channel which runs downstream from the Alcott Street dam. A pipeline runs through the middle of the culvert, but it appeared to have little influence on flow. A ladder will be installed to allow easier access at this site, as the concrete channel has vertical walls approximately 8 feet high. Gage height will be obtained by measuring down from the top of the concrete dam foundation on the upstream (south) side of Alcott Street, at the location surveyed by B&B. While the discharge measurements will be taken approximately 150 feet downstream of the gaging location, it should be possible to develop a representative stage/discharge relationship as the Creek flows through the concrete channel with no inflows or outflows for this entire distance.

For future surveys, the specific location for obtaining water quality samples and field measurements at station SWP2 (Alcott Street) will be just upstream of the location selected for stream velocity measurements. While the original sampling site 50 feet downstream has much easier access, it may not be appropriate for wet-weather event sampling when there will be frequent flow measurements since the original sampling location is located downstream of the flow measurement station. The disruption of the channel bed and possible resuspension of sediment during flow measurements could result in nonrepresentative samples at the original downstream site. While this problem could be avoided by collecting the water samples before measuring flow, it is recommended that flow be measured before the water samples and field parameter measurements are obtained to check that measured stream discharge qualifies as storm event or base flow, as appropriate. This will ensure that time will not have been wasted collecting water samples and measuring field parameters for a stream flow that does not meet sampling target criteria. Therefore, the location at which water quality samples and field parameter will be measured at station SWP2 will be moved approximately 50 feet upstream of the location used during the first sampling survey, slightly upstream of the location used for discharge measurements.

BASE FLOW SAMPLING SURVEY RESULTS

Sampling procedures did not vary from the procedures specified in the QAPP, except for slight alterations in the grab sampling methodology and in stream discharge measurements. QA/QC samples were obtained in accordance with the QAPP. Water samples will be taken from the Portage Creek sampling sites by directly submerging laboratory-supplied bottles in the Creek. The QAPP methodology listed a beaker as a sample gathering device. Directly sampling with the laboratory bottles eliminates any possible contamination from transferring samples from a sampling beaker to the bottles, eliminates any loss of volatile or semi-volatile chemicals during sample homogenization, and reduces the number of items that need to have decontamination rinses with solvents. Grab sampling is appropriate for the Portage Creek sites as depths were less than 2 feet and turbulent flows upstream of both sampling sites ensure that the Creek is completely mixed at the sampling locations.

Stream velocity and depth measurement frequency were increased from that listed in the QAPP. To better determine the characteristics of the velocity patterns and depth distribution across the channel at each site measurements were taken at a closer spacing than the 5-foot spacing specified in the QAPP. Stream velocities and depths were taken at approximately equal intervals across the stream channel. Changes in depth and velocity were relatively uniform and regular across the channel at both sites. However, because both sites have characteristics that may effect velocity parameters across the channel LTI recommends that at least 5 equally-spaced depth/velocity measurements be taken at each site for each discharge calculations.

Water samples and field parameter measurements were collected at the Alcott Street site (SWP2) between 16:05 and 16:30, with stream velocities measured between 16:40 and 17:00. Sampling occurred at Cork Street (SWP1) between 17:25 and 18:20. The sample I.D.'s corresponding to the sample sites are listed below.

	Sample Identification	
	Sample I.D.	Notes
Cork Street	A6~~6~~002	
Alcott Street	A6~~6~~000	MS/MSD were also obtained; no rinse blanks were taken as samples were collected directly in laboratory bottles
	A6~~6~~001	Alcott Street field duplicate sample.

Stream velocity measurements and discharge calculation results are included below. A slightly greater discharge, approximately 4%, was calculated at the upstream Cork Street site than at the downstream site. However, stream discharge calculations from meter velocity measurements are only accurate to approximately 5% of the true discharge under the best conditions, and the sites available at Portage Creek are not ideal stream discharge measurement sites. Thus, a 4% difference is within the expected measurement error from this method and no conclusions should be drawn from the difference.

	Stream Discharge Measurements			
	Avg. Depth (ft)	Avg. Velocity (ft/s)	Width (ft)	Discharge (ft^3/s)
Cork Street	2.2	1.81	14.2	56.8
Alcott Street	1.3	1.84	22.9	54.8

Field parameters were measured as specified in the QAPP and the field instrument standard procedures submitted by LTI, and results are included below. All parameters were measured in duplicate. LTI has a turbidimeter installed in a building at the Allied site, and all turbidity measurements were made at this building rather than at each station. Turbidity samples were collected in polypropylene bottles at each Creek station and the samples were analyzed for turbidity at 18:40, immediately after the sampling circuit was completed.

	Field Parameter Averages*				
	Temperature (^oC)	D.O. (mg/L)	Spec. Cond. (mS/cm @ 25^oC)	pH (S.U.)	Turbidity (NTU)
Cork Street	26.6	8.2	0.541	8.47	5.50
Alcott Street	25.8	7.5	0.478	8.08	11.50

* Duplicate measurements were taken for all field parameters.

VELOCITY PROFILE MEASUREMENT LOG

Station	Depth (ft)		Velocity (fps)		Average Velocity (fps)	Total Depth (ft)
	0.2	0.8	0.2	0.8		
7	0.88	0.22	1.71	1.36	1.54	1.1
6	0.88	0.22	2.35	1.58	1.97	1.1
5	0.96	0.24	2.62	1.45	2.04	1.2
4	0.96	0.24	1.52	1.26	1.39	1.2
3	1.12	0.28	1.81	2.24	2.03	1.4
2	1.28	0.32	2.48	1.48	1.98	1.6
1	1.20	0.30	3.14	0.78	1.96	1.5
					Average	1.84	1.3

4 AGJ 4

Location	SWP2 → A66000 & A66001 (Dup.)
Weather	SUNNY
Air Temperature	39.8°C 29.8°C
Samples	BDL/UTP
Total River Width	22.90'
Date	8/24/93
Time	16:40
Flow	1.84 x 1.3 x 22.9' = 54.78 cfs

Comments:

KB60207200

KB61301549

5/27/93
22933625

VELOCITY PROFILE MEASUREMENT LOG

Station	Depth (ft)		Velocity (fps)		Average Velocity (fps)	Total Depth (ft)
	0.2	0.8	0.2	0.8		
1	1.60	0.40	2.19	1.69	1.94	2.0
2	1.84	0.46	1.97	1.67	1.82	2.3
3	1.92	0.48	2.42	1.60	2.01	2.4
4	1.92	0.48	1.75	1.31	1.53	2.4
5	1.60	0.40	1.87	1.60	1.74	2.0
				Average	1.81	2.22

Location	SWP1
Weather	SUNNY
Air Temperature	28.5°C
Samples	BDL/TTP
Total River Width	14'2"
Date	8/24/93
Time	17:55
Flow	1.81 x 2.22 x 14.17' = 56.94 cfs

Comments:

KB60207201

KB61301550

5/27/93
22933625

SURFACE WATER SAMPLING FIELD LOG-GRAB

Sample Depth	SURFACE
Approximate Flow Rate	54 78 cfs
Volume of Sampling Device	1 L BOTTLES
Total Water Depth	1.2' [illegible]
Distance From Bank	10'
Depth Below Surface of Water Removed	2"

Location	SWPZ
Weather	SUNNY
Air Temperature	39.8°C
Samplers	BOL / [illegible] /
Date	8/24/93
Time	[illegible] 16:05

Temperature	25.8°C, 25.8 mean = [illegible] 25.8°C
Conductivity	0.475, 0.480 mean = 0.478
pH	8.07, 8.09 mean = 8.08
Dissolved Oxygen	7.5 PPM, 7.5 mean = 7.5
Turbidity	11.50, 11.50 mean = 11.50

Comments _____

6/15/93
16933625

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KB60207202

KB61301551

SURFACE WATER SAMPLING FIELD LOG-GRAB

Sample Depth	Surface
Approximate Flow Rate	56.94 cfs
Volume of Sampling Device	1 L BOTTLES
Total Water Depth	2.4'
Distance From Bank	7'
Depth Below Surface of Water Removed	2"

Location	SWP2
Weather	SUNNY
Air Temperature	28.5°C
Samplers	BDL/JTP
Date	8/24/93
Time	17:40

Temperature	26.6, 26.4 MEAN = 26.5°C
Conductivity	0.541, 0.541 MEAN = 0.541
pH	8.47, 8.47 MEAN = 8.47
Dissolved Oxygen	8.2, 8.2 MEAN = 8.2
Turbidity	5.50, 5.50 MEAN = 5.50

Comments _____

6/15/93
16033625

KB60207203

KB61301552

LTI – Limno-Tech, Inc.
Memorandum

TO:	Rick DiFiore	DATE:	October 1, 1993
		PROJECT:	KZRV1
FROM:	Tim Feist		
SUBJECT:	Field report for September 15-18, 1993 Portage Creek storm event sampling survey		

This report summarizes the field observations and field data obtained during the September 15 to September 18, 1993 storm event sampling survey of Portage Creek. During this survey personnel from Limno-Tech, Inc. (LTI) sampled two water sampling stations on Portage Creek: at Cork Street (SWP1) and near Alcott Street (SWP2). LTI personnel obtained water samples, recorded field measurements of water quality parameters, and measured stream discharge at these sites during eight separate sampling circuits over four days.

SURVEY PARTICIPANTS

The survey participants included:

John Peterson (LTI)
Brian Lord (LTI)

STORM EVENT FLOW SAMPLING SURVEY RESULTS

Sampling procedures did not vary from the procedures specified in the QAPP, except for slight alterations in the grab sampling methodology and in stream discharge measurements previously approved by B&B and described in the September 13, 1993 field report. Grab samples were obtained directly with the laboratory-supplied bottles. Stream velocity was measured more frequently than specified in the QAPP, at five locations across the stream at each station. QA/QC samples were obtained in accordance with the specifications of the QAPP.

LTI mobilized for sampling the storm flows based upon the quantity of precipitation on September 14, 1993 and relatively high creek flow on September 13. There was 1.91 inches of rainfall recorded for September 14 at WWMT television station in Kalamazoo. This amount of rainfall exceeded the 1.4 inches in 24 hours criteria for mobilization outlined in LTI's September 8, 1993 memorandum to B&B. Creek flow measured at Station SWP2 on September 13 was approximately 60 cfs.

Sampling surveys began September 15, 1993 at 14:25 and were completed September 18 at 10:30. One circuit was sampled September 15, three on September 16 and 17, and one on September 18. Individual circuits were separated from the previous circuit by at least two and one-half hours to allow any resuspended sediment from sampling activities at the upstream site to settle or be carried downstream of the downstream site. The sample I.D.'s corresponding to sampling time and site are listed in Table 1 below.

Table 1. Sample Identification and Time of Sampling.

Sample I.D.	Station	Date	Time	Notes
A66500	Alcott St.	9/15/93	14:45	
A66501	Cork St.	9/15/93	16:10	
A66502	Alcott St.	9/16/93	10:00	
A66503	Cork St.	9/16/93	10:40	
A66504	Alcott St.	9/16/93	13:40	MS/MSDS also taken for this sample
A66505	Alcott St.	9/16/93	13:40	Field duplicate of A66504
A66506	Cork St.	9/16/93	14:25	
A66507	Alcott St.	9/16/93	17:25	
A66508	Cork St.	9/16/93	17:50	
A66509	Alcott St.	9/17/93	8:50	
A66510	Cork St.	9/17/93	9:15	
A66511	Alcott St.	9/17/93	12:10	
A66512	Cork St.	9/17/93	12:40	
A66513	Alcott St.	9/17/93	15:35	
A66514	Cork St.	9/17/93	16:05	
A66515	Alcott St.	9/18/93	9:05	
A66516	Cork St.	9/18/93	9:50	

Alcott Street = Station SWP2
Cork Street = Station SWP1

Stream velocity measurements and discharge calculation results are included Table 2. The outflow from the Alcott Street dam was clogged with debris, which appeared to have affected the flow out of the dam. This may effect the accuracy of the stage discharge relationship as stage height is measured from the upstream side of the dam. LTI has installed an additional staff gage at the location where the water quality measurements are made, approximately 150 yards downstream. LTI will record gage height from this gage also in case a reliable stage discharge relation is not obtained from measuring down at the Alcott dam.

Table 2. Stream Discharge Measurements.

Date	Time	Avg. Velocity (ft/s)	Avg. Depth (ft)	Discharge (ft^3/s)	Gage Height (ft)
Cork Street					
9/15/93	16:20	2.58	2.5	89.9	792.60
9/16/93	10:50	2.20	2.4	74.8	792.49
9/16/93	14:35	2.33	2.4	79.9	
9/16/93	18:00	2.34	2.4	80.2	
9/17/93	9:25	2.24	2.3	73.0	792.49
9/17/93	12:50	2.33	2.4	77.9	
9/17/93	16:15	2.29	2.4	77.9	
9/18/93	10:00	2.14	2.3	69.8	792.44

Table 2. Stream Discharge Measurements (continued).

Date	Time	Avg. Velocity (ft/s)	Avg. Depth (ft)	Discharge (ft^3/s)	Gage Height (ft)
Alcott Street					
9/15/93	15:05	2.27	1.9	99.8	779.86
9/16/93	10:20	2.14	1.7	84.3	779.56
9/16/93	14:00	2.10	1.7	82.7	
9/16/93	17:30	2.11	1.7	83.1	
9/17/93	9:00	2.08	1.7	80.0	
9/17/93	12:20	2.08	1.7	80.0	
9/17/93	15:45	2.17	1.7	83.5	779.51
9/18/93	9:15	2.03	1.7	77.2	779.41

Creek widths: Alcott Street = 22.9 feet
Cork Street = 14.2 feet

Field parameters were measured as specified in the QAPP and the field instrument standard procedures submitted by LTI. All parameters were measured in duplicate and the averages of measurements are included in Table 3. LTI has a turbidimeter installed in a building at the Allied site, and all turbidity measurements were made at this building rather than at each station. Turbidity samples were collected in polypropylene bottles at each Creek station and the samples were analyzed for turbidity immediately after the sampling circuit was completed.

Table 3. Field Parameter Average Measurements.

Date	Time	Temp. (°C)	Spec. Cond. (mS/cm @ 25°C)	pH (S.U.)	D.O. (mg/L)	Turbidity (NTU)
Cork Street						
9/15/93	16:10	17.4	0.518	7.82	8.80	10.48
9/16/93	10:40	14.4	0.595	8.11	9.10	9.25
9/16/93	14:25	15.3	0.595	8.43	9.30	8.44
9/16/93	17:50	16.1	0.600	8.35	9.59	7.09
9/17/93	9:15	14.5	0.612	8.24	8.95	9.98
9/17/93	12:40	15.1	0.608	8.27	9.20	9.55
9/17/93	16:05	16.8	0.609	8.34	9.79	8.44
9/18/93	9:50	14.6	0.603	8.28	8.62	11.24
Alcott Street						
9/15/93	14:45	17.2	0.464	7.56	8.99	9.64
9/16/93	10:00	14.4	0.593	8.28	9.42	14.2
9/16/93	13:40	15.1	0.601	8.34	9.25	9.24
9/16/93	17:25	15.8	0.601	8.38	9.25	8.34
9/17/93	8:50	14.6	0.606	8.09	9.45	10.27
9/17/93	12:10	15.0	0.611	8.20	9.38	9.74
9/17/93	15:35	16.4	0.614	8.27	9.55	10.58
9/18/93	9:05	14.7	0.613	8.14	9.25	10.65

Alcott Street = Station SWP2
Cork Street = Station SWP1

VELOCITY PROFILE MEASUREMENT LOG

Station	Depth (ft)		Velocity (fps)		Average Velocity (fps)	Total Depth (ft)
	0.2	0.8	0.2	0.8		
5	1.36	0.34	2.22	1.70	1.96	1.7
4	1.36	0.34	2.55	1.67	2.11	1.7
3	1.44	0.36	2.00	1.75	1.88	1.8
2	1.68	0.42	2.84	2.60	2.72	2.1
1	1.84	0.46	3.31	2.05	2.68	2.3
				Average	2.27	1.92

Location	SWP 2 → A66500
Weather	OVERCAST / CLOUDY
Air Temperature	14.2°C
Samples	BDL / JTP
Total River Width	22.90'
Date	9/15/93
Time	1510 5
Flow	2.27 × 1.92 × 22.90' = 99.81 cfs

Comments:

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5/27/93
22933625

KB61301556

VELOCITY PROFILE MEASUREMENT LOG

Station	Depth (ft)		Velocity (fps)		Average Velocity (fps)	Total Depth (ft)
	0.2	0.8	0.2	0.8		
1	1.60	0.40	2.32	2.43	2.38	2.0
2	2.16	0.54	2.79	1.90	2.35	2.7
3	2.24	0.56	2.97	1.71	2.34	2.8
4	2.16	0.54	2.93	2.43	2.68	2.7
5	1.68	0.42	3.09	3.23	3.16	2.1
				Average	2.58	2.46

Location	SWP1 → A66501
Weather	OVERCAST / CLOUDY
Air Temperature	14.2°C
Samples	BDL / JTP
Total River Width	~~[illegible]~~' 14.17'
Date	9/15/93
Time	16:20
Flow	2.58 × 2.46 × 14.17 = 89.93 cfs

Comments:

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22933625

VELOCITY PROFILE MEASUREMENT LOG

Station	Depth (ft)		Velocity (fps)		Average Velocity (fps)	Total Depth (ft)
	0.2	0.8	0.2	0.8		
5	1.20	0.30	1.89	1.60	1.75	1.5
4	1.20	0.30	2.39	1.58	1.99	1.5
3	1.28	0.32	1.77	1.82	1.80	1.6
2	1.52	0.38	2.77	2.12	2.45	1.9
1	1.68	0.42	3.23	2.19	2.71	2.1
				Average	2.14	1.72

Location	SWP2 → A66502
Weather	OVERCAST / CLOUDY
Air Temperature	11.5°C
Samples	BDL / JTP
Total River Width	22.90'
Date	9/16/93
Time	10:20
Flow	2.14 x 1.72 x 22.90' = 84.30 cfs

Comments:

KB61301558

KB60207209

VELOCITY PROFILE MEASUREMENT LOG

Station	Depth (ft)		Velocity (fps)		Average Velocity (fps)	Total Depth (ft)
	0.2	0.8	0.2	0.8		
1	1.60	0.40	2.13	1.54	1.86	2.0
2	2.08	0.52	2.30	1.45	1.88	2.6
3	2.16	0.54	2.71	1.76	2.24	2.7
4	2.08	0.52	2.71	2.13	2.42	2.6
5	1.68	0.42	2.82	2.36	2.59	2.1
				Average	2.20	2.4

Location	SWP1 - A66503
Weather	OVERCAST / CLOUDY
Air Temperature	12.0°C
Samples	BDL / JTP
Total River Width	14.17'
Date	9/16/93
Time	10:50
Flow	2.20 x 2.40' x 14.17' = 74.82 cfs

Comments:

KB61301559

KB60207210

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VELOCITY PROFILE MEASUREMENT LOG

Station	Depth (ft)		Velocity (fps)		Average Velocity (fps)	Total Depth (ft)
	0.2	0.8	0.2	0.8		
5	1.20	0.30	1.91	1.77	1.84	1.5
4	1.20	0.30	2.29	1.60	1.95	1.5
3	1.28	0.32	1.78	1.59	1.69	1.6
2	1.52	0.38	2.71	2.05	2.38	1.9
1	1.68	0.42	3.39	1.91	2.65	2.1
				Average	2.10	1.72

Location	SWP 2 → A66604 & A66505 (DUP.)
Weather	OVERCAST / CLOUDY
Air Temperature	15.5°C
Samples	BDL / JTP
Total River Width	22.90'
Date	9/16/93
Time	14:00
Flow	2.10 x 1.72 x 22.90 = 82.72 cfs

Comments:

KB60207211

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22933625

KB61301560

VELOCITY PROFILE MEASUREMENT LOG

Station	Depth (ft)		Velocity (fps)		Average Velocity (fps)	Total Depth (ft)
	0.2	0.8	0.2	0.8		
1	1.68	0.42	2.23	1.73	1.98	2.1
2	2.08	0.52	2.36	1.64	2.02	2.6
3	2.16	0.54	2.65	1.95	2.32	2.7
4	2.08	0.52	2.86	2.52	2.69	2.6
5	1.68	0.42	2.91	2.38	2.65	2.1
				Average	2.33	2.42

Location	SWP1 → A6650%
Weather	OVERCAST / CLOUDY
Air Temperature	15.0°C
Samples	BOL / JTP
Total River Width	14.17'
Date	9/16/93
Time	14:35
Flow	2.33 x 2.42 x 14.17 = 79.90 cfs

Comments:

KB61301561

KB60207212

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VELOCITY PROFILE MEASUREMENT LOG

Station	Depth (ft)		Velocity (fps)		Average Velocity (fps)	Total Depth (ft)
	0.2	0.8	0.2	0.8		
5	1.20	0.30	1.80	1.65	1.73	1.5
4	1.20	0.30	2.42	1.85	2.14	1.5
3	1.28	0.32	1.95	1.74	1.85	1.6
2	1.52	0.38	2.83	1.56	2.20	1.9
1	1.68	0.42	3.37	1.88	2.63	2.1
				Average	2.11	1.72

Location	SWP2 → A66507
Weather	OVERCAST / CLOUDY
Air Temperature	15.9°C
Samples	BDL / UTP
Total River Width	22.90'
Date	9-16-93
Time	17:30
Flow	2.11 x 1.72 x 22.90 = 83.11 cfs

Comments:

KB60207213

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27903425

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VELOCITY PROFILE MEASUREMENT LOG

Station	Depth (ft)		Velocity (fps)		Average Velocity (fps)	Total Depth (ft)
	0.2	0.8	0.2	0.8		
1	1.68	0.42	2.05	1.82	1.94	2.1
2	2.08	0.52	2.55	1.66	2.11	2.6
3	2.16	0.54	2.79	1.72	2.26	2.7
4	2.08	0.52	2.79	2.48	2.64	2.6
5	1.68	0.42	2.87	2.63	2.75	2.1
				Average	2.34	2.42

Location	SWP1 → A66505
Weather	OVERCAST / CLOUDY
Air Temperature	14.8°C
Samples	BDL / JTP
Total River Width	14.17'
Date	9-16-93
Time	18:00
Flow	2.34 x 2.42 x 14.17 = 80.24 cfs

Comments:

KB61301563

KB60207214

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VELOCITY PROFILE MEASUREMENT LOG

Station	Depth (ft)		Velocity (fps)		Average Velocity (fps)	Total Depth (ft)
	0.2	0.8	0.2	0.8		
1	1.60	0.40	3.27	1.99	2.63	2.0
2	1.52	0.38	2.68	2.18	2.43	1.9
3	1.28	0.32	1.98	1.55	1.77	1.6
4	1.12	0.28	2.47	1.43	1.95	1.4
5	1.20	0.30	1.74	1.47	1.61	1.5
				Average	2.08	1.68

Location	SWP2 → A66509
Weather	OVERCAST / CLOUDY
Air Temperature	13.4°C
Samples	BDL / JTP
Total River Width	22.90'
Date	9-17-93
Time	9:00
Flow	2.08 x 1.68 x 22.90 = 80.02 cfs

Comments:

KB61301564

KB60207215

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22933625

VELOCITY PROFILE MEASUREMENT LOG

Station	Depth (ft)		Velocity (fps)		Average Velocity (fps)	Total Depth (ft)
	0.2	0.8	0.2	0.8		
1	1.52	0.35	2.04	1.84	1.96	1.9
2	2.00	0.50	2.40	1.60	2.00	2.5
3	2.05	0.52	2.62	1.88	2.25	2.6
4	2.00	0.50	2.59	2.21	2.40	2.5
5	1.60	0.40	2.75	2.46	2.61	2.0
				Average	2.24	2.3

Location	SWP1 → A66510
Weather	OVERCAST / CLOUDY
Air Temperature	13.2°C
Samples	BDL / JTT
Total River Width	14.17'
Date	9-17-93
Time	9:25
Flow	2.24 x 2.3 x 14.17 = 73.00 cfs

Comments:

KB61301565

KB60207216

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VELOCITY PROFILE MEASUREMENT LOG

Station	Depth (ft)		Velocity (fps)		Average Velocity (fps)	Total Depth (ft)
	0.2	0.8	0.2	0.8		
5	1.20	0.30	1.75	1.53	1.64	1.5
4	1.12	0.28	2.44	1.70	2.07	1.4
3	1.28	0.32	1.79	1.62	1.71	1.6
2	1.52	0.38	2.79	1.96	2.38	1.9
1	1.60	0.40	3.20	1.97	2.59	2.0
				Average	2.08	1.68

Location	SWP2 → A66511
Weather	OVERCAST / CLOUDY
Air Temperature	14.3°C
Samples	BDL / JTP
Total River Width	22.90'
Date	9-17-93
Time	12:20
Flow	2.08 x 1.68 x 22.90 = 80.02 cfs

Comments:

KB60207217

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27933025

KB61301566

VELOCITY PROFILE MEASUREMENT LOG

Station	Depth (ft)		Velocity (fps)		Average Velocity (fps)	Total Depth (ft)
	0.2	0.8	0.2	0.8		
1	1.52	0.38	2.19	1.77	1.98	1.9
2	2.08	0.52	2.47	1.73	2.10	2.6
3	2.16	0.54	2.64	1.95	2.30	2.7
4	2.08	0.52	2.91	2.29	2.60	2.6
5	1.60	0.40	2.73	2.57	2.65.	2.0
				Average	2.33	2.36

Location	SWP1 → A66512
Weather	OVERCAST / CLOUDY
Air Temperature	15.6°C
Samples	BDL / JTP
Total River Width	@ 14.17'
Date	9/17/93
Time	12:50
Flow	2.33 × 2.36 × 14.17' = 77.92 cfs

Comments:

KB61301567

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VELOCITY PROFILE MEASUREMENT LOG

Station	Depth (ft)		Velocity (fps)		Average Velocity (fps)	Total Depth (ft)
	0.2	0.8	0.2	0.8		
5	1.20	0.30	1.89	1.54	1.72	1.5
4	1.12	0.28	2.35	1.77	2.06	1.4
3	1.28	0.32	1.94	1.65	1.80	1.6
2	1.14	0.38	2.78	2.26	2.52	1.9
1	1.60	0.40	3.19	2.26	2.73.	2.0
				Average	2.17	1.68

Location	SWP2-A66513
Weather	OVERCAST / CLOUDY
Air Temperature	20.6°C
Samples	BDL / JTP
Total River Width	22.90'
Date	9/17/93
Time	15:45
Flow	2.17 × 1.68 × 22.9 = 83.48 cfs

Comments:

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VELOCITY PROFILE MEASUREMENT LOG

Station	Depth (ft)		Velocity (fps)		Average Velocity (fps)	Total Depth (ft)
	0.2	0.8	0.2	0.8		
1	1.60	0.40	2.23	1.74	1.99	2.0
2	2.08	0.52	2.34	1.77	2.06	2.6
3	2.16	0.54	2.58	1.76	2.17	2.7
4	2.08	0.52	2.81	2.41	2.61	2.6
5	1.68	0.42	2.69	2.52	2.61	2.1
				Average	2.29	2.4

Location	SWP1 → A66514
Weather	PARTLY SUNNY
Air Temperature	18.1°C
Samples	BDL/~~UTP~~
Total River Width	14.17'
Date	9/17/93
Time	16:15
Flow	2.29 x 2.4 x 14.17 = 77.89 cfs

Comments:

KB60207220

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22933625

KB61301569

VELOCITY PROFILE MEASUREMENT LOG

Station	Depth (ft)		Velocity (fps)		Average Velocity (fps)	Total Depth (ft)
	0.2	0.8	0.2	0.8		
5	1.20	0.30	1.76	1.66	1.71	1.5
4	1.12	0.28	2.26	2.03	2.15	1.4
3	1.20	0.30	1.71	1.44	1.56	1.5
2	1.52	0.38	2.68	1.82	2.25	1.9
1	1.60	0.40	3.16	1.84	2.50	2.0
				Average	2.03	1.66

Location	SWP2 → A66515
Weather	OVERCAST / CLOUDY
Air Temperature	12.7°C
Samples	BDL / JTP
Total River Width	22.90'
Date	9/18/93
Time	9:15
Flow	2.03 x 1.66 x 22.90 = 77.17 cfs

Comments:

KB60207221

5/27/93
22933625

KB61301570

VELOCITY PROFILE MEASUREMENT LOG

Station	Depth (ft)		Velocity (fps)		Average Velocity (fps)	Total Depth (ft)
	0.2	0.8	0.2	0.8		
1	1.52	0.38	2.03	1.60	1.82	1.9
2	2.00	0.50	2.20	1.28	1.74	2.5
3	2.08	0.52	2.47	1.58	2.03	2.6
4	2.00	0.50	2.62	2.13	2.38	2.5
5	1.60	0.40	2.83	2.64	2.74	2.0
				Average	2.14	2.3

Location	SWP1 → A66516
Weather	PARTLY SUNNY
Air Temperature	14.2°C
Samples	BDL / JTP
Total River Width	14.17'
Date	9/18/93
Time	10:00
Flow	2.14 x 2.3 x 14.17 = 69.75

Comments:

KB61301571

KB60207222

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22933625

SURFACE WATER SAMPLING FIELD LOG-GRAB

Sample Depth	2" BELOW SURFACE
Approximate Flow Rate	99.8 ~~4~~ ft^3/s
Volume of Sampling Device	1 L BOTTLES
Total Water Depth	~~[illegible]~~' 1.92'
Distance From Bank	7'
Depth Below Surface of Water Removed	2"

Location	SWPZ - A66500
Weather	OVERCAST / CLOUDY
Air Temperature	14.2°C
Samplers	BDL / JTP
Date	9/15/93
Time	14:45

Temperature	17.2°C / 17.2 mean = 17.25°C
Conductivity	.464 / .463 mean = 0.464
pH	7.67 / 7.56 mean = ~~[illegible]~~ 7.59
Dissolved Oxygen	8.99 / 7.99 mean = 8.99
Turbidity	9.95 / 9.32 mean = 9.64

Comments _____

6/15/93
16933625

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SURFACE WATER SAMPLING FIELD LOG-GRAB

Sample Depth	2" BELOW WATER SURFACE
Approximate Flow Rate	89.9 (ROUGHLY AS A RECTANGLE)
Volume of Sampling Device	1 L BOTTLES
Total Water Depth	2.46'
Distance From Bank	7'
Depth Below Surface of Water Removed	2" BELOW WATER SURFACE

Location	SWP-A66501
Weather	OVERCAST / CLOUDY
Air Temperature	14.2°C
Samplers	BDL / JTP
Date	9/15/93
Time	16:10

Temperature	17.4°C, 17.4 mean = 17.4°C
Conductivity	.518, .518 mean = 0.518
pH	7.88, 7.76 mean = 7.82
Dissolved Oxygen	8.80, 8.80 mean = 8.80
Turbidity	10.50, 10.46 mean = 10.48

Comments _____

6/15/93
16933625

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KB61301573

SURFACE WATER SAMPLING FIELD LOG-GRAB

Sample Depth	2" BELOW SURFACE
Approximate Flow Rate	84.30 ft^3/s
Volume of Sampling Device	1L BOTTLES
Total Water Depth	1.95'
Distance From Bank	7'
Depth Below Surface of Water Removed	2" BELOW SURFACE

Location	SWP2-A66502
Weather	OVERCAST / CLOUDY
Air Temperature	11.8°C
Samplers	BDL / JTP
Date	9/16/93
Time	10:00

Temperature	14.4°C, 14.4 mean = 14.4°C
Conductivity	0.593, .593 mean = 0.593
pH	8.30, 8.26 mean = 8.28
Dissolved Oxygen	9.42, 9.42 mean = 9.42
Turbidity	14.8, 13.6 mean = 14.2

Comments _____

6/15/93
16933625

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KB61301574

SURFACE WATER SAMPLING FIELD LOG-GRAB

Sample Depth	2" BELOW SURFACE
Approximate Flow Rate	74.82 cfs
Volume of Sampling Device	1L BOTTLES
Total Water Depth	2.4'
Distance From Bank	7'
Depth Below Surface of Water Removed	2" BELOW SURFACE

Location	SWP1 – A66503
Weather	OVERCAST / CLOUDY
Air Temperature	12.0°C
Samplers	BDL / JTP
Date	9/16/93
Time	10:40

Temperature	14.5°C, 14.3 mean = 14.4°C
Conductivity	.596, .593 mean = .595
pH	7.96, 8.25 mean = 8.11
Dissolved Oxygen	9.10, 9.10 mean = 9.10
Turbidity	9.75, 9.74 mean = 9.25

Comments _____

6/15/93
16933625

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SURFACE WATER SAMPLING FIELD LOG-GRAB

Sample Depth	2" BELOW SURFACE
Approximate Flow Rate	82.72 ft³/s.
Volume of Sampling Device	1 L BOTTLES
Total Water Depth	1.72'
Distance From Bank	7'
Depth Below Surface of Water Removed	2" BELOW SURFACE

Location	SWPZ — A66504 & A66505 (DUP.)
Weather	OVERCAST / CLOUDY
Air Temperature	15.5°C
Samplers	BDL / JTP
Date	9/16/93
Time	13:40

Temperature	15.1°C, 15.1 mean =	15.1°C
Conductivity	.601, .601 mean =	.601
pH	8.36, 8.31 mean =	8.34
Dissolved Oxygen	9.25, 9.25 mean =	9.25
Turbidity	9.46, 9.02 mean =	9.24

Comments _____

6/15/93
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KB60207227

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SURFACE WATER SAMPLING FIELD LOG-GRAB

Sample Depth	2" BELOW SURFACE
Approximate Flow Rate	79.90 cfs
Volume of Sampling Device	1 L BOTTLES
Total Water Depth	2.42'
Distance From Bank	7'
Depth Below Surface of Water Removed	2" BELOW SURFACE

Location	SWP1 - A66506
Weather	OVERCAST / CLOUDY
Air Temperature	15.0°C
Samplers	BRL / JTP
Date	9/16/93
Time	14:25

Temperature	15.2°C, 15.3 mean = 15.25°C
Conductivity	.596, .594 mean = .595
pH	8.44, 8.41 mean = 8.43
Dissolved Oxygen	9.30, 9.30 mean = 9.30
Turbidity	8.64, 8.24 mean = 8.44

Comments _____

6/15/93
16933625

KB60207228

KB61301577

SURFACE WATER SAMPLING FIELD LOG-GRAB

Sample Depth	2" BELOW WATER SURFACE
Approximate Flow Rate	83.11 cfs
Volume of Sampling Device	1 L BOTTLES
Total Water Depth	1.72
Distance From Bank	10'
Depth Below Surface of Water Removed	2"

Location	SWP2 → A66507
Weather	OVERCAST / CLOUDY
Air Temperature	15.9°C
Samplers	BDL / JTP
Date	9/16/93
Time	17:25

Temperature	15.8°C 15.8 mean:	15.80°C
Conductivity	.601, .601 mean:	.601
pH	8.35, 8.41 mean:	8.38
Dissolved Oxygen	9.25, 9.25 mean:	9.25
Turbidity	8.38, 8.29 mean:	8.34

Comments _____

6/15/93
16933625

KB61301578

KB60207229

SURFACE WATER SAMPLING FIELD LOG-GRAB

Sample Depth	2" BELOW WATER SURFACE
Approximate Flow Rate	80.24 cfs
Volume of Sampling Device	1 L BOTTLES
Total Water Depth	2.42
Distance From Bank	7'
Depth Below Surface of Water Removed	2"

Location	SWP1 → A66508
Weather	OVERCAST / CLOUDY
Air Temperature	14.8°C
Samplers	BDL / JTP
Date	9/16/93
Time	17:50

Temperature	16.0°C, 16.1	mean:	16.05C
Conductivity	.600, .599	mean:	.600
pH	8.38, 8.32	mean:	8.35
Dissolved Oxygen	9.59, 9.59	mean:	9.59
Turbidity	7.20, 6.97	mean:	7.09

Comments _____

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16933625

KB60207230

KB61301579

SURFACE WATER SAMPLING FIELD LOG-GRAB

Sample Depth	2" BELOW WATER SURFACE
Approximate Flow Rate	80.02 cfs
Volume of Sampling Device	1 L BOTTLES
Total Water Depth	1.68
Distance From Bank	10'
Depth Below Surface of Water Removed	2"

Location	SWP2 → A66509
Weather	OVERCAST / CLOUDY
Air Temperature	13.4°C
Samplers	BDL / JTP
Date	9/17/93
Time	8:50

Temperature	14.6°C 14.5 mean:	14.6°C
Conductivity	.607 .605 mean:	.606
pH	8.10 8.08 mean:	8.09
Dissolved Oxygen	9.45 9.45 mean:	9.45
Turbidity	10.28 10.26 mean:	10.27

Comments _____

6/15/93
16933625

KB60207231

KB61301580

SURFACE WATER SAMPLING FIELD LOG-GRAB

Sample Depth	2" BELOW WATER SURFACE
Approximate Flow Rate	73.00 cfs
Volume of Sampling Device	1 L BOTTLES
Total Water Depth	2.3'
Distance From Bank	7'
Depth Below Surface of Water Removed	2"

Location	SWP1 → A66510
Weather	OVERCAST / CLOUDY
Air Temperature	13.2°C
Samplers	BDL / JTP
Date	9/17/93
Time	9:15

Temperature	14.4°C, 14.5	mean:	14.458°C
Conductivity	.612, .611	mean:	.612
pH	8.25, 8.22	mean:	8.24
Dissolved Oxygen	8.95, 8.95	mean:	8.95
Turbidity	10.32, 9.64	mean:	9.98

Comments _____

8/15/93
16033625

KB61301581

KB60207232

SURFACE WATER SAMPLING FIELD LOG-GRAB

Sample Depth	2" BELOW WATER SURFACE
Approximate Flow Rate	80.02 cfs
Volume of Sampling Device	1 L BOTTLES
Total Water Depth	1.68'
Distance From Bank	10'
Depth Below Surface of Water Removed	2"

Location	SWP2 → A66511
Weather	OVERCAST / CLOUDY
Air Temperature	14.3°C
Samplers	BDL / JTP
Date	9/17/93
Time	12:10

Temperature	14.9°C	15.0 mean: ~~14.95~~°C	14.95°C
Conductivity	.611	.610 mean:	.611
pH	8.26	8.14 mean:	8.20
Dissolved Oxygen	9.40	9.35 mean:	9.38
Turbidity	10.72	8.75 mean:	9.74

Comments _____

6/15/93
16933625

KB60207233

KB61301582

SURFACE WATER SAMPLING FIELD LOG-GRAB

Sample Depth	2" BELOW WATER SURFACE
Approximate Flow Rate	77.92 cfs
Volume of Sampling Device	1 L BOTTLES
Total Water Depth	2.36
Distance From Bank	7'
Depth Below Surface of Water Removed	2"

Location	SWP1 → A66512
Weather	OVERCAST / CLOUDY
Air Temperature	15.6°C
Samplers	BDL / JTP
Date	9/17/93
Time	12:40

Temperature	15.1°C, 15.1 mean: ~~[illegible]~~°C 15.1°C
Conductivity	.608, .608 mean: 0.608
pH	8.28, 8.25 mean: 8.27
Dissolved Oxygen	9.20, 9.20 mean: 9.20
Turbidity	10.45, 8.64 mean: 9.55

Comments _____

6/15/93
1693362S

KB60207234

KB61301583

SURFACE WATER SAMPLING FIELD LOG-GRAB

Sample Depth	2" BELOW WATER SURFACE
Approximate Flow Rate	83.48 cfs
Volume of Sampling Device	1 L BOTTLES
Total Water Depth	1.68
Distance From Bank	10'
Depth Below Surface of Water Removed	2"

Location	SWPZ → A66513
Weather	OVERCAST / CLOUDY
Air Temperature	20.6 °C
Samplers	BDL / JTP
Date	9/17/93
Time	15:35

Temperature	16.3°C, 16.5 mean: 16.4°C
Conductivity	.615, .612 mean: .614
pH	8.30, 8.24 mean: 8.27
Dissolved Oxygen	9.55, 9.55 mean: 9.55
Turbidity	10.62, 10.54 mean: 10.58

Comments _____

6/15/93
16933625

KB60207235

KB61301584

SURFACE WATER SAMPLING FIELD LOG-GRAB

Sample Depth	2" BELOW WATER SURFACE
Approximate Flow Rate	77.89 CFS
Volume of Sampling Device	1 L BOTTLES
Total Water Depth	2.4'
Distance From Bank	7'
Depth Below Surface of Water Removed	2"

Location	SWP1 → A66514
Weather	PARTLY SUNNY
Air Temperature	18.1°C
Samplers	BDL / JTP
Date	9/17/93
Time	16:05

Temperature	16.8°C, 16.8 mean:	~~17.5°C~~ 16.8°C
Conductivity	.609, .609 mean:	.609
pH	8.33, 8.34 mean	8.34
Dissolved Oxygen	9.79, 9.79 mean:	9.79
Turbidity	8.85, 8.03 mean:	8.44

Comments _____

6/15/93
16933625

KB60207236

KB61301585

SURFACE WATER SAMPLING FIELD LOG-GRAB

Sample Depth	2" BELOW WATER SURFACE
Approximate Flow Rate	77.17 cfs
Volume of Sampling Device	1 L BOTTLES
Total Water Depth	1.66
Distance From Bank	10'
Depth Below Surface of Water Removed	2"

Location	SWP2 → A66515
Weather	OVERCAST / CLOUDY
Air Temperature	12.7°C
Samplers	BDL / JTP
Date	9/15/93
Time	9:05

Temperature	14.7°C, 14.7 mean: 14.7°C
Conductivity	.613, .612 mean: .613
pH	8.16, 8.11 mean: 8.14
Dissolved Oxygen	9.25, 9.25 mean: 9.25
Turbidity	10.75, 10.55 mean: 10.65

Comments _____

6/15/93
1693362S

KB60207237

KB61301586

SURFACE WATER SAMPLING FIELD LOG-GRAB

Sample Depth	2" BELOW WATER SURFACE
Approximate Flow Rate	69.75
Volume of Sampling Device	1 L BOTTLES
Total Water Depth	2.3'
Distance From Bank	7'
Depth Below Surface of Water Removed	2"

Location	SWP1 → A66516
Weather	PARTLY SUNNY
Air Temperature	14.2°C
Samplers	BDL / JTP
Date	9/18/93
Time	9:50

Temperature	14.6°C 14.6 mean:	14.6°C
Conductivity	.603 .603 mean:	.603
pH	8.28 8.28 mean:	8.28
Dissolved Oxygen	8.62 8.62 mean:	8.62
Turbidity	11.64 10.84 mean:	11.24

Comments _____

6/15/93
16933625

KB61301587

KB60207238

ALLIED SURFACE WATER

LTI – Limno-Tech, Inc.
Memorandum

TO: Rick DiFiore

DATE: November 24, 1993

PROJECT: KZRV1

FROM: Tim Feist

SUBJECT: Field report for October 17-21, 1993 Portage Creek storm event sampling survey

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This report summarizes the field observations and field data obtained during the October 17 to October 21, 1993 storm event sampling survey of Portage Creek. During this survey personnel from Limno-Tech, Inc. (LTI) sampled two water sampling stations on Portage Creek: at Cork Street (SWP1) and near Alcott Street (SWP2). LTI personnel obtained water samples, recorded field measurements of water quality parameters, and measured stream discharge at these sites during ten separate sampling circuits over five days. Field measurements for all circuits are included below. Water samples from two of these circuits were discarded because of unusual activities in the Creek upstream of the sampling sites that may have compromised the representativeness of the samples.

SURVEY PARTICIPANTS

The survey participants included:

John Peterson (LTI)
Brian Lord (LTI)

STORM EVENT FLOW SAMPLING SURVEY RESULTS

Sampling procedures did not vary from the procedures specified in the QAPP, except for slight alterations in the grab sampling methodology and in stream discharge measurements. The procedures used were previously approved by B&B and described in the September 13, 1993 field report. Grab samples were obtained directly with the laboratory-supplied bottles. Stream velocity was measured more frequently than specified in the QAPP, at five locations across the stream at each station. QA/QC samples were obtained in accordance with the specifications of the QAPP.

LTI mobilized for sampling the storm flows based upon the quantity of precipitation on October 16 and 17, 1993 and the resulting high creek flow. An additional 0.5 inches of rain fell on the night of October 20-21.

Sampling surveys began October 17, 1993 at 14:00 and were completed October 21 at 13:00. Two circuits were sampled October 17, three on October 18 (of which samples from two circuits were discarded), two circuits on October 19 and October 20, and one on October 21. Water quality samples (PCBs and TSS) collected near Alcott Street from the first and last circuits on October 18 were discarded due to concerns that upstream activities may have compromised the representativeness of the samples. During the morning sampling circuit activities associated with site maintenance by Fretco were conducted near the Creek. During the evening circuit B&B was collecting sediment samples from the Creek bed. LTI was not aware of either of these activities until after samples had been collected. LTI did not resume sampling until at least 2.5 hours after each of these activities ended to allow any resuspended sediment to settle or be carried downstream.

The sample I.D.'s corresponding to sampling time and site are listed in Table 1 below.

Table 1. Sample Identification and Time of Sampling.

Sample I.D.	Station	Date	Time	Notes
A66521	Alcott St.	10/17/93	14:20	
A66522	Cork St.	10/17/93	14:45	
A66523	Alcott St.	10/17/93	17:20	
A66524	Cork St.	10/17/93	17:45	
A66525	Alcott St.	10/18/93	9:25	Sample discarded due to possible upstream contamination
A66526	Cork St.	10/18/93	10:10	Sample discarded due to possible A66525 contamination
A66527	Alcott St.	10/18/93	14:15	
A66528	Cork St.	10/18/93	14:55	
A66529	Alcott St.	10/18/93	18:10	Sample discarded due to possible upstream contamination
A66530	Cork St.	10/18/93	18:35	Sample discarded due to possible A66529 contamination
A66531	Alcott St.	10/19/93	11:45	
A66532	Cork St.	10/19/93	12:40	
A66533	Alcott St.	10/19/93	17:20	MS/MSD samples also obtained
A66534	Cork St.	10/19/93	17:45	
A66535	Alcott St.	10/19/93	17:20	Field duplicate of A66533
A66536	Alcott St.	10/20/93	10:05	TCL/TAL parameters also sampled
A66537	Cork St.	10/20/93	10:45	TCL/TAL parameters also sampled
A66538	Alcott St.	10/20/93	14:00	
A66539	Cork St.	10/20/93	14:30	
A66540	Alcott St.	10/21/93	11:10	
A66541	Cork St.	10/21/93	11:40	

Alcott Street = Station SWP2
Cork Street = Station SWP1

Stream velocity measurements and discharge calculation results are included Table 2 and Table 3. Velocity was not measured during the first 2 circuits as stream flow was too rapid to safely enter the Creek and there are no suitable bridge crossings near the sampling sites. Flow was estimated at Alcott Street (SWP2) during these periods by multiplying average stream surface velocity by a correction factor and by stream width and average depth. Average stream surface velocity was determined by timing several floats over a 30-foot longitudinal distance at different locations across the stream width. The correction factor of 0.75 adjusts surface stream velocity to average water column velocity and was determined from comparisons of float and meter measurements on 9/13/93 and 10/18/93. Average stream depth was calculated from gage height at the site by subtracting the average difference between gage height and average depth from previous data. The float method could not be used at Cork Street (SWP1) as the stream channel was not suitable. Velocity measurements were also made with the float method on 10/19/93 due to problems with the charging of the flow meter's batteries. LTI has begun taping down to the Portage Creek water surface from the north side of the Cork Street culvert (survey site SG-2) in addition to the original south side of the culvert (survey site P-4). The north side has a smoother channel configuration that may provide a more precise discharge rating curve. This site was not originally selected for taping down due to heavy underbrush that made access difficult. This underbrush has since been removed.

Table 2. Stream Discharge Measurements at Cork Street.

Date	Time	Avg. Velocity (ft/s)	Avg. Depth (ft)	Discharge (ft^3/s)	Gage Height (ft) P-4	Gage Height (ft) SG-2
Cork Street						
10/17/93 *	14:55	—	—	—	793.49	793.01
10/17/93 *	18:00	—	—	—	792.99	793.66
10/18/93	10:20	3.01	2.6	111.8	792.64	792.51
10/18/93	15:05	2.83	2.6	104.3	792.69	792.46
10/18/93	18:45	2.67	2.5	94.6	792.79	792.36
10/19/93 **	12:45	—	—	—	792.54	792.41
10/19/93 **	17:50	—	—	—	792.44	792.36
10/20/93 **	10:55	—	—	—	792.44	792.31
10/20/93	14:40	2.49	2.4	84.7	792.44	792.31
10/21/93	11:50	2.47	2.5	88.9	792.54	792.31

* Creek flow was too high to safely enter the stream.
** Flow meter not functioning
Creek width at Cork Street = 14.2 feet
P-4 is on the south side (upstream side) of the Cork Street road culvert.
SG-2 is on the north side (downstream side) of the Cork Street road culvert.

Table 3. Stream Discharge Measurements at Alcott Street.

Date	Time	Avg. Velocity (ft/s)	Avg. Depth (ft)	Discharge (ft^3/s)	Gage Height (ft)
Alcott Street					
10/17/93 *	14:05	2.8	3.7	240	783.81
10/17/93 *	17:25	2.6	3.6	212	783.56
10/18/93	9:35	2.36	2.2	120.0	—
10/18/93	14:25	2.31	2.1	111.1	780.06
10/18/93	18:20	2.15	2.0	100.4	780.06
10/19/93 **	12:15	2.4	1.9	107	779.86
10/19/93 **	17:30	2.2	1.9	94	779.86
10/20/93	10:15	2.15	1.9	91.6	779.71
10/20/93	14:10	2.07	1.8	87.2	779.66
10/21/93	11:20	2.08	2.0	96.2	780.01

* Creek flow was too high to safely enter the stream, flow estimates made with the float method.
** Flow meter not functioning, flow estimates made with the float method.
Creek width at Alcott Street = 22.9 feet

Field parameters were measured as specified in the QAPP and the field instrument standard procedures submitted by LTI. All parameters were measured in duplicate and the averages of measurements are included in Table 4. LTI has a turbidimeter installed in a building at the Allied site, and all turbidity measurements were made at this building rather than at each station. Turbidity samples were collected in polypropylene bottles at each Creek station and the samples were analyzed for turbidity immediately after the sampling circuit was completed. The dissolved oxygen meter was not calibrating properly before the first sampling circuit. There was a delay in shipping of a replacement meter as the first day of sampling was a Sunday, when common carriers

do not operate. The pH electrode cable broke on 10/21/93, and pH measurements were not obtained during the single circuit conducted on that day.

Table 4. Field Parameter Average Measurements.

Date	Time	Temp. (°C)	Spec. Cond. (mS/cm @ 25°C)	pH (S.U.)	D.O. (mg/L)	Turbidity (NTU)
Cork Street						
10/17/93	14:45	14.2	0.341	7.85	**	15.46
10/17/93	17:45	13.9	0.329	7.89	**	15.60
10/18/93	10:10	10.6	0.515	7.66	**	6.81
10/18/93	14:55	13.9	0.532	7.74	**	7.10
10/18/93	18:35	14.2	0.550	7.71	**	7.18
10/19/93	12:40	12.9	0.575	7.99	**	6.12
10/19/93	17:45	14.5	0.591	8.07	**	5.83
10/20/93	10:45	12.9	0.598	7.93	**	7.83
10/20/93	14:30	13.4	0.598	8.01	9.89	8.66
10/21/93	11:40	11.6	0.547	**	9.85	10.92
Alcott Street						
10/17/93	14:20	14.2	0.307	7.90	**	18.93
10/17/93	17:20	14.2	0.339	7.90	**	16.29
10/18/93 *	9:25	10.8	0.514	7.74	**	10.43
10/18/93	14:15	12.8	0.532	7.64	**	6.76
10/18/93 *	18:10	14.4	0.545	7.80	**	10.08
10/19/93	11:45	12.8	0.586	8.09	**	7.58
10/19/93	17:20	14.3	0.594	8.14	**	6.41
10/20/93	10:05	12.8	0.606	7.98	**	8.88
10/20/93	14:00	13.2	0.609	8.03	9.94	9.94
10/21/93	11:10	11.5	0.533	**	9.70	13.81

* Possible contamination of samples from upstream activities.
** Meter not functioning properly.
Alcott Street = Station SWP2
Cork Street = Station SWP1

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VELOCITY PROFILE MEASUREMENT LOG

Using float method

Station	~~Depth (ft)~~ ~~0.2~~	~~0.8~~	~~Velocity (fps)~~ ~~0.2~~	~~0.8~~	$1/t * 30' * 0.75$ Average Velocity (fps)	Total Depth (ft)
	time 1 (s)	time 2 (s)	time 3 (s)	Avg. time (s)		
1	interference		w/ side	—		
2	9.42	9.96	8.94	9.44		
3	7.69	–	–	7.69		
4	7.37	6.49	6.47	6.777		
average				7.97	2.82	
				Average	2.82	3.71

Location	SWP2 → (A66521)
Weather	overcast / cloudy
Air Temperature	12.3°C
Samples	BDL/JTP
Total River Width	22.90'
Date	10/17/93
Time	14:05
Flow	239.9 cfs

Comments:

floats timed over a 30' section of Creek. Times taken for 4 sections across the creek. Avg. velocity = 0.75 surface velocity

avg. depth = LTI gage – 0.24

5/27/93

KB60207243

KB61301592

VELOCITY PROFILE MEASUREMENT LOG

(using float method

Station	~~Depth (ft)~~		~~Velocity (fps)~~		Average Velocity (fps)	Total Depth (ft)
	~~0.2~~	~~0.8~~	~~0.2~~	~~0.8~~		
	time 1 (s)	time 2 (s)	time 3 (s)	Avg time (s)		
1	10.84	–	–	10.84		
2	9.00	9.30	-	9.15		
3	8.13	–	–	8.13		
4	6.82	6.89	–	6.855		
average				8.756	2.57	
				Average	2.57	3.61

Location	SWP 2 → (A66523)
Weather	overcast / cloudy
Air Temperature	12.4° C
Samples	BDL/JTP
Total River Width	22.90'
Date	10/17/93
Time	17:25
Flow	212.4 cfs

Comments:

floats timed over a 30' section of Creek at 4 distances from the bank. Avg. velocity = 0.75 avg. surface velocity

avg. depth = LTI gage = 0.24 ft

KB61301593

5/27/93
22003025

KB60207244

VELOCITY PROFILE MEASUREMENT LOG

Using float method

Station	~~Depth (ft)~~		~~Velocity (fps)~~		Average Velocity (fps)	Total Depth (ft)
	~~0.2~~	~~0.8~~	~~0.2~~	~~0.8~~		
	time 1 (s)	time 2 (s)	time 3 (s)	Avg time (s)		
1	11.44	—	—	11.44		
2	-	—	—	—		
3	9.54	9.50	-	9.67		
4	8.73	8.40	-	8.565		
average				9.892	2.27	
				Average	2.27	2.26

Location	SWP2 → (A66525)
Weather	sunny
Air Temperature	7.9°C
Samples	BDL/JTP
Total River Width	22.90
Date	10/18/93
Time	9:30
Flow	117.7

Comments:

Used for comparison against a standard flow meter method conducted immediately afterward. Coefficient of 0.75 used to adjust surface velocity to average water column velocity.

5/27/90
22003625

KB60207245

KB61301594

7

VELOCITY PROFILE MEASUREMENT LOG

Station	Depth (ft)		Velocity (fps)		Average Velocity (fps)	Total Depth (ft)
	0.2	0.8	0.2	0.8		
5			3.45	2.36	2.91	2.6
4			2.83	2.70	2.77	2.5
3			2.30	1.57	1.94	2.1
2			2.45	2.04	2.25	1.9
1			2.06	1.78	1.92	2.0
				Average	2.36	2.22

Location	SWP2 → (A 66525)
Weather	sunny
Air Temperature	7.9°C
Samples	BDL/JTP
Total River Width	22.90'
Date	10/18/93
Time	9:35
Flow	120.0 cfs

Comments:

KB61301595

KB60207246

5/27/93
22003625

VELOCITY PROFILE MEASUREMENT LOG

Station	Depth (ft)		Velocity (fps)		Average Velocity (fps)	Total Depth (ft)
	0.2	0.8	0.2	0.8		
1			2.67	2.47	2.57	2.3
2			3.37	2.43	2.90	2.8
3			3.39	2.37	2.88	2.9
4			3.52	2.53	3.03	2.8
5			3.64	3.73	3.69	2.3
				Average	3.01	2.62

Location	SWP1 → A66526
Weather	PTLY. CLOUDY
Air Temperature	9.0°C
Samples	BDL/JTP
Total River Width	14.17'
Date	10/18/93
Time	10:20
Flow	111.75 cfs

Comments:

KB61301596

KB60207247

5/27/93
22933625

VELOCITY PROFILE MEASUREMENT LOG

Station	Depth (ft)		Velocity (fps)		Average Velocity (fps)	Total Depth (ft)
	0.2	0.8	0.2	0.8		
5			3.31	2.13	2.72	2.5
4			3.07	2.28	2.68	2.3
3			2.10	1.58	1.84	2.0
2			2.40	1.95	2.18	1.8
1			2.27	1.98	2.13	1.9
				Average	2.3	2.1

Location	SWP 2 → A66527
Weather	SUNNY
Air Temperature	14.3°C
Samples	BDL / JTP
Total River Width	22.90'
Date	10/18/93
Time	14:25
Flow	111.09 cfs

Comments:

5/27/93
22933625

KB60207248

KB61301597

VELOCITY PROFILE MEASUREMENT LOG

Station	Depth (ft)		Velocity (fps)		Average Velocity (fps)	Total Depth (ft)
	0.2	0.8	0.2	0.8		
1			2.40	2.09	2.25	2.2
2			3.09	2.11	2.60	2.8
3			3.39	2.40	2.90	2.9
4			3.37	2.23	2.80	2.8
5			3.63	3.54	3.59	2.3
				Average	2.83	2.60

Location	SWP1 → A66528
Weather	Sunny 1[redacted]
Air Temperature	16.3°c
Samples	BDL/JTP
Total River Width	14.17'
Date	10/18/93
Time	15:05
Flow	104.26 cfs

Comments:

KB60207249

5/27/93
22933625

KB61301598

VELOCITY PROFILE MEASUREMENT LOG

Station	Depth (ft)		Velocity (fps)		Average Velocity (fps)	Total Depth (ft)
	0.2	0.8	0.2	0.8		
5			3.17	1.92	2.55	2.4
4			2.71	2.19	2.45	2.1
3			1.95	1.62	1.79	2.0
2			2.34	1.71	2.03	1.8
1			2.09	1.77	1.93	1.9
				Average	2.15	2.04

Location	SWP2 → A66529
Weather	Pt. Cloudy
Air Temperature	16.1°C
Samples	BOL/JTR
Total River Width	22.90'
Date	10/18/93
Time	13:20
Flow	100.44 cfs

Comments:

KB60207250

5/27/93
22933625

KB61301599

VELOCITY PROFILE MEASUREMENT LOG

Station	Depth (ft)		Velocity (fps)		Average Velocity (fps)	Total Depth (ft)
	0.2	0.8	0.2	0.8		
1			2.25	1.62	1.94	2.1
2			2.82	1.97	2.40	2.7
3			3.16	2.50	2.83	2.8
4			3.33	2.20	2.77	2.7
5			3.53	3.29	3.41	2.2
				Average	2.67	2.5

Location	SWP1 → A66530
Weather	Pt. Cloudy
Air Temperature	13.0°C
Samples	BDL/JTP
Total River Width	14.17'
Date	10/18/93
Time	18:45
Flow	94.59 cfs

Comments:

KB60207251

5/27/93
22933625

KB61301600

VELOCITY PROFILE MEASUREMENT LOG

Using float method

Station	~~Depth (ft)~~		~~Velocity (fps)~~		1/t * 30' * 0.75 Average Velocity (fps)	Total Depth (ft)
	~~0.2~~	~~0.8~~	~~0.2~~	~~0.8~~		
	time 1 (s)	time 2 (s)	time 3 (s)	Avg. time (s)		
1	11.08	—	—	11.08		
2	—	—		—		
3	8.59	8.41		8.50		
4	7.99	—	—	7.99		
Average				9.19	2.458	
				Average	2.448	1.91

Location	SWP2 → (A66531)
Weather	overcast/cloudy
Air Temperature	12.9° C
Samples	BDL/JTP
Total River Width	22.90'
Date	10/19/93
Time	12:15
Flow	107.2 cfs

Comments:

floats timed at different distances from bank over a 30' distance. Avg. depth = LTI gage − 0.24'

Avg water column velocity = Avg surface velocity * 0.75

KB60207252

KB61301601

VELOCITY PROFILE MEASUREMENT LOG

Using the float method

Station	~~Depth (ft)~~		~~Velocity (fps)~~		1/t * 30 ft * .75 Average Velocity (fps)	Total Depth (ft)
	~~0.2~~	~~0.8~~	~~0.2~~	~~0.8~~		
	time 1 (s)	time 2 (s)	time 3 (s)	Avg time (s)		
1	11.63		-	11.63		
2	12.84	11.39	11.30	11.843		
3	10.30	8.19	—	9.245		
4	9.44	9.81	7.94	9.063		
Average				10.445	2.154	
				Average	2.154	1.91

Location	SWP2 → (A66533 + A66535)
Weather	overcast/cloudy
Air Temperature	17.4°C
Samples	BDL/JTP
Total River Width	22.90'
Date	10/19/93
Time	17:30
Flow	94.2 cfs

Comments:

floats timed at different distances from bank over a 30' distance. Avg. depth = LT1 gage − 0.24'

Avg. water column velocity = avg. surface velocity * 0.7

KB61301602 KB60207253

5/27/93
22903625

VELOCITY PROFILE MEASUREMENT LOG

Station	Depth (ft)		Velocity (fps)		Average Velocity (fps)	Total Depth (ft)
	0.2	0.8	0.2	0.8		
5			2.91	1.87	2.39	2.2
4			2.98	2.31	2.65	2.0
3			1.93	1.56	1.75	1.8
2			2.47	1.61	2.04	1.6
1			2.08	1.77	1.93	1.7
				Average	2.15	1.86

Location	SWP2 → A66536
Weather	OVERCAST / CLOUDY
Air Temperature	12.4°C
Samples	BOL / JTP
Total River Width	22.90'
Date	10/20/93
Time	10:15
Flow	91.58 CFS

Comments:

KB61301603

KB60207254

5/27/93
22933625

VELOCITY PROFILE MEASUREMENT LOG

Station	Depth (ft)		Velocity (fps)		Average Velocity (fps)	Total Depth (ft)
	0.2	0.8	0.2	0.8		
5			3.21	1.77	2.49	2.2
4			2.62	1.95	2.29	2.0
3			1.92	1.64	1.78	1.8
2			2.15	1.64	1.90	1.5
1			1.96	1.77	1.87	1.7
				Average	2.07	1.84

Location	SWPZ → A66538
Weather	OVERCAST / CLOUDY → LT. DRIZZLE
Air Temperature	12.4°C
Samples	BDL/JTP
Total River Width	22.90'
Date	10/20/93
Time	14:10
Flow	87.22 cfs

Comments:

KB61301604

KB60207255

5/27/93
22933625

VELOCITY PROFILE MEASUREMENT LOG

Station	Depth (ft)		Velocity (fps)		Average Velocity (fps)	Total Depth (ft)
	0.2	0.8	0.2	0.8		
1			2.08	2.07	2.08	2.0
2			2.57	1.91	2.24	2.6
3			2.75	2.28	2.52	2.7
4			2.93	2.01	2.47	2.6
5			3.29	3.02	3.16	2.1
				Average	2.49	2.4

Location	SWP1 → A66539
Weather	OVERCAST / CLOUDY / LT. RAIN
Air Temperature	13.3°C
Samples	BOC / JTP
Total River Width	~~[illegible]~~ 14.17'
Date	~~[illegible]~~ 10/20/93
Time	14:40
Flow	84.68 cfs

Comments:

KB61301605

KB60207256

5/27/93
22933623

VELOCITY PROFILE MEASUREMENT LOG

Station	Depth (ft)		Velocity (fps)		Average Velocity (fps)	Total Depth (ft)
	0.2	0.8	0.2	0.8		
5			2.96	1.76	2.36	2.4
4			2.98	2.26	2.62	2.2
3			1.54	1.36	1.45	1.9
2			2.30	1.78	2.04	1.7
1			2.15	1.70	1.93	1.9
				Average	2.08	2.02

Location	SWP2 → A66540
Weather	SUNNY
Air Temperature	7.1°C
Samples	BDL / ~~JTP~~
Total River Width	22.90'
Date	10/21/93
Time	11:20
Flow	96.22 cfs

Comments:

KB61301606

KB60207257

5/27/93
22933625

VELOCITY PROFILE MEASUREMENT LOG

Station	Depth (ft)		Velocity (fps)		Average Velocity (fps)	Total Depth (ft)
	0.2	0.8	0.2	0.8		
1			2.26	1.62	1.94	2.3
2			2.82	1.38	2.10	2.7
3			2.82	2.12	2.47	2.8
4			3.01	2.02	2.52	2.7
5			3.21	3.39	3.30	2.2
				Average	2.47	2.54

Location	SWP1 → A66541
Weather	Pt. Cloudy
Air Temperature	6.7°C
Samples	BDL/JTP
Total River Width	14.17'
Date	10/21/93
Time	11:50
Flow	88.90 cfs

Comments:

KB61301607

KB60207258

SURFACE WATER SAMPLING FIELD LOG-GRAB

Sample Depth	SURFACE (2" BELOW)
Approximate Flow Rate	
Volume of Sampling Device	1 L BOTTLES
Total Water Depth	3.95' (STAFF GAUGE)
Distance From Bank	10'
Depth Below Surface of Water Removed	2"

Location	SWP2 → A66521
Weather	OVERCAST / CLOUDY
Air Temperature	12.5°C
Samplers	BDL & JTP
Date	10/17/93
Time	14:20

Temperature	14.2°C (mean)
Conductivity	.307 (mean)
pH	7.90 (mean)
Dissolved Oxygen	——— meter not calibrating
Turbidity	18.93 (mean)

Comments _____

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6/15/93
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SURFACE WATER SAMPLING FIELD LOG-GRAB

Sample Depth	2" Below Water Surface
Approximate Flow Rate	
Volume of Sampling Device	1 L BOTTLES
Total Water Depth	— WATER TOO DEEP TO GET IN
Distance From Bank	7'
Depth Below Surface of Water Removed	2"

Location	SWP1 → A6652Z
Weather	OVERCAST / CLOUDY
Air Temperature	12.3°C
Samplers	BDL / JTP
Date	10/17/93
Time	14:45

Temperature	14.15°C (mean)
Conductivity	.341 (mean)
pH	7.85 (mean)
Dissolved Oxygen	— D.O. Meter not properly calibrating
Turbidity	15.46 (mean)

Comments _____

6/15/93
16933625

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SURFACE WATER SAMPLING FIELD LOG-GRAB

Sample Depth	2" BELOW WATER SURFACE
Approximate Flow Rate	
Volume of Sampling Device	1 L BOTTLES
Total Water Depth	3.85' (STAFF GAUGE READ)
Distance From Bank	10'
Depth Below Surface of Water Removed	2"

Location	SWP2 → A66523
Weather	OVERCAST / CLOUDY
Air Temperature	12.4°C
Samplers	BDL/JTP
Date	10/17/93
Time	17:20

Temperature	14.2°C (mean)
Conductivity	.339 (mean)
pH	7.90 (mean)
Dissolved Oxygen	— D.O. Meter not calibrating
Turbidity	16.29 (mean

Comments _____

6/15/93
16933625

KB61301610

KB60207261

SURFACE WATER SAMPLING FIELD LOG-GRAB

Sample Depth	2" Below water surface
Approximate Flow Rate	
Volume of Sampling Device	1 L Bottles
Total Water Depth	Water to deep to get in
Distance From Bank	7'
Depth Below Surface of Water Removed	2"

Location	SWP1 → A66524
Weather	OVERCAST / CLOUDY
Air Temperature	12.3°C
Samplers	BDL/JTP
Date	10/17/93
Time	17:45

Temperature	13.9°C (mean)
Conductivity	329 (mean)
pH	7.89 (mean)
Dissolved Oxygen	— D.O. Meter not calibrating
Turbidity	15.60 (mean)

Comments: _____

6/15/93
16933625

KB61301611

KB60207262

SURFACE WATER SAMPLING FIELD LOG-GRAB

Sample Depth	2" Below water surface
Approximate Flow Rate	
Volume of Sampling Device	1 L Bottler
Total Water Depth 2.22'	~~[illegible]~~ (S[illegible] gauge)
Distance From Bank	10'
Depth Below Surface of Water Removed	2"

Location	SWP2 → A66525
Weather	SUNNY
Air Temperature	7.9°C
Samplers	BDL/JTP
Date	10/18/93
Time	9:25

Temperature	10.8°C (mean)
Conductivity	.514 (mean)
pH	7.74 (mean)
Dissolved Oxygen	— D.O. Meter not calibrating
Turbidity	10.43 (mean)

Comments _____

6/15/93
10933625

KB61301612

KB60207263

SURFACE WATER SAMPLING FIELD LOG-GRAB

Sample Depth	2" BELOW WATER SURFACE
Approximate Flow Rate	111.75 cfs
Volume of Sampling Device	1 L BOTTLES
Total Water Depth	2.62'
Distance From Bank	7'
Depth Below Surface of Water Removed	2"

Location	SWP1 → A66526
Weather	PTLY. CLOUDY
Air Temperature	9.0°C
Samplers	BDL/JTP
Date	10/18/93
Time	10:10

Temperature	10.6°C (mean)
Conductivity	.515 (mean)
pH	7.66 (mean)
Dissolved Oxygen	D.O. Meter not calibrating
Turbidity	6.81 (mean)

Comments _____

6/15/93
18933625

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SURFACE WATER SAMPLING FIELD LOG-GRAB

Sample Depth	2" BELOW WATER SURFACE
Approximate Flow Rate	96.66 CFS
Volume of Sampling Device	1 L BOTTLES
Total Water Depth	2.1'
Distance From Bank	10'
Depth Below Surface of Water Removed	2"

Location	SWPZ → A66527
Weather	SUNNY
Air Temperature	14.3°C
Samplers	BDL/JTP
Date	10/18/93
Time	14:15

Temperature	12.8°C (mean)
Conductivity	.532 (mean)
pH	7.64 (mean)
Dissolved Oxygen	D.O. Meter not calibrating
Turbidity	6.76 (mean)

Comments _____

9/15/93
16933625

KB61301614

KB60207265

SURFACE WATER SAMPLING FIELD LOG-GRAB

Sample Depth	2" BELOW WATER SURFACE
Approximate Flow Rate	104.26 cfs
Volume of Sampling Device	1 L BOTTLES
Total Water Depth	2.6'
Distance From Bank	7'
Depth Below Surface of Water Removed	2"

Location	SWP1 → A66528
Weather	SUNNY
Air Temperature	16.3°C
Samplers	BDL/JTR
Date	10/18/93
Time	14:55

Temperature	13.9°C (mean)
Conductivity	.532 (mean)
pH	7.74 (mean)
Dissolved Oxygen	D.O. meter not calibrating
Turbidity	7.10 (mean)

Comments _____

6/15/93
16933625

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SURFACE WATER SAMPLING FIELD LOG-GRAB

Sample Depth	2" BELOW WATER SURFACE
Approximate Flow Rate	100.44 cfs
Volume of Sampling Device	1 L BOTTLES
Total Water Depth	2.04'
Distance From Bank	10'
Depth Below Surface of Water Removed	2"

Location	SWP2 → A66529
Weather	Pt. Cloudy
Air Temperature	16.1°C
Samplers	BDL/JTP
Date	10/18/93
Time	18:10

Temperature	14.4°C (mean)
Conductivity	.545 (mean)
pH	7.80 (mean)
Dissolved Oxygen	D.O. Meter not calibrating
Turbidity	10.08 (mean)

Comments _____

6/15/93
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SURFACE WATER SAMPLING FIELD LOG-GRAB

Sample Depth	2" BELOW WATER SURFACE
Approximate Flow Rate	94.59 cfs
Volume of Sampling Device	1 L BOTTLES
Total Water Depth	2.5'
Distance From Bank	7'
Depth Below Surface of Water Removed	2"

Location	SWP1 → A66530
Weather	Pt. Cloudy
Air Temperature	13.0°C
Samplers	BDL/JTP
Date	10/18/93
Time	18:35

Temperature	14.2°C (mean)
Conductivity	.550 (mean)
pH	7.71 (mean)
Dissolved Oxygen	D.O. meter not calibrating
Turbidity	7.18 (mean)

Comments _____

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KB61301617

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SURFACE WATER SAMPLING FIELD LOG-GRAB

Sample Depth	2" BELOW WATER SURFACE
Approximate Flow Rate	[redacted]
Volume of Sampling Device	1 L BOTTLES
Total Water Depth	2.15' (STAFF GAUGE READ)
Distance From Bank	10'
Depth Below Surface of Water Removed	2"

Location	SW92 → A66531
Weather	OVERCAST / CLOUDY
Air Temperature	12.9°C
Samplers	BDL / JTP
Date	10/19/93
Time	11:45

Temperature	12.8°C (mean)
Conductivity	.586 (mean)
pH	8.09 (mean)
Dissolved Oxygen	D.O. METER NOT CALIBRATING
Turbidity	7.58 (mean

Comments FLOW METER NOT CHARGED.

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16933625

KB61301618

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SURFACE WATER SAMPLING FIELD LOG-GRAB

Sample Depth	2" BELOW WATER SURFACE
Approximate Flow Rate	
Volume of Sampling Device	1 L BOTTLES
Total Water Depth	— NO DEPTHS OBTAINED, FLOW METER NOT WORKING
Distance From Bank	7'
Depth Below Surface of Water Removed	2"

Location	SWP1 → A66532
Weather	OVERCAST / CLOUDY
Air Temperature	13.3°C
Samplers	BDL / JTP
Date	10/19/93
Time	12:40

Temperature	12.9°C (mean)
Conductivity	.575 (mean)
pH	7.99 (mean)
Dissolved Oxygen	D.O. METER NOT CALIBRATING
Turbidity	6.12 (mean)

Comments _____

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SURFACE WATER SAMPLING FIELD LOG-GRAB

Sample Depth	2" BELOW WATER SURFACE
Approximate Flow Rate	
Volume of Sampling Device	1 L BOTTLES
Total Water Depth	2.15' (STAFF GAUGE READING
Distance From Bank	10'
Depth Below Surface of Water Removed	2"

Location	SWP2 → A66533
Weather	OVERCAST / CLOUDY
Air Temperature	17.4°C
Samplers	BDL / JTP
Date	10/19/93
Time	17:20

Temperature	14.3°C (mean)
Conductivity	.594 (mean)
pH	8.14 (mean)
Dissolved Oxygen	— D.O. METER NOT CALIBRATING
Turbidity	6.41 (mean

Comments COLLECTED DUPLICATE (2 PCB's & 1 TSS) & MS/MSD's (4 PCB's)

DUPLICATE IS A66535

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16933625

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SURFACE WATER SAMPLING FIELD LOG-GRAB

Sample Depth	2" BELOW WATER SURFACE
Approximate Flow Rate	
Volume of Sampling Device	1 L BOTTLES
Total Water Depth	-NO DEPTHS OBTAINED, FLOW METER NOT WORKING
Distance From Bank	7'
Depth Below Surface of Water Removed	2"

Location	SWP1 → A66534
Weather	OVERCAST / CLOUDY
Air Temperature	13.7°C
Samplers	BDL / JTP
Date	10/19/93
Time	17:45

Temperature	14.5°C (mean)
Conductivity	.591 (mean)
pH	8.07 (mean)
Dissolved Oxygen	-D.O. METER NOT CALIBRATING
Turbidity	5.83 (mean)

Comments _____

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SURFACE WATER SAMPLING FIELD LOG-GRAB

Sample Depth	2" BELOW WATER SURFACE
Approximate Flow Rate	91.58 cfs
Volume of Sampling Device	1 L BOTTLES
Total Water Depth	1.86'
Distance From Bank	10'
Depth Below Surface of Water Removed	2"

Location	SWP2 → A66536
Weather	OVERCAST / CLOUDY
Air Temperature	12.4°C
Samplers	BDL/DTP
Date	10/20/93
Time	10:05

Temperature	12.8°C (mean)
Conductivity	.606 (mean)
pH	7.98 (mean)
Dissolved Oxygen	D.O. METER NOT CALIBRATING
Turbidity	8.88 (mean)

Comments TCL/TAL SAMPLES WERE TAKEN @ 10:05.

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SURFACE WATER SAMPLING FIELD LOG-GRAB

Sample Depth	2" BELOW WATER SURFACE
Approximate Flow Rate	
Volume of Sampling Device	1 L BOTTLES
Total Water Depth	-FLOW METER NOT WORKING
Distance From Bank	7'
Depth Below Surface of Water Removed	2"

Location	SWP1 → A66537
Weather	OVERCAST / CLOUDY
Air Temperature	13.3°C
Samplers	BDL/JTP
Date	10/20/93
Time	10:45

Temperature	12.9°C (mean)
Conductivity	.598 (mean)
pH	7.93 (mean)
Dissolved Oxygen	-D.O. METER NOT WORKING
Turbidity	7.83 (mean)

Comments _____

6/15/93
16933625

KB61301623

KB60207274

SURFACE WATER SAMPLING FIELD LOG-GRAB

Sample Depth	2" BELOW WATER SURFACE
Approximate Flow Rate	87.22ESS
Volume of Sampling Device	1 L BOTTLES
Total Water Depth	1.84'
Distance From Bank	10'
Depth Below Surface of Water Removed	2"

Location	SWP2 → A66538
Weather	OVERCAST / CLOUDY → LIGHT DRIZZLE
Air Temperature	12.4°C
Samplers	BDL / JTP
Date	10/20/93
Time	14:00

Temperature	13.2°C (mean)
Conductivity	.609 (mean)
pH	8.03 (mean)
Dissolved Oxygen	9.94 (mean)
Turbidity	9.94 (mean)

Comments _____

6/15/93
16933625

KB61301624

KB60207275

SURFACE WATER SAMPLING FIELD LOG-GRAB

Sample Depth	2" BELOW WATER SURFACE
Approximate Flow Rate	84.68 CFS
Volume of Sampling Device	1 L BOTTLES
Total Water Depth	2.4'
Distance From Bank	7'
Depth Below Surface of Water Removed	2"

Location	SWP1 → A66539
Weather	OVERCAST / CLOUDY / LT. RAIN
Air Temperature	13.3°C
Samplers	BOL/JTP
Date	10/20/93
Time	14:30

Temperature	13.4°C
Conductivity	.598
pH	8.01
Dissolved Oxygen	9.89
Turbidity	8.66

Comments _____

6/15/93
16933625

KB61301625

KB60207276

SURFACE WATER SAMPLING FIELD LOG-GRAB

Sample Depth	2" BELOW WATER SURFACE
Approximate Flow Rate	96.22 CFS
Volume of Sampling Device	1 L BOTTLES
Total Water Depth	2.02
Distance From Bank	10'
Depth Below Surface of Water Removed	2"

Location	SWP2 → A66540
Weather	SUNNY
Air Temperature	7.1°C
Samplers	BDL/JTP
Date	10/21/93
Time	11:10

Temperature	11.5°C (mean)
Conductivity	.533 (mean)
pH	→ BROKEN ELECTRODE
Dissolved Oxygen	9.70 (mean)
Turbidity	13.81 (mean)

Comments _____

6/15/93
16933625

KB61301626

KB60207277

SURFACE WATER SAMPLING FIELD LOG-GRAB

Sample Depth	2" BELOW WATER SURFACE
Approximate Flow Rate	88.90 CFS
Volume of Sampling Device	1 L BOTTLES
Total Water Depth	2.54'
Distance From Bank	7'
Depth Below Surface of Water Removed	2"

Location	SWP1 → ALC541
Weather	Pt. CLOUDY
Air Temperature	6.7°C
Samplers	BDL/JJP
Date	10/21/93
Time	11:40

Temperature	11.6°C
Conductivity	.547
pH	→ BROKEN ELECTRODE
Dissolved Oxygen	9.85
Turbidity	10.92

Comments _____

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8/15/93
16933625

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ALLIED
SURFACE WATER

LTI – Limno-Tech, Inc.
Memorandum

TO: Rick DiFiore

DATE: December 14, 1993

PROJECT: KZRV1

FROM: Tim Feist

SUBJECT: Field report for December 2-3, 1993 Portage Creek storm event sampling survey

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This report summarizes the field observations and field data obtained during the December 2 to December 3, 1993 storm event sampling survey of Portage Creek. During this survey personnel from Limno-Tech, Inc. (LTI) sampled two water sampling stations on Portage Creek: at Cork Street (SWP1) and near Alcott Street (SWP2). LTI personnel obtained water samples, recorded field measurements of water quality parameters, and measured stream discharge at these sites during five separate sampling circuits over two days. After consultation with B&B, the survey was limited to five circuits due to the small changes in flows during the event and a majority of previous event samples having been collected at similar flows as the third event. Field measurements for all circuits are included below.

SURVEY PARTICIPANTS

The survey participants included:

John Peterson (LTI)
Brian Lord (LTI)

STORM EVENT FLOW SAMPLING SURVEY RESULTS

Sampling procedures did not vary from the procedures specified in the QAPP, except for slight alterations in the grab sampling methodology and in stream discharge measurements. The procedures used were previously approved by B&B and described in the September 13, 1993 field report. Grab samples were obtained directly with the laboratory-supplied bottles. Stream velocity was measured more frequently than specified in the QAPP, at five locations across the stream at each station. QA/QC samples were obtained in accordance with the specifications of the QAPP.

LTI mobilized for sampling the storm flows based upon Creek flows exceeding the target criteria flow of 75 cfs. Two-tenths of an inch of precipitation fell on November 29, resulting in Creek flows approaching the target criteria. An additional 0.3 inches of precipitation on the morning of December 2, 1993 resulted in Creek flow exceeding the criteria.

LTI conducted three sampling circuits on December 2, 1993 and two circuits on December 3, 1993. The storm survey was stopped after five circuits after consultation with B&B. The flows measured during the first four circuits of the survey ranged from 69 to 82 cfs. A large proportion of the storm event samples from the first two events also fell within this range. It was agreed that this range has been adequately characterized and additional data from this flow range would not provide significant new information. Rain was forecast for the following day, which would not allow sampling of lower flows and only result in additional samples from flows in the 80 cfs range. LTI and B&B agreed that a fifth circuit would be conducted in the late afternoon of December 2 when the flows had receded as much as possible, and that further sampling would not be beneficial after that point.

The sample I.D.'s corresponding to sampling time and site are listed in Table 1 below. Stream velocity measurements and discharge calculation results are included in Table 2.

Table 1. Sample Identification and Time of Sampling.

Sample I.D.	Station	Date	Time	Notes
A66542	Alcott St.	12/2/93	14:00	
A66543	Cork St.	12/2/93	14:40	
A66544	Alcott St.	12/2/93	17:45	
A66545	Cork St.	12/2/93	18:20	
A66546	Alcott St.	12/2/93	21:15	
A66547	Cork St.	12/2/93	21:45	
A66548	Alcott St.	12/3/93	9:15	
A66549	Cork St.	12/3/93	9:40	
A66550	Alcott St.	12/3/93	14:50	MS/MSD samples also collected
A66551	Cork St.	12/3/93	15:40	
A66552	Alcott St.	12/3/93	14:50	Field duplicate of A66550

Alcott Street = Station SWP2
Cork Street = Station SWP1

Table 2. Stream Discharge Measurements.

Date	Time	Avg. Velocity (ft/s)	Avg. Depth (ft)	Discharge (ft^3/s)	Gage Height (ft) SG-2
Cork Street					
12/2/93	14:50	2.25	2.3	73.3	792.36
12/2/93	18:30	2.31	2.3	75.3	792.36
12/2/93	21:55	2.27	2.3	74.0	792.31
12/3/93	9:50	2.12	2.2	66.1	792.31
12/3/93	15:50	20.6	2.2	64.2	792.31
Alcott Street					
12/2/93	14:15	2.03	1.8	81.8	779.41
12/2/93	17:55	2.03	1.7	80.9	779.41
12/2/93	21:25	1.93	1.8	77.8	*
12/3/93	9:25	1.86	1.62	69.0	779.16
12/3/93	15:00	1.81	1.6	66.3	779.09

* This was a nighttime measurement, and it was too dark for an accurate reading at this site.
SG-2 is on the north side (downstream side) of the Cork Street road culvert.
Creek width at Cork Street = 14.2 feet
Creek width at Alcott Street = 22.9 feet

Field parameters were measured as specified in the QAPP and the field instrument standard procedures submitted by LTI. All parameters were measured in duplicate and the averages of measurements are included in Table 3. LTI has a turbidimeter installed in a building at the Allied site, and all turbidity measurements were made at this building rather than at each station. Turbidity samples were collected in polypropylene bottles at each Creek station and the samples were analyzed for turbidity immediately after the sampling circuit was completed.

Table 3. Field Parameter Average Measurements.

Date	Time	Temp (°C)	Spec. Cond. (mS/cm @ 25°C)	pH (S.U.)	D.O. (mg/L)	Turbidity (NTU)
Cork St.						
12/2/93	14:40	10.1	0.656	8.10	10.40	9.79
12/2/93	18:20	9.9	0.773	8.13	10.20	9.57
12/2/93	21:45	8.7	0.703	8.22	10.30	10.32
12/3/93	9:40	7.4	0.630	8.19	11.20	7.63
12/3/93	15:40	7.8	0.637	8.03	11.60	8.69
Alcott St.						
12/2/93	14:00	9.6	0.647	8.02	10.80	9.39
12/2/93	17:45	10.1	0.892	8.02	10.05	11.67
12/2/93	21:15	8.8	0.726	8.25	10.40	10.47
12/3/93	9:15	7.5	0.635	7.81	11.80	7.90
12/3/93	14:50	7.9	0.637	7.76	11.10	8.94

Alcott Street = Station SWP2
Cork Street = Station SWP1

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KB60207281

KB61301630

VELOCITY PROFILE MEASUREMENT LOG

Station	Depth (ft)		Velocity (fps)		Average Velocity (fps)	Total Depth (ft)
	0.2	0.8	0.2	0.8		
5			3.08	2.35	2.72	2.1
4			2.49	1.93	2.21	1.9
3			1.42	1.52	1.47	1.7
2			2.17	1.56	1.87	1.5
1			2.09	1.70	1.90.	1.6
					2.03	
				Average		1.76'

Location	SWP2 → A66542
Weather	SUNNY / Pt. CLOUDY
Air Temperature	12.0°C
Samples	BDL / JTP
Total River Width	22.90'
Date	12-2-93
Time	14:15
Flow	81.82 cfs

Comments:

5/27/93
22933625

KB60207282

KB61301631

VELOCITY PROFILE MEASUREMENT LOG

Station	Depth (ft)		Velocity (fps)		Average Velocity (fps)	Total Depth (ft)
	0.2	0.8	0.2	0.8		
1			1.96	1.58	1.77	1.9
2			2.18	1.56	1.87	2.5
3			2.50	1.75	2.13	2.6
4			2.85	2.19	2.52	2.5
5			3.04	2.91	2.98	2.0
				Average	2.25	2.3

Location	SWP1 → A66543
Weather	SUNNY / PARTLY CLOUDY
Air Temperature	9.6°C
Samples	BDL / JTP
Total River Width	14.17'
Date	12/2/93
Time	14:50
Flow	73.33 cfs

Comments:

KB61301632

KB60207283

VELOCITY PROFILE MEASUREMENT LOG

Station	Depth (ft)		Velocity (fps)		Average Velocity (fps)	Total Depth (ft)
	0.2	0.8	0.2	0.8		
5			3.00	2.05	2.53	2.1
4			2.28	1.70	1.99	1.9
3			1.59	1.67	1.63	1.6
2			2.22	1.98	2.10	1.5
1			2.08	1.67	1.88	1.6
				Average	2.03	1.74

Location	SWP2 → A66544
Weather	DARK / CLEAR SKY
Air Temperature	7.5° C
Samples	BDL / JTP
Total River Width	22.90'
Date	12/2/93
Time	17:55
Flow	80.89 cfs

Comments:

KB60207284

5/27/93
22903625

KB61301633

VELOCITY PROFILE MEASUREMENT LOG

Station	Depth (ft)		Velocity (fps)		Average Velocity (fps)	Total Depth (ft)
	0.2	0.8	0.2	0.8		
1			1.91	1.86	1.89	1.9
2			2.22	1.57	1.90	2.5
3			2.67	1.62	2.15	2.6
4			2.82	2.40	2.61	2.5
5			3.09	2.90	3.00.	2.0
				Average	2.31	2.30'

Location	SWP1 → A66545
Weather	DARK/CLEAR SKY
Air Temperature	4.9°C
Samples	BDL/UTP
Total River Width	14.17'
Date	12/2/93
Time	18:30
Flow	75.29 cfs

Comments:

3/27/93
22103625

KB61301634

KB60207285

VELOCITY PROFILE MEASUREMENT LOG

Station	Depth (ft)		Velocity (fps)		Average Velocity (fps)	Total Depth (ft)
	0.2	0.8	0.2	0.8		
5			2.83	2.01	2.42	2.1
4			2.54	1.57	2.06	1.9
3			1.36	1.52	1.44	1.7
2			2.15	1.57	1.86	1.5
1			1.97	1.76	1.87	1.6
				Average	1.93	1.76

Location	SWP2 - A66546
Weather	DARK / CLEAR SKY
Air Temperature	2.3°C
Samples	BDL / JTP
Total River Width	22.90'
Date	12/2/93
Time	21:25
Flow	77.79 CFS

Comments:

KB61301635

KB60207286

5/27/93

VELOCITY PROFILE MEASUREMENT LOG

Station	Depth (ft)		Velocity (fps)		Average Velocity (fps)	Total Depth (ft)
	0.2	0.8	0.2	0.8		
1			1.84	1.85	1.85	1.9
2			2.16	1.45	1.81	2.5
3			2.40	2.08	2.24	2.6
4			2.66	2.20	2.43	2.5
5			3.00	2.99	3.00.	2.0
				Average	2.27	2.30'

Location	SWP1 → A66547
Weather	DARK (CLEAR SKY)
Air Temperature	0.9°C
Samples	BDL / JTP
Total River Width	14.17'
Date	12/2/93
Time	21:55
Flow	73.98cfs

Comments:

KB61301636

KB60207287

5/27/93

VELOCITY PROFILE MEASUREMENT LOG

Station	Depth (ft)		Velocity (fps)		Average Velocity (fps)	Total Depth (ft)
	0.2	0.8	0.2	0.8		
5			2.92	1.69	2.31	2.0
4			2.29	1.69	1.99	1.7
3			1.34	1.67	1.51	1.6
2			1.99	1.46	1.73	1.3
1			1.79	1.73	1.76	1.5
				Average	1.86	1.62

Location	SWP2 → A66548
Weather	OVERCAST / ~~[illegible]~~ FOGGY
Air Temperature	1.9°C
Samples	BDL / JTP
Total River Width	22.90'
Date	12/3/93
Time	9.25
Flow	69.00 cfs

Comments:

KB61301637

KB60207288

5/27/93

VELOCITY PROFILE MEASUREMENT LOG

Station	Depth (ft)		Velocity (fps)		Average Velocity (fps)	Total Depth (ft)
	0.2	0.8	0.2	0.8		
1			1.93	1.37	1.65	1.8
2			2.15	1.53	1.84	2.4
3			2.39	1.76	2.08	2.5
4			2.57	2.07	2.32	2.4
5			2.87	2.50	2.69	1.9
				Average	2.12	2.2

Location	SWP1 → A66549
Weather	OVERCAST / FOGGY
Air Temperature	1.1°C
Samples	BDL / JTP
Total River Width	14.17'
Date	12/3/93
Time	9:50
Flow	~~67.65 cfs~~ 66.09 cfs

Comments:

KB61301638

KB60207289

VELOCITY PROFILE MEASUREMENT LOG

Station	Depth (ft)		Velocity (fps)		Average Velocity (fps)	Total Depth (ft)
	0.2	0.8	0.2	0.8		
5			2.83	1.83	2.33	2.0
4			2.28	1.77	2.03	1.7
3			1.56	1.25	1.41	1.5
2			2.06	1.16	1.61	1.3
1			1.68	1.67	1.68	1.5
				Average	1.81	1.6

Location	SWP2 => A66550
Weather	OVERCAST / CLOUDY
Air Temperature	5.1°C
Samples	BDL / JTP
Total River Width	22.90'
Date	12/3/93
Time	15:00
Flow	66.32 cfs

Comments:

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5/27/90

VELOCITY PROFILE MEASUREMENT LOG

Station	Depth (ft)		Velocity (fps)		Average Velocity (fps)	Total Depth (ft)
	0.2	0.8	0.2	0.8		
1			1.81	1.45	1.63	1.8
2			1.93	1.55	1.74	2.4
3			2.11	1.95	2.03	2.5
4			2.43	1.89	2.16	2.4
5			2.78	2.68	2.73	1.9
				Average	2.06	2.2

Location	SWP1 → A66551
Weather	OVERCAST / CLOUDY
Air Temperature	4.2°C
Samples	BDL/JTP
Total River Width	14.17'
Date	12/3/93
Time	15:50
Flow	64.22CfS

Comments:

KB61301640

KB60207291

SURFACE WATER SAMPLING FIELD LOG-GRAB

Sample Depth	2" BELOW WATER SURFACE
Approximate Flow Rate	81.82 cfs
Volume of Sampling Device	2 L BOTTLES
Total Water Depth	1.76'
Distance From Bank	10'
Depth Below Surface of Water Removed	2"

Location	SWP2 → A66542
Weather	SUNNY / Pt. CLOUDY
Air Temperature	12.0°C
Samplers	BDL / JTP
Date	12-2-93
Time	14:00

Temperature	9.6°C
Conductivity	.647
pH	8.02
Dissolved Oxygen	10.80
Turbidity	9.29

Comments _____

8/15/93
16933625

KB61301641

KB60207292

SURFACE WATER SAMPLING FIELD LOG-GRAB

Sample Depth	2" BELOW WATER SURFACE
Approximate Flow Rate	73.33 cfs
Volume of Sampling Device	1 L BOTTLES
Total Water Depth	2.3
Distance From Bank	7'
Depth Below Surface of Water Removed	2"

Location	SW01 → A66543
Weather	SUNNY / Pt. CLOUDY
Air Temperature	9.6°C
Samplers	BDL / JTP
Date	12-2-93
Time	14:40

Temperature	10.1°C
Conductivity	.656
pH	8.10
Dissolved Oxygen	10.40
Turbidity	9.79

Comments _____

6/15/93
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KB61301642

SURFACE WATER SAMPLING FIELD LOG-GRAB

Sample Depth	2" BELOW WATER SURFACE
Approximate Flow Rate	80.89 cfs
Volume of Sampling Device	1 L BOTTLES
Total Water Depth	1.74'
Distance From Bank	10'
Depth Below Surface of Water Removed	2"

Location	SWP2 → A66544
Weather	DARK / CLEAR SKY
Air Temperature	7.5°C
Samplers	BDL / JTP
Date	12/2/93
Time	17:45

Temperature	10.1°C
Conductivity	.892
pH	8.02
Dissolved Oxygen	10.05
Turbidity	11.67

Comments _____

8/15/93
16933625

KB61301643

KB60207294

SURFACE WATER SAMPLING FIELD LOG-GRAB

Sample Depth	2" BELOW WATER SURFACE
Approximate Flow Rate	75.29 cfs
Volume of Sampling Device	1 L BOTTLES
Total Water Depth	2.30'
Distance From Bank	7'
Depth Below Surface of Water Removed	2"

Location	SWP1 → A66545
Weather	DARK / CLEAR SKY
Air Temperature	4.9°C
Samplers	BDL / JTP
Date	12/2/93
Time	18:20

Temperature	9.9°C
Conductivity	.773
pH	8.13
Dissolved Oxygen	10.20
Turbidity	9.57

Comments _____

6/15/93
16033625

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SURFACE WATER SAMPLING FIELD LOG-GRAB

Sample Depth	2" BELOW WATER SURFACE
Approximate Flow Rate	77.79 cfs
Volume of Sampling Device	1.L BOTTLES
Total Water Depth	1.76'
Distance From Bank	10'
Depth Below Surface of Water Removed	2"

Location	SWP2 → A66546
Weather	DARK / CLEAR SKY
Air Temperature	2.3°C
Samplers	BDL / JTP
Date	12/2/93
Time	21:15

Temperature	8.8°C
Conductivity	.726
pH	8.25
Dissolved Oxygen	10.40
Turbidity	10.47

Comments _____

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6/15/93
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SURFACE WATER SAMPLING FIELD LOG-GRAB

Sample Depth	2" BELOW WATER SURFACE
Approximate Flow Rate	73.98 cfs
Volume of Sampling Device	1 L BOTTLES
Total Water Depth	2.3'
Distance From Bank	7'
Depth Below Surface of Water Removed	2"

Location	SWP1 → A66547
Weather	DARK / CLEAR SKY
Air Temperature	0.9°C
Samplers	BDL / JTP
Date	12/2/93
Time	21:45

Temperature	8.7°C
Conductivity	.703
pH	8.22
Dissolved Oxygen	10.30
Turbidity	10.32

Comments _____

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6/15/93
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SURFACE WATER SAMPLING FIELD LOG-GRAB

Sample Depth	2" BELOW WATER SURFACE
Approximate Flow Rate	69.00 CFS
Volume of Sampling Device	1 L BOTTLES
Total Water Depth	1.62'
Distance From Bank	10'
Depth Below Surface of Water Removed	2"

Location	SW02 → A66548
Weather	OVERCAST / FOGGY
Air Temperature	1.9°C
Samplers	BDL / JTP
Date	12/3/93
Time	9:15

Temperature	7.5°C
Conductivity	.635
pH	7.81
Dissolved Oxygen	11.80
Turbidity	7.90

Comments _____

6/15/93
16933625

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SURFACE WATER SAMPLING FIELD LOG-GRAB

Sample Depth	2" BELOW WATER SURFACE
Approximate Flow Rate	67.65 cfs
Volume of Sampling Device	1 L BOTTLES
Total Water Depth	2.2'
Distance From Bank	7'
Depth Below Surface of Water Removed	2"

Location	SW01 → A66549
Weather	OVERCAST / FOGGY
Air Temperature	1.1°C
Samplers	BDL / JTP
Date	12/3/93
Time	9:40

Temperature	7.4°C
Conductivity	.630
pH	8.19
Dissolved Oxygen	11.20
Turbidity	7.63

Comments _____

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6/15/93
16933625

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KB60207299

SURFACE WATER SAMPLING FIELD LOG-GRAB

Sample Depth	2" BELOW WATER SURFACE
Approximate Flow Rate	66.32 CFS
Volume of Sampling Device	1 L BOTTLES
Total Water Depth	1.6'
Distance From Bank	10'
Depth Below Surface of Water Removed	2"

Location	SWP2 → A66550 & DUP. : A66552
Weather	OVERCAST / CLOUDY
Air Temperature	5.1°C
Samplers	BDL / JTP
Date	12/3/93
Time	14:50

Temperature	7.9°C
Conductivity	.637
pH	7.76
Dissolved Oxygen	11.10
Turbidity	8.94

Comments OUR MS/MSD AND DUPLICATE SAMPLES WERE TAKEN AT THIS SITE.

8/16/93
16033625

KB61301649

KB60207300

SURFACE WATER SAMPLING FIELD LOG-GRAB

Sample Depth	2" BELOW WATER SURFACE
Approximate Flow Rate	64.22 CFS
Volume of Sampling Device	1 L BOTTLES
Total Water Depth	2.2'
Distance From Bank	7'
Depth Below Surface of Water Removed	2"

Location	SWP1 → A66551
Weather	OVERCAST / CLOUDY
Air Temperature	4.2°C
Samplers	BDL / JTP
Date	12/3/93
Time	15:40

Temperature	7.8°C
Conductivity	.637
pH	8.03
Dissolved Oxygen	11.60
Turbidity	8.69

Comments _____

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8/15/93
16933825

KB61301650

KB60207301

LTI – Limno-Tech, Inc.
Memorandum

TO: Rick DiFiore

DATE: December 30, 1993

PROJECT: KZRV1

FROM: Tim Feist

SUBJECT: Field report for December 15, 1993 Portage Creek base flow sampling survey

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This report summarizes the field observations and field data obtained during the December 15, 1993 base flow sampling survey of Portage Creek. During this survey personnel from Limno-Tech, Inc. (LTI) sampled two water sampling stations on Portage Creek: at Cork Street (SWP1) and near Alcott Street (SWP2). LTI personnel obtained water samples, recorded field measurements of water quality parameters, and measured stream discharge at these sites during a single sampling circuit. Portage Creek stream discharge was greater than the target criteria outlined in the September 8, 1993 memorandum from LTI to B&B. However, Creek flows have been greater than the target criteria since at least August due to higher than normal precipitation this fall. In a November 24, 1993 telephone conference LTI and B&B agreed that at least two more base flow surveys should be conducted, at flows greater than the target criteria if necessary but only after a 5-day period with no significant precipitation. The conditions during the December 15, 1993 survey met these modified criteria. This survey is the first of the two surveys, and the second Portage Creek base flow survey overall. Field measurements for the survey are included below.

SURVEY PARTICIPANTS

The survey participants included:

John Peterson (LTI)
Brian Lord (LTI)

BASE FLOW SAMPLING SURVEY RESULTS

Sampling procedures did not vary from the procedures specified in the QAPP, except for slight alterations in the grab sampling methodology and in stream discharge measurements. The procedures used were previously approved by B&B and described in the September 13, 1993 field report. Grab samples were obtained directly with the laboratory-supplied bottles. Stream velocity was measured more frequently than specified in the QAPP, at five locations across the stream at each station.

LTI conducted one sampling circuit on December 15, 1993. There was no significant rainfall during the five days preceding the sampling event. Creek flow measured near Alcott Street during the survey was 58.5 cfs.

The sample I.D.'s corresponding to sampling time and site are listed in Table 1 below. Stream velocity measurements and discharge calculation results are included in Table 2.

Table 1. Sample Identification and Time of Sampling.

Sample I.D.	Station	Date	Time	Notes
A64003	Alcott St.	12/15/93	11:45	originally submitted to lab as A66003
A64004	Cork St.	12/15/93	12:30	originally submitted to lab as A66004

Alcott Street = Station SWP2
Cork Street = Station SWP1

Table 2. Stream Discharge Measurements.

Date	Time	Avg. Velocity (ft/s)	Avg. Depth (ft)	Discharge (ft^3/s)	Gage Height (ft)
Cork Street					
12/15/93	12:40	1.77	2.1	52.7	792.21
Alcott Street					
12/15/93	11:55	1.75	1.5	58.5	778.91

Cork Street gage height at SG-2, on the north side (downstream side) of the road culvert.
Creek width at Cork Street = 14.2 feet
Creek width at Alcott Street = 22.9 feet

Field parameters were measured as specified in the QAPP and the field instrument standard procedures submitted by LTI. All parameters were measured in duplicate and the averages of measurements are included in Table 3. The D.O. meter would not calibrate properly and D.O. measurements were not obtained. LTI has a turbidimeter installed in a building at the Allied site, and turbidity measurements were made at this building rather than at each station. Turbidity samples were collected in polypropylene bottles at each Creek station and the samples were analyzed for turbidity immediately after the sampling circuit was completed.

Table 3. Field Parameter Average Measurements.

Date	Time	Temp (°C)	Spec. Cond. (mS/cm @ 25°C)	pH (S.U.)	D.O. (mg/L)	Turbidity (NTU)
Cork St.						
12/15/93	12:30	7.2	0.633	8.18	—	3.21
Alcott St.						
12/15/93	11:45	7.2	0.611	7.68	—	3.22

Alcott Street = Station SWP2
Cork Street = Station SWP1

VELOCITY PROFILE MEASUREMENT LOG

Station	Depth (ft)		Velocity (fps)		Average Velocity (fps)	Total Depth (ft)
	0.2	0.8	0.2	0.8		
5			3.10	1.74	2.42	1.8
4			2.51	1.35	1.93	1.6
3			1.26	0.91	1.09	1.4
2			2.16	1.64	1.90	1.2
1			1.41	1.45	1.43	1.3
				Average	1.75	1.46

Location	SWP2 → A66003
Weather	OVERCAST/CLOUDY
Air Temperature	5.7°C
Samples	BDC/JTP
Total River Width	22.90'
Date	12/15/93
Time	11:55
Flow	58.51 cfs

Comments:

5/27/93
22933825

KB60207304

KB61301653

VELOCITY PROFILE MEASUREMENT LOG

Station	Depth (ft)		Velocity (fps)		Average Velocity (fps)	Total Depth (ft)
	0.2	0.8	0.2	0.8		
1			1.59	1.26	1.43	1.7
2			1.77	0.94	1.36	2.3
3			1.91	1.38	1.65	2.4
4			2.17	1.87	2.02	2.3
5			2.32	2.41	2.37	1.8
				Average	1.77	2.1

Location	SWA1 → A6600
Weather	OVERCAST/CLOUDY
Air Temperature	5.6°C
Samples	BOL/JTP
Total River Width	14.17'
Date	12/15-93
Time	12:40
Flow	52.67 cfs

Comments:

3/27/93
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KB61301654

SURFACE WATER SAMPLING FIELD LOG-GRAB

Sample Depth	2" BELOW WATER SURFACE
Approximate Flow Rate	58.51 cfs
Volume of Sampling Device	1 L BOTTLES
Total Water Depth	1.46
Distance From Bank	~10'
Depth Below Surface of Water Removed	2"

Location	SWP2 → A66003
Weather	OVERCAST / CLOUDY
Air Temperature	5.7°C
Samplers	BDC / JTP
Date	12/15/93
Time	11:45

Temperature	7.2°C
Conductivity	.611
pH	7.68
Dissolved Oxygen	meter would not calibrate
Turbidity	3.22

Comments _____

1/15/93
'6933625

KB60207306

KB61301655

SURFACE WATER SAMPLING FIELD LOG-GRAB

Sample Depth	2" BELOW WATER SURFACE
Approximate Flow Rate	52.67 cfs
Volume of Sampling Device	1L BOTTLES
Total Water Depth	2.1'
Distance From Bank	~7'
Depth Below Surface of Water Removed	2"

Location	SWP1 → A66004
Weather	OVERCAST / CLOUDY
Air Temperature	5.6°C
Samplers	BDL / JTP
Date	12/15/93
Time	12:30

Temperature	7.2°C
Conductivity	.633
pH	8.19
Dissolved Oxygen	Meter would not calibrate
Turbidity	3.21

Comments _____

/15/93
3933625

KB60207307

KB61301656

LTI – Limno-Tech, Inc.
Memorandum

TO: Rick DiFiore

DATE: December 30, 1993
PROJECT: KZRV1

FROM: Tim Feist

SUBJECT: Field report for December 28, 1993 Portage Creek base flow sampling survey

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This report summarizes the field observations and field data obtained during the December 28, 1993 base flow sampling survey of Portage Creek. During this survey personnel from Limno-Tech, Inc. (LTI) sampled two water sampling stations on Portage Creek: at Cork Street (SWP1) and near Alcott Street (SWP2). LTI personnel obtained water samples, recorded field measurements of water quality parameters, and measured stream discharge at these sites during a single sampling circuit. Portage Creek stream discharge was greater than the target criteria outlined in the September 8, 1993 memorandum from LTI to B&B. However, Creek flows have been greater than the target criteria since at least August due to higher than normal precipitation this fall. In a November 24, 1993 telephone conference LTI and B&B agreed that at least two more base flow surveys should be conducted, at flows greater than the target criteria if necessary but only after a 5-day period with no significant precipitation. The conditions during the December 28, 1993 survey met these modified criteria. This survey is the second of the two surveys, and the third Portage Creek base flow survey overall. Field measurements for the survey are included below.

SURVEY PARTICIPANTS

The survey participants included:

John Peterson (LTI)
Brian Lord (LTI)

BASE FLOW SAMPLING SURVEY RESULTS

Sampling procedures did not vary from the procedures specified in the QAPP, except for slight alterations in the grab sampling methodology and in stream discharge measurements. The procedures used were previously approved by B&B and described in the September 13, 1993 field report. Grab samples were obtained directly with the laboratory-supplied bottles. Stream velocity was measured more frequently than specified in the QAPP, at five locations across the stream at each station. QA/QC samples were obtained in accordance with the specifications of the QAPP.

LTI conducted one sampling circuit on December 28, 1993. Creek flow measured near Alcott Street during the survey was 57.6 cfs. There was no significant rainfall during the five days preceding the sampling event. While four to eight inches of snow fell in the area December 25, temperatures during the following three days remained below -4° C and there was little snow melt.

The sample I.D.'s corresponding to sampling time and site are listed in Table 1 below. Stream velocity measurements and discharge calculation results are included in Table 2.

Table 1. Sample Identification and Time of Sampling.

Sample I.D.	Station	Date	Time	Notes
A64005	Alcott St.	12/28/93	12:35	originally submitted to lab as A66005
A64006	Cork St.	12/28/93	13:10	originally submitted to lab as A66006
A64007	Alcott St.	12/28/93	12:35	Field duplicate of A64005 originally submitted to lab as A66007

Alcott Street = Station SWP2
Cork Street = Station SWP1

Table 2. Stream Discharge Measurements.

Date	Time	Avg. Velocity (ft/s)	Avg. Depth (ft)	Discharge (ft^3/s)	Gage Height (ft)
Cork Street					
12/28/93	13:20	1.84	2.1	54.8	792.16
Alcott Street					
12/28/93	12:50	1.70	1.5	57.6	—

Cork Street gage height at SG-2, on the north side (downstream side) of the road culvert.
Creek width at Cork Street = 14.2 feet
Creek width at Alcott Street = 22.9 feet

Field parameters were measured as specified in the QAPP and the field instrument standard procedures submitted by LTI. All parameters were measured in duplicate and the averages of measurements are included in Table 3. Repairs to the D.O. meter since the December 15 survey were not successful and the meter would not calibrate properly. LTI has a turbidimeter installed in a building at the Allied site, and turbidity measurements were made at this building rather than at each station. Turbidity samples were collected in polypropylene bottles at each Creek station and the samples were analyzed for turbidity immediately after the sampling circuit was completed.

Table 3. Field Parameter Average Measurements.

Date	Time	Temp (°C)	Spec. Cond. (mS/cm @ 25°C)	pH (S.U.)	D.O. (mg/L)	Turbidity (NTU)
Cork St.						
12/28/93	13:10	3.2	0.678	8.31	—	5.98
Alcott St.						
12/28/93	12:35	2.8	0.669	8.14	—	5.43

Alcott Street = Station SWP2
Cork Street = Station SWP1

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KB60207309

KB61301658

VELOCITY PROFILE MEASUREMENT LOG

Station	Depth (ft)		Velocity (fps)		Average Velocity (fps)	Total Depth (ft)
	0.2	0.8	0.2	0.8		
5			2.59	1.61	2.10	1.8
4			2.16	1.54	1.85	1.6
3			1.20	1.45	1.33	1.5
2			2.02	1.60	1.81	1.2
1			1.45	1.41	1.43	1.3
				Average	1.70	1.48

Location	SWP2 → A66005 + Dup A66007
Weather	Clear sky / ptly. cloudy / snow on ground
Air Temperature	-6.9°C
Samples	BOL / JTP
Total River Width	22.90'
Date	12/29/93
Time	12.50
Flow	57.62 cfs

Comments:

KB60207310

5/27/93
22903825

KB61301659

VELOCITY PROFILE MEASUREMENT LOG

Station	Depth (ft)		Velocity (fps)		Average Velocity (fps)	Total Depth (ft)
	0.2	0.8	0.2	0.8		
1			1.62	1.37	1.50	1.7
2			1.67	1.21	1.44	2.3
3			2.23	1.53	1.88	2.4
4			2.20	1.74	1.97	2.3
5			2.51	2.32	2.42	1.8
				Average	1.84	2.1

Location	SWP1 — A66006
Weather	clear / ptly. cloudy / snow on ground
Air Temperature	-4.2°C
Samples	BDL / JTP
Total River Width	14.17'
Date	12/28/93
Time	13:20
Flow	54.75 cfs

Comments:

KB60207311

5/27/93
22933625

KB61301660

SURFACE WATER SAMPLING FIELD LOG-GRAB

Sample Depth	2" BELOW WATER SURFACE
Approximate Flow Rate	57.62 cfs
Volume of Sampling Device	1 L-BOTTLES
Total Water Depth	1.48'
Distance From Bank	10'
Depth Below Surface of Water Removed	2"

Location	SWP2 - A66005 + DUP. (A66007)
Weather	Clear sky / ptly. cloudy / snow on ground
Air Temperature	-6.9°C
Samplers	BDL / JTP
Date	12/28/93
Time	12:35

Temperature	2.8°C
Conductivity	.669
pH	8.14
Dissolved Oxygen	WOULD NOT CALIBRATE
Turbidity	5.43

Comments _____

6/15/93
16933625

KB60207312

KB61301661

SURFACE WATER SAMPLING FIELD LOG-GRAB

Sample Depth	2" BELOW WATER SURFACE
Approximate Flow Rate	54.75 CFS
Volume of Sampling Device	1 L BOTTLES
Total Water Depth	2.1'
Distance From Bank	7'
Depth Below Surface of Water Removed	2"

Location	SWP1 (A66006)
Weather	Clear sky / ptly. cloudy / snow on ground
Air Temperature	-4.2°C
Samplers	BDL / JTP
Date	12/28/93
Time	13:10

Temperature	3.2°C
Conductivity	.678
pH	8.31
Dissolved Oxygen	WOULD NOT CALIBRATE
Turbidity	5.98

Comments _____

8/15/93
16933625

KB60207313

KB61301662

1/13/94 Allegan Lake - MDL Study

- Collected Sample by pumping water through teflon tubing utilizing and peristaltic pump that distributed directly into sample containers

- collected 24 1-liter amber bottles for PCB analysis

Time 17:00
Water Depth: 3.3'

- Sample Location: Halfway off shore at DNR boat launch off of Monroe Rd

1/14 TRANSECT KPT 155 - Allegan Lake

In Attendance: RPD, TPM, RGP, MSS
Andrea Putcher - CDM oversight

Description: ~~400~~ 1200' upstream of KPT 156
Across Indian shore Park
weather: snowy, cold, -10°F cloudy Lake Info
Rt. bank: 2' step incline
Left bank: 40'-50' bank
Lake width: 1965'

Location KPT 155-1 1 of 87
Water Depth 10.5'
Sediment Depth 8.0'
Top 4" Brown - Dk brown silt, trace fine sand, organics

Core Sample TIME: 11:20
Sediment penetrated 4.0'
Sediment recovered 2.4'
Description 0-0.8': dark brown silt, organics, trace fine sand
0.8-2.4' Dk brown fine sand with silt

Todd J. Monroe 1/19/94

KB53501656

LTI – Limno-Tech, Inc.
Memorandum

TO: Rick DiFiore **DATE:** July 6, 1994
PROJECT: KZRV1

FROM: Tim Feist

SUBJECT: Field report for April 11-14, 1994 Portage Creek storm event sampling survey

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This report summarizes the field observations and field data obtained during the April 11 to April 14, 1994 storm event sampling survey of Portage Creek. During this survey personnel from Limno-Tech, Inc. (LTI) sampled two water sampling stations on Portage Creek: at Cork Street (SWP1) and near Alcott Street (SWP2). LTI personnel obtained water samples and estimated stream discharge from a gage at the Alcott Street site during sixteen separate sampling circuits over four days. This survey was conducted as a supplement to the previous three Portage Creek surveys specified in the Work Plan. The objective of this survey was to obtain water samples throughout both the rising and falling legs of the hydrograph. In contrast, sampling in the previous surveys began after a specified criteria flow was reached, as specified in the work plan, and as a result the rising leg of the hydrograph was not adequately characterized.

SURVEY PARTICIPANTS

The survey participants included:

John Peterson (LTI)

STORM EVENT FLOW SAMPLING SURVEY RESULTS

Sampling procedures did not vary from the procedures specified in the QAPP, except for slight alterations in the grab sampling methodology. Water samples were collected as frequently as at two hour intervals. To avoid disturbing the stream or sediment and creating non-representative samples downstream, water samples were collected from the stream bank. Field parameters, such as dissolved oxygen or conductivity, were not measured during this survey. Grab samples were obtained directly with the laboratory-supplied bottles. QA/QC samples were obtained in accordance with the specifications of the QAPP. Creek flow was estimated based upon a staff gage at the Alcott Street site (SWP2) and a previously developed rating curve.

LTI mobilized for sampling the storm flows based upon high Creek flows and a forecast of rain. A total of 1.5 inches of precipitation (as recorded at an LTI gage in Kalamazoo) fell between 19:00 on April 11 and 12:00 on April 13, 1994. Approximately 1 inch of the total fell during April 12.

The sample I.D.'s and estimated flows corresponding to sampling time and site are listed in Table 1 below.

Table 1. Sample Identification and Estimated Flow.

Sample I.D.	Station Number	Station Name	Date	Time	Est. Flow (cfs)	Notes
A66553	SWP2	Alcott	4/11/94	21:45	69	
A66554	SWP1	Cork	4/11/94	22:15		
A66555	SWP2	Alcott	4/12/94	8:30	95	
A66556	SWP1	Cork	4/12/94	9:00		
A66557	SWP2	Alcott	4/12/94	10:30	105	MS/MSD also collected
A66558	SWP1	Cork	4/12/94	11:10		
A66559	SWP2	Alcott	4/12/94	10:30		field duplicate of A66557
A66560	SWP2	Alcott	4/12/94	12:30	118	
A66561	SWP1	Cork	4/12/94	13:00		
A66562	SWP2	Alcott	4/12/94	14:30	128	
A66563	SWP1	Cork	4/12/94	15:00		
A66564	SWP2	Alcott	4/12/94	17:00	128	
A66565	SWP1	Cork	4/12/94	17:30		
A66566	SWP2	Alcott	4/12/94	19:00	121	
A66567	SWP1	Cork	4/12/94	19:30		
A66568	SWP2	Alcott	4/12/94	21:00	118	
A66569	SWP1	Cork	4/12/94	21:30		
A66570	SWP2	Alcott	4/12/94	23:30	118	
A66571	SWP1	Cork	4/12/94	23:55		
~~A66572~~	~~SWP2~~	~~Alcott~~	~~4/13/94~~	~~4:00~~		too foggy to safely sample,
~~A66573~~	~~SWP1~~	~~Cork~~	~~4/13/94~~	~~4:30~~		circuit canceled
A66574	SWP2	Alcott	4/13/94	8:00	105	
A66575	SWP1	Cork	4/13/94	8:30		
A66576	SWP2	Alcott	4/13/94	12:30	98	
A66577	SWP1	Cork	4/13/94	12:45		
A66578	SWP2	Alcott	4/13/94	17:00	92	
A66579	SWP1	Cork	4/13/94	17:15		
A66580	SWP2	Alcott	4/13/94	22:30	85	MS/MSD also collected
A66581	SWP1	Cork	4/13/94	23:00		
A66582	SWP2	Alcott	4/13/94	22:30		field duplicate of A66580
A66583	SWP2	Alcott	4/14/94	12:30		
A66584	SWP1	Cork	4/14/94	12:45		
A66585	SWP2	Alcott	4/14/94	16:45		
A66586	SWP1	Cork	4/14/94	17:00		
A66587	SWP2	Alcott	4/14/94	23:30		
A66588	SWP1	Cork	4/14/94	23:50		
A66589	SWP2	Alcott	4/14/94	23:30		field duplicate of A66587

KB61301680

LTI – Limno-Tech, Inc.
Memorandum

TO: Rick DiFiore

DATE: July 26, 1994
PROJECT: KZRV1

FROM: Tim Feist

SUBJECT: Field report for June 9, 1994 Portage Creek base flow sampling survey

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This report summarizes the field observations and field data obtained during the June 9, 1994 base flow sampling survey of Portage Creek. During this survey personnel from Limno-Tech, Inc. (LTI) sampled two water sampling stations on Portage Creek: at Cork Street (SWP1) and near Alcott Street (SWP2). LTI personnel collected water samples, recorded field measurements of water quality parameters, and measured stream discharge at these sites during a single sampling circuit. Portage Creek flows had exceeded the target base flow criteria of 45 cfs since August, 1993 due to higher than normal precipitation last fall. B&B requested that a base flow sample be obtained once discharge decreased below the target criteria. Discharge during the June 9, 1994 survey met the base flow criteria. This survey was the fourth Portage Creek base flow survey. Field measurements for the survey are included below.

SURVEY PARTICIPANTS

The survey participants included:

John Peterson (LTI)
Brian Lord (LTI)

BASE FLOW SAMPLING SURVEY RESULTS

Sampling procedures did not vary from the procedures specified in the QAPP, except for slight alterations in the grab sampling methodology and in stream discharge measurements. The procedures used were previously approved by B&B and described in the September 13, 1993 field report. Grab samples were obtained directly with the laboratory-supplied bottles. Stream velocity was measured more frequently than specified in the QAPP, at five locations across the stream at each station. QA/QC samples were obtained in accordance with the specifications of the QAPP.

The sample I.D.'s corresponding to sampling time and site are listed in Table 1 below. Stream velocity measurements and discharge calculation results are included in Table 2.

Table 1. Sample Identification and Time of Sampling.

Sample I.D.	Station	Date	Time	Notes
A6~~0~~008	Alcott St.	6/9/94	13:30	Also collected CLP TCL/TAL
A6~~0~~009	Cork St.	6/9/94	14:45	Also collected CLP TCL/TAL

Alcott Street = Station SWP2
Cork Street = Station SWP1

Table 2. Stream Discharge Measurements.

Date	Time	Avg. Velocity (ft/s)	Avg. Depth (ft)	Discharge (ft^3/s)	Gage Height (ft)
Cork Street					
6/9/94	14:55	1.29	1.9	34.7	dry
Alcott Street					
6/9/94	13:45	1.85	0.9	39.8	–

Cork Street gage height at SG-2, on the north side (downstream side) of the road culvert.
Creek width at Cork Street = 14.2 feet
Creek width at Alcott Street = 22.9 feet

Field parameters were measured as specified in the QAPP and the field instrument standard procedures submitted by LTI. All parameters were measured in duplicate and the averages of measurements are included in Table 3. LTI has a turbidimeter installed in a building at the Allied site, and turbidity measurements were made at this building rather than at each station. Turbidity samples were collected in polypropylene bottles at each Creek station and the samples were analyzed for turbidity immediately after the sampling circuit was completed.

Table 3. Field Parameter Average Measurements.

Date	Time	Temp (°C)	Spec. Cond. (mS/cm @ 25°C)	pH (S.U.)	D.O. (mg/L)	Turbidity (NTU)
Cork St.						
6/9/94	14:45	22.1	0.616	8.10	8.6	8.46
Alcott St.						
6/9/94	13:30	18.7	0.589	8.25	8.3	9.34

Alcott Street = Station SWP2
Cork Street = Station SWP1

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SURFACE WATER SAMPLING FIELD LOG-GRAB

Sample Depth	~2" BELOW WATER SURFACE
Approximate Flow Rate	39.82 CFS
Volume of Sampling Device	1 L BOTTLES
Total Water Depth	0.94'
Distance From Bank	~11.5'
Depth Below Surface of Water Removed	2"

Location	SWP2 →
Weather	Ptly. cloudy / sunny
Air Temperature	25.1°C
Samplers	BDL / JTP
Date	6/9/94
Time	13:30

Temperature	18.7°C
Conductivity	.589
pH	8.25
Dissolved Oxygen	8.30
Turbidity	9.34

Comments _____

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6/15/93
16933625

KB61301683

SURFACE WATER SAMPLING FIELD LOG-GRAB

Sample Depth	~2" BELOW WATER SURF.
Approximate Flow Rate	34.73 cfs
Volume of Sampling Device	1 L BOTTLES
Total Water Depth	1.9'
Distance From Bank	~7'
Depth Below Surface of Water Removed	2"

Location	SWP1 →
Weather	CLEAR SKY / SUNNY
Air Temperature	29.3°C
Samplers	BOL / JTP
Date	6/9/94
Time	12:45

Temperature	22.1°C
Conductivity	.616
pH	8.10
Dissolved Oxygen	~~8.46~~ 8.60
Turbidity	~~8.60~~ 8.46 NTU

Comments _____

6/16/93
10033625

KB61301684

VELOCITY PROFILE MEASUREMENT LOG

Station	Depth (ft)		Velocity (fps)		Average Velocity (fps)	Total Depth (ft)
	0.2	0.8	0.2	0.8		
1			2.95	1.96	2.46	1.1
2			3.09	2.11	2.60	1.2
3			2.24	1.31	1.78	1.1
4			1.49	1.10	1.30	0.7
5			1.32	0.82	1.07	0.6
				Average	1.85	0.94

Location	SWP2 →
Weather	Ptly. cloudy / sunny
Air Temperature	25.1°C
Samples	BDL / JTP
Total River Width	22.90'
Date	6/9/94
Time	13:45
Flow	39.82 CFS

Comments:

KB61301685

VELOCITY PROFILE MEASUREMENT LOG

Station	Depth (ft)		Velocity (fps)		Average Velocity (fps)	Total Depth (ft)
	0.2	0.8	0.2	0.8		
1			1.18	1.02	1.10	1.5
2			1.19	0.75	0.97	2.1
3			1.48	0.88	1.18	2.2
4			1.68	1.37	1.53	2.1
5			1.91	1.38	1.65	1.6
				Average	1.29	1.9

Location	SWP1 →
Weather	CLEAR SKY (SUNNY)
Air Temperature	29.3°C
Samples	BOL/JTP
Total River Width	14.17'
Date	6/9/94
Time	14:55
Flow	34.73 cfs

Comments:

5/27/93

KB61301686

LTI – Limno-Tech, Inc.
Memorandum

TO: Rick DiFiore

DATE: November 7, 1994

PROJECT: KZRV1

FROM: Tim Feist

SUBJECT: Field report for September 8, 1994 Portage Creek base flow sampling survey

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This report summarizes the field observations and field data obtained during the September 8, 1994 base flow sampling survey of Portage Creek. During this survey personnel from Limno-Tech, Inc. (LTI) sampled two water sampling stations on Portage Creek: at Cork Street (SWP1) and near Alcott Street (SWP2). LTI personnel collected water samples, recorded field measurements of water quality parameters, and measured stream discharge at these sites during a single sampling circuit. Portage Creek flows had exceeded the target base flow criteria of 45 cfs since August, 1993 due to higher than normal precipitation last fall. B&B requested that additional base flow samples be obtained once discharge decreased below approximately 50 cfs. Discharge during the September 8, 1994 survey met the base flow criteria. Field measurements for the survey are included below.

SURVEY PARTICIPANTS

The survey participants included:

John Peterson (LTI)
Brian Lord (LTI)

BASE FLOW SAMPLING SURVEY RESULTS

Sampling procedures did not vary from the procedures specified in the QAPP, except for slight alterations in the grab sampling methodology and in stream discharge measurements. The procedures used were previously approved by B&B and described in the September 13, 1993 field report. Grab samples were obtained directly with the laboratory-supplied bottles. Stream velocity was measured more frequently than specified in the QAPP, at five locations across the stream at each station. QA/QC samples were obtained in accordance with the specifications of the QAPP.

The sample I.D.'s corresponding to sampling time and site are listed in Table 1 below. Stream velocity measurements and discharge calculation results are included in Table 2.

Table 1. Sample Identification and Time of Sampling.

Sample I.D.	Station	Date	Time	Notes
A660011	Alcott St.	9/8/94	15:55	
A660012	Cork St.	9/8/94	16:40	

Alcott Street = Station SWP2
Cork Street = Station SWP1

Table 2. Stream Discharge Measurements.

Date	Time	Avg. Velocity (ft/s)	Avg. Depth (ft)	Discharge (ft^3/s)	Gage Height (ft)
Cork Street					
9/8/94	16:50	1.43	2.1	42.6	7.4
Alcott Street					
9/8/94	16:05	1.89	1.1	47.6	11.05

Creek width at Cork Street = 14.2 feet
Creek width at Alcott Street = 22.9 feet

Field parameters were measured as specified in the QAPP and the field instrument standard procedures submitted by LTI. All parameters were measured in duplicate and the averages of measurements are included in Table 3. Specific conductance samples were collected in bottles and analyzed at the LTI office.

Table 3. Field Parameter Average Measurements.

Date	Time	Temp (°C)	Spec. Cond. (mS/cm @ 25°C)	pH (S.U.)	D.O. (mg/L)	Turbidity (NTU)
Cork St.						
9/8/94	16:40	21.5	0.612	8.22	7.8	9.82
Alcott St.						
9/8/94	15:55	20.5	0.590	8.24	8.5	11.0

Alcott Street = Station SWP2
Cork Street = Station SWP1

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SURFACE WATER SAMPLING FIELD LOG-GRAB

Sample Depth	~2" Below water surf.
Approximate Flow Rate	42.55 cfs
Volume of Sampling Device	1 L Bottles
Total Water Depth	2.1'
Distance From Bank	~7"
Depth Below Surface of Water Removed	~2"

Location	SWP1 → A6 ~~0~~ 10
Weather	Sunny / Ptly cloudy
Air Temperature	—
Samplers	BDL / JTP
Date	9/8/94
Time	16:40

Temperature	21.5°C
Conductivity	.612
pH	8.22
Dissolved Oxygen	7.83
Turbidity	9.82

Comments _____

6/15/93
10033625

KB61301689

SURFACE WATER SAMPLING FIELD LOG-GRAB

Sample Depth	~2" Below water surf.
Approximate Flow Rate	47.61 cfs
Volume of Sampling Device	1 L Bottles
Total Water Depth	1.1'
Distance From Bank	~10'
Depth Below Surface of Water Removed	~2"

Location	SWP2 → A6~~6~~4 0 [illegible] Stt
Weather	Sunny / Ptly. cloudy
Air Temperature	—
Samplers	BDL / JTP
Date	9/8/94
Time	15:55

Temperature	20.5°C
Conductivity	.590
pH	8.24
Dissolved Oxygen	8.50
Turbidity	10.95

Comments _____

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6/15/93
16033623

KB61301690

VELOCITY PROFILE MEASUREMENT LOG

Station	Depth (ft)		Velocity (fps)		Average Velocity (fps)	Total Depth (ft)
	0.2	0.8	0.2	0.8		
1			1.07	0.87	0.97	1.8
2			1.40	0.88	1.14	2.3
3			1.44	0.91	1.18	2.4
4			2.02	1.50	1.76	2.2
5			2.21	1.95	2.08	1.8
				Average	1.43	2.1

Location	SW91 → A66010
Weather	SUNNY / PTLY. CLOUDY
Air Temperature	—
Samples	BDL / JTP
Total River Width	14.17'
Date	9/8/94
Time	16:50
Flow	42.55 cfs

Comments:

KB61301691

VELOCITY PROFILE MEASUREMENT LOG

Station	Depth (ft)		Velocity (fps)		Average Velocity (fps)	Total Depth (ft)
	0.2	0.8	0.2	0.8		
1			2.55	2.24	2.40	1.4
2			2.97	1.72	2.35	1.2
3			1.94	1.11	1.53	1.1
4			1.82	1.37	1.60	0.8
5			1.66	1.48	1.57	1.0
				Average	1.89	1.10

4

Location	SWP2 → A6601)
Weather	SUNNY / PTLY. CLOUDY
Air Temperature	—
Samples	BDL/JTP
Total River Width	22.90'
Date	9/8/94
Time	16:05
Flow	47.61 cfs

Comments:

KB61301692

LTI – Limno-Tech, Inc.
Memorandum

TO: Rick DiFiore

DATE: November 7, 1994
PROJECT: KZRV1

FROM: Tim Feist

SUBJECT: Field report for September 21, 1994 Portage Creek base flow sampling survey

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This report summarizes the field observations and field data obtained during the September 21, 1994 base flow sampling survey of Portage Creek. During this survey personnel from Limno-Tech, Inc. (LTI) sampled two water sampling stations on Portage Creek: at Cork Street (SWP1) and near Alcott Street (SWP2). LTI personnel collected water samples and recorded field measurements of water quality parameters. Portage Creek flows had exceeded the target base flow criteria of 45 cfs since August, 1993 due to higher than normal precipitation last fall. B&B requested that additional base flow samples be obtained once discharge decreased below approximately 50 cfs. Discharge during the September 21, 1994 survey met the base flow criteria. Field measurements for the survey are included below.

SURVEY PARTICIPANTS

The survey participants included:

Brian Lord (LTI)

BASE FLOW SAMPLING SURVEY RESULTS

Sampling procedures did not vary from the procedures specified in the QAPP except for slight alterations in the grab sampling methodology. The procedures used were previously approved by B&B and described in the September 13, 1993 field report. Grab samples were obtained directly with the laboratory-supplied bottles. Stream velocity was not measured during this survey, but a staff gage measurement from an LTI gage near Alcott Street indicated that flows were approximately 49 cfs. QA/QC samples were obtained in accordance with the specifications of the QAPP.

The sample I.D.'s corresponding to sampling time and site are listed in Table 1 below. Stream velocity measurements and discharge calculation results are included in Table 2.

Table 1. Sample Identification and Time of Sampling.

Sample I.D.	Station	Date	Time	Notes
A660013	Alcott St.	9/21/94	12:25	
A660014	Cork St.	9/21/94	13:00	

Alcott Street = Station SWP2
Cork Street = Station SWP1

Table 2. Stream Discharge Measurements.

Date	Time	Avg. Velocity (ft/s)	Avg. Depth (ft)	Discharge (ft^3/s)	Gage Height (ft)
Cork Street					
9/21/94	13:00	–	–	–	7.4
Alcott: Street					
9/21/94	12:25	–	–	–	11.1

Creek width at Cork Street = 14.2 feet
Creek width at Alcott Street = 22.9 feet

Field parameters were measured as specified in the QAPP and the field instrument standard procedures submitted by LTI. All parameters were measured in duplicate and the averages of measurements are included in Table 3. Specific conductance samples were collected in bottles and analyzed at the LTI office.

Table 3. Field Parameter Average Measurements.

Date	Time	Temp (°C)	Spec. Cond. (mS/cm @ 25°C)	pH (S.U.)	D.O. (mg/L)	Turbidity (NTU)
Cork St.						
9/21/94	13:00	21.5	0.630	8.22	8.0	8.94
Alcott St.						
9/21/94	12:25	21.0	0.602	8.23	8.4	9.95

Alcott Street = Station SWP2
Cork Street = Station SWP1

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SURFACE WATER SAMPLING FIELD LOG-GRAB

Sample Depth	~2" Below water surf
Approximate Flow Rate	
Volume of Sampling Device	1 L Bottles
Total Water Depth	Field meas. mark at Alcott St. Dam: 11.1' Staff gauge: 1.45'
Distance From Bank	~ 10'
Depth Below Surface of Water Removed	~2"

Location	SWP2 → A66013
Weather	Sunny, Hazy
Air Temperature	—
Samplers	BDL/[redacted]
Date	9/21/94
Time	12:25

Temperature	21.0°C
Conductivity	.602
pH	8.23
Dissolved Oxygen	8.40
Turbidity	9.95

Comments _____

6/15/93
16933625

KB61301695

SURFACE WATER SAMPLING FIELD LOG-GRAB

Sample Depth	~2" BELOW WATER SURF.
Approximate Flow Rate	—
Volume of Sampling Device	1 L BOTTLES
Total Water Depth	FIELD MEAS. MARK ON BRIDGE TO WATER SURF.: 7.4'
Distance From Bank	~7'
Depth Below Surface of Water Removed	~2"

Location	SWP1 → A66014
Weather	SUNNY / HAZY
Air Temperature	—
Samplers	BDL
Date	9/21/94
Time	13:00

Temperature	21.5°C
Conductivity	.630
pH	8.22
Dissolved Oxygen	8.00
Turbidity	8.94

Comments _____

6/16/93
16933423

KB61301696

MEMORANDUM

BBL
BLASLAND, BOUCK & LEE, INC.
engineers & scientists

To: Files

Date: 6/5/98

Re: Renumbering of LTI Samples

cc:

As explained on the following page, samples collected by LTI on May 19, 1997 were renumbered. The corrected sample numbers have been noted throughout the report.

EBM/ebm

KB61301697

BLASLAND, BOUCK & LEE

SUBJECT	PROJ. NO.	BY	DATE	SHEET
	645.51	AEG	7/29/97	1 of 1

The following samples collected by LTI were renumbered because the IDs had been previously used:

SAMPLE DATE	ORIGINAL ID		CORRECTED ID
5-19-97	A66552	→	A66590
	A66553	→	A66591
	A66554	→	A66592
↓	A66555	→	A66593
5-19-97	K34153	→	K34155
	K34154	→	K34156
	K34155	→	K34157
	K34156	→	K34158
↓	K34157	→	K34159

KB61301698

Memorandum

JUN 6

TO: Files **DATE:** June 12, 1997
PROJECT: JD7-3
FROM: John Peterson, Cathy Whiting **COPIES:** Dawn Penniman

SUBJECT: Allied Paper Operable Unit-Surface Water Sampling

Surface water sampling of Portage Creek was conducted by LTI Environmental Engineering on May 19, 1997, at the request of Blasland, Bouck & Lee (BBL). John Peterson of LTI met with Scott Cornelius and Emily Bell of the Michigan Department of Environmental Quality (MDEQ), who were to provide oversight and obtain split samples. The sampling locations agreed upon on May 15, 1997 were Portage Creek at the downstream end of the Allied Paper Operable Unit at Alcott Street (SWP-2) and Portage Creek at Cork Street (SWP-1). In addition to the agreed upon locations, MDEQ requested that samples be collected at two additional Portage Creek locations and four Kalamazoo River locations. Specific details regarding the collection of each sample are given below:

Sample SWP-1 (A66553)
- Sample collected at 5:00 p.m.
- Sample location was Portage Creek at Cork Street, on the north side of the culvert.
- Sample collected 2 inches below the surface.
- LTI collected the sample, MDEQ did not obtain a split sample.

Sample SWP-2 (A66552)
- Sample collected at 11:55 a.m.
- Sample location was Portage Creek, 150 yards downsteam of Alcott Street.
- Sample collected 2 inches below the surface.
- LTI collected the sample, MDEQ obtained a split sample.

Sample Byant Mill Pond (A66555)
- Sample collected at 12:20 p.m.
- Sample location was Bryant Mill Pond, 10 feet from the east bank, upstream of the dam.
- Sample collected 2 inches below the surface.
- LTI collected the sample, MDEQ obtained a split sample.

Sample SWP-3A (K43153)
- Sample collected at 1:50 p.m.
- Sample location was Portage Creek at the Gibson Street bridge.
- Sample was collected 2 inches below the surface.
- LTI collected the sample, MDEQ obtained a split sample.

Sample Plainwell Dam (K34154)

- Sample collected at 2:30 p.m.
- Sample location was the Kalamazoo River at Plainwell Dam, at the tip of the peninsula.
- Sample was collected 2 inches below the surface.
- LTI collected the sample, MDEQ obtained a split sample.

Sample Otsego Dam (K34155)

- Sample collected at 2:50 p.m.
- Sample location was the Kalamazoo River at Otsego Dam, 50 yards upstream of Bittersweet Ski Area entrance.
- Sample was collected 2 inches below the surface.
- LTI collected the sample, MDEQ obtained a split sample.

Sample Trowbridge Dam (K34156)

- Sample collected at 3:10 p.m.
- Sample location was the Kalamazoo River at Trowbridge Dam, 30 yards downstream of 26th Street bridge.
- Sample was collected 2 inches below the surface.
- LTI collected the sample, MDEQ obtained a split sample.

Sample Allegan Dam (K34157)

- Sample collected at 3:55 p.m.
- Sample location was the Kalamazoo River at Allegan Dam, at public boat launch, just upstream of the dock.
- Sample was collected 2 inches below the surface.
- LTI collected the sample, MDEQ obtained a split sample.

The samples were collected using sampling protocols provided in the 1993 Field Sampling Plan for the API-OU. The samples were submitted to Aquatec for PCB and total suspended solids analysis using methods detailed in the 1993 QA/QC Project Plan for the Allied Paper, Inc./ Portage Creek/Kalamazoo River Superfund Site.

5-19-97

(8)

PORTAGE CREEK SAMPLING - SPECIAL EVENT W/DEQ

ON SITE - 11:35 - JTP - LTI
- Scott Cornelius - DEQ
- Emily Bell - DEQ Intern

Scott Cornelius - Requested we Pull Samples + Move on - Not interested in flow measurements or other water parameter measurements - I will return for these readings later -

All Equipment Calibrated at LTI - Kalamazoo field office - at 10:30AM. (see Calibration sheets)

11:45 - Arrived on site - (SWP-2) A66552 + A66554 (Dup)
weather - partly cloudy/sunny - 65°F

Number + volume of Samples Taken at each Location - LTI - 2 - 950ml - Amber Bottle - PCB's
1 - 1L Plastic Bottle - TSS

DEQ - 3 - 950ml - Amber Bottles - PCB's

11:55 - JTP - Collecting Samples (SWP-2) - 2" Below Surface
- STAFF Gauge reading - 1.86'
- LTI - Duplicate Taken - (A66554)

12:05 - DEQ - ~~Reg~~ Requested to Sample above stream of Dam - (bryant Mill Pond) -

KB61301701

KB11902811

5-19-97

(9)

12:10 - on site Bryant Mill Dam - Alcott Street

12:20 - Sample - (Bryant M.) A66555
Wade into Creek from East Bank - 10'
upstream of Dam - split Sample w/ DNR

informed of DEQ's intension to Sample The
Kalamazoo River and Portage creek
Downstream of the allied site -
Asked To go Along to split Samples -
~~Sampling OKed by~~
OKed Sample split with Greg Peterson
of LTI - Asked DEQ for TIME To
Get Bottles together + Prep Sampling
Equipment -

DNR - Not interested in Sampling at Cork
street (sup-1) - So will Take Sample
Later -

Further Sampling - (Planned by DEQ - "at Request
of Surface Water Quality") To be
Taken upstream of Portage Creek and
Kalamazoo River Confluents - (I Suggested
(SWR-3A) - at Gibson ST. Bridge) and Downstream at
of Four Dams on The Kalamazoo River.
The Four Dams are - Plainwell, ~~Otsego~~ Otsego
Trowbridge, + Allegan Dams

KB61301702
KB11902812

5-19-97

(10)

13:40 - On Site - (SWP-3A) K34153
Gibson street Bridge -
Sample Bottles the Same - Procedures as Before

13:50 - Sample - (SWP-3A) K34153
No Flow or other Measurements Taken

14:20 - On site - Plainwell Dam K34154
M89 - EAST - 12th ST - RT - RT on dirt Road

14:30 - Sample Taken - ~~walk~~ waded in at
Tip of peninsula - K34154

14:50 - On site - Downstream of Otsego Dam - K34155
- Walked in to Woods - Approx - 50 yds upstream
of Bittersweet ski Area Entrance - waded in

15:00 - Sample Taken - K34155

15:10 - On Site - Trowbridge Dam - K34156
- Approx - 30 yds Downstream of 26th ST Bridge
- Waded in From South Bank

15:20 - Sample Taken - K34156

KB61301703

KB11902813

15:45 - On Site - Allegan Dam - K34157
- at Public Boat Launch - Just upstream of Dock
15:55 - Sample Taken - K34157

5-19-97

(11)

16:05 - Say Good-bye To Scott & Emily - Head Back To Allied Site -

~~OUS~~

16:50 - ON SITE (SWP-1) - STP of LTI only

17:00 - Sample (SWP-1) A66553
- Sample Taken 2" below Surface at ~~South~~ North Side of Culvert

17:05 - Field Measurements -
- Mark on Bridge to water Surface - KeckProbe - 7.05'

(1)

18.2°C	Temp	18.2°C
8.44	PH	8.44
0.573	Cond.	0.574
9.91	Turb.	10.0

17:10

Culvert (North side)

W E

Depth (ft)	X1 1.8	X2 2.4	X3 2.5	X4 2.4	X5 1.9
0.2	0.55	1.02	1.56	1.74	1.82
0.8	0.54	0.52	0.83	1.18	1.48

KB61301704

KB11902814

off site - 17:40

5-19-97

(12)

17:45 - on site - (swp-2)

17:50 - Field Measurements
- Measurement - Mark on wall to water surface - (Keck), 7.65'
- STAFF Gauge - 1.72 - creek -

①		②
8.49	PH	8.49
18.0	Temp	18.0
0.583	Cond.	0.583
10.2	Turb	10.6

18:05

W 1 2 3 4 5 E

DEPTH (FT)	0.8	1.8	1.6	1.7	1.6
0.2	0.34	1.58	1.03	1.98	1.73
0.8	0.22	1.45	0.56	1.33	1.61

18:35 - Field Measurements -
- Dam staff Reading - 779.89'
- Measurement - Mark on Alcott Street Dam using Keck Probe - 10.12'

off Site - 18.45

KB61301705

Ship Samples Tomorrow To AQUATEC -

KB11902815

LTI – Limno-Tech, Inc.
Memorandum

TO: Rick DiFiore

DATE: November 7, 1994
PROJECT: KZRV1

FROM: Tim Feist

SUBJECT: Field report for September 8, 1994 Portage Creek base flow sampling survey

---

This report summarizes the field observations and field data obtained during the September 8, 1994 base flow sampling survey of Portage Creek. During this survey personnel from Limno-Tech, Inc. (LTI) sampled two water sampling stations on Portage Creek: at Cork Street (SWP1) and near Alcott Street (SWP2). LTI personnel collected water samples, recorded field measurements of water quality parameters, and measured stream discharge at these sites during a single sampling circuit. Portage Creek flows had exceeded the target base flow criteria of 45 cfs since August, 1993 due to higher than normal precipitation last fall. B&B requested that additional base flow samples be obtained once discharge decreased below approximately 50 cfs. Discharge during the September 8, 1994 survey met the base flow criteria. Field measurements for the survey are included below.

SURVEY PARTICIPANTS

The survey participants included:

John Peterson (LTI)
Brian Lord (LTI)

BASE FLOW SAMPLING SURVEY RESULTS

Sampling procedures did not vary from the procedures specified in the QAPP, except for slight alterations in the grab sampling methodology and in stream discharge measurements. The procedures used were previously approved by B&B and described in the September 13, 1993 field report. Grab samples were obtained directly with the laboratory-supplied bottles. Stream velocity was measured more frequently than specified in the QAPP, at five locations across the stream at each station. QA/QC samples were obtained in accordance with the specifications of the QAPP.

The sample I.D.'s corresponding to sampling time and site are listed in Table 1 below. Stream velocity measurements and discharge calculation results are included in Table 2.

Table 1. Sample Identification and Time of Sampling.

Sample I.D.	Station	Date	Time	Notes
A660011	Alcott St.	9/8/94	15:55	
A660010	Cork St.	9/8/94	16:40	

Alcott Street = Station SWP2
Cork Street = Station SWP1

KB61301706

Table 2. Stream Discharge Measurements.

Date	Time	Avg. Velocity (ft/s)	Avg. Depth (ft)	Discharge (ft^3/s)	Gage Height (ft)
Cork Street					
9/8/94	16:50	1.43	2.1	42.6	7.4
Alcott: Street					
9/8/94	16:05	1.89	1.1	47.6	11.05

Creek width at Cork Street = 14.2 feet
Creek width at Alcott Street = 22.9 feet

Field parameters were measured as specified in the QAPP and the field instrument standard procedures submitted by LTI. All parameters were measured in duplicate and the averages of measurements are included in Table 3. Specific conductance samples were collected in bottles and analyzed at the LTI office.

Table 3. Field Parameter Average Measurements.

Date	Time	Temp (°C)	Spec. Cond. (mS/cm @ 25°C)	pH (S.U.)	D.O. (mg/L)	Turbidity (NTU)
Cork St.						
9/8/94	16:40	21.5	0.612	8.22	7.8	9.82
Alcott St.						
9/8/94	15:55	20.5	0.590	8.24	8.5	11.0

Alcott Street = Station SWP2
Cork Street = Station SWP1

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SURFACE WATER SAMPLING FIELD LOG-GRAB

Sample Depth	~2" Below water surf.
Approximate Flow Rate	42.55 cfs
Volume of Sampling Device	1 L Bottles
Total Water Depth	2.1'
Distance From Bank	~7"
Depth Below Surface of Water Removed	~2"

Location	SWP1 → A6 ~~0~~ 10
Weather	Sunny / Ptly cloudy
Air Temperature	—
Samplers	BDL / JTP
Date	9/8/94
Time	16:40

Temperature	21.5°C
Conductivity	.612
pH	8.22
Dissolved Oxygen	7.83
Turbidity	9.82

Comments _____

6/15/93
10633625

KB61301708

SURFACE WATER SAMPLING FIELD LOG-GRAB

Sample Depth	~2" Below water surf.
Approximate Flow Rate	47.6' cfs
Volume of Sampling Device	1 L Bottles
Total Water Depth	1.1'
Distance From Bank	~10'
Depth Below Surface of Water Removed	~2"

Location	SWPZ → A6~~6~~4 0 [illegible] Stt
Weather	Sunny / Ptly. cloudy
Air Temperature	—
Samplers	BDL / JTP
Date	9/8/94
Time	15:55

Temperature	20.5°C
Conductivity	.590
pH	8.24
Dissolved Oxygen	8.50
Turbidity	10.95

Comments _____

6/15/93
16933623

KB61301709

VELOCITY PROFILE MEASUREMENT LOG

Station	Depth (ft)		Velocity (fps)		Average Velocity (fps)	Total Depth (ft)
	0.2	0.8	0.2	0.8		
1			1.07	0.87	0.97	1.8
2			1.40	0.88	1.14	2.3
3			1.44	0.91	1.18	2.4
4			2.02	1.50	1.76	2.2
5			2.21	1.95	2.08	1.8
				Average	1.43	2.1

Location	SWP1 → A6~~6~~4010
Weather	SUNNY / PTLY. CLOUDY
Air Temperature	—
Samples	BDL / JTP
Total River Width	14.17'
Date	9/8/94
Time	16:50
Flow	42.55 cfs

Comments:

VELOCITY PROFILE MEASUREMENT LOG

Station	Depth (ft)		Velocity (fps)		Average Velocity (fps)	Total Depth (ft)
	0.2	0.8	0.2	0.8		
1			2.55	2.24	2.40	1.4
2			2.97	1.72	2.35	1.2
3			1.94	1.11	1.53	1.1
4			1.82	1.37	1.60	0.8
5			1.66	1.48	1.57	1.0
				Average	1.89	1.10

4

Location	SWP2 → A6601)
Weather	SUNNY / PTLY. CLOUDY
Air Temperature	—
Samples	BDL/JTP
Total River Width	22.96'
Date	9/8/94
Time	16:05
Flow	47.61 cfs

Comments:

KB61301711

LTI – Limno-Tech, Inc.
Memorandum

TO: Rick DiFiore

DATE: November 7, 1994

PROJECT: KZRV1

FROM: Tim Feist

SUBJECT: Field report for September 21, 1994 Portage Creek base flow sampling survey

---

This report summarizes the field observations and field data obtained during the September 21, 1994 base flow sampling survey of Portage Creek. During this survey personnel from Limno-Tech, Inc. (LTI) sampled two water sampling stations on Portage Creek: at Cork Street (SWP1) and near Alcott Street (SWP2). LTI personnel collected water samples and recorded field measurements of water quality parameters. Portage Creek flows had exceeded the target base flow criteria of 45 cfs since August, 1993 due to higher than normal precipitation last fall. B&B requested that additional base flow samples be obtained once discharge decreased below approximately 50 cfs. Discharge during the September 21, 1994 survey met the base flow criteria. Field measurements for the survey are included below.

SURVEY PARTICIPANTS

The survey participants included:

Brian Lord (LTI)

BASE FLOW SAMPLING SURVEY RESULTS

Sampling procedures did not vary from the procedures specified in the QAPP except for slight alterations in the grab sampling methodology. The procedures used were previously approved by B&B and described in the September 13, 1993 field report. Grab samples were obtained directly with the laboratory-supplied bottles. Stream velocity was not measured during this survey, but a staff gage measurement from an LTI gage near Alcott Street indicated that flows were approximately 49 cfs. QA/QC samples were obtained in accordance with the specifications of the QAPP.

The sample I.D.'s corresponding to sampling time and site are listed in Table 1 below. Stream velocity measurements and discharge calculation results are included in Table 2.

Table 1. Sample Identification and Time of Sampling.

Sample I.D.	Station	Date	Time	Notes
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Alcott Street = Station SWP2
Cork Street = Station SWP1

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Date	Time	Avg. Velocity (ft/s)	Avg. Depth (ft)	Discharge (ft^3/s)	Gage Height (ft)
Cork Street					
9/21/94	13:00	–	–	–	7.4
Alcott Street					
9/21/94	12:25	–	–	–	11.1

Creek width at Cork Street = 14.2 feet
Creek width at Alcott Street = 22.9 feet

Field parameters were measured as specified in the QAPP and the field instrument standard procedures submitted by LTI. All parameters were measured in duplicate and the averages of measurements are included in Table 3. Specific conductance samples were collected in bottles and analyzed at the LTI office.

Table 3. Field Parameter Average Measurements.

Date	Time	Temp (°C)	Spec. Cond. (mS/cm @ 25°C)	pH (S.U.)	D.O. (mg/L)	Turbidity (NTU)
Cork St.						
9/21/94	13:00	21.5	0.630	8.22	8.0	8.94
Alcott St.						
9/21/94	12:25	21.0	0.602	8.23	8.4	9.95

Alcott Street = Station SWP2
Cork Street = Station SWP1

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SURFACE WATER SAMPLING FIELD LOG-GRAB

Sample Depth	~2" Below water surf
Approximate Flow Rate	
Volume of Sampling Device	1 L Bottles
Total Water Depth	Field meas. mark at Alcott St. Dam: 11.1' Staff gauge: 1.45'
Distance From Bank	~ 10'
Depth Below Surface of Water Removed	~2"

Location	SWP2 → A66013
Weather	Sunny, Hazy
Air Temperature	—
Samplers	BDL/[redacted]
Date	9/21/94
Time	12:25

Temperature	21.0°C
Conductivity	.602
pH	8.23
Dissolved Oxygen	8.40
Turbidity	9.95

Comments _____

6/15/93
16933625

KB61301714

SURFACE WATER SAMPLING FIELD LOG-GRAB

Sample Depth	~2" BELOW WATER SURF.
Approximate Flow Rate	—
Volume of Sampling Device	1 L BOTTLES
Total Water Depth	FIELD MEAS. MARK ON BRIDGE TO WATER SURF.: 7.4'
Distance From Bank	~7'
Depth Below Surface of Water Removed	~2"

Location	SWP1 → A66014
Weather	SUNNY / HAZY
Air Temperature	—
Samplers	BDL
Date	9/21/94
Time	13:00

Temperature	21.5°C
Conductivity	.630
pH	8.22
Dissolved Oxygen	8.00
Turbidity	8.94

Comments _____

6/15/93
16833623

KB61301715

Memorandum

TO:	Files	DATE:	June 12, 1997
		PROJECT:	JD7-3
FROM:	John Peterson, Cathy Whiting	COPIES:	Dawn Penniman
SUBJECT:	Allied Paper Operable Unit-Surface Water Sampling		

Surface water sampling of Portage Creek was conducted by LTI Environmental Engineering on May 19, 1997, at the request of Blasland, Bouck & Lee (BBL). John Peterson of LTI met with Scott Cornelius and Emily Bell of the Michigan Department of Environmental Quality (MDEQ), who were to provide oversight and obtain split samples. The sampling locations agreed upon on May 15, 1997 were Portage Creek at the downstream end of the Allied Paper Operable Unit at Alcott Street (SWP-2) and Portage Creek at Cork Street (SWP-1). In addition to the agreed upon locations, MDEQ requested that samples be collected at two additional Portage Creek locations and four Kalamazoo River locations. Specific details regarding the collection of each sample are given below:

Sample SWP-1 (A66553)
- Sample collected at 5:00 p.m.
- Sample location was Portage Creek at Cork Street, on the north side of the culvert.
- Sample collected 2 inches below the surface.
- LTI collected the sample, MDEQ did not obtain a split sample.

Sample SWP-2 (A66552)
- Sample collected at 11:55 a.m.
- Sample location was Portage Creek, 150 yards downsteam of Alcott Street.
- Sample collected 2 inches below the surface.
- LTI collected the sample, MDEQ obtained a split sample.

Sample Byant Mill Pond (A66555)
- Sample collected at 12:20 p.m.
- Sample location was Bryant Mill Pond, 10 feet from the east bank, upstream of the dam.
- Sample collected 2 inches below the surface.
- LTI collected the sample, MDEQ obtained a split sample.

Sample SWP-3A (K43153)
- Sample collected at 1:50 p.m.
- Sample location was Portage Creek at the Gibson Street bridge.
- Sample was collected 2 inches below the surface.
- LTI collected the sample, MDEQ obtained a split sample.

Sample Plainwell Dam (K34154)

- Sample collected at 2:30 p.m.
- Sample location was the Kalamazoo River at Plainwell Dam, at the tip of the peninsula.
- Sample was collected 2 inches below the surface.
- LTI collected the sample, MDEQ obtained a split sample.

Sample Otsego Dam (K34155)

- Sample collected at 2:50 p.m.
- Sample location was the Kalamazoo River at Otsego Dam, 50 yards upstream of Bittersweet Ski Area entrance.
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Sample Trowbridge Dam (K34156)

- Sample collected at 3:10 p.m.
- Sample location was the Kalamazoo River at Trowbridge Dam, 30 yards downstream of 26th Street bridge.
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- Sample collected at 3:55 p.m.
- Sample location was the Kalamazoo River at Allegan Dam, at public boat launch, just upstream of the dock.
- Sample was collected 2 inches below the surface.
- LTI collected the sample, MDEQ obtained a split sample.

The samples were collected using sampling protocols provided in the 1993 Field Sampling Plan for the API-OU. The samples were submitted to Aquatec for PCB and total suspended solids analysis using methods detailed in the 1993 QA/QC Project Plan for the Allied Paper, Inc./ Portage Creek/Kalamazoo River Superfund Site.

5-19-97

(8)

PORTAGE CREEK SAMPLING - SPECIAL EVENT w/DEQ

ON SITE - 11:35 - JTP - LTI
- Scott Cornelius - DEQ
- Emily Bell - DEQ Intern

Scott Cornelius - Requested we Pull Samples & move on - not interested in flow measurements or other water parameter measurements - I will return for these readings later -

All Equipment Calibrated at LTI - Kalamazoo field office - at 10:30am. (see Calibration sheets)

11:45 - Arrived on site - (SWP-2) A66552 + A66554 (Dup)
weather - partly cloudy/sunny - 65°F

Number + volume of Samples Taken at each Location - LTI - 2 - 950ml - Amber Bottles - PCB's
1 - 1L Plastic Bottle - TSS

DEQ - 3 - 950ml - Amber Bottles - PCB's

11:55 - JTP - Collecting Samples (SWP-2) - 2" Below Surface
- STAFF Gauge reading - 1.86'
- LTI - Duplicate Taken - (A66554)

12:05 - DEQ - ~~Reg~~ Requested to Sample above stream of Dam - (Bryant Mill Pond) -

KB61301718

5-19-97

(9)

12:10 - on site Bryant Mill Dam - Alcott Street

12:20 - Sample - (Bryant M.) A66555
Wade into Creek from East Bank - 10'
upstream of Dam - split Sample w/ DNR

informed of DEQ's intension to Sample The
Kalamazoo River and Portage creek
Downstream of the allied site -
Asked To go Along to split Samples -
~~Sampling OKed by~~
OKed Sample split with Greg Peterson
of LTI - Asked DEQ for TIME To
Get Bottles together + Prep Sampling
Equipment -

DNR - Not interested in Sampling at Cork
street (SWP-1) - So will Take Sample
Later -

Further Sampling - (Planned by DEQ - "at Request
of Surface water Quality") To be
Taken upstream of Portage Creek and
Kalamazoo River Confluents - (I Suggested
(SWP-3A) - at Gibson ST. Bridge) and Downstream at
of Four Dams on the Kalamazoo River -
The Four Dams are - Plainwell, ~~Otsego~~ Otsego
Trowbridge + Allegan Dams

KB61301719

5-19-97

(10)

13:40 - On Site - (SWP-3A) K34153
Gibson street Bridge -
Sample Bottles the Same - Procedure as Before

13:50 - Sample - (SWP-3A) K34153
No Flow or other Measurements Taken

14:20 - On site - Plainwell Dam K34154
M89 - EAST - 12th ST - RT - RT on dirt Road

14:30 - Sample Taken - ~~south~~ Waded in at
Tip of peninsula - K34154

14:50 - On site - Downstream of Otsego Dam - K34155
- Walked in to Woods - Approx - 50yds upstream
of Bittersweet ski Area Entrance - Waded in

15:00 - Sample Taken - K34155

15:10 - On Site - Trowbridge Dam - K34156
- Approx - 30yds Downstream of 26th ST Bridge
- Waded in From South Bank.

15:20 - Sample Taken - K34156

15:45 - On Site - Allegan Dam - K34157
- at Public Boat Launch - Just upstream of Dock
15:55 - Sample Taken. K34157

KB61301720

5-19-97

(11)

16:05 - Say Good-bye To Scott + Emily - Head Back To Allied Site —

~~OUS~~

16:50 - ON SITE (SWP-1) - JTP + LTI only

17:00 - Sample (SWP-1) A66553
- Sample Taken 2" below Surface at ~~South~~ North Side of Culvert

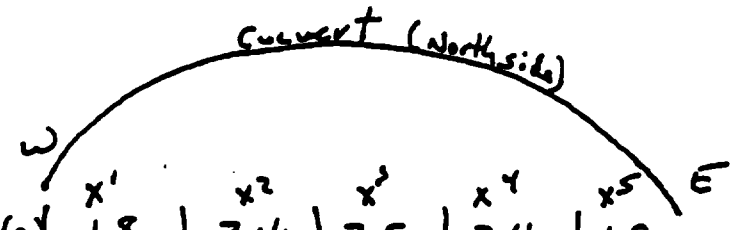
17:05 - Field Measurements —
- Mark on Bridge to water Surface - Keck Probe - 7.05'

①

18.2°C	Temp	18.2°C
8.44	PH	8.44
0.573	Cond.	0.574
9.91	Turb.	10.0

14.

17:10



	x^1	x^2	x^3	x^4	x^5
Depth(ft)	1.8	2.4	2.5	2.4	1.9
0.2	0.55	1.02	1.56	1.74	1.82
0.8	0.54	0.52	0.83	1.18	1.48

1.8
2.4
2.5
2.4
1.9
5 | 11.0
1.9
12

off site - 17:40

KB61301721

5-19-97

(12)

17:45 - on site - (swp-2)

17:50 - Field Measurements
- Measurement - Mark on wall to water surface - 7.65' (Keck),
- STAFF Gauge - 1.72 - creek -

①		②
8.49	PH	8.49
18.0	Temp	18.0
0.583	Cond.	0.583
10.2	Turb	10.6

22 ft.

18:05

W 1 2 3 4 5 E

Depth (ft)	0.8	1.8	1.6	1.7	1.6
0.2	0.34	1.58	1.03	1.98	1.73
0.8	0.22	1.45	0.56	1.33	1.61

18:35 - Field Measurements -
- Dam staff Reading - 779.89'
- Measurement - Mark on Alcott Street Dam using Keck Probe - 10.12'

off Site - 18:45

Ship Samples Tomorrow To AQUATEC -

KB61301722

LTI – Limno-Tech, Inc.
Memorandum

TO:	Rick DiFiore	**DATE:**	July 6, 1994
		PROJECT:	KZRV1
FROM:	Tim Feist		

SUBJECT: Field report for April 11-14, 1994 Portage Creek storm event sampling survey

---

This report summarizes the field observations and field data obtained during the April 11 to April 14, 1994 storm event sampling survey of Portage Creek. During this survey personnel from Limno-Tech, Inc. (LTI) sampled two water sampling stations on Portage Creek: at Cork Street (SWP1) and near Alcott Street (SWP2). LTI personnel obtained water samples and estimated stream discharge from a gage at the Alcott Street site during sixteen separate sampling circuits over four days. This survey was conducted as a supplement to the previous three Portage Creek surveys specified in the Work Plan. The objective of this survey was to obtain water samples throughout both the rising and falling legs of the hydrograph. In contrast, sampling in the previous surveys began after a specified criteria flow was reached, as specified in the work plan, and as a result the rising leg of the hydrograph was not adequately characterized.

SURVEY PARTICIPANTS

The survey participants included:

John Peterson (LTI)

STORM EVENT FLOW SAMPLING SURVEY RESULTS

Sampling procedures did not vary from the procedures specified in the QAPP, except for slight alterations in the grab sampling methodology. Water samples were collected as frequently as at two hour intervals. To avoid disturbing the stream or sediment and creating non-representative samples downstream, water samples were collected from the stream bank. Field parameters, such as dissolved oxygen or conductivity, were not measured during this survey. Grab samples were obtained directly with the laboratory-supplied bottles. QA/QC samples were obtained in accordance with the specifications of the QAPP. Creek flow was estimated based upon a staff gage at the Alcott Street site (SWP2) and a previously developed rating curve.

LTI mobilized for sampling the storm flows based upon high Creek flows and a forecast of rain. A total of 1.5 inches of precipitation (as recorded at an LTI gage in Kalamazoo) fell between 19:00 on April 11 and 12:00 on April 13, 1994. Approximately 1 inch of the total fell during April 12.

The sample I.D.'s and estimated flows corresponding to sampling time and site are listed in Table 1 below.

Table 1. Sample Identification and Estimated Flow.

Sample I.D.	Station Number	Station Name	Date	Time	Est. Flow (cfs)	Notes
A66553	SWP2	Alcott	4/11/94	21:45	69	
A66554	SWP1	Cork	4/11/94	22:15		
A66555	SWP2	Alcott	4/12/94	8:30	95	
A66556	SWP1	Cork	4/12/94	9:00		
A66557	SWP2	Alcott	4/12/94	10:30	105	MS/MSD also collected
A66558	SWP1	Cork	4/12/94	11:10		
A66559	SWP2	Alcott	4/12/94	10:30		field duplicate of A66557
A66560	SWP2	Alcott	4/12/94	12:30	118	
A66561	SWP1	Cork	4/12/94	13:00		
A66562	SWP2	Alcott	4/12/94	14:30	128	
A66563	SWP1	Cork	4/12/94	15:00		
A66564	SWP2	Alcott	4/12/94	17:00	128	
A66565	SWP1	Cork	4/12/94	17:30		
A66566	SWP2	Alcott	4/12/94	19:00	121	
A66567	SWP1	Cork	4/12/94	19:30		
A66568	SWP2	Alcott	4/12/94	21:00	118	
A66569	SWP1	Cork	4/12/94	21:30		
A66570	SWP2	Alcott	4/12/94	23:30	118	
A66571	SWP1	Cork	4/12/94	23:55		
~~A66572~~	~~SWP2~~	~~Alcott~~	~~4/13/94~~	~~4:00~~		too foggy to safely sample,
~~A66573~~	~~SWP1~~	~~Cork~~	~~4/13/94~~	~~4:30~~		circuit canceled
A66574	SWP2	Alcott	4/13/94	8:00	105	
A66575	SWP1	Cork	4/13/94	8:30		
A66576	SWP2	Alcott	4/13/94	12:30	98	
A66577	SWP1	Cork	4/13/94	12:45		
A66578	SWP2	Alcott	4/13/94	17:00	92	
A66579	SWP1	Cork	4/13/94	17:15		
A66580	SWP2	Alcott	4/13/94	22:30	85	MS/MSD also collected
A66581	SWP1	Cork	4/13/94	23:00		
A66582	SWP2	Alcott	4/13/94	22:30		field duplicate of A66580
A66583	SWP2	Alcott	4/14/94	12:30		
A66584	SWP1	Cork	4/14/94	12:45		
A66585	SWP2	Alcott	4/14/94	16:45		
A66586	SWP1	Cork	4/14/94	17:00		
A66587	SWP2	Alcott	4/14/94	23:30		
A66588	SWP1	Cork	4/14/94	23:50		
A66589	SWP2	Alcott	4/14/94	23:30		field duplicate of A66587

LTI – Limno-Tech, Inc.
Memorandum

TO: Rick DiFiore **DATE:** July 26, 1994
PROJECT: KZRV1

FROM: Tim Feist

SUBJECT: Field report for June 9, 1994 Portage Creek base flow sampling survey

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This report summarizes the field observations and field data obtained during the June 9, 1994 base flow sampling survey of Portage Creek. During this survey personnel from Limno-Tech, Inc. (LTI) sampled two water sampling stations on Portage Creek: at Cork Street (SWP1) and near Alcott Street (SWP2). LTI personnel collected water samples, recorded field measurements of water quality parameters, and measured stream discharge at these sites during a single sampling circuit. Portage Creek flows had exceeded the target base flow criteria of 45 cfs since August, 1993 due to higher than normal precipitation last fall. B&B requested that a base flow sample be obtained once discharge decreased below the target criteria. Discharge during the June 9, 1994 survey met the base flow criteria. This survey was the fourth Portage Creek base flow survey. Field measurements for the survey are included below.

SURVEY PARTICIPANTS

The survey participants included:

John Peterson (LTI)
Brian Lord (LTI)

BASE FLOW SAMPLING SURVEY RESULTS

Sampling procedures did not vary from the procedures specified in the QAPP, except for slight alterations in the grab sampling methodology and in stream discharge measurements. The procedures used were previously approved by B&B and described in the September 13, 1993 field report. Grab samples were obtained directly with the laboratory-supplied bottles. Stream velocity was measured more frequently than specified in the QAPP, at five locations across the stream at each station. QA/QC samples were obtained in accordance with the specifications of the QAPP.

The sample I.D.'s corresponding to sampling time and site are listed in Table 1 below. Stream velocity measurements and discharge calculation results are included in Table 2.

Table 1. Sample Identification and Time of Sampling.

Sample I.D.	Station	Date	Time	Notes
A6~~6~~4008	Alcott St.	6/9/94	13:30	Also collected CLP TCL/TAL
A6~~6~~4009	Cork St.	6/9/94	14:45	Also collected CLP TCL/TAL

Alcott Street = Station SWP2
Cork Street = Station SWP1

Table 2. Stream Discharge Measurements.

Date	Time	Avg. Velocity (ft/s)	Avg. Depth (ft)	Discharge (ft^3/s)	Gage Height (ft)
Cork Street					
6/9/94	14:55	1.29	1.9	34.7	dry
Alcott Street					
6/9/94	13:45	1.85	0.9	39.8	--

Cork Street gage height at SG-2, on the north side (downstream side) of the road culvert.
Creek width at Cork Street = 14.2 feet
Creek width at Alcott Street = 22.9 feet

Field parameters were measured as specified in the QAPP and the field instrument standard procedures submitted by LTI. All parameters were measured in duplicate and the averages of measurements are included in Table 3. LTI has a turbidimeter installed in a building at the Allied site, and turbidity measurements were made at this building rather than at each station. Turbidity samples were collected in polypropylene bottles at each Creek station and the samples were analyzed for turbidity immediately after the sampling circuit was completed.

Table 3. Field Parameter Average Measurements.

Date	Time	Temp (°C)	Spec. Cond. (mS/cm @ 25°C)	pH (S.U.)	D.O. (mg/L)	Turbidity (NTU)
Cork St.						
6/9/94	14:45	22.1	0.616	8.10	8.6	8.46
Alcott St.						
6/9/94	13:30	18.7	0.589	8.25	8.3	9.34

Alcott Street = Station SWP2
Cork Street = Station SWP1

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SURFACE WATER SAMPLING FIELD LOG-GRAB

Sample Depth	~2" BELOW WATER SURFACE
Approximate Flow Rate	39.82 CFS
Volume of Sampling Device	1 L BOTTLES
Total Water Depth	0.94'
Distance From Bank	~ 11.5'
Depth Below Surface of Water Removed	2"

Location	SWP2 →
Weather	P+ly. cloudy / sunny
Air Temperature	25.1°C
Samplers	BOL / JTP
Date	6/9/94
Time	13:30

Temperature	18.7°C
Conductivity	.589
pH	8.25
Dissolved Oxygen	8.30
Turbidity	9.34

Comments _____

6/18/93
10933625

KB61301727

SURFACE WATER SAMPLING FIELD LOG-GRAB

Sample Depth	~2" BELOW WATER SURF.
Approximate Flow Rate	34.73 cfs
Volume of Sampling Device	1 L BOTTLES
Total Water Depth	1.9'
Distance From Bank	~7'
Depth Below Surface of Water Removed	2"

Location	SWP1 →
Weather	CLEAR SKY / SUNNY
Air Temperature	29.3°C
Samplers	BDL / JTP
Date	6/9/94
Time	12:45

Temperature	22.1°C
Conductivity	.616
pH	8.10
Dissolved Oxygen	~~8.46~~ 8.60
Turbidity	~~8.60~~ 8.46 NTU

Comments _____

6/15/93
10033625

KB61301728

VELOCITY PROFILE MEASUREMENT LOG

Station	Depth (ft)		Velocity (fps)		Average Velocity (fps)	Total Depth (ft)
	0.2	0.8	0.2	0.8		
1			2.95	1.96	2.46	1.1
2			3.09	2.11	2.60	1.2
3			2.24	1.31	1.78	1.1
4			1.49	1.10	1.30	0.7
5			1.32	0.82	1.07	0.6
				Average	1.85	0.94

Location	SWR2 —
Weather	Ptly. cloudy / sunny
Air Temperature	25.1°C
Samples	BOL / JTP
Total River Width	22.90'
Date	6/9/94
Time	13:45
Flow	39.82 CFS

Comments:

KB61301729

VELOCITY PROFILE MEASUREMENT LOG

Station	Depth (ft)		Velocity (fps)		Average Velocity (fps)	Total Depth (ft)
	0.2	0.8	0.2	0.8		
1			1.18	1.02	1.10	1.5
2			1.19	0.75	0.97	2.1
3			1.48	0.88	1.18	2.2
4			1.68	1.37	1.53	2.1
5			1.91	1.38	1.65	1.6
				Average	1.29	1.9

Location	SWP1 →
Weather	CLEAR SKY (SUNNY)
Air Temperature	29.3°C
Samples	BOL/JTP
Total River Width	14.17'
Date	6/9/94
Time	14:55
Flow	34.73 cfs

Comments:

KB61301730

Appendix C

Biota Sampling Field Documentation

BLASLAND, BOUCK & LEE, INC.
engineers & scientists

7/26

Crew: KDS/DWH/CKR 11:10 - 1:30

Shocking on Portage Creek/Bryant Mill Pond using Backpack unit

zed 80% of area of former Bryant Mill Pond.

Tagged 24 Carp
46 White Sucker
1 Fillotable size rock bass

Fish were tagged with blue Floy tags, tagged posterior to dorsal fin, also fin clipped R or L pelvic.

Portage creek in study area, varying substrate ranging from gravel to paper mill residue. Large areas of emergent macrophytes. Carp taken from weedy areas and along bank.

Portage Creek - Range 20-40 ft wide, deepest hole 3-4 ft at at riffle bottom lobes (isthmus)

Creek was mostly shallow to medium depth run, broken by an occassional deep cut and v. shallow riffle.

Only real riffle areas were at access points up & downstream access points. Upstream by landfill, small riffle just east of where you put in. Downstream access, riffle at Isthmus area.

Species Observed

7/26 Carp
White Sucker
Rock Bass
Blacknose Dace
Common Shiner
Creek Chub
1 Small Largemouth
Darter spp. (johnny / Tessellated)
Crayfish
2 Snapping turtles

7/27 Brown trout
Brown Bullhead
Bluegill

7/27

Covered 100% of Portage Creek / former Bryant Mill Pond area

Tagged 27 Carp
63 W. Suckers

Total tagged fish 51 carp
109 White Sucker

This stretch of Portage Creek running through the former Bryant Mill Pond area offers poor habitat for resident fish species. The majority of this stretch runs shallow (< 2 ft. depth) over unconsolidated substrate composed of sand and paper residue. Canopy coverage ranges from 0-20%. Several areas of gravelly substrate and deep run/cuts were interspersed with the more common unconsolidated areas. Only two riffle areas were present in the entire stretch creek shocked. These were located: 1) immediately upstream of the landfill access point 2) immediately downstream the tributary access point at the former isthmus area. A single deep pool was located just downstream of a small like obstruction (appears to be sheet metal). This obstruction spanned the creek in the former isthmus area. Instream structure consisted of a few dead falls and snags on the many steel rods spaced along (within) the creek. In general, carp were taken in weedy areas (> 1 ft deep) and along undercut banks with overhanging vegetation. Suckers were common in deep run/cuts and also along the stream banks. Both carp and suckers were taken in the few locations where in-stream structure was present.

KB60207314

KB61301663

BLASLAND, BOUCK & LEE
ENGINEERS & GEOSCIENTISTS

SUBJECT	PROJ. NO.	BY	DATE	SHEET
Fish Sampling Record / Portage Creek (Former Bryant Mill Pond)				

Site Location #12 - Mark / Recapture

July 26, 1993 Crew: KDS, DWH, DKR Oversight: No oversight

Allied OU - access on foot 2 locations. At power line crossing near landfill and stormwater retention pond also via small creek bed midway between old powerhouse & landfill.

* using the backpack unit we fished/sampled approx 80% of the former Bryant Mill Pond area of creek flow. Target species (carp, sucker, gamefish) were tagged with a blue fly tag and fin clipped (R or L pelvic) = marked 24 carp, 46 white suckers & 1 edible-size rock bass. No smallmouth bass were observed all day.

July 27, 1993 Crew: KDS, DWH, DKR Oversight: No oversight

Allied OU - access via power line and creek bed as described above.

* using backpack unit, sampled 100% of former Bryant Mill Pond Area. Marked 27 carp and 63 white suckers. Again no smallmouth bass were observed.

Nov 8, 1993 Crew: KDS, DWH, RTF Oversight: R. Hunter

Allied OU - access via creek bed and powerline as described above.

* using the backpack unit until batteries ran out, we sampled upper Portage Creek (S of isthmus) and a portion of the lower section capturing 11 marked carp and 7 marked W. suckers. Again saw no edible-size gamefish.

Nov 9, 1993 Crew: KDS, DWH, RTF Oversight: R. Hunter

Allied OU - access via creek bed (as described above) and new location behind former mill buildings, a Second Feeder stream near old powerhouse bldg behind stack.

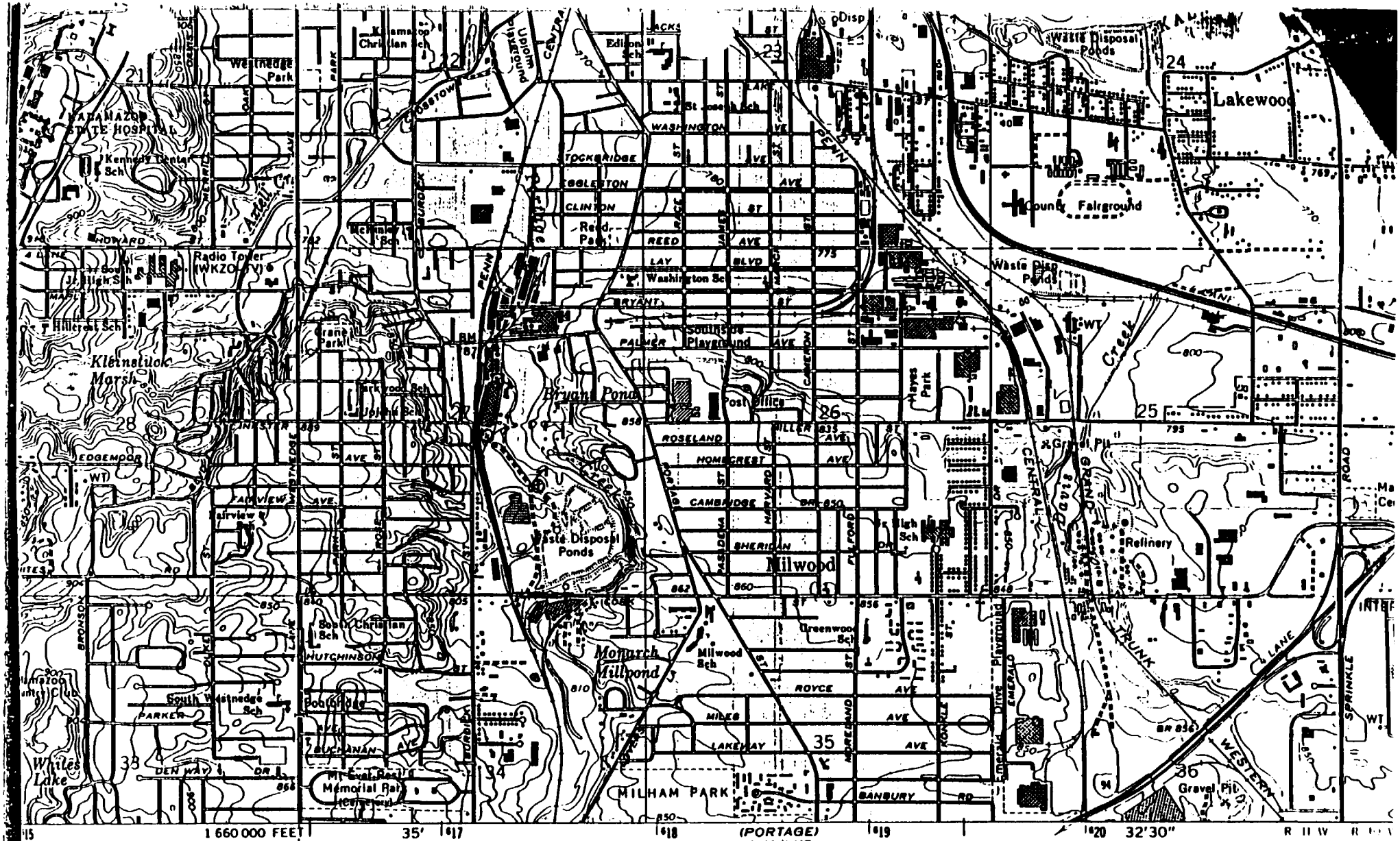
* Using backpack unit sampled lower Portage creek (N of isthmus) and captured 4 marked W. suckers to complete the sucker sample. No edible-size gamefish observed.

Observations

This stretch of P. Creek offers poor habitat for resident fish species. Majority of stream is shallow depth over unconsolidate substrate (sand, paper residue). Limited in-stream structure, banks were low w/some overhanging vegetation. Some areas of in-stream macrophytic growth. During marking efforts all carp were fley tagged & fin clipped, suckers were only fin clipped to reduce stress to these smaller fish. During recapture not one fley tag was observed remaining in any carp. Marked carp were easy to locate, unmarked carp were common but not particularly numerous. Marked suckers were more difficult to locate, unmarked suckers were common and V. numerous outnumbering marked individuals by approx. 7 or 10 to 1.

KB60207315

KB61301664



SCALE 1:24 000

1 0 1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 .5 0 1 KILOMETER

CONTOUR INTERVAL 10 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U. S. GEOLOGICAL SURVEY, DENVER, COLORADO 80225, OR RESTON, VIRGINIA 22092
AND GEOLOGICAL SURVEY DIVISION

MN GN
1½° 27 MILS
0°58' 17 MILS

UTM GRID AND 1973 MAGNETIC NORTH
DECLINATION AT CENTER OF SHEET

MICHIGAN
QUADRANGLE LOCATION

gical Survey
es
ial
m
stem, south zone
ks.
ildings are shown

KB61301665
KB6020731 6

Location #12
portage creek
Bryant Mill Pond.

To place on the predicted North American

ATTACHMENT A-1

FISH COLLECTION
FIELD DATA SHEET

Collection Time 12:30 - 4:00 PM

Collection Date 11/8/93

Water Body Portage Creek

Sampling Location Portage Creek Collected By RJF, DWH, KDS

Processed By RJF

Sampling Method Backpack Electro shocking

Dimension and Mesh Size of Seine (if applicable) _____

Sample #	Species	Total Length(cm)	Weight (g)	Gender	Sample Type	Comments	
K40399-12-CP	Carp	60.5	3.4 KG				
K40400-12-CP		48.5	1.9 KG				pilot study ♀
K40401-12-CP		48.0	1.8 KG				pilot study ♀
K40402-12-CP		52.5	2.0 KG				
K40403-12-CP		52.5	2.3 KG				
K40404-12-CP		52.0	2.1 KG				pilot study ♀
K40405-12-CP		49.0	1.7 KG				pilot study ♂
K40406-12-CP		48.5	1.6 KG				pilot study ♂
K40407-12-CP		47.0	1.7 KG				
K40408-12-CP		48.0	1.7 KG				pilot study ♂
K40409-12-CP		47.0	1.3 KG				
K40410-12-WS	Wh. Sucker	27.0	220 G				
K40411-12-WS		24.5	160 G				
K40412-12-WS		24.5	180 G				
K40413-12-WS		23.0	120 G				
K40414-12-WS		21.0	110 G				
K40415-12-WS		18.0	54 G				
K40416-12-WS		16.0	39 G				

KB60207317

KB61301666

ATTACHMENT A-1

FISH COLLECTION
FIELD DATA SHEET

Collection Time _____

Collection Date 11/9/93

Water Body Portage Creek - Allied

Sampling Location " Collected By KDS, DWH RJF

Processed By DWH RJF

Sampling Method Backpack Electrofisher

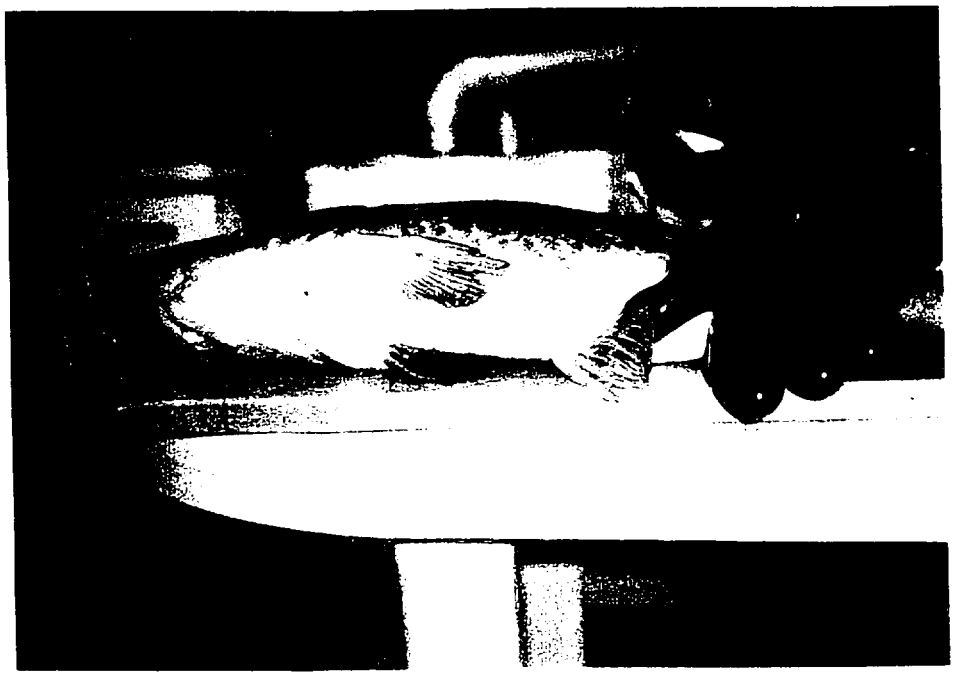
Dimension and Mesh Size of Seine (if applicable) _____

Sample #	Species	Total Length(cm)	Weight (g)	Gender	Sample Type	Comments
P K40417-12-WS	Wh. Sucker	21	87			Fin clipped
P K40418-12-WS	WH. SUCKER	18	48			
P K40419-12-WS	WH. SUCKER	16	37			
P40420-12-WS	WH. SUCKER	15	32			

KB60207318

KB61301667

P40399

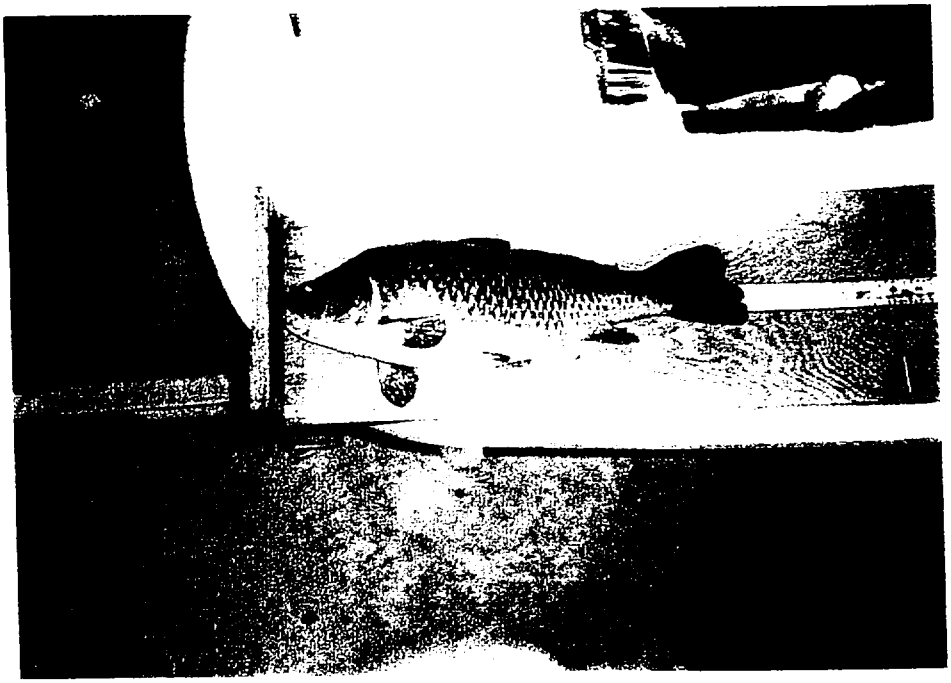


P40399 (clipped fin)

KB61301668

KB60207319

4/5/94
1394667D



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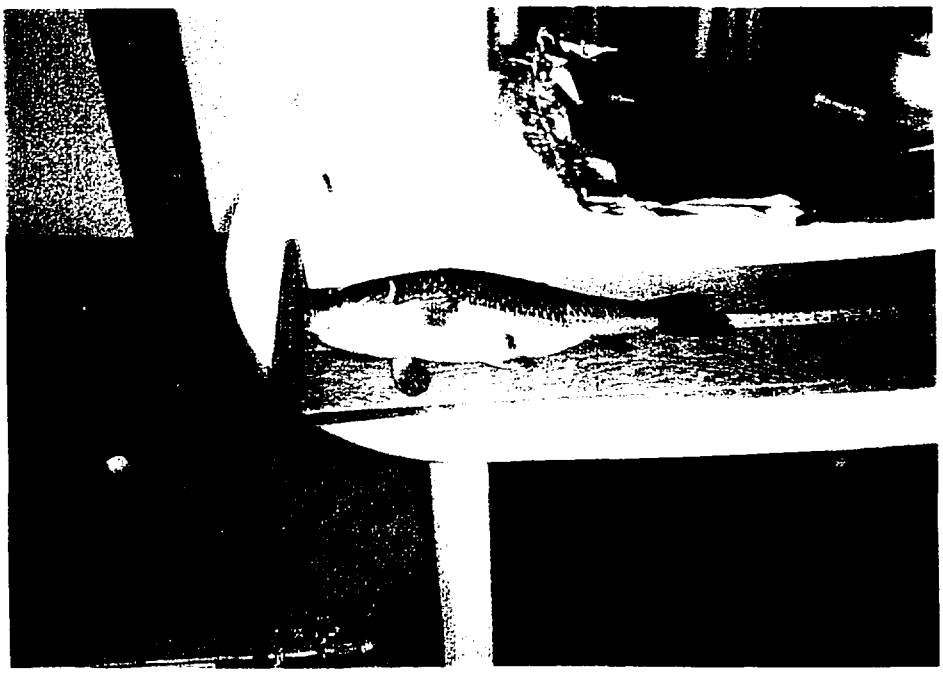
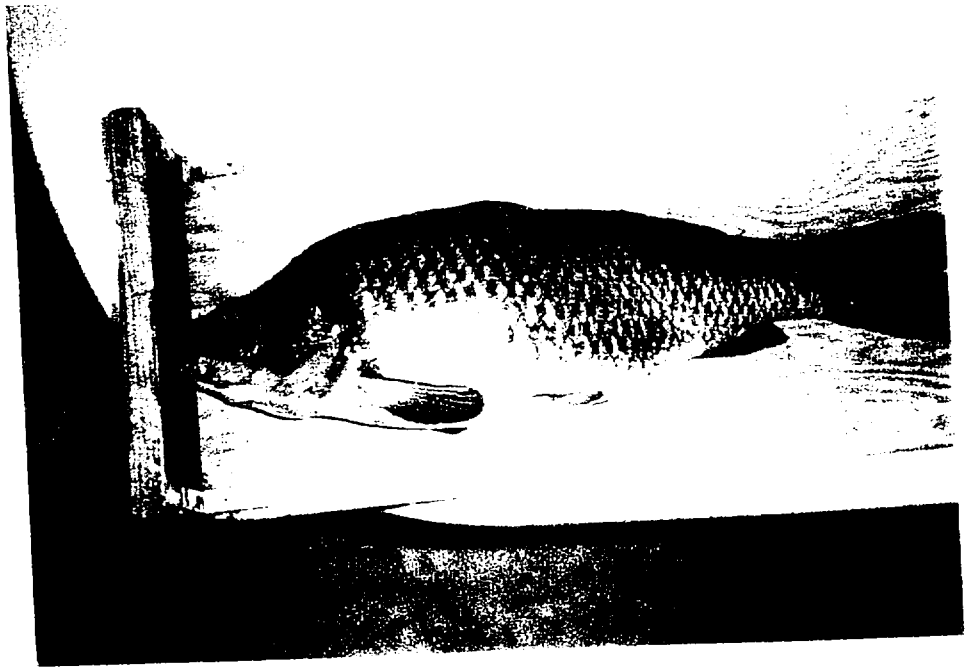


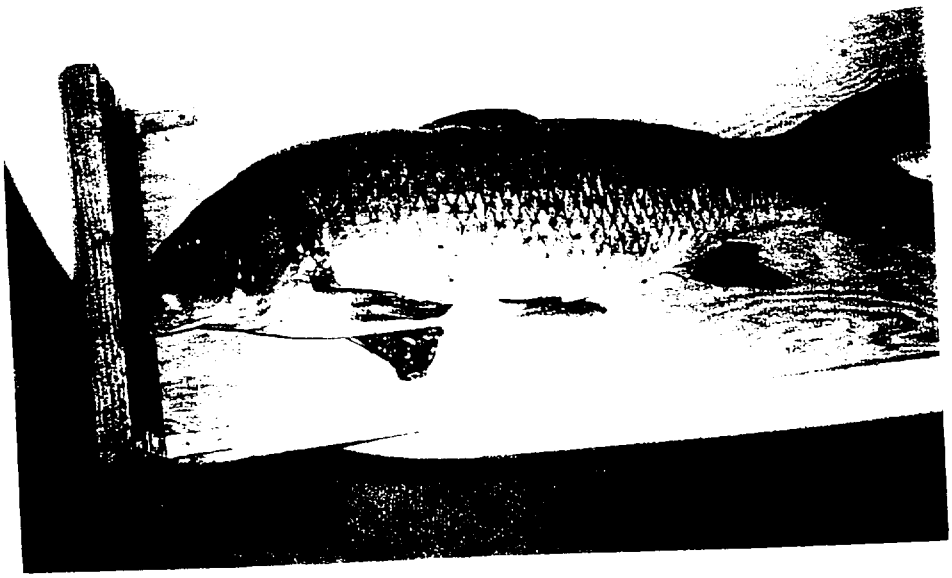
P40400 (clipped fin)

KB61301669

KB60207320



P40401



P40402

KB61301670

KB60207321

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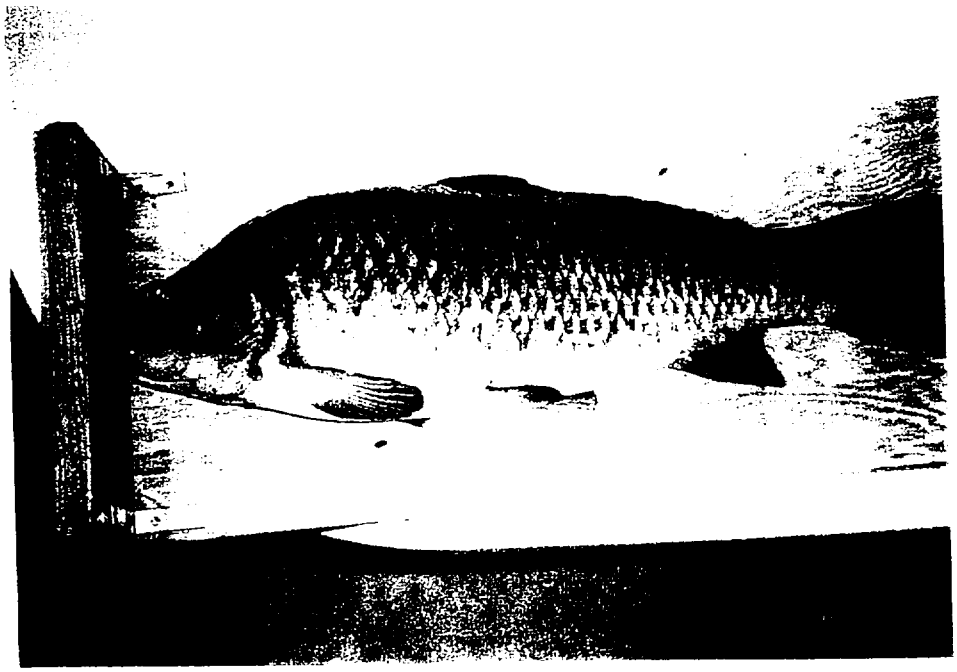

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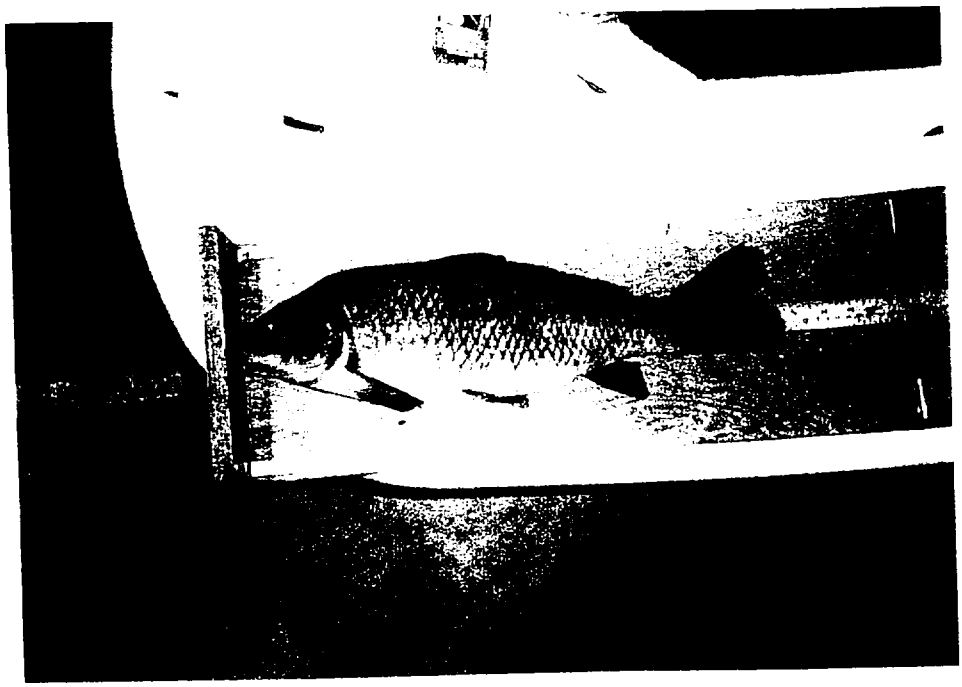

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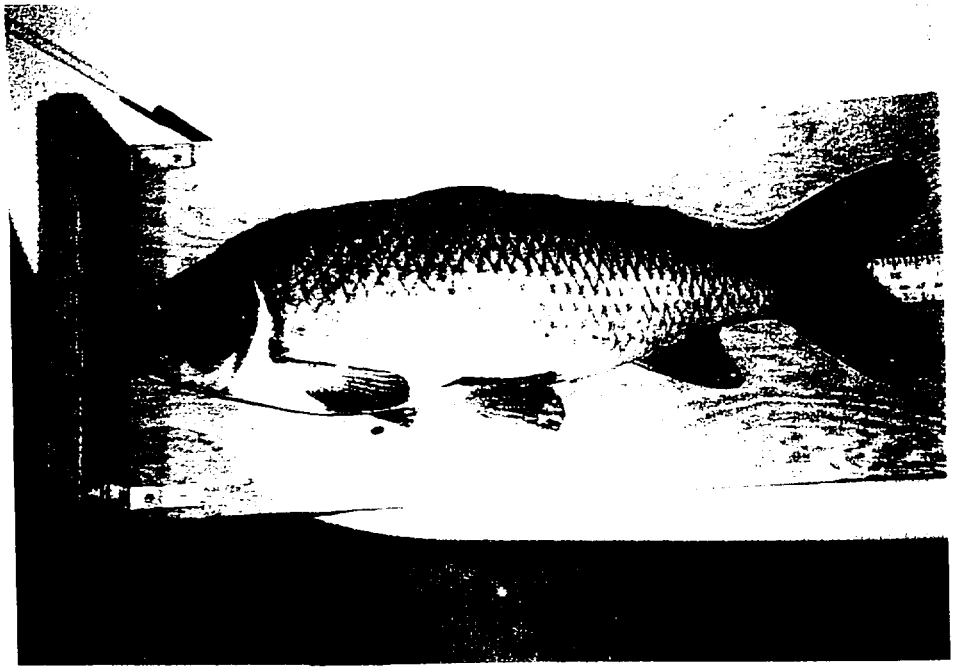

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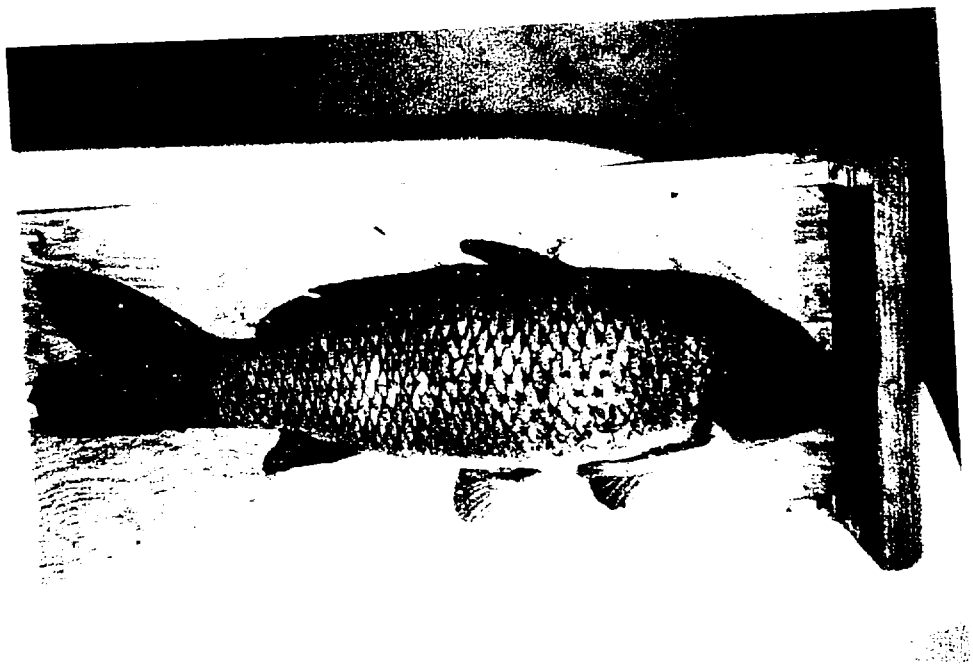

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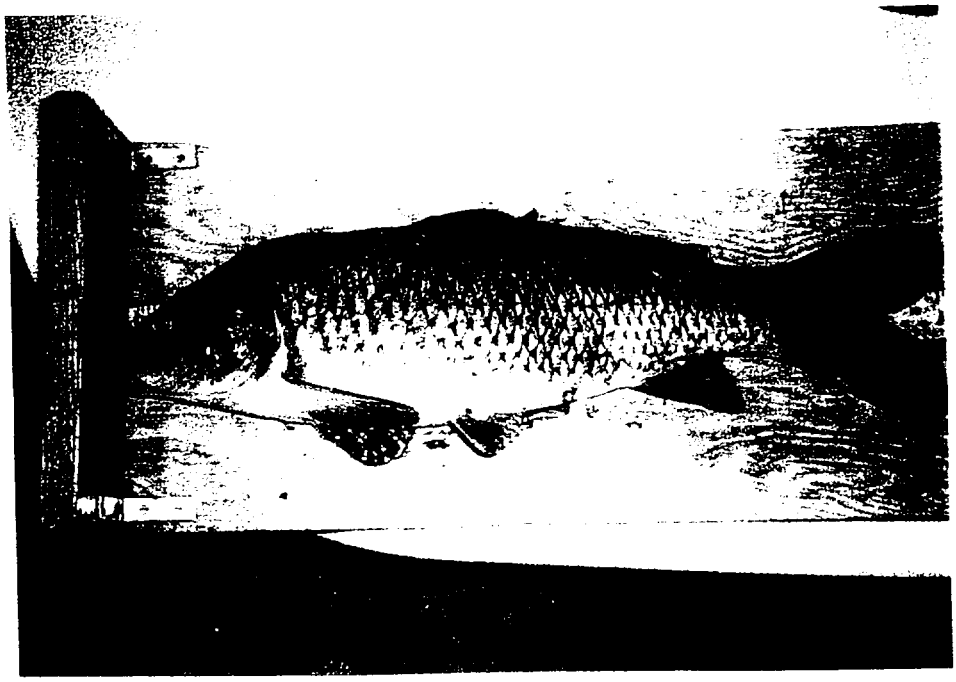

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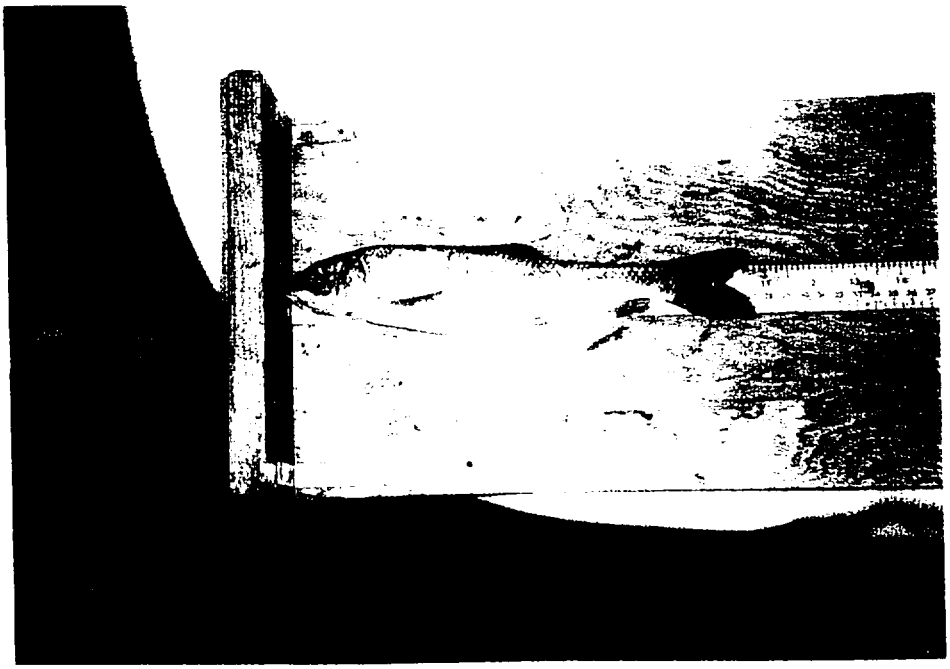

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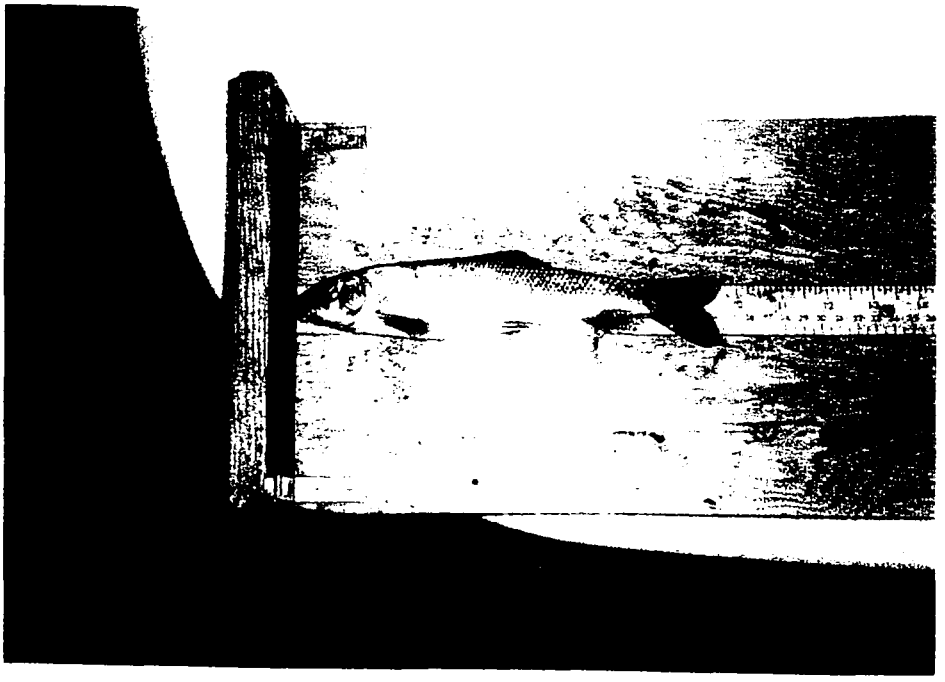

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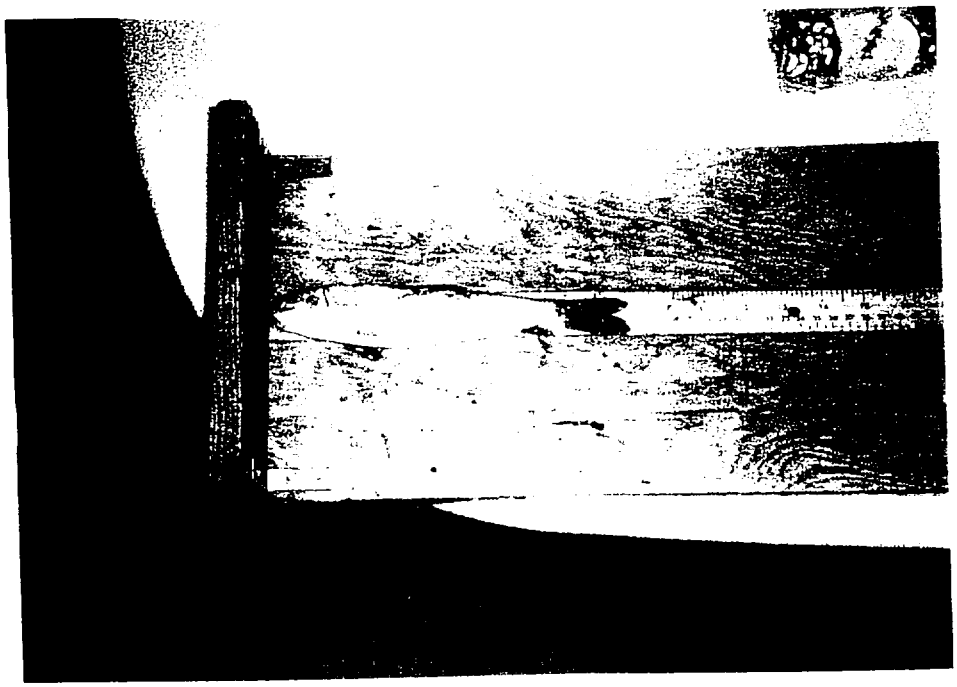

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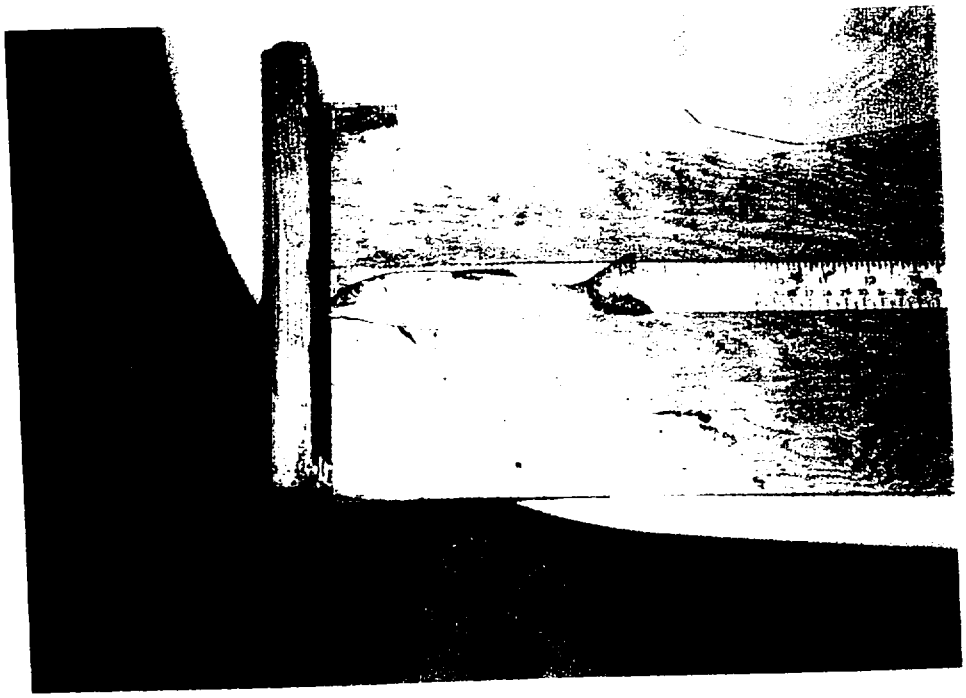

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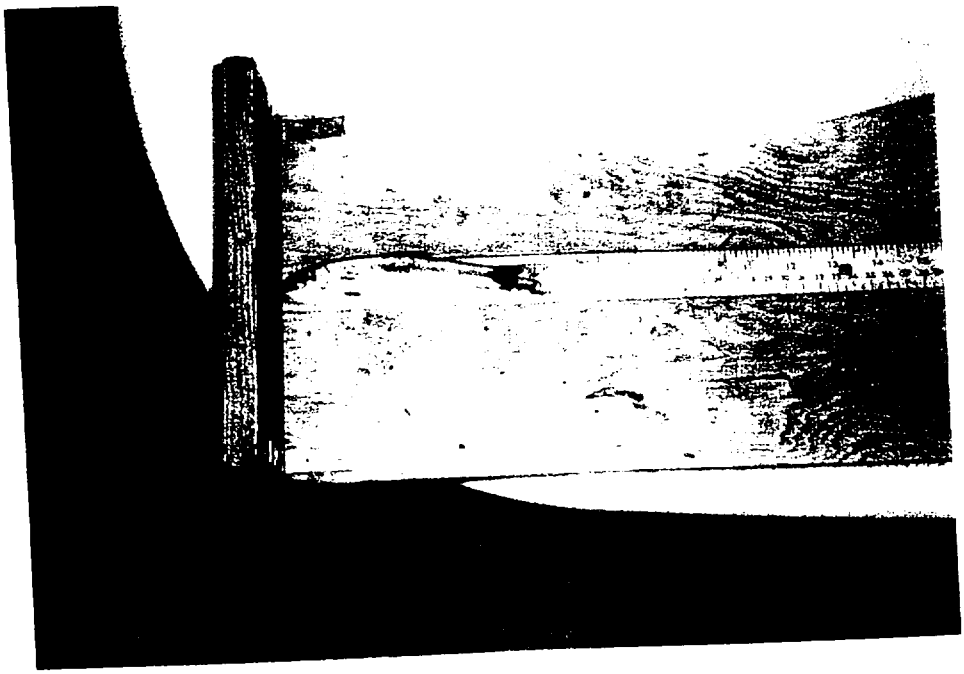

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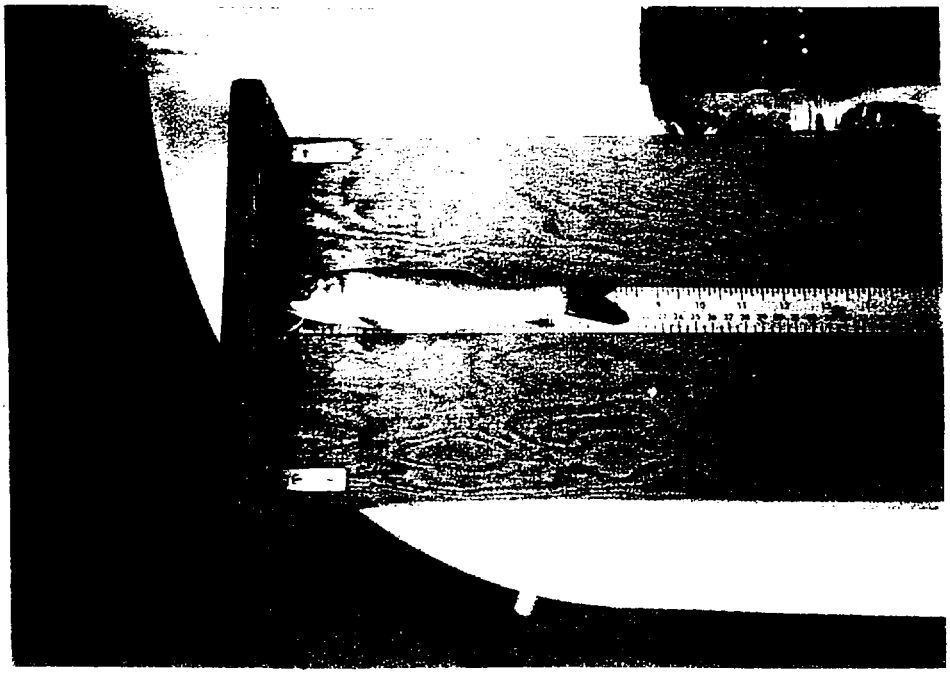

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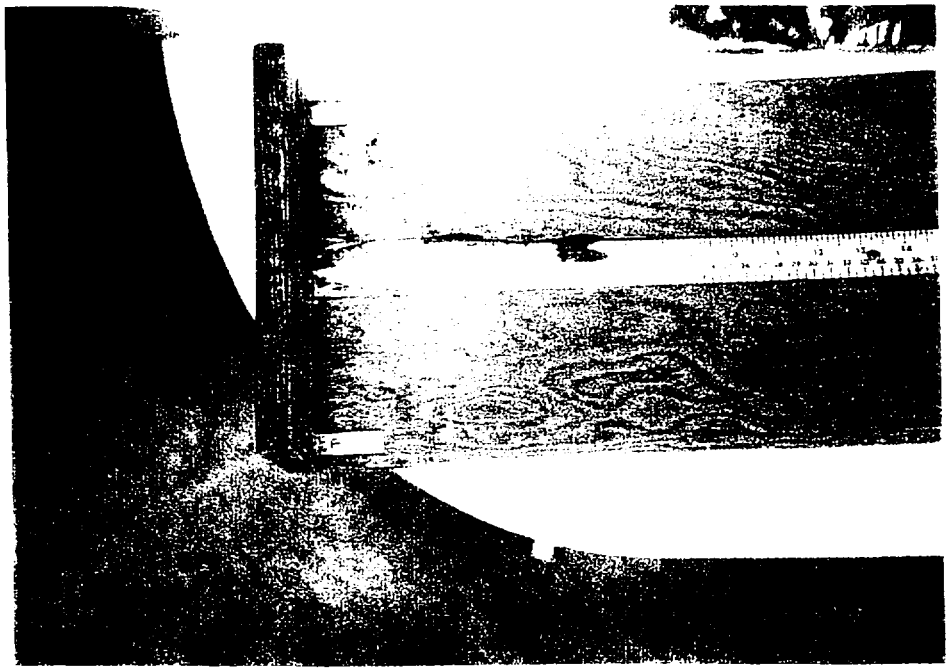

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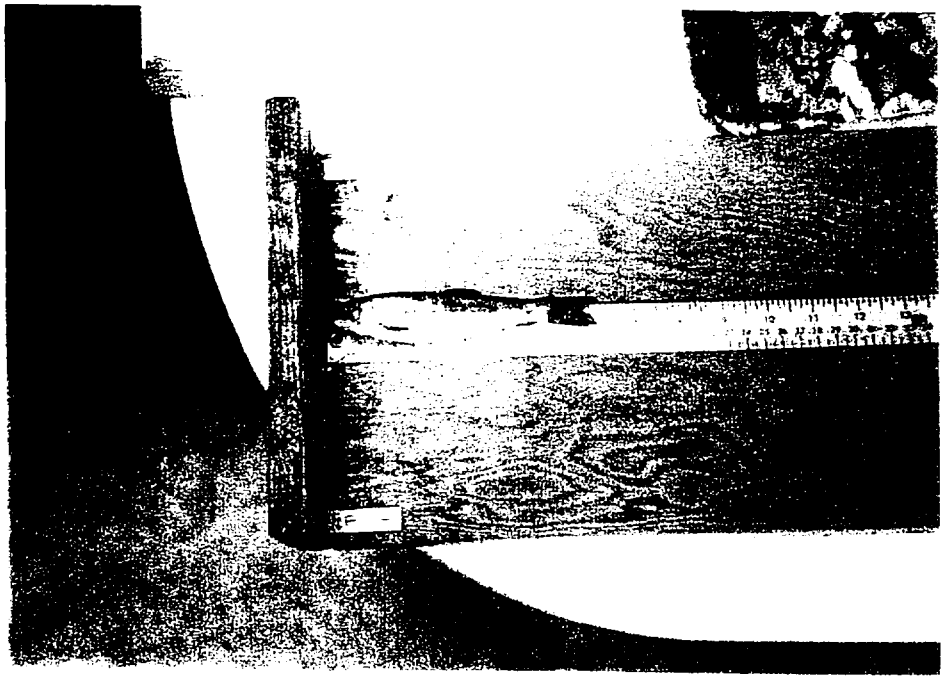

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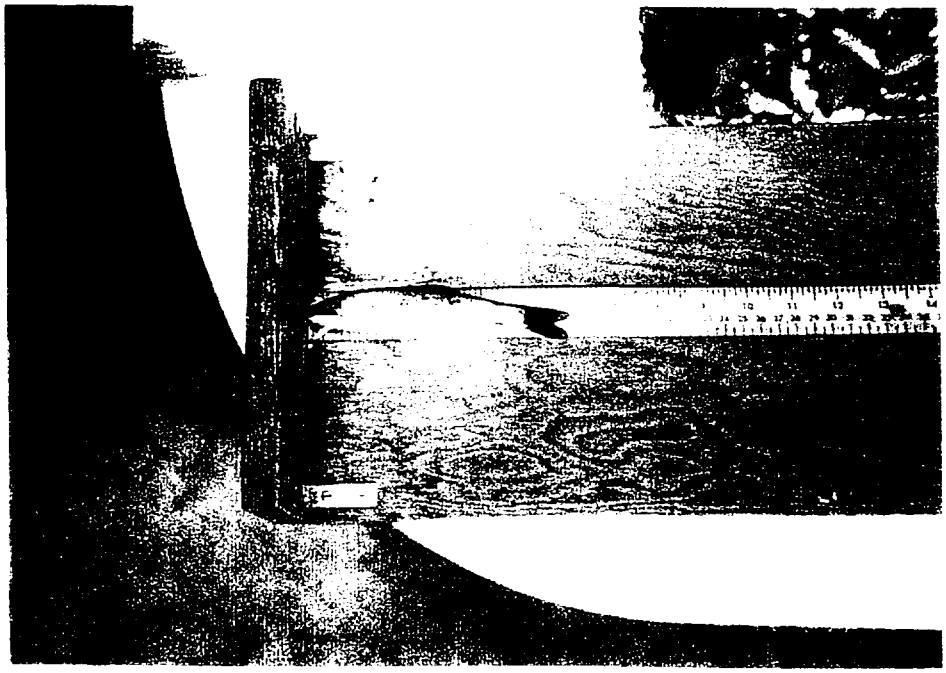

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Appendix D

Wetlands Assessment Supporting Documentation

BLASLAND, BOUCK & LEE, INC.
engineers & scientists

TABLE 1

KALAMAZOO RIVER SUPERFUND SITE
OPERABLE UNIT WETLAND CHARACTERIZATION

SITE LOCATION: Allied OU

EVALUATED BY: L. Elligott, J. Saxton DATE: 10/07/93

ARE CONDITIONS: NORMAL ___ DISTURBED X

GENERAL FEATURES: Moderate slope to Portage Creek – loosestrife, willow hummocks, cattail marsh edge

ROUTINE ON-SITE FORM COMPLETED:

YES X FORM # AL-1

NO ___

SURROUNDING LAND USE: Stack – Industrial – Electric substation

APPROXIMATE AREA: 15-20 acres

COMMUNITY/WETLAND TYPE: Emergent marsh, with scrub/shrub on fringes

DOMINANT PLANTS: Purple loosestrife

Common cattail

SOILS: Paper residuals

SERIES/PHASES:

HYDROLOGY:

TABLE 2

KALAMAZOO RIVER SUPERFUND SITE
OPERABLE UNIT WETLAND CHARACTERIZATION

ITE LOCATION: Allied OU

EVALUATED BY: L. Elligott, J. Saxton DATE: 10/07/93

ARE CONDITIONS: NORMAL ___ DISTURBED X

GENERAL FEATURES: Roadside in OU adjacent to standing water area

ROUTINE ON-SITE FORM COMPLETED:

YES X FORM # AL-2

NO ___

SURROUNDING LAND USE: Landfill unit

APPROXIMATE AREA: 5 acres

COMMUNITY/WETLAND TYPE: edge of ponded water area

OMINANT PLANTS:
- Hawthorn
- Cottonwood
- Primrose
- Mullein

SOILS: Paper residuals (saturated)

SERIES/PHASES: ----

HYDROLOGY: Standing water observed

TABLE 3

KALAMAZOO RIVER SUPERFUND SITE
OPERABLE UNIT WETLAND CHARACTERIZATION

SITE LOCATION: Allied OU

EVALUATED BY: L. Elligott, J. Saxton DATE: 10/07/93

ARE CONDITIONS: NORMAL ___ DISTURBED X

GENERAL FEATURES: Adjacent to Portage Creek and Allied landfill area

ROUTINE ON-SITE FORM COMPLETED:

YES X FORM # AL-3

NO ___

SURROUNDING LAND USE: Landfill

APPROXIMATE AREA: 1 Acre

COMMUNITY/WETLAND TYPE: Scrub/roadside near landfill

DOMINANT PLANTS:

Black willow	Brambles
Silver maple	Grass
Ash	
Jewelweed	
Grape	

SOILS: Mixed paper residuals

SERIES/PHASES: ---

HYDROLOGY: Upslope bank of Portage Creek – (Subject to overland flow)

TABLE 4

KALAMAZOO RIVER SUPERFUND SITE
OPERABLE UNIT WETLAND CHARACTERIZATION

SITE LOCATION: Allied OU

EVALUATED BY: L. Elligott, J. Saxton DATE: 10/07/93

ARE CONDITIONS: NORMAL X DISTURBED ___

GENERAL FEATURES: Downslope adjacent to Portage Creek at staff gage

ROUTINE ON-SITE FORM COMPLETED:

YES X FORM # AL-4

NO ___

SURROUNDING LAND USE: Streamside habiat

APPROXIMATE AREA: 1 acre

COMMUNITY/WETLAND TYPE: Bottomland

DOMINANT PLANTS:

Common cattail	Phlox
Jewelweed	Purple loosestrife
Willow	Boxelder
Viburnum sp.	

SOILS: Mixed paper residuals in soils

SERIES/PHASES:

HYDROLOGY: Floodplain

TABLE 5

KALAMAZOO RIVER SUPERFUND SITE
OPERABLE UNIT WETLAND CHARACTERIZATION

SITE LOCATION: Allied OU

EVALUATED BY: L. Elligott, J. Saxton DATE: 10/07/93

ARE CONDITIONS: NORMAL ___ DISTURBED X

GENERAL FEATURES: Upland area on roadside berm

ROUTINE ON-SITE FORM COMPLETED:

YES X FORM # AL-5

NO ___

SURROUNDING LAND USE: Landfill

APPROXIMATE AREA: 1 Acre

COMMUNITY/WETLAND TYPE: Upland

DOMINANT PLANTS:

Sumac	Red pine
Viburnum sp.	Grass
Ash	Grape
Pokeweed	Golden rod
Nightshade	

SOILS: Fill material (mixed paper residuals)

SERIES/PHASES:

HYDROLOGY:

1694439LOA

KB61302383

TABLE 6

DATA FORM
ROUTINE ON-SITE DETERMINATION METHOD[1]

Field Investigator(s): L. Elligott, R. Fewster, J. Saxton Date: 10/07/93

Project/Site: Allied OU State: MI County: Kalamazoo

Applicant/Owner: Kalamazoo River RI Study Plant Community #/Name: AI-1 Emergent marsh

NOTE: If a more detailed site description is necessary, use the back of data form or field notebook.

Do normal environmental conditions exist at the plant community?

Yes _____ No X

Has the vegetation, soils, and/or hydrology been significantly disturbed?

Yes X No _____

VEGETATION

Dominant Plant Species	Indicator Status	Stratum	Dominant Plant Species	Indicator Status	Stratum
1. Common cattail	OBL	Herb	11.		
2. Purple loosestrife	OBL	Herb	12.		
3.			13.		
4.			14.		
5.			15.		
6.			16.		
7.			17.		
8.			18.		
9.			19.		
10.			20.		

Percent of dominant species that are OBL, FACW, and/or FAC 100%

Is the hydrophytic vegetation criterion met? Yes X No _____

Rationale: Entire area is covered by OBL species

SOILS

Series/phase: Paper residuals Subgroup[2]: _____

Is the soil on the hydric soils list? Yes _____ No _____ Undetermined: _____

Is the soil a Histosol? Yes _____ No _____ Histic epipedon present? Yes _____ No _____

Is the soil: Mottled? Yes _____ No _____ Gleyed? Yes _____ No _____

Matrix Color: _____ Mottle Colors: _____

Other hydric soil indicators: _____

Is the hydric soil criterion met? Yes _____ No _____

Rationale: _____

HYDROLOGY

Is the ground surface inundated? Yes _____ No X Surface water depth: _____

Is the soil saturated? Yes X No _____

Depth to free-standing water in pit/soil probe hole: _____

List other field evidence of surface inundation or soil saturation: Ground surface is very wet and unstable, all paper residuals

Is the wetland hydrology criterion met? Yes _____ No _____

Rationale: _____

JURISDICTIONAL DETERMINATION AND RATIONALE

Is the plant community a wetland? Yes X No _____

Rationale for jurisdictional decision: Supports emergent marsh

[1]This data form can be used for the Hydric Soil Assessment Procedure and the Plant Community Assessment Procedure.
[2]Classification according to "Soil Taxonomy."

TABLE 7

DATA FORM
ROUTINE ON-SITE DETERMINATION METHOD[1]

Field Investigator(s): L. Elligott, R. Fewster, J. Saxton Date: 10/07/93

Project/Site: Allied OU State: MI County: Kalamazoo

Applicant/Owner: Kalamazoo River RI Study Plant Community #/Name: AL-2 Roadside, adjacent to standing water

NOTE: If a more detailed site description is necessary, use the back of data form or field notebook.

Do normal environmental conditions exist at the plant community?

Yes X No ____

Has the vegetation, soils, and/or hydrology been significantly disturbed?

Yes ____ No X

VEGETATION

Dominant Plant Species	Indicator Status	Stratum	Dominant Plant Species	Indicator Status	Stratum
1. Hawthorn	N/R	Under	11.		
2. Cottonwood	FAC+	Over	12.		
3. Primrose	N/R	Herb	13.		
4. Mullein	---	Herb	14.		
5.			15.		
6.			16.		
7.			17.		
8.			18.		
9.			19.		
10.			20.		

Percent of dominant species that are OBL, FACW, and/or FAC 25

Is the hydrophytic vegetation criterion met? Yes ____ No X

Rationale: One of four species has a classification.

SOILS

Series/phase: Paper residuals Subgroup[2]: ____

Is the soil on the hydric soils list? Yes ____ No ____ Undetermined: ____

Is the soil a Histosol? Yes ____ No ____ Histic epipedon present? Yes ____ No ____

Is the soil: Mottled? Yes ____ No ____ Gleyed? Yes ____ No ____

Matrix Color: ____ Mottle Colors: ____

Other hydric soil indicators: ____

Is the hydric soil criterion met? Yes ____ No ____

Rationale: ____

HYDROLOGY

Is the ground surface inundated? Yes X No ____ Surface water depth: ____

Is the soil saturated? Yes X No ____

Depth to free-standing water in pit/soil probe hole: ____

List other field evidence of surface inundation or soil saturation: ____

Is the wetland hydrology criterion met? Yes X No ____

Rationale: ____

JURISDICTIONAL DETERMINATION AND RATIONALE

Is the plant community a wetland? Yes X No ____

Rationale for jurisdictional decision: Hydrology parameter is positive.

[1]This data form can be used for the Hydric Soil Assessment Procedure and the Plant Community Assessment Procedure.
[2]Classification according to "Soil Taxonomy."

TABLE 8

DATA FORM
ROUTINE ON-SITE DETERMINATION METHOD[1]

Field Investigator(s): L. Elligott, R. Fewster, J. Saxton Date: 10/07/93

Project/Site: Allied OU State: MI County: Kalamazoo

Applicant/Owner: Kalamazoo River RI Study Plant Community #/Name: AL-3 Allied landfill area

NOTE: If a more detailed site description is necessary, use the back of data form or field notebook.

Do normal environmental conditions exist at the plant community?

Yes _____ No X

Has the vegetation, soils, and/or hydrology been significantly disturbed?

Yes X No _____

VEGETATION

Dominant Plant Species	Indicator Status	Stratum	Dominant Plant Species	Indicator Status	Stratum
1. Black willow	OBL	Over	11.		
2. Silver maple	FACW	Over	12.		
3. Ash	N/R	Over	13.		
4. Boxelder	FACW-	Over	14.		
5. Common cattail	OBL	Herb	15.		
6. Purple loosestrife	OBL	Herb	16.		
7. Grape	---	Herb	17.		
8. Sedges	N/R	Herb	18.		
9. Jewelweed	FACW	Herb	19.		
10. Brambles	N/R	Herb	20.		

Percent of dominant species that are OBL, FACW, and/or FAC 60

Is the hydrophytic vegetation criterion met? Yes X No _____

Rationale: Presence of obligate species as dominant vegetation

SOILS

Series/phase: Paper residuals Subgroup[2]: _____

Is the soil on the hydric soils list? Yes _____ No _____ Undetermined: _____

Is the soil a Histosol? Yes _____ No _____ Histic epipedon present? Yes _____ No _____

Is the soil: Mottled? Yes _____ No _____ Gleyed? Yes _____ No _____

Matrix Color: _____ Mottle Colors: _____

Other hydric soil indicators: _____

Is the hydric soil criterion met? Yes _____ No _____

Rationale: _____

HYDROLOGY

Is the ground surface inundated? Yes _____ No X Surface water depth: _____

Is the soil saturated? Yes X No _____

Depth to free-standing water in pit/soil probe hole: <6"

List other field evidence of surface inundation or soil saturation: Channels, proximity to Portage Creek

Is the wetland hydrology criterion met? Yes X No _____

Rationale: Saturated conditions, depth to standing water.

JURISDICTIONAL DETERMINATION AND RATIONALE

Is the plant community a wetland? Yes X No _____

Rationale for jurisdictional decision: Vegetation and hydrology parameters are positive.

[1]This data form can be used for the Hydric Soil Assessment Procedure and the Plant Community Assessment Procedure.
[2]Classification according to "Soil Taxonomy."

TABLE 9

DATA FORM
ROUTINE ON-SITE DETERMINATION METHOD[1]

Field Investigator(s): L. Elligott, R. Fewster, J. Saxton Date: 10/07/93

Project/Site: Allied OU State: MI County: Kalamazoo

Applicant/Owner: Kalamazoo River RI Study Plant Community #/Name: AL-4 Down slope adjacent to Portage Cr.

NOTE: If a more detailed site description is necessary, use the back of data form or field notebook.

Do normal environmental conditions exist at the plant community?

Yes X No ____

Has the vegetation, soils, and/or hydrology been significantly disturbed?

Yes ____ No X

VEGETATION

Dominant Plant Species	Indicator Status	Stratum	Dominant Plant Species	Indicator Status	Stratum
1. Willow	N/R	Over	11.		
2. Boxelder	FACW-	Over	12.		
3. Common cattail	OBL	Herb	13.		
4. Purple loosestrife	OBL	Herb	14.		
5. Phlox	N/R	Herb	15.		
6. Viburnum sp.	N/R	Under	16.		
7. Jewelweed	FACW	Herb	17.		
8.			18.		
9.			19.		
10.			20.		

Percent of dominant species that are OBL, FACW, and/or FAC 60

Is the hydrophytic vegetation criterion met? Yes X No ____

Rationale: Presence of obligate species as dominant vegetation

SOILS

Series/phase: Some paper residuals mixed with soils Subgroup[2]: ____

Is the soil on the hydric soils list? Yes ____ No ____ Undetermined: ____

Is the soil a Histosol? Yes ____ No ____ Histic epipedon present? Yes ____ No ____

Is the soil: Mottled? Yes ____ No ____ Gleyed? Yes ____ No ____

Matrix Color: ____ Mottle Colors: ____

Other hydric soil indicators: ____

Is the hydric soil criterion met? Yes ____ No ____

Rationale: ____

HYDROLOGY

Is the ground surface inundated? Yes ____ No X Surface water depth: ____

Is the soil saturated? Yes X No ____

Depth to free-standing water in pit/soil probe hole: <6"

List other field evidence of surface inundation or soil saturation: Channels, proximity to Portage Creek

Is the wetland hydrology criterion met? Yes X No ____

Rationale: ____

JURISDICTIONAL DETERMINATION AND RATIONALE

Is the plant community a wetland? Yes X No ____

Rationale for jurisdictional decision: Presence of obligate vegetation and hydrology

[1]This data form can be used for the Hydric Soil Assessment Procedure and the Plant Community Assessment Procedure.
[2]Classification according to "Soil Taxonomy."

TABLE 10

DATA FORM
ROUTINE ON-SITE DETERMINATION METHOD[1]

Field Investigator(s): L. Elligott, R. Fewster, J. Saxton Date: 10/07/93

Project/Site: Allied OU State: MI County: Kalamazoo

Applicant/Owner: Kalamazoo River RI Study Plant Community #/Name: AL-5 Upland area at roadside berm

NOTE: If a more detailed site description is necessary, use the back of data form or field notebook.

Do normal environmental conditions exist at the plant community?

Yes _____ No X

Has the vegetation, soils, and/or hydrology been significantly disturbed?

Yes X No _____

VEGETATION

Dominant Plant Species	Indicator Status	Stratum	Dominant Plant Species	Indicator Status	Stratum
1. Red pine	FACU	Over	11.		
2. Sumac	---	Under	12.		
3. Viburnum sp.	N/R	Under	13.		
4. Ash	N/R	Under	14.		
5. Pokeweed	FAC-	Herb	15.		
6. Grass	N/R	Herb	16.		
7. Horsetail	FAC	Herb	17.		
8. Nightshade	FAC	Herb	18.		
9. Grape	---	Herb	19.		
10. Goldenrod	N/R	Herb	20.		

Percent of dominant species that are OBL, FACW, and/or FAC 30

Is the hydrophytic vegetation criterion met? Yes _____ No X

Rationale: Most predominant species are FACU or dryer

SOILS

Series/phase: Paper residuals Subgroup[2]: _____

Is the soil on the hydric soils list? Yes _____ No _____ Undetermined: _____

Is the soil a Histosol? Yes _____ No _____ Histic epipedon present? Yes _____ No _____

Is the soil: Mottled? Yes _____ No _____ Gleyed? Yes _____ No _____

Matrix Color: _____ Mottle Colors: _____

Other hydric soil indicators: _____

Is the hydric soil criterion met? Yes _____ No _____

Rationale: _____

HYDROLOGY

Is the ground surface inundated? Yes _____ No X Surface water depth: _____

Is the soil saturated? Yes _____ No X

Depth to free-standing water in pit/soil probe hole: >20"

List other field evidence of surface inundation or soil saturation: None

Is the wetland hydrology criterion met? Yes _____ No X

Rationale: No indicators

JURISDICTIONAL DETERMINATION AND RATIONALE

Is the plant community a wetland? Yes _____ No X

Rationale for jurisdictional decision: Upland character, no indicators

[1]This data form can be used for the Hydric Soil Assessment Procedure and the Plant Community Assessment Procedure.
[2]Classification according to "Soil Taxonomy."

Appendix E

QA/QC Review of Data - Summary of Precision and Accuracy

BLASLAND, BOUCK & LEE, INC.
engineers & scientists

Appendix E

QA/QC Review of Data - Summary of Precision and Accuracy Assessment

E.1 Precision and Accuracy Assessment for PCB Laboratory Analyses

Data packages for the Allied-OU PCB surface water and biota sample analyses were reviewed and inspected for analytical precision and accuracy. Twelve sample delivery groups (SDGs) containing surface water samples, one SDG containing biota samples and one SDG containing the surface water MDL study were reviewed and evaluated. The originally collected surface water SDGs were designated as 39025, 39499, 40199, 40278, 41106 and 41311; the SDGs for surface water collected between April 1994 and May 1997 were designated 43546, 43567, 44723, 46546, 46665 and 64982; the biota SDG was designated 40667; and the SDG containing the MDL study was designated 41814. Table E-1 presents the SDGs and their associated samples.

Analytical precision was assessed by comparing the percent recoveries of the matrix spike (MS) and matrix spike duplicate (MSD) samples. Field duplicates were also used to assess the overall precision of the laboratory analyses. The relative percent differences (RPDs) between percent recoveries were calculated for each pair of duplicate analyses.

In addition to the MS data, other indicators of accuracy, such as surrogate spike and blank spike recoveries, were examined to assess the analytical method's accuracy.

An overall precision and accuracy summary, as assessed through the review of QA/QC information including MS/MSD recoveries and RPDs between recoveries, matrix spike blank (MSB) recoveries, field duplicate RPD results, surrogate spike recoveries and contamination levels in the blanks, is presented below. A more detailed review of the data can be found in Appendix F - Data Review Reports and Laboratory Analytical Results.

E.1.1 Surface Water PCB Data Quality Summary

All MS/MSD recoveries and RPD between recoveries were within control limits. Aroclor 1242 recoveries ranged from 59 to 94 percent with an average of 77 percent while Aroclor 1254 recoveries ranged from 75 to 106 percent with an average of 83 percent. The precision of the matrix spikes, as measured by the RPD between the MS and MSD recoveries, ranged from 1 to 14 percent with an average of 6 percent for Aroclor 1242, and from 1 to 21 percent with an average of 7 percent for Aroclor 1254. The MSB recoveries for Aroclor 1242 ranged from 58 to 93 percent with an average of 72 percent while Aroclor 1254 recoveries ranged from 66 to 90 percent with an average of 77 percent.

All surface water field duplicate RPD values were within USEPA Region V acceptance limits. The RPD values for all duplicates ranged from 3.4 to 42 percent with an average of 13 percent. USEPA Region V guidance considers differences to be significant when there is more than a factor of 5 between concentration values. This is equivalent to a RPD of 133 percent.

Recovery for one surrogate was below control limits in samples A64000, A64001, A64002, A66500, A66501, A66502, A66503, A66504, A66505, A66506, A66511, A66512, A66513, A66514, A66523, A66524, A66532, A66533, A66534, A66535, A66538, A66539, A66540, A66541, A66542, A66543, A66544RE, A66545, A66546, A66547RE, A66548, A66549, A66550, A66551, A66552, A66553, A66554, A66556, A66560, A66561, A66563, A66580 and A66585; however, since in all cases recoveries of the second surrogate were within control limits, no data were qualified based on the recoveries. Recovery for one surrogate was also below control limits in the original analyses of samples A66544 and A66547 (SDG 41106). Although recovery for the second surrogate was within control limits, recovery of the noncompliant surrogate was less than ten percent, indicating a potential extraction error or matrix interference. The samples were later reextracted with more acceptable surrogate recoveries. Data for the

reextracted samples, rather than the original analyses, are included on the attached data tables. Overall, surrogate recoveries for tetrachloro-meta-xylene (TCMX) ranged from 4 to 120 percent with an average of 59 percent. Recoveries for decachlorobiphenyl (DCB) ranged from 68 to 122 percent with an average of 85 percent.

No Aroclors were detected in any instrument or rinse blank. Aroclor 1248 was detected in method blank PBLK7G. Aroclor 1248 was not detected in any of the associated samples, so no qualification was necessary. No Aroclors were detected in any of the other method blanks.

Two continuing calibration verification standards were outside the control limit resulting in the qualification of data for samples A64003, A64004, A66527, A66528, A66531, A66532 and A66534

The data reported for samples A66507, A66514, A66544 and A66547 are taken from analyses which were performed outside the specified holding times. All data for these samples have been qualified as estimated based on the holding time violations.

E.1.2 Biota PCB Data Quality Summary

All MS/MSD recoveries and RPD between recoveries were within control limits. Aroclor 1242 recoveries for carp ranged from 43 to 44 percent with an average of 44 percent, while Aroclor 1254 recoveries ranged from 53 to 57 percent with an average of 55 percent. Aroclor 1242 recoveries for white suckers ranged from 74 to 81 percent with an average of 78 percent while Aroclor 1254 recoveries ranged from 72 to 81 percent with an average of 76 percent. The precision of the matrix spikes, as measured by the RPD between the MS and MSD recoveries for carp, was 2 percent for Aroclor 1242 and 7 percent for Aroclor 1254. RPDs for white suckers was 9 percent for Aroclor 1242 and 12 percent for Aroclor 1254. The matrix spike blank (MSB) recoveries for carp were 57 percent for Aroclor 1242 and 62 percent for Aroclor 1254. MSB recoveries for white suckers were 75 percent for Aroclor 1242 and 100 percent for Aroclor 1254.

No biota field duplicates were analyzed.

Recovery for one surrogate was below control limits in samples P40399F, P40400F, P40400R, P40401F, P40401R, P40402F, P40403F, P40404F, P40404R, P40405F, P40405R, P40406F, P40406R, P40407F and P40408R. Since recoveries for the second surrogate were within control limits, no data have been qualified based on the recoveries. Recoveries for both surrogates were below control limits in sample P40408F. All data for this sample have been qualified as estimated based on the recoveries. Overall, carp surrogate recoveries for TCMX ranged from 37 to 53 percent with an average of 45 percent, while recoveries for DCB ranged from 55 to 76 percent with an average of 67 percent. White sucker surrogate recoveries for TCMX ranged from 59 to 94 percent with an average of 75 percent, while recoveries for DCB ranged from 85 to 102 percent with an average of 94 percent.

No Aroclors were detected in any method or instrument blank.

E.1.3 MDL Study PCB Data Quality Summary

No MS/MSD analyses were performed on the samples. However, the average recovery for Aroclor 1242 for the seven replicates was 117 percent and the average recovery for Aroclor 1248 was 90 percent.

The precision of the replicates, as measured by the percent relative standard deviation was 12.6 percent for Aroclor 1242 and 7.0% for Aroclor 1248.

One surrogate recovery was below control limits in samples REP1, REP2, REP3, REP4, REP5, REP9 and REP11. Since recoveries for the second surrogate were within control limits, no data have been qualified based on the recoveries. Overall, surrogate recoveries for TCMX ranged from 47 to 63 percent with an average of 58 percent, while recoveries for DCB ranged from 86 to 102 percent with an average of 92 percent.

No Aroclors were detected in the method blank.

E.2 Precision and Accuracy Assessment for VOC, SVOC, Pesticide/PCB, Pesticide/PBB, and Inorganic Laboratory Analyses

Two SDGs (40278 and 44723) containing surface water samples for VOC, SVOC, Pesticide/PCB, and Inorganic analyses and one SDG (40667) containing biota samples for Pesticide/Polybrominated Biphenyl (PBB) and Mercury analyses were reviewed and evaluated for analytical precision and accuracy. Table E-1 presents the SDGs and their associated samples.

Analytical precision was assessed by comparing the percent recoveries of the MS and MSD samples for organic and inorganic analyses, and by comparing laboratory duplicates for inorganic analyses. Field duplicates were also used to assess the overall precision of the analyses.

To assess the accuracy of the analytical method, MS data were examined in conjunction with other indicators of accuracy such as surrogate spike recoveries and blank contamination for organic analyses, and laboratory control sample recoveries and blank contamination for inorganic analyses.

An overall summary of the precision and accuracy, which includes surrogate standard recoveries and blank contamination, is presented below. A more detailed review of the data can be found in Appendix F - Data Review Reports and Laboratory Analytical Results.

E.2.1 Surface Water Data Quality Summary

VOCs

No MS/MSD or field duplicate analyses were performed on the surface water samples.

All surrogate recoveries were within acceptable control limits, with a range of 89 to 103 percent and an average of 96 percent.

No target compounds were detected in the method blanks.

Two compounds were outside acceptable limits in one of the continuing calibration verification standards resulting in the qualified of data for samples A66536 and A66537.

SVOCs

No MS/MSD or field duplicate analyses were performed on the surface water samples.

All sample surrogate recoveries were within acceptable control limits, with a range of 79 to 113 percent and an average of 94 percent.

Bis(2-ethylhexyl)phthalate was detected in the method blanks and all surface water samples. Data for this compound were qualified as not detected in all samples based on the method blank content.

Several compounds were outside acceptable limits in three of the continuing calibration verification standards resulting in the qualification of data for samples A66536, A66537, A64008 and A64009.

Pesticide/PCB Analyses

No MS/MSD or field duplicate analyses were performed on the surface water samples.

All surrogate recoveries were within acceptable control limits, with a range of 77 to 96 percent and an average of 86 percent.

No target compounds were detected in the method blanks.

Inorganic Analyses

No MS, laboratory duplicate or field duplicate analyses were performed on the surface water samples.

All laboratory control sample (LCS) percent recoveries were within acceptable control limits ranging from 93 to 115 percent with an average of 98 percent.

All calibration and preparation blanks were found to be acceptable with no target analytes detected above the contract required detection limit (CRDL).

The results were outside control limits for sodium for one of the serial dilution analyses. Based on the results, sodium data were qualified as estimated in samples A64008 and A64009.

The GFAA spike recovery for selenium was below control limits for samples A64008 and A66009 resulting in the qualification of sodium data for the samples.

E.2.2 Biota Sample Data Quality Summary

VOCs

No VOC analyses were performed on the biota samples.

SVOCs

No SVOC analyses were performed on the biota samples.

Pesticide/PBB Analyses

MS/MSD recoveries were generally high due to positive interference from PCBs present in the samples. Carp recoveries ranged from 70 to 154 percent with an average of 113 percent, while white sucker recoveries ranged from 88 to 352 percent with an average of 192 percent. The precision of the matrix spikes as measured by the RPD between the MS and MSD recoveries ranged from 6 to 55 percent with an average of 20 percent for carp, and from 5 to 22 percent with an average of 12 percent for white suckers. The MSB recoveries for suckers ranged from 98 to 128 percent with an average of 116 percent. Due to a spiking error, no MSB data were available for carp.

No biota field duplicate analyses were performed.

Recovery for one surrogate was below control limits in samples P40399F, P40399FMS, P40399FMSD, P40400F, P40400R, P40401F, P40401R, P40403F, P40404F, P40404R, P40405F, P40405R, P40406R, P40408R, P40410MSD and P40415. Since recoveries for the second surrogate were within control limits, no data have been qualified based on the recoveries. Recoveries for both surrogates were below control limits in sample P40408F. All data for this sample have been qualified as estimated based on the recoveries. Overall, carp surrogate recoveries ranged from 41 to 84 percent with an average of 63 percent and white sucker surrogate recoveries ranged from 57 to 131 percent with an average of 87 percent.

No target compounds were detected in the method or instrument blanks.

Due to poor agreement between the quantitated results for the two analytical columns, data for several pesticides have been either qualified as estimated or rejected, depending on the severity of the disagreement. In most cases the disagreement can be attributed to matrix interference which precludes the proper identification and/or quantitation of individual compounds. Details regarding the specific compounds, samples and actions can be found in the data review report found in Appendix F.

Inorganic Analyses - Mercury

The carp matrix spike recovery was below control limits at 66 percent. All carp data was qualified as estimated based on the recovery. The sucker matrix spike recovery of 76 percent was within acceptable limits.

The RPD of the laboratory duplicate results of 4 percent for carp was within control limits. The white sucker RPD of 30 percent was outside the method-specified control limit, but was deemed not significant enough to warrant data qualification.

No biota field duplicate analyses were performed.

Recoveries for both laboratory control samples (LCS) were 100 percent.

All calibration and preparation blanks were found to be acceptable with no mercury detected above the contract required detection limit (CRDL).

TABLE E-1

ALLIED PAPER, INC./PORTAGE CREEK/KALAMAZOO RIVER
SUPERFUND SITE

ALLIED PAPER, INC. OPERABLE UNIT
SAMPLE DELIVERY GROUP SUMMARY

Sample Delivery Group	Sample ID	Duplicate	Matrix	Location	Analysis						QA/QC
					PCB	TCL	TAL	Pesticide	Mercury	TSS	MS/MSD
39025	A64000	A64001	Surface Water	Alcott Street	x					x	x
	A64001	A64000	Surface Water	Alcott Street	x					x	x
	A64002		Surface Water	Cork Street	x					x	
39499	A66500		Surface Water	Alcott Street	x					x	
	A66501		Surface Water	Cork Street	x					x	
	A66502		Surface Water	Alcott Street	x					x	
	A66503		Surface Water	Cork Street	x					x	
	A66504	A66505	Surface Water	Alcott Street	x					x	x
	A66505	A66504	Surface Water	Alcott Street	x					x	
	A66506		Surface Water	Cork Street	x					x	
	A66507		Surface Water	Alcott Street	x					x	
	A66508		Surface Water	Cork Street	x					x	
	A66509		Surface Water	Alcott Street	x					x	
	A66510		Surface Water	Cork Street	x					x	
	A66511		Surface Water	Alcott Street	x					x	
	A66512		Surface Water	Cork Street	x					x	
	A66513		Surface Water	Alcott Street	x					x	
	A66514		Surface Water	Cork Street	x					x	
	A66515		Surface Water	Alcott Street	x					x	
	A66516		Surface Water	Cork Street	x					x	
40199	A66521		Surface Water	Alcott Street	x					x	
	A66522		Surface Water	Cork Street	x					x	
	A66523		Surface Water	Alcott Street	x					x	
	A66524		Surface Water	Cork Street	x					x	
	A66527		Surface Water	Alcott Street	x					x	
	A66528		Surface Water	Cork Street	x					x	
	A66531		Surface Water	Alcott Street	x					x	
	A66532		Surface Water	Cork Street	x					x	

TABLE E-1

ALLIED PAPER, INC./PORTAGE CREEK/KALAMAZOO RIVER
SUPERFUND SITE

ALLIED PAPER, INC. OPERABLE UNIT
SAMPLE DELIVERY GROUP SUMMARY

Sample Delivery Group	Sample ID	Duplicate	Matrix	Location	Analysis						QA/QC
					PCB	TCL	TAL	Pesticide	Mercury	TSS	MS/MSD
	A66533	A66535	Surface Water	Alcott Street	x					x	x
	A66534		Surface Water	Cork Street	x					x	
	A66535	A66533	Surface Water	Alcott Street	x					x	
	A66538		Surface Water	Alcott Street	x					x	
	A66539		Surface Water	Cork Street	x					x	
	A66540		Surface Water	Alcott Street	x					x	
	A66541		Surface Water	Cork Street	x					x	
40278	A66536		Surface Water	Alcott Street		x	x			x	
	A66537		Surface Water	Cork Street		x	x			x	
40667	K40399F		Carp - Fillet	Former Bryant Mill Pond	x			x	x		x
	K40400F		Carp - Fillet	Former Bryant Mill Pond	x			x	x		
	K40400R		Carp - Carcass	Former Bryant Mill Pond	x			x	x		
	K40401F		Carp - Fillet	Former Bryant Mill Pond	x			x	x		
	K40401R		Carp - Carcass	Former Bryant Mill Pond	x			x	x		
	K40402F		Carp - Fillet	Former Bryant Mill Pond	x			x	x		
	K40403F		Carp - Fillet	Former Bryant Mill Pond	x			x	x		
	K40404F		Carp - Fillet	Former Bryant Mill Pond	x			x	x		
	K40404R		Carp - Carcass	Former Bryant Mill Pond	x			x	x		
	K40405F		Carp - Fillet	Former Bryant Mill Pond	x			x	x		
	K40405R		Carp - Carcass	Former Bryant Mill Pond	x			x	x		
	K40406F		Carp - Fillet	Former Bryant Mill Pond	x			x	x		
	K40406R		Carp - Carcass	Former Bryant Mill Pond	x			x	x		
	K40407F		Carp - Fillet	Former Bryant Mill Pond	x			x	x		
	K40408F		Carp - Fillet	Former Bryant Mill Pond	x			x	x		
	K40408R		Carp - Carcass	Former Bryant Mill Pond	x			x	x		
	K40409F		Carp - Fillet	Former Bryant Mill Pond	x			x	x		
	P40410		Sucker - Whole	Former Bryant Mill Pond	x			x	x		x
	P40411		Sucker - Whole	Former Bryant Mill Pond	x			x	x		

TABLE E-1

ALLIED PAPER, INC./PORTAGE CREEK/KALAMAZOO RIVER
SUPERFUND SITE

ALLIED PAPER, INC. OPERABLE UNIT
SAMPLE DELIVERY GROUP SUMMARY

Sample Delivery Group	Sample ID	Duplicate	Matrix	Location	Analysis						QA/QC
					PCB	TCL	TAL	Pesticide	Mercury	TSS	MS/MSD
	P40412		Sucker - Whole	Former Bryant Mill Pond	x			x	x		
	P40413		Sucker - Whole	Former Bryant Mill Pond	x			x	x		
	P40414		Sucker - Whole	Former Bryant Mill Pond	x			x	x		
	P40415		Sucker - Whole	Former Bryant Mill Pond	x			x	x		
	P40416		Sucker - Whole	Former Bryant Mill Pond	x			x	x		
	P40417		Sucker - Whole	Former Bryant Mill Pond	x			x	x		
	P40418		Sucker - Whole	Former Bryant Mill Pond	x			x	x		
	P40419		Sucker - Whole	Former Bryant Mill Pond	x			x	x		
	P40420		Sucker - Whole	Former Bryant Mill Pond	x			x	x		
41106	A66542		Surface Water	Alcott Street	x					x	
	A66543		Surface Water	Cork Street	x					x	
	A66544		Surface Water	Alcott Street	x					x	
	A66545		Surface Water	Cork Street	x					x	
	A66546		Surface Water	Alcott Street	x					x	
	A66547		Surface Water	Cork Street	x					x	
	A66548		Surface Water	Alcott Street	x					x	
	A66549		Surface Water	Cork Street	x					x	
	A66550	A66552	Surface Water	Alcott Street	x					x	x
	A66551		Surface Water	Cork Street	x					x	
	A66552	A66550	Surface Water	Alcott Street	x					x	
41311	A64003		Surface Water	Alcott Street	x					x	
	A64004		Surface Water	Cork Street	x					x	
	A64005	A64007	Surface Water	Alcott Street	x					x	
	A64006		Surface Water	Cork Street	x					x	
	A64007	A64005	Surface Water	Alcott Street	x					x	
43546	A66553		Surface Water	Alcott Street	x					x	
	A66554		Surface Water	Cork Street	x					x	
	A66555		Surface Water	Alcott Street	x					x	

TABLE E-1

ALLIED PAPER, INC./PORTAGE CREEK/KALAMAZOO RIVER
SUPERFUND SITE

ALLIED PAPER, INC. OPERABLE UNIT
SAMPLE DELIVERY GROUP SUMMARY

Sample Delivery Group	Sample ID	Duplicate	Matrix	Location	Analysis						QA/QC
					PCB	TCL	TAL	Pesticide	Mercury	TSS	MS/MSD
	A66556		Surface Water	Cork Street	x					x	
	A66557	A66559	Surface Water	Alcott Street	x					x	
	A66558		Surface Water	Cork Street	x					x	
	A66559	A66557	Surface Water	Alcott Street	x					x	
	A66560		Surface Water	Alcott Street	x					x	
	A66561		Surface Water	Cork Street	x					x	
	A66562		Surface Water	Alcott Street	x					x	
	A66563		Surface Water	Cork Street	x					x	
	A66568		Surface Water	Alcott Street	x					x	
	A66569		Surface Water	Cork Street	x					x	
	A66580	A66852	Surface Water	Alcott Street	x					x	
	A66581		Surface Water	Cork Street	x					x	
	A66582	A66580	Surface Water	Alcott Street	x					x	
	A66583		Surface Water	Alcott Street	x					x	
	A66584		Surface Water	Cork Street	x					x	
	A66585		Surface Water	Alcott Street	x					x	
	A66586		Surface Water	Cork Street	x					x	
43567	A66587	A66589	Surface Water	Alcott Street	x					x	
	A66588		Surface Water	Cork Street	x					x	
	A66589	A66587	Surface Water	Alcott Street	x					x	
44723	A64008		Surface Water	Alcott Street		x	x			x	
	A64009		Surface Water	Cork Street		x	x			x	
46546	A64010		Surface Water	Cork Street	x					x	
	A64011		Surface Water	Alcott Street	x					x	
46665	A64013		Surface Water	Alcott Street	x					x	
	A64014		Surface Water	Cork Street	x					x	
64982	A64590	A64592	Surface Water	Alcott Street	x					x	
	A64591		Surface Water	Cork Street	x					x	

TABLE E-1

ALLIED PAPER, INC./PORTAGE CREEK/KALAMAZOO RIVER
SUPERFUND SITE

ALLIED PAPER, INC. OPERABLE UNIT
SAMPLE DELIVERY GROUP SUMMARY

Sample Delivery Group	Sample ID	Duplicate	Matrix	Location	Analysis						QA/QC
					PCB	TCL	TAL	Pesticide	Mercury	TSS	MS/MSD
	A64592	A64590	Surface Water	Alcott Street	x					x	
	A64593		Surface Water	Bryant Mill Pond	x					x	
41814	Rep 1		Surface Water	Lake Allegan	x					x	
	Rep 2		Surface Water	Lake Allegan	x					x	
	Rep 3		Surface Water	Lake Allegan	x					x	
	Rep 4		Surface Water	Lake Allegan	x					x	
	Rep 5		Surface Water	Lake Allegan	x					x	
	Rep 6		Surface Water	Lake Allegan	x					x	
	Rep 7		Surface Water	Lake Allegan	x					x	
	Rep 8		Surface Water	Lake Allegan	x					x	
	Rep 9		Surface Water	Lake Allegan	x					x	
	Rep 10		Surface Water	Lake Allegan	x					x	
	Rep 11		Surface Water	Lake Allegan	x					x	
	Rep 12		Surface Water	Lake Allegan	x					x	
	Rep 13		Surface Water	Lake Allegan	x					x	
	Rep 14		Surface Water	Lake Allegan	x					x	

Appendix F

Data Review Reports and Laboratory Analytical Results

BLASLAND, BOUCK & LEE, INC.
engineers & scientists

DATA REVIEW FOR

ALLIED PAPER, INC./PORTAGE CREEK/KALAMAZOO RIVER SUPERFUND SITE

SDG# 39025

PCB ANALYSES

ALLIED OPERABLE UNIT

Analyses performed by:

Aquatec, Inc.
Colchester, Vermont

Review performed by:

Blasland, Bouck & Lee, Inc.
Syracuse, New York

Summary

The following is an assessment of the PCB data package for SDG # 39025 for the Allied Operable Unit sampling of the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site. Included with this assessment are the data review check sheets used in the review of the package and sample results for PCB and total suspended solids analyses. Analyses were performed on the following samples:

Sample ID	Lab ID	Matrix	Sample Date
A64000*	195074	water	8/24/93
A64001	195075	water	8/24/93
A64002	195076	water	8/24/93

* MS/MSD performed on this sample

Introduction

Analyses were performed according to the USEPA SW-846 method 8081, modified for PCB only analysis.

The data review process is intended to evaluate the data on a technical basis. It is assumed that the data package represents the best efforts of the laboratory and had already been subjected to adequate and sufficient quality review prior to submission.

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer. Results are qualified with the following codes in accordance with National Functional Guidelines:

- U The compound was analyzed for but not detected. The associated value is the compound quantitation limit.
- J The compound was positively identified; however, the associated numerical value is an estimated concentration only.
- B The compound has been found in the sample as well as its associated blank, its presence in the sample may be suspect.
- N The analysis indicates the presence of a compound for which there is presumptive evidence to make a tentative identification.
- JN The analysis indicates the presence of a compound for which there is presumptive evidence to make a tentative identification. The associated numerical value is an estimated concentration only.
- E The compound was quantitated above the calibration range.
- D Concentration is based on a diluted sample analysis.
- UJ The compound was not detected above the reported sample quantitation limit. However, the reported limit is approximate and may or may not represent the actual limit of quantitation.
- R The sample results are rejected.

Two facts should be noted by all data users. First, the "R" flag means that the associated value is unusable. In other words, due to significant QC problems, the analysis is invalid and provides no information as to whether the compound is present or not. "R" values should not appear on data tables because they cannot be relied upon, even as a last resort. The second fact to keep in mind is that no compound concentration, even if it has passed all QC test, is guaranteed to be accurate. Strict QC serves to increase confidence in data but any value potentially contains error.

The data presented in the package has been derived using a procedure developed by Aquatec, Inc. in an attempt to improve the analytical process of calibration, identification, and quantitation of PCBs as Aroclors. Key components of this procedure include:

Calibration

The response function of the electron capture detector is inherently non-linear, and while significant linearization is achieved for this detector by electronic means, some non-linearity remains. Power function linearization is used to "straighten the curve" and allow the use of response factors for calibration purposes.

During the initial calibration a response factor is calculated for each peak in the individual Aroclors.

A weighted response factor calculation has been used to adjust for non-linearity at the low end of the calibration curve.

Identification

Peak retention times are relative. Retention times are in set windows relative to the time markers DCB and TCMX. Time markers adjust for minor variations in column flow or instrument condition and allow the use of very tight windows which minimizes the number of both false positive and false negative peak identifications.

The determination of "which Aroclor or mixture of Aroclors will produce a chromatogram most similar to that of the residue" is made by expressing the unknown sample chromatogram as a linear combination of the Aroclors. The "most similar" Aroclor or mixture of Aroclors is determined by using a least squares minimization of the difference between the unknown chromatogram and the linear combination of Aroclors. This is similar to the procedure presented by L.E. Slivon, P.M. Schumacher and A. Alford-Stevens for the determination of Aroclor composition from GC/MS level of chlorination results.

Identification/quantitation of Aroclors in samples is based on the combined response of two columns, typically RTX-5 and RTX-35. The pooling of response combines the unique qualities of both columns to derive a more defined Aroclor pattern which less likely to be affected by interferents. Identification/quantitation data for the individual columns is provided in the package and can be used as a check on the combined column results.

Data Assessment

1. Holding Time

The QAPP-specified holding times for PCB analyses of water samples are 5 days from date of sample receipt to extraction and 40 days from extraction to analysis. The technical holding times are 7 days from sample collection to extraction and 40 days to analysis.

All samples were extracted and analyzed within the specified holding times.

2. Blank Contamination

Quality assurance blanks, i.e., method, field or rinse blanks, are prepared to identify any contamination which may have been introduced in to the samples during sample preparation or field activity. Method blanks measure laboratory contamination. Field and rinse blanks measure contamination of samples during field operations.

No target compounds were detected in the method or instrument blanks.

3. System Performance

The system performance was acceptable for both columns.

4. Calibration

Satisfactory instrument calibration is established to insure that the instrument is capable of producing acceptable quantitative data. An initial calibration demonstrates that the instrument is capable of giving acceptable performance at the beginning of an experimental sequence. The continuing calibration verifies that the instrument is giving satisfactory daily performance.

4.1 Initial Calibration

The method allows a maximum RSD of 20%. The %RSD was within acceptable limits for all Aroclors.

4.2 Continuing Calibration

A maximum %D of 15 is allowed. All continuing calibrations were within the specified limits.

5. Surrogates / System Monitoring Compounds

All samples to be analyzed for organic compounds are spiked with surrogate compounds prior to sample preparation to evaluate overall laboratory performance and efficiency of the analytical technique.

Recoveries for samples A64000, A64001 and A64002 were below the control limits for one surrogate on one column. Since recoveries for the remaining surrogate were within control limits, no qualifiers have been added to the samples based on the deviation. All other surrogate recoveries were within acceptable control limits.

6. Compound Identification

The determination of Aroclor presence is made by expressing the unknown sample chromatogram as a linear combination of the Aroclors. The most similar Aroclor or mixture of Aroclors is determined by using a least squares minimization of the difference between the unknown chromatogram and the linear combination of Aroclors.

Identification/quantitation of Aroclors is based on the combined response of the RTX-5 and RTX-35 columns. Identification/quantitation data for the individual columns is provided in the package and has been used as a check on the combined column results.

A review of the sample chromatograms indicate that the Aroclors have been correctly identified/quantitated.

7. Matrix Spike/Matrix Spike Duplicate

Matrix spike and matrix spike duplicate data are used to assess the precision and accuracy of the analytical method.

All matrix spike and matrix spike duplicate recoveries were within acceptable control limits.

8. Field Duplicates

Results for duplicate samples are summarized below:

Compound	Sample A64000	Duplicate A64001	RPD
Aroclor 1016	0.23	0.22	4.4

The RPD result is within acceptable limits.

9. System Performance and Overall Assessment

Overall system performance was acceptable. Other than those deviations specifically mentioned in this review, the overall data quality is within the guidelines listed in the analytical method.

DATA REVIEW CHECKLIST

PCB Data Review Checklist

	YES	NO	NA
Data Completeness and Deliverables			
Is there a narrative or cover letter present?	X		
Are the samples numbers included in the narrative?	X		
Are the sample chain-of-custodies present?	X		
Do the chain-of-custodies indicate any problems with sample receipt or sample condition?		X	
Holding Times			
Have any holding times been exceeded?		X	
Surrogate Recovery			
Are surrogate recovery forms present?	X		
Are all the samples listed on the appropriate surrogate recovery form?	X		
Are the outliers correctly marked with an asterisk?	X		
Were recoveries of TCMX or DCB outside of specified limits for any sample or blank?	X		
If yes, were the samples reanalyzed?		X	
Matrix Spikes			
Is there a matrix spike recovery form present?	X		
Were matrix spikes analyzed at the required frequency?	X		

How many spike recoveries were outside of QC limits?

0 out of 4

How many RPDs for matrix spike and matrix spike duplicate were outside of QC limits?

0 out of 2

	YES	NO	NA
Blanks			
Is a Method Blank Summary Form present?	X		
Has a method blank been analyzed for each set of samples or for each 20 samples, whichever is more frequent?	X		
Is the chromatographic performance acceptable for each instrument?	X		
Do any method/reagent/instrument blanks have positive results?		X	

PCB Data Review Checklist - Page 2

	YES	NO	NA
Do any field/rinse blanks have positive results?			X
Are there field/rinse/equipment blanks associated with every sample?		X	
Calibration and GC Performance			
Are the following chromatograms and data printouts present?			
Aroclor 1016/1260	X		
Aroclor 1221	X		
Aroclor 1232	X		
Aroclor 1242	X		
Aroclor 1248	X		
Aroclor 1254	X		
Are Initial Calibration Summary Forms present and complete for each column and analytical sequence?	X		
Are the linearity criteria for the initial analyses within limits for both columns (20% RSD)	X		
Have all samples been injected within a 12 hour period beginning with the injection of a calibration standard?	X		
Is a Calibration Verification Summary Form present and complete for each continuing standard analyzed?	X		
Are %D values for all compounds within limits (less than 15%)?	X		
Analytical Sequence Check			
Is a analytical sequence form present and complete for each column and each period of analyses?	X		
Was the proper analytical sequence followed?	X		
Cleanup Efficiency Verification			
If GPC cleanup was performed, is Gel Permeation Chromatography Check Form present?			X
Are percent recoveries of the compounds used to check the efficiency of the cleanup procedure within QC limits?			X

PCB Data Review Checklist - Page 3

	YES	NO	NA
PCB Identification			
Is both a combined and single column Aroclor Identification Report present for every sample?	X		
Do the combined column and individual column Aroclor identifications agree?	X		
Were there any false negatives?		X	
Was GC/MS confirmation provided when required?			X
Compound Quantitation and Reported Detection Limits			
Are the reporting limits adjusted to reflect sample dilutions, and for soils, sample moisture?	X		
Chromatogram Quality			
Were the baselines stable?	X		
Were any electronegative displacement (negative peaks) or unusual peaks detected?		X	
Field Duplicates			
Where field duplicates submitted with the samples?	X		

PCB Holding Time and Surrogate Recovery Summary

Sample ID	Holding Time	Surrogates - Column 1		Surrogates - Column 2	
		TCX	DCB	TCX	DCB
A64000	OK for all samples			↓ (58)	
A64001				↓ (57)	
A64002				↓ (55)	
A64000MS					
A64000MSD				↓ (57)	

Surrogates:
TCX Tetrachloro-m-xylene
DCB Decachlorobiphenyl

Qualifiers:
D Surrogates diluted out
↑ Recovery high
↓ Recovery low

Unless otherwise noted, all parameters are within specified limits.

PCB Calibration Summary

Instrument: HP2618
Column: RTX-35 / RTX-5

Date:	9/25 02:55	10/2	10/2	10/2	10/2	10/2	10/2
Time:	to 9/26 22:54	4:10	4:45	14:28	15:03	22:08	22:43
	Initial Cal.	Cont. Cal.	Cont. Cal.	Cont. Cal.	Cont. Cal.	Cont. Cal.	Cont. Cal.
	%RSD	%D	%D	%D	%D	%D	%D
Aroclor 1016	3.3 / 3.6						
Aroclor 1221	3.7 / 3.4						
Aroclor 1232	2.8 / 3.6						
Aroclor 1242	3.1 / 3.3		3.5				
Aroclor 1248	2.8 / 3.0	3.0		6.0		6.5	
Aroclor 1254	2.7 / 2.6				7.5		
Aroclor 1260	3.3 / 2.8						7.0
Tetrachloro-m-xylene	5.0 / 2.3						
Decachlorobiphenyl	6.3 / 6.7						
Affected Samples:							

CORRECTED ANALYSIS SUMMARY FORMS

FORM 1
AROCLOR ANALYSIS DATA SHEET

EPA SAMPLE NO.
A64000
~~A66000~~

Lab Name: Aquatec, Inc. Lab Code: AQUAI

Contract: 91082 Case: PCB SDG: 39025

Phase Type: Water
Phase Volume: 998 (mL)
Injection Volume: 1.0 (uL)
Dilution Factor: 1.0

Lab Sample ID: 195074
Date Received: 08/26/93
Date Extracted: 08/30/93
Date Analyzed: 10/02/93
Sulfur Clean-up: N (Y/N)

CAS NO.	COMPOUND	CONCENTRATION (ug/L)	Q
12674-11-2	Aroclor-1016	0.051	U
11104-28-2	Aroclor-1221	0.051	U
11141-16-5	Aroclor-1232	0.051	U
53469-21-9	Aroclor-1242	0.23	
12672-29-6	Aroclor-1248	0.051	U
11097-69-1	Aroclor-1254	0.051	U
11096-82-5	Aroclor-1260	0.051	U

FORM 1
AROCLOR ANALYSIS DATA SHEET

EPA SAMPLE NO.
A6400 1
~~A66001~~

Lab Name: Aquatec, Inc. Lab Code: AQUAI

Contract: 91082 Case: PCB SDG: 39025

Phase Type: Water
Phase Volume: 999 (mL)
Injection Volume: 1.0 (uL)
Dilution Factor: 1.0

Lab Sample ID: 195075
Date Received: 08/26/93
Date Extracted: 08/30/93
Date Analyzed: 10/02/93
Sulfur Clean-up: N (Y/N)

CAS NO.	COMPOUND	CONCENTRATION (ug/L)	Q
12674-11-2	Aroclor-1016	0.051	U
11104-28-2	Aroclor-1221	0.051	U
11141-16-5	Aroclor-1232	0.051	U
53469-21-9	Aroclor-1242	0.22	
12672-29-6	Aroclor-1248	0.051	U
11097-69-1	Aroclor-1254	0.051	U
11096-82-5	Aroclor-1260	0.051	U

FORM 1
AROCLOR ANALYSIS DATA SHEET

EPA SAMPLE NO.
A64002
~~A66002~~

Lab Name: Aquatec, Inc. Lab Code: AQUAI

Contract: 91082 Case: PCB SDG: 39025

Phase Type: Water
Phase Volume: 1000 (mL)
Injection Volume: 1.0 (uL)
Dilution Factor: 1.0

Lab Sample ID: 195076
Date Received: 08/26/93
Date Extracted: 08/30/93
Date Analyzed: 10/02/93
Sulfur Clean-up: N (Y/N)

CAS NO.	COMPOUND	CONCENTRATION (ug/L)	Q
12674-11-2	Aroclor-1016	0.050	U
11104-28-2	Aroclor-1221	0.050	U
11141-16-5	Aroclor-1232	0.050	U
53469-21-9	Aroclor-1242	0.050	U
12672-29-6	Aroclor-1248	0.050	U
11097-69-1	Aroclor-1254	0.050	U
11096-82-5	Aroclor-1260	0.050	U

CONVENTIONAL ANALYSES

Introduction

Analyses were performed according to the following method:

Total Suspended Solids	EPA 160.2

The data validation process is intended to evaluate the data on a technical basis. It is assumed that the data package represents the best efforts of the laboratory and had already been subjected to adequate and sufficient quality review prior to submission for validation.

During the validation process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this valuation, qualifier codes may be added, deleted, or modified by the data validator. Validator qualified results are annotated with the following codes in accordance with National Functional Guidelines:

- U The analyte was analyzed for but not detected. The associated value is the analyte method detection limit.
- J The analyte was positively identified; however, the associated numerical value is an estimated concentration only.
- UJ The analyte was not detected above the reported sample detection limit. However, the reported limit is approximate and may or may not represent the actual limit of detection.
- R The sample results are rejected.

Two facts should be noted by all data users. First, the "R" flag means that the associated value is unusable. In other words, due to significant QC problems, the analysis is invalid and provides no information as to whether the compound is present or not. "R" values should not appear on data tables because they cannot be relied upon, even as a last resort. The second fact to keep in mind is that no compound concentration, even if it has passed all QC test, is guaranteed to be accurate. Strict QC serves to increase confidence in data but any value potentially contains error.

Data Assessment

1. Holding Time

All samples were analyzed within specified holding times.

2. Blank Contamination

Quality assurance blanks, i.e., method, field, or rinse blanks are prepared to identify any contamination which may have been introduced in to the samples during sample preparation or field activity. Method blanks (including initial and continuing calibration blanks and preparation blanks) measure laboratory contamination. Field and rinse blanks measure cross contamination of samples during field operations.

No blank data was included in the data package.

3. Calibration

Satisfactory instrument calibration is established to insure that the instrument is capable of producing acceptable quantitative data. An initial calibration demonstrates that the instrument is capable of giving acceptable performance at the beginning of an experimental sequence. The continuing calibration verifies that the instrument is giving satisfactory daily performance.

3.1 Initial Calibration

Total suspended solids analyses have no calibration correlation coefficient requirements.

3.2 Continuing Calibration

Total suspended solids analyses have no continuing calibration verification standard requirements.

4. Laboratory Duplicate

Laboratory duplicate data are used to assess the precision of the analytical method.

No laboratory duplicate data was included in the data package.

5. Field Duplicates

Results for duplicate samples are summarized below:

Sample ID/ Duplicate ID	Analyte	Sample Result	Duplicate Result	RPD
A64000 / A64001	Total Suspended Solids	20.0	17.3	14.5%

The duplicate results are acceptable.

6. Laboratory Control Sample (LCS)

No LCS recoveries were included in the data package.

7. System Performance and Overall Assessment

Overall system performance was acceptable. Other than those deviation specifically mentioned in this review, the overall data quality is within the guidelines specified in the method.

TOTAL SUSPENDED SOLIDS RESULTS

Total Suspended Solids Results

Sample ID	Lab ID	Matrix	Result
A64000	195074	water	20.0 mg/l
A64001	195075	water	17.3 mg/l
A64002	195076	water	5.2 mg/l

CHAIN OF CUSTODY

BLASLAND & BOUCK ENGINEERS, P.C.
6723 Towpath Road, Box 66
Syracuse, New York 13214-0066
TEL: 315-446-9120
FAX: 315-449-0017

CHAIN OF CUSTODY RECORD

000003

KB5450146O

PROJ. NO.: 645.51
PROJECT NAME: Kalamazoo River - Portage Creek
SAMPLERS: (Signature) [signature]

STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION	Number of Containers	PCBs	TSS	~~PCBs~~		Temp		REMARKS
SWP-2	8-24	16:00		✓	A66000	7	6	1					Do MS/MSD on PCBs
	8-24			✓	A66001	3	2	1					
SWP-1	8-24	17:40		✓	A66002	3	2	1					
—	8-24				Temp Blank						1		Cooler 251

Relinquished by: (Signature)	DATE	TIME	Received by: (Signature)	Relinquished by: (Signature)	DATE	TIME	Relinquished by: (Signature)
[signature]	8-25-93	13:00					
Relinquished by: (Signature)	DATE	TIME	Received by: (Signature)	Relinquished by: (Signature)	DATE	TIME	Relinquished by: (Signature)
Relinquished by: (Signature)	DATE	TIME	Received for Laboratory by: (Signature) Janine L. Barth	DATE 8/26/93	TIME 1000	Remarks: Temp Blank = 4°C	

7/12/93
1393786HCDR

Distribution: Original Accompanies Shipment; Copy to Coordinator Field Files

MEMORANDUM

BBL
BLASLAND, BOUCK & LEE, INC.
engineers & scientists

To: Doug Cowin **Date:** 7/16/99

From: Laurie Indick **cc:** MPB, AEG, file

Re: KRSG - Allied OU Sampling

Several surface water samples collected at the Allied-OU in 1993 and 1994 were assigned identification numbers which had been reserved for groundwater samples. In addition, two surface water samples collected in September 1994 were assigned non-standard identification numbers. To eliminate any confusion regarding the nature of the samples and to comply with database storage requirements, the numbers have been revised, as follows:

Sample Date	Original Identification Number (list on COC)	Revised Number
8/24/99	A66000	A64000
	A66001	A64001
	A66002	A64002
12/15/93	A66003	A64003
	A66004	A64004
	A66005	A64005
	A66006	A64006
	A66007	A64007
6/9/94	A66008	A64008
	A66009	A64009
9/8/94	A66010	A64010
	A66011	A64011
9/22/94	SWP-1	A64014
	SWP-2	A64013

lai/

DATA REVIEW FOR

ALLIED PAPER, INC./PORTAGE CREEK/KALAMAZOO RIVER SUPERFUND SITE

SDG# 39499

PCB ANALYSES

ALLIED OPERABLE UNIT

Analyses performed by:

Aquatec, Inc.
Colchester, Vermont

Review performed by:

Blasland, Bouck & Lee, Inc.
Syracuse, New York

Summary

The following is an assessment of the PCB data package for SDG # 39499 for the Allied Operable Unit sampling of the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site. Included with this assessment are the data review check sheets used in the review of the package and sample results for PCB analyses. Analyses were performed on the following samples:

Sample ID	Lab ID	Matrix	Sample Date
A66500	197630	water	9/15/93
A66501	197631	water	9/15/93
A66502	197632	water	9/16/93
A66503	197633	water	9/16/93
A66504*	197634	water	9/16/93
A66505	197635	water	9/16/93
A66506	197636	water	9/16/93
A66507	197807	water	9/16/93
A66508	197808	water	9/16/93
A66509	197809	water	9/17/93
A66510	197810	water	9/17/93
A66511	197811	water	9/17/93
A66512	197812	water	9/17/93
A66513	197813	water	9/17/93
A66514	197814	water	9/17/93
A66515	197967	water	9/18/93
A66516	197968	water	9/18/93

* MS/MSD performed on this sample

Introduction

Analyses were performed according to the USEPA SW-846 method 8081, modified for PCB only analysis.

The data review process is intended to evaluate the data on a technical basis. It is assumed that the data package represents the best efforts of the laboratory and had already been subjected to adequate and sufficient quality review prior to submission.

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer. Results are qualified with the following codes in accordance with National Functional Guidelines:

- U The compound was analyzed for but not detected. The associated value is the compound quantitation limit.
- J The compound was positively identified; however, the associated numerical value is an estimated concentration only.
- B The compound has been found in the sample as well as its associated blank, its presence in the sample may be suspect.
- N The analysis indicates the presence of a compound for which there is presumptive evidence to make a tentative identification.
- JN The analysis indicates the presence of a compound for which there is presumptive evidence to make a tentative identification. The associated numerical value is an estimated concentration only.
- E The compound was quantitated above the calibration range.
- D Concentration is based on a diluted sample analysis.
- UJ The compound was not detected above the reported sample quantitation limit. However, the reported limit is approximate and may or may not represent the actual limit of quantitation.
- R The sample results are rejected.

Two facts should be noted by all data users. First, the "R" flag means that the associated value is unusable. In other words, due to significant QC problems, the analysis is invalid and provides no information as to whether the compound is present or not. "R" values should not appear on data tables because they cannot be relied upon, even as a last resort. The second fact to keep in mind is that no compound concentration, even if it has passed all QC test, is guaranteed to be accurate. Strict QC serves to increase confidence in data but any value potentially contains error.

The data presented in the package has been derived using a procedure developed by Aquatec, Inc. in an attempt to improve the analytical process of calibration, identification, and quantitation of PCBs as Aroclors. Key components of this procedure include:

Calibration

The response function of the electron capture detector is inherently non-linear, and while significant linearization is achieved for this detector by electronic means, some non-linearity remains. Power function linearization is used to "straighten the curve" and allow the use of response factors for calibration purposes.

During the initial calibration a response factor is calculated for each peak in the individual Aroclors.

A weighted response factor calculation has been used to adjust for non-linearity at the low end of the calibration curve.

Identification

Peak retention times are relative. Retention times are in set windows relative to the time markers DCB and TCMX. Time markers adjust for minor variations in column flow or instrument condition and allow the use of very tight windows which minimizes the number of both false positive and false negative peak identifications.

The determination of "which Aroclor or mixture of Aroclors will produce a chromatogram most similar to that of the residue" is made by expressing the unknown sample chromatogram as a linear combination of the Aroclors. The "most similar" Aroclor or mixture of Aroclors is determined by using a least squares minimization of the difference between the unknown chromatogram and the linear combination of Aroclors. This is similar to the procedure presented by L.E. Slivon, P.M. Schumacher and A. Alford-Stevens for the determination of Aroclor composition from GC/MS level of chlorination results.

Identification/quantitation of Aroclors in samples is based on the combined response of two columns, typically RTX-5 and RTX-35. The pooling of response combines the unique qualities of both columns to derive a more defined Aroclor pattern which less likely to be affected by interferents. Identification/quantitation data for the individual columns is provided in the package and can be used as a check on the combined column results.

Data Assessment

1. Holding Time

The QAPP-specified holding times for PCB analyses of water samples is 5 days from date of sample receipt to extraction and 40 days from extraction to analysis. The technical holding times are 7 days from collection to extraction and 40 days to analysis.

All samples were originally extracted and analyzed within the specified holding times. The original extracts for samples A66507 and A66514 were, however, compromised and the samples were subsequently re-extracted over the specified holding time. Data for these samples have been qualified as estimated based on the holding time violation.

2. Blank Contamination

Quality assurance blanks, i.e., method, field or rinse blanks, are prepared to identify any contamination which may have been introduced in to the samples during sample preparation or field activity. Method blanks measure laboratory contamination. Field and rinse blanks measure contamination of samples during field operations.

No target compounds were detected in the instrument blanks. Aroclor 1248 was, however, detected in method blank PBLK7G. Since no Aroclor 1248 was detected in the associated samples A66507 and A66514, no qualifiers have been added to the data based on the blank content.

3. System Performance

The system performance was acceptable for both columns.

4. Calibration

Satisfactory instrument calibration is established to insure that the instrument is capable of producing acceptable quantitative data. An initial calibration demonstrates that the instrument is capable of giving acceptable performance at the beginning of an experimental sequence. The continuing calibration verifies that the instrument is giving satisfactory daily performance.

4.1 Initial Calibration

The method allows a maximum RSD of 20%. The %RSD was within acceptable limits for all Aroclors.

4.2 Continuing Calibration

A maximum %D of 15 is allowed. All continuing calibrations were within the specified limits.

5. Surrogates / System Monitoring Compounds

All samples to be analyzed for organic compounds are spiked with surrogate compounds prior to sample preparation to evaluate overall laboratory performance and efficiency of the analytical technique.

Recovery for one surrogate was below control limits in samples A66500, A66501, A66502, A66503, A66504, A66506, A66511, A66512, A66513 and A66514. Since recoveries for the remaining surrogate were within control limits, no qualifiers have been added to the samples based on deviations. All other surrogate recoveries were within control limits.

6. Compound Identification

The determination of Aroclor presence is made by expressing the unknown sample chromatogram as a linear combination of the Aroclors. The most similar Aroclor or mixture of Aroclors is determined by using a least squares minimization of the difference between the unknown chromatogram and the linear combination of Aroclors.

Identification/quantitation of Aroclors is based on the combined response of the RTX-5 and RTX-35 columns. Identification/quantitation data for the individual columns is provided in the package and has been used as a check on the combined column results.

A review of the sample chromatograms indicate that the Aroclors have been correctly identified/quantitated.

7. Matrix Spike/Matrix Spike Duplicate

Matrix spike and matrix spike duplicate data are used to assess the precision and accuracy of the analytical method.

All matrix spike and matrix spike duplicate recoveries were within control limits.

8. Field Duplicates

Results for duplicate samples are summarized below:

Sample ID/ Duplicate ID	Analyte	Sample Result	Duplicate Result	RPD
A66504 / A66505	Aroclor 1016	0.034	0.052	41.9%

The duplicate results are acceptable.

9. System Performance and Overall Assessment

Overall system performance was acceptable. Other than those deviations specifically mentioned in this review, the overall data quality is within the guidelines listed in the analytical method.

DATA REVIEW CHECKLIST

PCB Data Review Checklist

	YES	NO	NA
Data Completeness and Deliverables			
Is there a narrative or cover letter present?	X		
Are the samples numbers included in the narrative?	X		
Are the sample chain-of-custodies present?	X		
Do the chain-of-custodies indicate any problems with sample receipt or sample condition?		X	
Holding Times			
Have any holding times been exceeded?	X		
Surrogate Recovery			
Are surrogate recovery forms present?	X		
Are all the samples listed on the appropriate surrogate recovery form?	X		
Are the outliers correctly marked with an asterisk?	X		
Were recoveries of TCMX or DCB outside of specified limits for any sample or blank?	X		
If yes, were the samples reanalyzed?		X	
Matrix Spikes			
Is there a matrix spike recovery form present?	X		
Were matrix spikes analyzed at the required frequency?	X		
How many spike recoveries were outside of QC limits?			
0 out of 4			
How many RPDs for matrix spike and matrix spike duplicate were outside of QC limits?			
0 out of 2			
Blanks			
Is a Method Blank Summary Form present?	X		
Has a method blank been analyzed for each set of samples or for each 20 samples, whichever is more frequent?	X		
Is the chromatographic performance acceptable for each instrument?	X		
Do any method/reagent/instrument blanks have positive results?	X		

PCB Data Review Checklist - Page 2

	YES	NO	NA
Do any field/rinse blanks have positive results?			X
Are there field/rinse/equipment blanks associated with every sample?		X	
Calibration and GC Performance			
Are the following chromatograms and data printouts present?			
Aroclor 1016/1260	X		
Aroclor 1221	X		
Aroclor 1232	X		
Aroclor 1242	X		
Aroclor 1248	X		
Aroclor 1254	X		
Are Initial Calibration Summary Forms present and complete for each column and analytical sequence?	X		
Are the linearity criteria for the initial analyses within limits for both columns (20% RSD)	X		
Have all samples been injected within a 12 hour period beginning with the injection of a calibration standard?	X		
Is a Calibration Verification Summary Form present and complete for each continuing standard analyzed?	X		
Are %D values for all compounds within limits (less than 15%)?	X		
Analytical Sequence Check			
Is a analytical sequence form present and complete for each column and each period of analyses?	X		
Was the proper analytical sequence followed?	X		
Cleanup Efficiency Verification			
If GPC cleanup was performed, is Gel Permeation Chromatography Check Form present?			X
Are percent recoveries of the compounds used to check the efficiency of the cleanup procedure within QC limits?			X

PCB Data Review Checklist - Page 3

	YES	NO	NA
PCB Identification			
Is both a combined and single column Aroclor Identification Report present for every sample?	X		
Do the combined column and individual column Aroclor identifications agree?	X		
Were there any false negatives?		X	
Was GC/MS confirmation provided when required?			X
Compound Quantitation and Reported Detection Limits			
Are the reporting limits adjusted to reflect sample dilutions, and for soils, sample moisture?	X		
Chromatogram Quality			
Were the baselines stable?	X		
Were any electronegative displacement (negative peaks) or unusual peaks detected?		X	
Field Duplicates			
Where field duplicates submitted with the samples?	X		

PCB Holding Time and Surrogate Recovery Summary

Sample ID	Holding Time	Surrogates - Column 1		Surrogates - Column 2	
		TCX	DCB	TCX	DCB
A66500		↓ (57)			
A66501		↓ (55)		↓ (58)	
A66502		↓ (52)		↓ (57)	
A66503		↓ (45)		↓ (51)	
A66504		↓ (49)		↓ (54)	
A66504MS		↓ (51)		↓ (57)	
A66504MSD		↓ (54)			
A66505					
A66506		↓ (45)		↓ (50)	
A66507	+22				
A66508					
A66509					
A66510					
A66511		↓ (56)		↓ (58)	
A66512		↓ (56)		↓ (59)	
A66513		↓ (58)			
A66514	+21	↓ (52)		↓ (51)	
A66515					
A66516					

Surrogates:
TCX Tetrachloro-m-xylene
DCB Decachlorobiphenyl

Qualifiers:
D Surrogates diluted out
↑ Recovery high
↓ Recovery low

Unless otherwise noted, all parameters are within specified limits.

PCB Calibration Summary

Instrument: HP2618
Column: RTX-35 / RTX-5

Date:	10/7 19:32	10/14	10/14	10/14	10/14	10/14	10/14
Time:	to 10/8 15:32	08:32	08:56	15:24	16:00	23:03	23:38
	Initial Cal.	Cont. Cal.	Cont. Cal.	Cont. Cal.	Cont. Cal.	Cont. Cal.	Cont. Cal.
	%RSD	%D	%D	%D	%D	%D	%D
Aroclor 1016	3.5 / 3.5						3.0
Aroclor 1221	4.1 / 4.9						
Aroclor 1232	3.0 / 5.1						
Aroclor 1242	2.9 / 4.0						
Aroclor 1248	2.8 / 3.8	0.0		0.0		3.5	
Aroclor 1254	2.8 / 2.5		5.0				
Aroclor 1260	3.0 / 3.2				6.5		
Tetrachloro-m-xylene	3.9 / 3.9						
Decachlorobiphenyl	9.6 / 11.3						
Affected Samples:							

PCB Calibration Summary - Page 2

Instrument: HP2618
Column: RTX-35 / RTX-5

Date:		10/15	10/15	10/19	10/19	10/19	10/19
Time:		06:41	07:16	03:24	04:00	09:52	10:28
	Initial Cal.	Cont. Cal.	Cont. Cal.	Cont. Cal.	Cont. Cal.	Cont. Cal.	Cont. Cal.
	%RSD	%D	%D	%D	%D	%D	%D
Aroclor 1016							
Aroclor 1221							
Aroclor 1232							
Aroclor 1242			0.5		1.5		
Aroclor 1248		0.0		3.0		1.5	
Aroclor 1254							10.5
Aroclor 1260							
Tetrachloro-m-xylene							
Decachlorobiphenyl							
Affected Samples:							

CORRECTED ANALYSIS SUMMARY FORMS

FORM 1
AROCLOR ANALYSIS DATA SHEET

EPA SAMPLE NO.

A66500

Lab Name: Aquatec, Inc. Lab Code: AQUAI

Contract: 91082 Case: PCB SDG: 39499

Phase Type: Water
Phase Volume: 1001 (mL)
Injection Volume: 1.0 (uL)
Dilution Factor: 1.0

Lab Sample ID: 197630
Date Received: 09/17/93
Date Extracted: 09/21/93
Date Analyzed: 10/14/93
Sulfur Clean-up: N (Y/N)

CAS NO.	COMPOUND	CONCENTRATION (ug/L)	Q
12674-11-2	Aroclor-1016	0.086	
11104-28-2	Aroclor-1221	0.050	U
11141-16-5	Aroclor-1232	0.050	U
53469-21-9	Aroclor-1242	0.050	U
12672-29-6	Aroclor-1248	0.050	U
11097-69-1	Aroclor-1254	0.050	U
11096-82-5	Aroclor-1260	0.050	U

FORM 1
AROCLOR ANALYSIS DATA SHEET

EPA SAMPLE NO.

A66501

Lab Name: Aquatec, Inc. Lab Code: AQUAI

Contract: 91082 Case: PCB SDG: 39499

Phase Type: Water

Phase Volume: 1001 (mL)

Injection Volume: 1.0 (uL)

Dilution Factor: 1.0

Lab Sample ID: 197631

Date Received: 09/17/93

Date Extracted: 09/21/93

Date Analyzed: 10/14/93

Sulfur Clean-up: N (Y/N)

CAS NO.	COMPOUND	CONCENTRATION (ug/L)	Q
12674-11-2	Aroclor-1016	0.050	U
11104-28-2	Aroclor-1221	0.050	U
11141-16-5	Aroclor-1232	0.050	U
53469-21-9	Aroclor-1242	0.050	U
12672-29-6	Aroclor-1248	0.050	U
11097-69-1	Aroclor-1254	0.050	U
11096-82-5	Aroclor-1260	0.050	U

FORM 1
AROCLOR ANALYSIS DATA SHEET

EPA SAMPLE NO.

A66502

Lab Name: Aquatec, Inc. Lab Code: AQUAI

Contract: 91082 Case: PCB SDG: 39499

Phase Type: Water
Phase Volume: 1003 (mL)
Injection Volume: 1.0 (uL)
Dilution Factor: 1.0

Lab Sample ID: 197632
Date Received: 09/17/93
Date Extracted: 09/21/93
Date Analyzed: 10/14/93
Sulfur Clean-up: N (Y/N)

CAS NO.	COMPOUND	CONCENTRATION (ug/L)	Q
12674-11-2	Aroclor-1016	0.035	J
11104-28-2	Aroclor-1221	0.050	U
11141-16-5	Aroclor-1232	0.050	U
53469-21-9	Aroclor-1242	0.050	U
12672-29-6	Aroclor-1248	0.050	U
11097-69-1	Aroclor-1254	0.050	U
11096-82-5	Aroclor-1260	0.050	U

FORM 1
AROCLOR ANALYSIS DATA SHEET

EPA SAMPLE NO.

A66503

Lab Name: Aquatec, Inc. Lab Code: AQUAI

Contract: 91082 Case: PCB SDG: 39499

Phase Type: Water

Phase Volume: 1001 (mL)

Injection Volume: 1.0 (uL)

Dilution Factor: 1.0

Lab Sample ID: 197633

Date Received: 09/17/93

Date Extracted: 09/21/93

Date Analyzed: 10/14/93

Sulfur Clean-up: N (Y/N)

CAS NO.	COMPOUND	CONCENTRATION (ug/L)	Q
12674-11-2	Aroclor-1016	0.050	U
11104-28-2	Aroclor-1221	0.050	U
11141-16-5	Aroclor-1232	0.050	U
53469-21-9	Aroclor-1242	0.050	U
12672-29-6	Aroclor-1248	0.050	U
11097-69-1	Aroclor-1254	0.050	U
11096-82-5	Aroclor-1260	0.050	U

FORM 1
AROCLOR ANALYSIS DATA SHEET

EPA SAMPLE NO.

A66504

Lab Name: Aquatec, Inc. Lab Code: AQUAI

Contract: 91082 Case: PCB SDG: 39499

Phase Type: Water

Phase Volume: 1001 (mL)

Injection Volume: 1.0 (uL)

Dilution Factor: 1.0

Lab Sample ID: 197634

Date Received: 09/17/93

Date Extracted: 09/21/93

Date Analyzed: 10/14/93

Sulfur Clean-up: N (Y/N)

CAS NO.	COMPOUND	CONCENTRATION (ug/L)	Q
12674-11-2	Aroclor-1016	0.034	J
11104-28-2	Aroclor-1221	0.050	U
11141-16-5	Aroclor-1232	0.050	U
53469-21-9	Aroclor-1242	0.050	U
12672-29-6	Aroclor-1248	0.050	U
11097-69-1	Aroclor-1254	0.050	U
11096-82-5	Aroclor-1260	0.050	U

FORM 1
AROCLOR ANALYSIS DATA SHEET

EPA SAMPLE NO.

A66505

Lab Name: Aquatec, Inc. Lab Code: AQUAI

Contract: 91082 Case: PCB SDG: 39499

Phase Type: Water

Phase Volume: 1002 (mL)

Injection Volume: 1.0 (uL)

Dilution Factor: 1.0

Lab Sample ID: 197636

Date Received: 09/17/93

Date Extracted: 09/21/93

Date Analyzed: 10/14/93

Sulfur Clean-up: N (Y/N)

CAS NO.	COMPOUND	CONCENTRATION (ug/L)	Q
12674-11-2	Aroclor-1016	0.052	
11104-28-2	Aroclor-1221	0.050	U
11141-16-5	Aroclor-1232	0.050	U
53469-21-9	Aroclor-1242	0.050	U
12672-29-6	Aroclor-1248	0.050	U
11097-69-1	Aroclor-1254	0.050	U
11096-82-5	Aroclor-1260	0.050	U

FORM 1
AROCLOR ANALYSIS DATA SHEET

EPA SAMPLE NO.

A66506

Lab Name: Aquatec, Inc. Lab Code: AQUAI

Contract: 91082 Case: PCB SDG: 39499

Phase Type: Water
Phase Volume: 1002 (mL)
Injection Volume: 1.0 (uL)
Dilution Factor: 1.0

Lab Sample ID: 197637
Date Received: 09/17/93
Date Extracted: 09/21/93
Date Analyzed: 10/14/93
Sulfur Clean-up: N (Y/N)

CAS NO.	COMPOUND	CONCENTRATION (ug/L)	Q
12674-11-2	Aroclor-1016	0.064	
11104-28-2	Aroclor-1221	0.050	U
11141-16-5	Aroclor-1232	0.050	U
53469-21-9	Aroclor-1242	0.050	U
12672-29-6	Aroclor-1248	0.050	U
11097-69-1	Aroclor-1254	0.050	U
11096-82-5	Aroclor-1260	0.050	U

FORM 1
AROCLOR ANALYSIS DATA SHEET

EPA SAMPLE NO.

A66507

Lab Name: Aquatec, Inc. Lab Code: AQUAI

Contract: 91082 Case: PCB SDG: 39499

Phase Type: Water

Phase Volume: 1001 (mL)

Injection Volume: 1.0 (uL)

Dilution Factor: 1.0

Lab Sample ID: 197807

Date Received: 09/18/93

Date Extracted: 10/15/93

Date Analyzed: 10/19/93

Sulfur Clean-up: N (Y/N)

CAS NO.	COMPOUND	CONCENTRATION (ug/L)	Q
12674-11-2	Aroclor-1016	0.032	J
11104-28-2	Aroclor-1221	0.050	U J
11141-16-5	Aroclor-1232	0.050	U J
53469-21-9	Aroclor-1242	0.050	U J
12672-29-6	Aroclor-1248	0.050	U J
11097-69-1	Aroclor-1254	0.050	U J
11096-82-5	Aroclor-1260	0.050	U J

FORM 1
AROCLOR ANALYSIS DATA SHEET

EPA SAMPLE NO.

A66508

Lab Name: Aquatec, Inc. Lab Code: AQUAI

Contract: 91082 Case: PCB SDG: 39499

Phase Type: Water
Phase Volume: 1001 (mL)
Injection Volume: 1.0 (uL)
Dilution Factor: 1.0

Lab Sample ID: 197808
Date Received: 09/18/93
Date Extracted: 09/23/93
Date Analyzed: 10/14/93
Sulfur Clean-up: N (Y/N)

CAS NO.	COMPOUND	CONCENTRATION (ug/L)	Q
12674-11-2	Aroclor-1016	0.050	U
11104-28-2	Aroclor-1221	0.050	U
11141-16-5	Aroclor-1232	0.050	U
53469-21-9	Aroclor-1242	0.050	U
12672-29-6	Aroclor-1248	0.050	U
11097-69-1	Aroclor-1254	0.050	U
11096-82-5	Aroclor-1260	0.050	U

FORM 1
AROCLOR ANALYSIS DATA SHEET

EPA SAMPLE NO.

A66509

Lab Name: Aquatec, Inc. Lab Code: AQUAI

Contract: 91082 Case: PCB SDG: 39499

Phase Type: Water
Phase Volume: 1004 (mL)
Injection Volume: 1.0 (uL)
Dilution Factor: 1.0

Lab Sample ID: 197809
Date Received: 09/18/93
Date Extracted: 09/23/93
Date Analyzed: 10/14/93
Sulfur Clean-up: N (Y/N)

CAS NO.	COMPOUND	CONCENTRATION (ug/L)	Q
12674-11-2	Aroclor-1016	0.050	U
11104-28-2	Aroclor-1221	0.050	U
11141-16-5	Aroclor-1232	0.050	U
53469-21-9	Aroclor-1242	0.081	
12672-29-6	Aroclor-1248	0.050	U
11097-69-1	Aroclor-1254	0.050	U
11096-82-5	Aroclor-1260	0.050	U

FORM 1
AROCLOR ANALYSIS DATA SHEET

EPA SAMPLE NO.

A66510

Lab Name: Aquatec, Inc. Lab Code: AQUAI

Contract: 91082 Case: PCB SDG: 39499

Phase Type: Water

Phase Volume: 1001 (mL)

Injection Volume: 1.0 (uL)

Dilution Factor: 1.0

Lab Sample ID: 197810

Date Received: 09/18/93

Date Extracted: 09/23/93

Date Analyzed: 10/14/93

Sulfur Clean-up: N (Y/N)

CAS NO.	COMPOUND	CONCENTRATION (ug/L)	Q
12674-11-2	Aroclor-1016	0.050	U
11104-28-2	Aroclor-1221	0.050	U
11141-16-5	Aroclor-1232	0.050	U
53469-21-9	Aroclor-1242	0.050	U
12672-29-6	Aroclor-1248	0.050	U
11097-69-1	Aroclor-1254	0.050	U
11096-82-5	Aroclor-1260	0.050	U

FORM 1
AROCLOR ANALYSIS DATA SHEET

EPA SAMPLE NO.

A66511

Lab Name: Aquatec, Inc. Lab Code: AQUAI

Contract: 91082 Case: PCB SDG: 39499

Phase Type: Water

Phase Volume: 1000 (mL)

Injection Volume: 1.0 (uL)

Dilution Factor: 1.0

Lab Sample ID: 197811

Date Received: 09/18/93

Date Extracted: 09/23/93

Date Analyzed: 10/14/93

Sulfur Clean-up: N (Y/N)

CAS NO.	COMPOUND	CONCENTRATION (ug/L)	Q
12674-11-2	Aroclor-1016	0.050	U
11104-28-2	Aroclor-1221	0.050	U
11141-16-5	Aroclor-1232	0.050	U
53469-21-9	Aroclor-1242	0.086	
12672-29-6	Aroclor-1248	0.050	U
11097-69-1	Aroclor-1254	0.050	U
11096-82-5	Aroclor-1260	0.050	U

FORM 1
AROCLOR ANALYSIS DATA SHEET

EPA SAMPLE NO.

A66512

Lab Name: Aquatec, Inc. Lab Code: AQUAI

Contract: 91082 Case: PCB SDG: 39499

Phase Type: Water

Phase Volume: 1001 (mL)

Injection Volume: 1.0 (uL)

Dilution Factor: 1.0

Lab Sample ID: 197812

Date Received: 09/18/93

Date Extracted: 09/23/93

Date Analyzed: 10/15/93

Sulfur Clean-up: N (Y/N)

CAS NO.	COMPOUND	CONCENTRATION (ug/L)	Q
12674-11-2	Aroclor-1016	0.050	U
11104-28-2	Aroclor-1221	0.050	U
11141-16-5	Aroclor-1232	0.050	U
53469-21-9	Aroclor-1242	0.050	U
12672-29-6	Aroclor-1248	0.050	U
11097-69-1	Aroclor-1254	0.050	U
11096-82-5	Aroclor-1260	0.050	U

FORM 1
AROCLOR ANALYSIS DATA SHEET

EPA SAMPLE NO.

A66513

Lab Name: Aquatec, Inc. Lab Code: AQUAI

Contract: 91082 Case: PCB SDG: 39499

Phase Type: Water
Phase Volume: 1002 (mL)
Injection Volume: 1.0 (uL)
Dilution Factor: 1.0

Lab Sample ID: 197813
Date Received: 09/18/93
Date Extracted: 09/23/93
Date Analyzed: 10/15/93
Sulfur Clean-up: N (Y/N)

CAS NO.	COMPOUND	CONCENTRATION (ug/L)	Q
12674-11-2	Aroclor-1016	0.050	U
11104-28-2	Aroclor-1221	0.050	U
11141-16-5	Aroclor-1232	0.050	U
53469-21-9	Aroclor-1242	0.094	
12672-29-6	Aroclor-1248	0.050	U
11097-69-1	Aroclor-1254	0.050	U
11096-82-5	Aroclor-1260	0.050	U

FORM 1
AROCLOR ANALYSIS DATA SHEET

EPA SAMPLE NO.

A66514

Lab Name: Aquatec, Inc. Lab Code: AQUAI

Contract: 91082 Case: PCB SDG: 39499

Phase Type: Water

Phase Volume: 1002 (mL)

Injection Volume: 1.0 (uL)

Dilution Factor: 1.0

Lab Sample ID: 197814

Date Received: 09/18/93

Date Extracted: 10/15/93

Date Analyzed: 10/19/93

Sulfur Clean-up: N (Y/N)

CAS NO.	COMPOUND	CONCENTRATION (ug/L)	Q
12674-11-2	Aroclor-1016	0.050	U J
11104-28-2	Aroclor-1221	0.050	U J
11141-16-5	Aroclor-1232	0.050	U J
53469-21-9	Aroclor-1242	0.050	U J
12672-29-6	Aroclor-1248	0.050	U J
11097-69-1	Aroclor-1254	0.050	U J
11096-82-5	Aroclor-1260	0.050	U J

FORM 1
AROCLOR ANALYSIS DATA SHEET

EPA SAMPLE NO.

A66515

Lab Name: Aquatec, Inc. Lab Code: AQUAI

Contract: 91082 Case: PCB SDG: 39499

Phase Type: Water
Phase Volume: 1002 (mL)
Injection Volume: 1.0 (uL)
Dilution Factor: 1.0

Lab Sample ID: 197967
Date Received: 09/18/93
Date Extracted: 09/23/93
Date Analyzed: 10/15/93
Sulfur Clean-up: N (Y/N)

CAS NO.	COMPOUND	CONCENTRATION (ug/L)	Q
12674-11-2	Aroclor-1016	0.050	U
11104-28-2	Aroclor-1221	0.050	U
11141-16-5	Aroclor-1232	0.050	U
53469-21-9	Aroclor-1242	0.10	
12672-29-6	Aroclor-1248	0.050	U
11097-69-1	Aroclor-1254	0.050	U
11096-82-5	Aroclor-1260	0.050	U

FORM 1
AROCLOR ANALYSIS DATA SHEET

EPA SAMPLE NO.

A66516

Lab Name: Aquatec, Inc. Lab Code: AQUAI

Contract: 91082 Case: PCB SDG: 39499

Phase Type: Water

Phase Volume: 1002 (mL)

Injection Volume: 1.0 (uL)

Dilution Factor: 1.0

Lab Sample ID: 197968

Date Received: 09/18/93

Date Extracted: 09/23/93

Date Analyzed: 10/15/93

Sulfur Clean-up: N (Y/N)

CAS NO.	COMPOUND	CONCENTRATION (ug/L)	Q
12674-11-2	Aroclor-1016	0.050	U
11104-28-2	Aroclor-1221	0.050	U
11141-16-5	Aroclor-1232	0.050	U
53469-21-9	Aroclor-1242	0.050	U
12672-29-6	Aroclor-1248	0.050	U
11097-69-1	Aroclor-1254	0.050	U
11096-82-5	Aroclor-1260	0.050	U

CONVENTIONAL ANALYSES

Introduction

Analyses were performed according to the following method:

Total Suspended Solids	EPA 160.2

The data validation process is intended to evaluate the data on a technical basis. It is assumed that the data package represents the best efforts of the laboratory and had already been subjected to adequate and sufficient quality review prior to submission for validation.

During the validation process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this valuation, qualifier codes may be added, deleted, or modified by the data validator. Validator qualified results are annotated with the following codes in accordance with National Functional Guidelines:

- U The analyte was analyzed for but not detected. The associated value is the analyte method detection limit.
- J The analyte was positively identified; however, the associated numerical value is an estimated concentration only.
- UJ The analyte was not detected above the reported sample detection limit. However, the reported limit is approximate and may or may not represent the actual limit of detection.
- R The sample results are rejected.

Two facts should be noted by all data users. First, the "R" flag means that the associated value is unusable. In other words, due to significant QC problems, the analysis is invalid and provides no information as to whether the compound is present or not. "R" values should not appear on data tables because they cannot be relied upon, even as a last resort. The second fact to keep in mind is that no compound concentration, even if it has passed all QC test, is guaranteed to be accurate. Strict QC serves to increase confidence in data but any value potentially contains error.

Data Assessment

1. Holding Time

All samples were analyzed within specified holding times.

2. Blank Contamination

Quality assurance blanks, i.e., method, field, or rinse blanks are prepared to identify any contamination which may have been introduced in to the samples during sample preparation or field activity. Method blanks (including initial and continuing calibration blanks and preparation blanks) measure laboratory contamination. Field and rinse blanks measure cross contamination of samples during field operations.

No blank data was included in the data package.

3. Calibration

Satisfactory instrument calibration is established to insure that the instrument is capable of producing acceptable quantitative data. An initial calibration demonstrates that the instrument is capable of giving acceptable performance at the beginning of an experimental sequence. The continuing calibration verifies that the instrument is giving satisfactory daily performance.

3.1 Initial Calibration

Total suspended solids analyses have no calibration correlation coefficient requirements.

3.2 Continuing Calibration

Total suspended solids analyses have no continuing calibration verification standard requirements.

4. Laboratory Duplicate

Laboratory duplicate data are used to assess the precision of the analytical method.

No laboratory duplicate data was included in the data package.

5. Field Duplicates

Results for duplicate samples are summarized below:

Sample ID/ Duplicate ID	Analyte	Sample Result	Duplicate Result	RPD
A66504 / A66505	Total Suspended Solids	9.6	9.5	1.0%

The duplicate results are acceptable.

6. Laboratory Control Sample (LCS)

No LCS recoveries were included in the data package.

7. System Performance and Overall Assessment

Overall system performance was acceptable. Other than those deviation specifically mentioned in this review, the overall data quality is within the guidelines specified in the method.

CONVENTIONAL ANALYSIS SAMPLE RESULTS

Sample	Total Suspended Solids (mg/L)
A66500	21.0
A66501	16.3
A66502	11.6
A66503	10.0
A66504	9.6
A66505	9.5
A66506	8.4
A66507	9.4
A66508	25.0
A66509	12.9
A66510	10.8
A66511	11.5
A66512	8.8
A66513	8.5
A66514	11.5
A66515	14.8
A66516	13.0

CHAIN OF CUSTODY

BLASLAND & BOUCK ENGINEERS, P.C.
6723 Towpath Road, Box 66
Syracuse, New York 13214-0066
TEL: 315-446-9120
FAX: 315-449-0017

CHAIN OF CUSTODY RECORD

000003

KB54501463

PROJ. NO.: 645.51
PROJECT NAME: Kalamazoo River-Portage Creek
SAMPLERS: (Signature) John Peterson, Brian R. Tank

STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION	Number of Containers	PCBs	TSS				TEMP	REMARKS
SWP-2	9-15	14:45		✓	A66500	3	2	1					
SWP-1	9-15	16:10		✓	A66501	3	2	1					
SWP-2	9-16	10:00		✓	A66502	3	2	1					
SWP-1	9-16	10:40		✓	A66503	3	2	1					
—	9-15				TEMP BLANK	1						1	Cooler # 249
—	9-16				TEMP BLANK	1						1	

Relinquished by: (Signature)	DATE	TIME	Received by: (Signature)	Relinquished by: (Signature)	DATE	TIME	Relinquished by: (Signature)
John Peterson	9-16-93	12:00					
Relinquished by: (Signature)	DATE	TIME	Received by: (Signature)	Relinquished by: (Signature)	DATE	TIME	Relinquished by: (Signature)
Relinquished by: (Signature)	DATE	TIME	Received for Laboratory by: (Signature)	DATE	TIME	Remarks:	
			[illegible]	9/17/93	1000		

7/12/93
1393786HCDR

Distribution: Original Accompanies Shipment; Copy to Coordinator Field Files

BLASLAND & BOUCK ENGINEERS, P.C.
6723 Towpath Road, Box 66
Syracuse, New York 13214-0066
TEL: 315-446-9120
FAX: 315-449-0017

CHAIN OF CUSTODY RECORD

PROJ. NO. 645.51 PROJECT NAME KALAMAZOO RIVER-PORTAGE CREEK

SAMPLERS: (Signature) [signature] [signature]

STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION	Number of Containers	PCB's	TSS				TEMP	REMARKS
✓ SWP-2	9-16			✓	A66504	7	6	1					Do MS/MSD on PCB's
✓				✓	A66505	3	2	1					" "
✓ SWP-1	9-16			✓	A66506	3	2	1					
—	9-16				TEMP BLANK	1						1	Cooler #236

Relinquished by: (Signature)	DATE	TIME	Received by: (Signature)	Relinquished by: (Signature)	DATE	TIME	Relinquished by: (Signature)
[signature]	9-16-93	16:00					
Relinquished by: (Signature)	DATE	TIME	Received by: (Signature)	Relinquished by: (Signature)	DATE	TIME	Relinquished by: (Signature)
Relinquished by: (Signature)	DATE	TIME	Received for Laboratory by: (Signature) [signature]	DATE 9/17/93	TIME 1000	Remarks:	

7/12/93
1393786HCDR

Distribution: Original Accompanies Shipment; Copy to Coordinator Field Files

000004

KB54501464

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6723 Towpath Road, Box 66
Syracuse, New York 13214-0066
TEL: 315-446-9120
FAX: 315-449-0017

CHAIN OF CUSTODY RECORD

000006

KB54501466

PROJ. NO.: 64551
PROJECT NAME: KALAMAZOO RIVER - PORTAGE CREEK
SAMPLERS: (Signature) [signature] / Brian D. Ford

STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION	Number of Containers	PCB's	TSS				Temp	REMARKS
SWP-2	9-16	17:25		✓	A66507 ✓	3	2	1					
SWP-1	9-16	17:50		✓	A66508 ✓	3	2	1					
SWP-2	9-17	8:50		✓	A66509 ✓	3	2	1					
SW-P-1	9-17	9:15		✓	A66510 ✓	3	2	1					
—	9-16				TEMP BLANK	1						1	Cooler #234
—	9-17				TEMP BLANK	1						1	

Relinquished by: (Signature)	DATE	TIME	Received by: (Signature)	Relinquished by: (Signature)	DATE	TIME	Relinquished by: (Signature)
[signature]	9-17	17:30					
Relinquished by: (Signature)	DATE	TIME	Received by: (Signature)	Relinquished by: (Signature)	DATE	TIME	Relinquished by: (Signature)

Relinquished by: (Signature)	DATE	TIME	Received for Laboratory by: (Signature)	DATE	TIME	Remarks:
			[signature]	9/18/93	1100	temp. Blank temps = 1°C + 4°C

7/12/93
1393786HCDR

Distribution: Original Accompanies Shipment; Copy to Coordinator Field Files

BLASLAND & BOUCK ENGINEERS, P.C.
6723 Towpath Road, Box 66
Syracuse, New York 13214-0066
TEL: 315-446-9120
FAX: 315-449-0017

CHAIN OF CUSTODY RECORD

000005

KB54501465

PROJ. NO.: 64551
PROJECT NAME: Kalamazoo River - Portage Creek
SAMPLERS: (Signature)

STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION	Number of Containers	PCBs	TSS				Temp	REMARKS
SWP-2	9-17	12:10		✓	A66511 ✓	3	2	1					
SWP-1	9-17	12:40		✓	A66512 ✓	3	2	1					
SWP-2	9-17	15:35		✓	A66513 ✓	3	2	1					
SWP-1	9-17	16:05		✓	A66514 ✓	3	2	1					
—	9-17				Temp Blank	1						1	Cooler # No Number

Relinquished by: (Signature)	DATE	TIME	Received by: (Signature)	Relinquished by: (Signature)	DATE	TIME	Relinquished by: (Signature)
	9-17	17:30					

Relinquished by: (Signature)	DATE	TIME	Received by: (Signature)	Relinquished by: (Signature)	DATE	TIME	Relinquished by: (Signature)

Relinquished by: (Signature)	DATE	TIME	Received for Laboratory by: (Signature)	DATE	TIME	Remarks:
				9/18/93	1100	Temp Blank temp = 4°C

7/12/93
1393706HCDR

Distribution: Original Accompanies Shipment; Copy to Coordinator Field Files

BLASLAND & BOUCK ENGINEERS, P.C.
6723 Towpath Road, Box 66
Syracuse, New York 13214-0066
TEL: 315-446-9120
FAX: 315-449-0017

CHAIN OF CUSTODY RECORD

000007

KB54501467

PROJ. NO.: 645.51
PROJECT NAME: KALAMAZOO RIVER-PORTAGE CREEK
SAMPLERS: (Signature)

STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION	Number of Containers	PCB's	TSS				TEMP	REMARKS
SWP-2	9-18			✓	A66515	3	2	1					
SWP-1	9-18			✓	A66516	3	2	1					
~~SWP-2~~	~~9-18~~			~~✓~~									
~~SWP-1~~	~~9-18~~			~~✓~~									
—	9-17				TEMP BLANK	1						1	Cooler # 98

Relinquished by: (Signature)	DATE	TIME	Received by: (Signature)	Relinquished by: (Signature)	DATE	TIME	Relinquished by: (Signature)
	9-20	16:00					
Relinquished by: (Signature)	**DATE**	**TIME**	**Received by: (Signature)**	**Relinquished by: (Signature)**	**DATE**	**TIME**	**Relinquished by: (Signature)**
Relinquished by: (Signature)	**DATE**	**TIME**	**Received for Laboratory by: (Signature)**	**DATE**	**TIME**	**Remarks:**	
			Sheila M Wynkoop	9/21/93	1000	temp = 6°C	

7/12/93
1393786HCDR

Distribution: Original Accompanies Shipment; Copy to Coordinator Field Files

DATA REVIEW FOR

ALLIED PAPER, INC./PORTAGE CREEK/KALAMAZOO RIVER
SUPERFUND SITE

SDG# 40199

PCB ANALYSES

ALLIED OPERABLE UNIT

Analyses performed by:

Aquatec, Inc.
Colchester, Vermont

Review performed by:

Blasland, Bouck & Lee, Inc.
Syracuse, New York

Summary

The following is an assessment of the PCB data package for SDG # 40199 for the Allied Operable Unit sampling of the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site. Included with this assessment are the data review check sheets used in the review of the package and sample results for PCB analyses. Analyses were performed on the following samples:

Sample ID	Lab ID	Matrix	Sample Date
A66521	201530	water	10/17/93
A66522	201531	water	10/17/93
A66523	201532	water	10/17/93
A66524	201533	water	10/17/93
A66527	201537	water	10/18/93
A66528	201538	water	10/18/93
A66531	201629	water	10/19/93
A66532	201630	water	10/19/93
A66533*	201786	water	10/19/93
A66534	201787	water	10/19/93
A66535	201788	water	10/19/93
A66538	201899	water	10/20/93
A66539	201900	water	10/20/93
A66540	201901	water	10/20/93
A66541	201902	water	10/20/93

* MS/MSD performed on this sample

Introduction

Analyses were performed according to the USEPA SW-846 method 8081, modified for PCB only analysis.

The data review process is intended to evaluate the data on a technical basis. It is assumed that the data package represents the best efforts of the laboratory and had already been subjected to adequate and sufficient quality review prior to submission.

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer. Results are qualified with the following codes in accordance with National Functional Guidelines:

- U The compound was analyzed for but not detected. The associated value is the compound quantitation limit.
- J The compound was positively identified; however, the associated numerical value is an estimated concentration only.
- B The compound has been found in the sample as well as its associated blank, its presence in the sample may be suspect.
- N The analysis indicates the presence of a compound for which there is presumptive evidence to make a tentative identification.
- JN The analysis indicates the presence of a compound for which there is presumptive evidence to make a tentative identification. The associated numerical value is an estimated concentration only.
- E The compound was quantitated above the calibration range.
- D Concentration is based on a diluted sample analysis.
- UJ The compound was not detected above the reported sample quantitation limit. However, the reported limit is approximate and may or may not represent the actual limit of quantitation.
- R The sample results are rejected.

Two facts should be noted by all data users. First, the "R" flag means that the associated value is unusable. In other words, due to significant QC problems, the analysis is invalid and provides no information as to whether the compound is present or not. "R" values should not appear on data tables because they cannot be relied upon, even as a last resort. The second fact to keep in mind is that no compound concentration, even if it has passed all QC test, is guaranteed to be accurate. Strict QC serves to increase confidence in data but any value potentially contains error.

The data presented in the package has been derived using a procedure developed by Aquatec, Inc. in an attempt to improve the analytical process of calibration, identification, and quantitation of PCBs as Aroclors. Key components of this procedure include:

Calibration

The response function of the electron capture detector is inherently non-linear, and while significant linearization is achieved for this detector by electronic means, some non-linearity remains. Power function linearization is used to "straighten the curve" and allow the use of response factors for calibration purposes.

During the initial calibration a response factor is calculated for each peak in the individual Aroclors.

A weighted response factor calculation has been used to adjust for non-linearity at the low end of the calibration curve.

Identification

Peak retention times are relative. Retention times are in set windows relative to the time markers DCB and TCMX. Time markers adjust for minor variations in column flow or instrument condition and allow the use of very tight windows which minimizes the number of both false positive and false negative peak identifications.

The determination of "which Aroclor or mixture of Aroclors will produce a chromatogram most similar to that of the residue" is made by expressing the unknown sample chromatogram as a linear combination of the Aroclors. The "most similar" Aroclor or mixture of Aroclors is determined by using a least squares minimization of the difference between the unknown chromatogram and the linear combination of Aroclors. This is similar to the procedure presented by L.E. Slivon, P.M. Schumacher and A. Alford-Stevens for the determination of Aroclor composition from GC/MS level of chlorination results.

Identification/quantitation of Aroclors in samples is based on the combined response of two columns, typically RTX-5 and RTX-35. The pooling of response combines the unique qualities of both columns to derive a more defined Aroclor pattern which less likely to be affected by interferents. Identification/quantitation data for the individual columns is provided in the package and can be used as a check on the combined column results.

Data Assessment

1. Holding Time

The QAPP-specified holding times for PCB analyses of water samples are 5 days from date of sample receipt to extraction and 40 days from extraction to analysis. The technical holding times are 7 days from date of collection to extraction and 40 days to analysis.

All samples were extracted and analyzed within the specified holding times.

2. Blank Contamination

Quality assurance blanks, i.e., method, field or rinse blanks, are prepared to identify any contamination which may have been introduced in to the samples during sample preparation or field activity. Method blanks measure laboratory contamination. Field and rinse blanks measure contamination of samples during field operations.

No target compounds were detected in the method or instrument blanks.

3. System Performance

The system performance was acceptable for both columns.

4. Calibration

Satisfactory instrument calibration is established to insure that the instrument is capable of producing acceptable quantitative data. An initial calibration demonstrates that the instrument is capable of giving acceptable performance at the beginning of an experimental sequence. The continuing calibration verifies that the instrument is giving satisfactory daily performance.

4.1 Initial Calibration

The method allows a maximum RSD of 20%. The %RSD was within acceptable limits for all Aroclors.

4.2 Continuing Calibration

A maximum %D of 15 is allowed. All continuing calibrations were within the specified limits except for the following:

Instrument HP2759 11/3/93 02:41

Aroclor 1016 17.0%

Data for this Aroclor have been qualified as estimated in the associated samples A66527, A66528, A66531, A66532 and A66534 based on the %D.

5. Surrogates / System Monitoring Compounds

All samples to be analyzed for organic compounds are spiked with surrogate compounds prior to sample preparation to evaluate overall laboratory performance and efficiency of the analytical technique.

Recovery for one surrogate was below control limits in samples A66523, A66524, A66532, A66533, A66534, A66535, A66538, A66539, A66540 and A66541. Since recoveries for the remaining surrogate were within control limits, no data have been qualified based on the deviations. All other surrogate recoveries were within control limits.

6. Compound Identification

The determination of Aroclor presence is made by expressing the unknown sample chromatogram as a linear combination of the Aroclors. The most similar Aroclor or mixture of Aroclors is determined by using a least squares minimization of the difference between the unknown chromatogram and the linear combination of Aroclors.

Identification/quantitation of Aroclors is based on the combined response of the RTX-5 and RTX-35 columns. Identification/quantitation data for the individual columns is provided in the package and has been used as a check on the combined column results.

A review of the sample chromatograms indicate that the Aroclors have been correctly identified/quantitated.

7. Matrix Spike/Matrix Spike Duplicate

Matrix spike and matrix spike duplicate data are used to assess the precision and accuracy of the analytical method.

All matrix spike and matrix spike duplicate recoveries and relative percent differences were within control limits.

8. Field Duplicates

Results for duplicate samples are summarized below:

Sample ID/ Duplicate ID	Analyte	Sample Result	Duplicate Result	RPD
A66533 / A66535	Aroclor 1016	0.030	0.029	3.4%

The duplicate results are acceptable.

9. System Performance and Overall Assessment

Overall system performance was acceptable. Other than those deviations specifically mentioned in this review, the overall data quality is within the guidelines listed in the analytical method.

DATA REVIEW CHECKLIST

PCB Data Review Checklist

	YES	NO	NA
Data Completeness and Deliverables			
Is there a narrative or cover letter present?	X		
Are the samples numbers included in the narrative?	X		
Are the sample chain-of-custodies present?	X		
Do the chain-of-custodies indicate any problems with sample receipt or sample condition?		X	
Holding Times			
Have any holding times been exceeded?		X	
Surrogate Recovery			
Are surrogate recovery forms present?	X		
Are all the samples listed on the appropriate surrogate recovery form?	X		
Are the outliers correctly marked with an asterisk?	X		
Were recoveries of TCMX or DCB outside of specified limits for any sample or blank?	X		
If yes, were the samples reanalyzed?		X	
Matrix Spikes			
Is there a matrix spike recovery form present?	X		
Were matrix spikes analyzed at the required frequency?	X		
How many spike recoveries were outside of QC limits? 0 out of 4			
How many RPDs for matrix spike and matrix spike duplicate were outside of QC limits? 0 out of 2			
Blanks			
Is a Method Blank Summary Form present?	X		
Has a method blank been analyzed for each set of samples or for each 20 samples, whichever is more frequent?	X		
Is the chromatographic performance acceptable for each instrument?	X		
Do any method/reagent/instrument blanks have positive results?		X	

PCB Data Review Checklist - Page 2

	YES	NO	NA
Do any field/rinse blanks have positive results?			X
Are there field/rinse/equipment blanks associated with every sample?		X	
Calibration and GC Performance			
Are the following chromatograms and data printouts present?			
Aroclor 1016/1260	X		
Aroclor 1221	X		
Aroclor 1232	X		
Aroclor 1242	X		
Aroclor 1248	X		
Aroclor 1254	X		
Are Initial Calibration Summary Forms present and complete for each column and analytical sequence?	X		
Are the linearity criteria for the initial analyses within limits for both columns (20% RSD)	X		
Have all samples been injected within a 12 hour period beginning with the injection of a calibration standard?	X		
Is a Calibration Verification Summary Form present and complete for each continuing standard analyzed?	X		
Are %D values for all compounds within limits (less than 15%)?		X	
Analytical Sequence Check			
Is a analytical sequence form present and complete for each column and each period of analyses?	X		
Was the proper analytical sequence followed?	X		
Cleanup Efficiency Verification			
If GPC cleanup was performed, is Gel Permeation Chromatography Check Form present?			X
Are percent recoveries of the compounds used to check the efficiency of the cleanup procedure within QC limits?			X

PCB Data Review Checklist - Page 3

	YES	NO	NA
PCB Identification			
Is both a combined and single column Aroclor Identification Report present for every sample?	X		
Do the combined column and individual column Aroclor identifications agree?	X		
Were there any false negatives?		X	
Was GC/MS confirmation provided when required?			X
Compound Quantitation and Reported Detection Limits			
Are the reporting limits adjusted to reflect sample dilutions, and for soils, sample moisture?	X		
Chromatogram Quality			
Were the baselines stable?	X		
Were any electronegative displacement (negative peaks) or unusual peaks detected?		X	
Field Duplicates			
Where field duplicates submitted with the samples?	X		

PCB Holding Time and Surrogate Recovery Summary

Sample ID	Holding Time	Surrogates - Column 1		Surrogates - Column 2	
		TCX	DCB	TCX	DCB
A66521	OK for all samples				
A66522					
A66523		↓ (58)		↓ (57)	
A66524		↓ (59)		↓ (59)	
A66527					
A66528					
A66531					
A66532		↓ (46)		↓ (44)	
A66533		↓ (47)		↓ (49)	
A66533MS		↓ (48)		↓ (49)	
A66533MSD		↓ (50)		↓ (52)	
A66534		↓ (57)		↓ (55)	
A66535		↓ (48)		↓ (48)	
A66538		↓ (50)		↓ (51)	
A66539		↓ (48)		↓ (49)	
A66540		↓ (49)		↓ (51)	
A66541		↓ (48)		↓ (49)	

Surrogates:
TCX Tetrachloro-m-xylene
DCB Decachlorobiphenyl

Qualifiers:
D Surrogates diluted out
↑ Recovery high
↓ Recovery low

Unless otherwise noted, all parameters are within specified limits.

PCB Calibration Summary

Instrument: HP2759
Column: RTX-35 / RTX-5

Date:	10/29 21:35	11/2	11/2	11/2	11/2	11/3	11/3
Time:	to 10/30 18:27	10:45	11:20	18:25	19:01	02:05	02:41
	Initial Cal.	Cont. Cal.	Cont. Cal.	Cont. Cal.	Cont. Cal.	Cont. Cal.	Cont. Cal.
	%RSD	%D	%D	%D	%D	%D	%D
Aroclor 1016	8.0 / 3.1						17.0
Aroclor 1221	5.1 / 5.7						
Aroclor 1232	3.6 / 4.1						
Aroclor 1242	7.0 / 3.5						
Aroclor 1248	6.8 / 4.5	9.0		5.5		3.0	
Aroclor 1254	3.8 / 3.8		8.5				
Aroclor 1260	4.0 / 3.5				4.0		
Tetrachloro-m-xylene	13.0 / 10.6						
Decachlorobiphenyl	8.0 / 8.0						
Affected Samples:							A66527
							A66528
							A66531
							A66532
							A66534

PCB Calibration Summary - Page 2

Instrument: HP2618
Column: RTX-35 / RTX-5

Date:	11/6 01:47	11/8	11/8	11/8	11/9	11/10	11/10
Time:	to 11/6 21:47	17:41	17:49	23:43	00:18	17:23	17:59
	Initial Cal.	Cont. Cal.	Cont. Cal.	Cont. Cal.	Cont. Cal.	Cont. Cal.	Cont. Cal.
	%RSD	%D	%D	%D	%D	%D	%D
Aroclor 1016	3.9 / 4.8		11.0				
Aroclor 1221	6.9 / 5.4						
Aroclor 1232	3.2 / 5.7						
Aroclor 1242	2.8 / 5.0				11.0		14.0
Aroclor 1248	3.7 / 4.9	15.0		11.5		14.5	
Aroclor 1254	2.5 / 4.8						11.0
Aroclor 1260	3.5 / 4.1						
Tetrachloro-m-xylene	2.8 / 3.2						
Decachlorobiphenyl	11.6 / 10.8						
Affected Samples:							

PCB Calibration Summary - Page 3

Instrument: HP2618
Column: RTX-35 / RTX-5

Date:		11/11	11/11	11/15	11/15	11/16	11/16
Time:		01:01	01:36	19:00	19:35	02:38	03:14
	Initial Cal.	Cont. Cal.	Cont. Cal.	Cont. Cal.	Cont. Cal.	Cont. Cal.	Cont. Cal.
	%RSD	%D	%D	%D	%D	%D	%D
Aroclor 1016							8.5
Aroclor 1221							
Aroclor 1232							
Aroclor 1242							
Aroclor 1248		7.0		13.0		14.0	
Aroclor 1254			7.0				
Aroclor 1260					15.0		
Tetrachloro-m-xylene							
Decachlorobiphenyl							
Affected Samples:							

CORRECTED ANALYSIS SUMMARY FORMS

FORM 1
AROCLOR ANALYSIS DATA SHEET

EPA SAMPLE NO.

A66521

Lab Name: Aquatec, Inc. Lab Code: AQUAI

Contract: 91082 Case: PCB SDG: 40199

Phase Type: Water

Phase Volume: 989 (mL)

Injection Volume: 1.0 (uL)

Dilution Factor: 1.0

Lab Sample ID: 201530

Date Received: 10/19/93

Date Extracted: 10/22/93

Date Analyzed: 11/02/93

Sulfur Clean-up: N (Y/N)

CAS NO.	COMPOUND	CONCENTRATION (ug/L)	Q
12674-11-2	Aroclor-1016	0.041	J
11104-28-2	Aroclor-1221	0.051	U
11141-16-5	Aroclor-1232	0.051	U
53469-21-9	Aroclor-1242	0.051	U
12672-29-6	Aroclor-1248	0.051	U
11097-69-1	Aroclor-1254	0.051	U
11096-82-5	Aroclor-1260	0.051	U

FORM 1
AROCLOR ANALYSIS DATA SHEET

EPA SAMPLE NO.

A66522

Lab Name: Aquatec, Inc. Lab Code: AQUAI

Contract: 91082 Case: PCB SDG: 40199

Phase Type: Water
Phase Volume: 999 (mL)
Injection Volume: 1.0 (uL)
Dilution Factor: 1.0

Lab Sample ID: 201531
Date Received: 10/19/93
Date Extracted: 10/22/93
Date Analyzed: 11/02/93
Sulfur Clean-up: N (Y/N)

CAS NO.	COMPOUND	CONCENTRATION (ug/L)	Q
12674-11-2	Aroclor-1016	0.051	U
11104-28-2	Aroclor-1221	0.051	U
11141-16-5	Aroclor-1232	0.051	U
53469-21-9	Aroclor-1242	0.051	U
12672-29-6	Aroclor-1248	0.051	U
11097-69-1	Aroclor-1254	0.051	U
11096-82-5	Aroclor-1260	0.051	U

FORM 1
AROCLOR ANALYSIS DATA SHEET

EPA SAMPLE NO.

A66523

Lab Name: Aquatec, Inc. Lab Code: AQUAI

Contract: 91082 Case: PCB SDG: 40199

Phase Type: Water

Phase Volume: 996 (mL)

Injection Volume: 1.0 (uL)

Dilution Factor: 1.0

Lab Sample ID: 201532

Date Received: 10/19/93

Date Extracted: 10/22/93

Date Analyzed: 11/02/93

Sulfur Clean-up: N (Y/N)

CAS NO.	COMPOUND	CONCENTRATION (ug/L)	Q
12674-11-2	Aroclor-1016	0.041	J
11104-28-2	Aroclor-1221	0.051	U
11141-16-5	Aroclor-1232	0.051	U
53469-21-9	Aroclor-1242	0.051	U
12672-29-6	Aroclor-1248	0.051	U
11097-69-1	Aroclor-1254	0.051	U
11096-82-5	Aroclor-1260	0.051	U

FORM 1
AROCLOR ANALYSIS DATA SHEET

EPA SAMPLE NO.

A66524

Lab Name: Aquatec, Inc. Lab Code: AQUAI

Contract: 91082 Case: PCB SDG: 40199

Phase Type: Water

Phase Volume: 1001 (mL)

Injection Volume: 1.0 (uL)

Dilution Factor: 1.0

Lab Sample ID: 201533

Date Received: 10/19/93

Date Extracted: 10/22/93

Date Analyzed: 11/02/93

Sulfur Clean-up: N (Y/N)

CAS NO.	COMPOUND	CONCENTRATION (ug/L)	Q
12674-11-2	Aroclor-1016	0.050	U
11104-28-2	Aroclor-1221	0.050	U
11141-16-5	Aroclor-1232	0.050	U
53469-21-9	Aroclor-1242	0.050	U
12672-29-6	Aroclor-1248	0.050	U
11097-69-1	Aroclor-1254	0.050	U
11096-82-5	Aroclor-1260	0.050	U

FORM 1
AROCLOR ANALYSIS DATA SHEET

EPA SAMPLE NO.

A66527

Lab Name: Aquatec, Inc. Lab Code: AQUAI

Contract: 91082 Case: PCB SDG: 40199

Phase Type: Water
Phase Volume: 1005 (mL)
Injection Volume: 1.0 (uL)
Dilution Factor: 1.0

Lab Sample ID: 201536
Date Received: 10/19/93
Date Extracted: 10/22/93
Date Analyzed: 11/02/93
Sulfur Clean-up: N (Y/N)

CAS NO.	COMPOUND	CONCENTRATION (ug/L)	Q
12674-11-2	Aroclor-1016	0.055	J
11104-28-2	Aroclor-1221	0.050	U
11141-16-5	Aroclor-1232	0.050	U
53469-21-9	Aroclor-1242	0.050	U
12672-29-6	Aroclor-1248	0.050	U
11097-69-1	Aroclor-1254	0.050	U
11096-82-5	Aroclor-1260	0.050	U

FORM 1
AROCLOR ANALYSIS DATA SHEET

EPA SAMPLE NO.

A66528

Lab Name: Aquatec, Inc. Lab Code: AQUAI

Contract: 91082 Case: PCB SDG: 40199

Phase Type: Water

Phase Volume: 1003 (mL)

Injection Volume: 1.0 (uL)

Dilution Factor: 1.0

Lab Sample ID: 201537

Date Received: 10/19/93

Date Extracted: 10/22/93

Date Analyzed: 11/02/93

Sulfur Clean-up: N (Y/N)

CAS NO.	COMPOUND	CONCENTRATION (ug/L)	Q
12674-11-2	Aroclor-1016	0.050	U J
11104-28-2	Aroclor-1221	0.050	U
11141-16-5	Aroclor-1232	0.050	U
53469-21-9	Aroclor-1242	0.050	U
12672-29-6	Aroclor-1248	0.050	U
11097-69-1	Aroclor-1254	0.050	U
11096-82-5	Aroclor-1260	0.050	U

FORM 1
AROCLOR ANALYSIS DATA SHEET

EPA SAMPLE NO.

A66531

Lab Name: Aquatec, Inc. Lab Code: AQUAI

Contract: 91082 Case: PCB SDG: 40199

Phase Type: Water

Phase Volume: 1004 (mL)

Injection Volume: 1.0 (uL)

Dilution Factor: 1.0

Lab Sample ID: 201629

Date Received: 10/20/93

Date Extracted: 10/25/93

Date Analyzed: 11/02/93

Sulfur Clean-up: N (Y/N)

CAS NO.	COMPOUND	CONCENTRATION (ug/L)	Q
12674-11-2	Aroclor-1016	0.037	J
11104-28-2	Aroclor-1221	0.050	U
11141-16-5	Aroclor-1232	0.050	U
53469-21-9	Aroclor-1242	0.050	U
12672-29-6	Aroclor-1248	0.050	U
11097-69-1	Aroclor-1254	0.050	U
11096-82-5	Aroclor-1260	0.050	U

FORM 1
AROCLOR ANALYSIS DATA SHEET

EPA SAMPLE NO.

A66532

Lab Name: Aquatec, Inc. Lab Code: AQUAI

Contract: 91082 Case: PCB SDG: 40199

Phase Type: Water

Phase Volume: 999 (mL)

Injection Volume: 1.0 (uL)

Dilution Factor: 1.0

Lab Sample ID: 201630

Date Received: 10/20/93

Date Extracted: 10/25/93

Date Analyzed: 11/02/93

Sulfur Clean-up: N (Y/N)

CAS NO.	COMPOUND	CONCENTRATION (ug/L)	Q
12674-11-2	Aroclor-1016	0.051	U J
11104-28-2	Aroclor-1221	0.051	U
11141-16-5	Aroclor-1232	0.051	U
53469-21-9	Aroclor-1242	0.051	U
12672-29-6	Aroclor-1248	0.051	U
11097-69-1	Aroclor-1254	0.051	U
11096-82-5	Aroclor-1260	0.051	U

FORM 1
AROCLOR ANALYSIS DATA SHEET

EPA SAMPLE NO.

A66533

Lab Name: Aquatec, Inc. Lab Code: AQUAI

Contract: 91082 Case: PCB SDG: 40199

Phase Type: Water

Phase Volume: 1003 (mL)

Injection Volume: 1.0 (uL)

Dilution Factor: 1.0

Lab Sample ID: 201786

Date Received: 10/21/93

Date Extracted: 10/26/93

Date Analyzed: 11/10/93

Sulfur Clean-up: N (Y/N)

CAS NO.	COMPOUND	CONCENTRATION (ug/L)	Q
12674-11-2	Aroclor-1016	0.030	J
11104-28-2	Aroclor-1221	0.050	U
11141-16-5	Aroclor-1232	0.050	U
53469-21-9	Aroclor-1242	0.050	U
12672-29-6	Aroclor-1248	0.050	U
11097-69-1	Aroclor-1254	0.050	U
11096-82-5	Aroclor-1260	0.050	U

FORM 1
AROCLOR ANALYSIS DATA SHEET

EPA SAMPLE NO.

A66534

Lab Name: Aquatec, Inc. Lab Code: AQUAI

Contract: 91082 Case: PCB SDG: 40199

Phase Type: Water

Phase Volume: 1005 (mL)

Injection Volume: 1.0 (uL)

Dilution Factor: 1.0

Lab Sample ID: 201787

Date Received: 10/21/93

Date Extracted: 10/26/93

Date Analyzed: 11/03/93

Sulfur Clean-up: N (Y/N)

CAS NO.	COMPOUND	CONCENTRATION (ug/L)	Q
12674-11-2	Aroclor-1016	0.050	U J
11104-28-2	Aroclor-1221	0.050	U
11141-16-5	Aroclor-1232	0.050	U
53469-21-9	Aroclor-1242	0.050	U
12672-29-6	Aroclor-1248	0.050	U
11097-69-1	Aroclor-1254	0.050	U
11096-82-5	Aroclor-1260	0.050	U

FORM 1
AROCLOR ANALYSIS DATA SHEET

EPA SAMPLE NO.

A66535

Lab Name: Aquatec, Inc. Lab Code: AQUAI

Contract: 91082 Case: PCB SDG: 40199

Phase Type: Water

Phase Volume: 1004 (mL)

Injection Volume: 1.0 (uL)

Dilution Factor: 1.0

Lab Sample ID: 201788

Date Received: 10/21/93

Date Extracted: 10/26/93

Date Analyzed: 11/08/93

Sulfur Clean-up: N (Y/N)

CAS NO.	COMPOUND	CONCENTRATION (ug/L)	Q
12674-11-2	Aroclor-1016	0.029	J
11104-28-2	Aroclor-1221	0.050	U
11141-16-5	Aroclor-1232	0.050	U
53469-21-9	Aroclor-1242	0.050	U
12672-29-6	Aroclor-1248	0.050	U
11097-69-1	Aroclor-1254	0.050	U
11096-82-5	Aroclor-1260	0.050	U

FORM 1
AROCLOR ANALYSIS DATA SHEET

EPA SAMPLE NO.

A66538

Lab Name: Aquatec, Inc. Lab Code: AQUAI

Contract: 91082 Case: PCB SDG: 40199

Phase Type: Water

Phase Volume: 1002 (mL)

Injection Volume: 1.0 (uL)

Dilution Factor: 1.0

Lab Sample ID: 201899

Date Received: 10/22/93

Date Extracted: 10/26/93

Date Analyzed: 11/08/93

Sulfur Clean-up: N (Y/N)

CAS NO.	COMPOUND	CONCENTRATION (ug/L)	Q
12674-11-2	Aroclor-1016	0.050	U
11104-28-2	Aroclor-1221	0.050	U
11141-16-5	Aroclor-1232	0.050	U
53469-21-9	Aroclor-1242	0.067	
12672-29-6	Aroclor-1248	0.050	U
11097-69-1	Aroclor-1254	0.050	U
11096-82-5	Aroclor-1260	0.050	U

FORM 1
AROCLOR ANALYSIS DATA SHEET

EPA SAMPLE NO.

A66539

Lab Name: Aquatec, Inc. Lab Code: AQUAI

Contract: 91082 Case: PCB SDG: 40199

Phase Type: Water

Phase Volume: 1004 (mL)

Injection Volume: 1.0 (uL)

Dilution Factor: 1.0

Lab Sample ID: 201900

Date Received: 10/22/93

Date Extracted: 10/26/93

Date Analyzed: 11/08/93

Sulfur Clean-up: N (Y/N)

CAS NO.	COMPOUND	CONCENTRATION (ug/L)	Q
12674-11-2	Aroclor-1016	0.050	U
11104-28-2	Aroclor-1221	0.050	U
11141-16-5	Aroclor-1232	0.050	U
53469-21-9	Aroclor-1242	0.050	U
12672-29-6	Aroclor-1248	0.050	U
11097-69-1	Aroclor-1254	0.050	U
11096-82-5	Aroclor-1260	0.050	U

FORM 1
AROCLOR ANALYSIS DATA SHEET

EPA SAMPLE NO.

A66540

Lab Name: Aquatec, Inc. Lab Code: AQUAI

Contract: 91082 Case: PCB SDG: 40199

Phase Type: Water

Phase Volume: 1000 (mL)

Injection Volume: 1.0 (uL)

Dilution Factor: 1.0

Lab Sample ID: 201901

Date Received: 10/22/93

Date Extracted: 10/26/93

Date Analyzed: 11/08/93

Sulfur Clean-up: N (Y/N)

CAS NO.	COMPOUND	CONCENTRATION (ug/L)	Q
12674-11-2	Aroclor-1016	0.050	U
11104-28-2	Aroclor-1221	0.050	U
11141-16-5	Aroclor-1232	0.050	U
53469-21-9	Aroclor-1242	0.071	
12672-29-6	Aroclor-1248	0.050	U
11097-69-1	Aroclor-1254	0.050	U
11096-82-5	Aroclor-1260	0.050	U

FORM 1
AROCLOR ANALYSIS DATA SHEET

EPA SAMPLE NO.

A66541

Lab Name: Aquatec, Inc. Lab Code: AQUAI

Contract: 91082 Case: PCB SDG: 40199

Phase Type: Water

Phase Volume: 989 (mL)

Injection Volume: 1.0 (uL)

Dilution Factor: 1.0

Lab Sample ID: 201902

Date Received: 10/22/93

Date Extracted: 10/26/93

Date Analyzed: 11/08/93

Sulfur Clean-up: N (Y/N)

CAS NO.	COMPOUND	CONCENTRATION (ug/L)	Q
12674-11-2	Aroclor-1016	0.051	U
11104-28-2	Aroclor-1221	0.051	U
11141-16-5	Aroclor-1232	0.051	U
53469-21-9	Aroclor-1242	0.051	U
12672-29-6	Aroclor-1248	0.051	U
11097-69-1	Aroclor-1254	0.051	U
11096-82-5	Aroclor-1260	0.051	U

CONVENTIONAL ANALYSES

Introduction

Analyses were performed according to the following method:

Total Suspended Solids	EPA 160.2

The data validation process is intended to evaluate the data on a technical basis. It is assumed that the data package represents the best efforts of the laboratory and had already been subjected to adequate and sufficient quality review prior to submission for validation.

During the validation process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this valuation, qualifier codes may be added, deleted, or modified by the data validator. Validator qualified results are annotated with the following codes in accordance with National Functional Guidelines:

- U The analyte was analyzed for but not detected. The associated value is the analyte method detection limit.
- J The analyte was positively identified; however, the associated numerical value is an estimated concentration only.
- UJ The analyte was not detected above the reported sample detection limit. However, the reported limit is approximate and may or may not represent the actual limit of detection.
- R The sample results are rejected.

Two facts should be noted by all data users. First, the "R" flag means that the associated value is unusable. In other words, due to significant QC problems, the analysis is invalid and provides no information as to whether the compound is present or not. "R" values should not appear on data tables because they cannot be relied upon, even as a last resort. The second fact to keep in mind is that no compound concentration, even if it has passed all QC test, is guaranteed to be accurate. Strict QC serves to increase confidence in data but any value potentially contains error.

Data Assessment

1. Holding Time

All samples were analyzed within specified holding times.

2. Blank Contamination

Quality assurance blanks, i.e., method, field, or rinse blanks are prepared to identify any contamination which may have been introduced in to the samples during sample preparation or field activity. Method blanks (including initial and continuing calibration blanks and preparation blanks) measure laboratory contamination. Field and rinse blanks measure cross contamination of samples during field operations.

No blank data was included in the data package.

3. Calibration

Satisfactory instrument calibration is established to insure that the instrument is capable of producing acceptable quantitative data. An initial calibration demonstrates that the instrument is capable of giving acceptable performance at the beginning of an experimental sequence. The continuing calibration verifies that the instrument is giving satisfactory daily performance.

3.1 Initial Calibration

Total suspended solids analyses have no calibration correlation coefficient requirements.

3.2 Continuing Calibration

Total suspended solids analyses have no continuing calibration verification standard requirements.

4. Laboratory Duplicate

Laboratory duplicate data are used to assess the precision of the analytical method.

The laboratory duplicate results were acceptable.

5. Field Duplicates

Results for duplicate samples are summarized below:

Sample ID/ Duplicate ID	Analyte	Sample Result	Duplicate Result	RPD
A66533 / A66535	Total Suspended Solids	5.7	5.3	7.3%

The duplicate results are acceptable.

6. Laboratory Control Sample (LCS)

No LCS recoveries were included in the data package.

7. System Performance and Overall Assessment

Overall system performance was acceptable. Other than those deviation specifically mentioned in this review, the overall data quality is within the guidelines specified in the method.

CONVENTIONAL ANALYSIS SAMPLE RESULTS

Sample	Total Suspended Solids (mg/L)
A66521	12.3
A66522	12.7
A66523	9.4
A66524	11.0
A66527	10.1
A66528	6.1
A66531	7.0
A66532	5.8
A66533	5.7
A66534	5.4
A66535	5.3
A66538	11.2
A66539	10.3
A66540	14.1
A66541	10.6

CHAIN OF CUSTODY

BLASLAND & BOUCK ENGINEERS, P.C.
6723 Towpath Road, Box 66
Syracuse, New York 13214-0066
TEL: 315-446-9120
FAX: 315-449-0017

CHAIN OF CUSTODY RECORD

000003

KB5450147O

PROJ. NO.: 645.51
PROJECT NAME: Kalamazoo River / Portage Creek
SAMPLERS: (Signature)

STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION	Number of Containers	PCBs	TSS				Temp	REMARKS
SWP-2	10-17	14:20		✓	A66521	3	2	1					
SWP-1	10-17	14:45		✓	A66522	3	2	1					
SWP-2	10-17	17:20		✓	A66523	3	2	1					
SWP-1	10-17	17:45		✓	A66524	3	2	1					
—	10-17				Temp Blank							1	Cooler # 249

Relinquished by: (Signature)	DATE	TIME	Received by: (Signature)	Relinquished by: (Signature)	DATE	TIME	Relinquished by: (Signature)
	10-18-93	17:15					
Relinquished by: (Signature)	**DATE**	**TIME**	**Received by: (Signature)**	**Relinquished by: (Signature)**	**DATE**	**TIME**	**Relinquished by: (Signature)**
Relinquished by: (Signature)	**DATE**	**TIME**	**Received for Laboratory by: (Signature)**	**DATE**	**TIME**	**Remarks:**	
			Sheila M Wimbrop	10/19/93	1000	4°C	

7/12/93
1393786HCDR

Distribution: Original Accompanies Shipment; Copy to Coordinator Field Files

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000004

KB54501471

CHAIN OF CUSTODY RECORD

PROJ. NO.: 645.51
PROJECT NAME: Kalamazoo River / Portage Creek
SAMPLERS: (Signature) [signature]

STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION	Number of Containers	PCB's	TSS				Temp	REMARKS
✓ SWP-2	10-18	9:25		✓	A66525	3	2	1					Disposed of these per R. Difiore telcon.
✓ SWP-1	10-18	10:10		✓	A66526	3	2	1					Disposed of these per R. Difiore telcon JLB 10/20
✓ SWP-2	10-18	14:15		✓	A66527	3	2	1					
✓ SWP-1	10-18	14:55		✓	A66528	3	2	1					
—	10-18				Temp Blank	1						1	Cooler # 261

Relinquished by: (Signature)	DATE	TIME	Received by: (Signature)	Relinquished by: (Signature)	DATE	TIME	Relinquished by: (Signature)
[signature]	10-18-93	17:15					
Relinquished by: (Signature)	DATE	TIME	Received by: (Signature)	Relinquished by: (Signature)	DATE	TIME	Relinquished by: (Signature)
Relinquished by: (Signature)	DATE	TIME	Received for Laboratory by: (Signature) [signature]	DATE 10/19/93	TIME 1000	Remarks: 5°C	

7/12/93
1393786HCDR

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000005

KB54501472

CHAIN OF CUSTODY RECORD

PROJ. NO.: 645.51
PROJECT NAME: Kalamazoo River / Portage Creek
SAMPLERS: (Signature) John T. Peters / Brian L. [illegible]

STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION	Number of Containers	PCBs	TSS				Temp	REMARKS
SWP-2	10-18	18:10		✓	A66529	3	2	1					Disposed of this per R. Difiore 10/20/93
SWP-1	10-18	18:35		✓	A66530	3	2	1					Disposed of this per R. Difiore 10/20/93 JLB
SWP-2	10-19	11:45		✓	A66531	3	2	1					
SWP-1	10-19	12:40		✓	A66532	3	2	1					
	10-18				TEMP BLANK	1						1	Cooler #151
	10-19				TEMP BLANK	1						1	

Relinquished by: (Signature)	DATE	TIME	Received by: (Signature)	Relinquished by: (Signature)	DATE	TIME	Relinquished by: (Signature)
John T. Peters	10-19-93	16:20					
Relinquished by: (Signature)	DATE	TIME	Received by: (Signature)	Relinquished by: (Signature)	DATE	TIME	Relinquished by: (Signature)

Relinquished by: (Signature)	DATE	TIME	Received for Laboratory by: (Signature)	DATE	TIME	Remarks:
			Pat Poundstone	10/20/93	1000	Temp = 10°C

7/12/93
1393786HCDR

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CHAIN OF CUSTODY RECORD

000006

KB54501473

PROJ. NO.: 645.51
PROJECT NAME: Kalamazoo River/Portage Creek
SAMPLERS: (Signature) John J. Peterson, Brian D. Lord

STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION	Number of Containers	PCB's	TSS				TEMP	REMARKS
SWP-2	10-19	17:20		✓	A66533	7	6	1					Do MS/MSD on PCB's
SWP-1	10-19	17:45		✓	A66534	3	2	1					
—	—	—		✓	A66535	3	2	1					
—	10-19	—			Temp Blank	1						1	Cooler #77

Relinquished by: (Signature)	DATE	TIME	Received by: (Signature)	Relinquished by: (Signature)	DATE	TIME	Relinquished by: (Signature)
John J. Peterson	10-20-93	17:00					
Relinquished by: (Signature)	DATE	TIME	Received by: (Signature)	Relinquished by: (Signature)	DATE	TIME	Relinquished by: (Signature)

Relinquished by: (Signature)	DATE	TIME	Received for Laboratory by: (Signature)	DATE	TIME	Remarks:
			Pat Poundstone	10/21/93	1000	Temp blank = 0°C

7/12/93
1393786ICDR

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FAX: 315-449-0017

CHAIN OF CUSTODY RECORD

000007

KB54501474

PROJ. NO.: 645.51
PROJECT NAME: Kalamazoo River / Portage Creek
SAMPLERS: (Signature) [signature], Brian R. [signature]

STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION	Number of Containers	PCBs	TSS				Temp	REMARKS
SWP-2	10-20	14:00		✓	A66538	3	2	1					
SWP-1	10-20	14:30		✓	A66539	3	2	1					
SWP-2	10-21	11:10		✓	A66540	3	2	1					
SWP-1	10-21	11:40		✓	A66541	3	2	1					
—	10-20	—			Temp Blank	1						1	Cooler #224
—	10-21	—			Temp Blank	1						1	

Relinquished by: (Signature)	DATE	TIME	Received by: (Signature)	Relinquished by: (Signature)	DATE	TIME	Relinquished by: (Signature)
[signature]	10-21-93	14:00					
Relinquished by: (Signature)	DATE	TIME	Received by: (Signature)	Relinquished by: (Signature)	DATE	TIME	Relinquished by: (Signature)

Relinquished by: (Signature)	DATE	TIME	Received for Laboratory by: (Signature)	DATE	TIME	Remarks:
			Pat Poundstone	10/22/93	1000	Temp blanks = 1°C & 0°C

7/12/93
1J93786HCDR

Distribution: Original Accompanies Shipment; Copy to Coordinator Field Files

DATA REVIEW FOR

ALLIED PAPER, INC./PORTAGE CREEK/KALAMAZOO RIVER
SUPERFUND SITE

SDG# 40278

VOLATILE, SEMIVOLATILE, PESTICIDE/PCB,
AND INORGANICS ANALYSES

ALLIED OPERABLE UNIT

Analyses performed by:

Aquatec, Inc.
Colchester, Vermont

Review performed by:

Blasland, Bouck & Lee, Inc.
Syracuse, New York

Summary

The following is an assessment of the data package for SDG # 40278 for the Allied Operable Unit sampling of the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site. Included with this assessment are the data review check sheets used in the review of the package and corrected sample results. Analyses were performed on the following samples:

Sample ID	Lab ID	Matrix	Sample Date	Analysis				
				VOA	BNA	Pest	TAL	TSS
A66536	201814	water	10/20/93	x	x		x	x
A66537	201815	water	10/20/93	x	x		x	x

VOLATILE ANALYSES

Introduction

Analyses were performed according to the USEPA CLP SOW OLM01.8.

The data review process is intended to evaluate the data on a technical basis. It is assumed that the data package represents the best efforts of the laboratory and had already been subjected to adequate and sufficient quality review prior to submission.

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer. Results are qualified with the following codes in accordance with National Functional Guidelines:

- U The compound was analyzed for but not detected. The associated value is the compound quantitation limit.
- J The compound was positively identified; however, the associated numerical value is an estimated concentration only.
- B The compound has been found in the sample as well as its associated blank, its presence in the sample may be suspect.
- N The analysis indicates the presence of a compound for which there is presumptive evidence to make a tentative identification.
- JN The analysis indicates the presence of a compound for which there is presumptive evidence to make a tentative identification. The associated numerical value is an estimated concentration only.
- E The compound was quantitated above the calibration range.
- D Concentration is based on a diluted sample analysis.
- UJ The compound was not detected above the reported sample quantitation limit. However, the reported limit is approximate and may or may not represent the actual limit of quantitation.
- R The sample results are rejected.

Two facts should be noted by all data users. First, the "R" flag means that the associated value is unusable. In other words, due to significant QC problems, the analysis is invalid and provides no information as to whether the compound is present or not. "R" values should not appear on data tables because they cannot be relied upon, even as a last resort. The second fact to keep in mind is that no compound concentration, even if it has passed all QC test, is guaranteed to be accurate. Strict QC serves to increase confidence in data but any value potentially contains error.

Data Assessment

1. Holding Time

The QAPP-specified holding time for volatile analyses of water samples under OLM01.8 is 10 days from sample receipt. The technical holding times for preserved water samples is 14 days from sample collection. No deviations from these holding time requirements were noted.

2. Blank Contamination

Quality assurance blanks, i.e., method, trip, field, or rinse blanks are prepared to identify any contamination which may have been introduced in to the samples during sample preparation or field activity. Method blanks measure laboratory contamination. Trip blanks measure cross contamination of samples during shipment. Field and rinse blanks measure cross contamination of samples during field operations.

No target compounds were detected in the method blank.

3. Mass Spectrometer Tuning

Mass spectrometer performance was acceptable.

4. Calibration

Satisfactory instrument calibration is established to insure that the instrument is capable of producing acceptable quantitative data. An initial calibration demonstrates that the instrument is capable of giving acceptable performance at the beginning of an experimental sequence. The continuing calibration verifies that the instrument is giving satisfactory daily performance.

4.1 Initial Calibration

The % relative standard deviation (%RSD) for all compounds was less than 30% and all response factors were above the minimum required RF of 0.05.

4.2 Continuing Calibration

Continuing calibration standards were within the 25% difference (%D) of the initial calibration with the exception of the following:

Instrument M 10/28/93 12:59

Acetone	48.9%
2-Butanone	38.7%

Data for these compounds was qualified as estimated in the associated samples A66536 and A66537.

5. Surrogates / System Monitoring Compounds

All samples to be analyzed for organic compounds are spiked with surrogate compounds prior to sample preparation to evaluate overall laboratory performance and efficiency of the analytical technique.

All surrogate recoveries were within control limits.

6. Internal Standard Performance

Internal standard performance criteria insure that the GC/MS sensitivity and response are stable during every experimental run.

All internal standard areas and retention times were within established limits.

7. Compound Identification

Compounds are identified on the GC/MS by using the analyte's relative retention time (RRT) and ion spectra.

All compounds identified met the specified criteria.

8. Matrix Spike/Matrix Spike Duplicate

Matrix spike and matrix spike duplicate data are used to assess the precision and accuracy of the analytical method.

No matrix spike was included in this data set

9. Field Duplicates

No field duplicates were included in this data set.

10. System Performance and Overall Assessment

Overall system performance was acceptable. Other than those deviations specifically mentioned in this review, the overall data quality is within the guidelines listed in the analytical method.

Data Validation Checksheets

Volatile Organics Data Validation Checklist

	YES	NO	NA
Data Completeness and Deliverables			
Is there a narrative or cover letter present?	X		
Are the samples numbers included in the narrative?	X		
Are the sample chain-of-custodies present?	X		
Do the chain-of-custodies indicate any problems with sample receipt or sample condition?		X	
Holding Times			
Have any holding times been exceeded?		X	
Surrogate Recovery			
Are the surrogate recovery forms present?	X		
Are all the samples listed on the appropriate surrogate recovery form?	X		
Are the outliers correctly marked with an asterisk?			X
Was one or more surrogate recovery outside of specified limits for any sample or blank?		X	
If yes, were the samples reanalyzed?			X
Were the method blanks reanalyzed?			X
Matrix Spikes			
Is there a matrix spike recovery form present?		X	
Were matrix spikes analyzed at the required frequency?		X	
How many spike recoveries were outside of QC limits?			
0 out of 0			
How many RPDs for matrix spike and matrix spike duplicate were outside of QC limits?			
0 out of 0			
Blanks			
Is the method blank summary form present?	X		
Has a method blank been analyzed for each set of samples or for each 20 samples, whichever is more frequent?	X		
Has a blank been analyzed at least once every twelve hours for each system used?	X		

Volatile Organics Data Validation Checklist - Page 2

	YES	NO	NA
Is the chromatographic performance acceptable for each instrument?	X		
Do any method/reagent/instrument blanks have positive results?		X	
Do any trip/field/rinse blanks have positive results?			X
Are there field/rinse/equipment blanks associated with every sample?		X	
Tuning and Mass Calibration			
Are the GC/MS tuning forms present for BFB?	X		
Are the bar graph spectrum and mass/charge listing provided for each BFB?	X		
Has a BFB been analyzed for each twelve hours of analysis per instrument?	X		
Have the ion abundance criteria been met for each instrument used?	X		
Target Analytes			
Is an organics analysis data sheet present for each of the following:			
Samples	X		
Matrix spikes	X		
Blanks	X		
Are the reconstructed ion chromatograms present for each of the following:			
Samples	X		
Matrix spikes	X		
Blanks	X		
Is the chromatographic performance acceptable with respect to:			
Baseline stability	X		
Resolution	X		
Peak shape	X		
Are the mass spectra of the identified compounds present?	X		

Volatile Organics Data Validation Checklist - Page 3

	YES	NO	NA
Tentatively Identified Compounds			
Are all the TIC summary forms present?	X		
Are the mass spectra for the tentatively identified compounds and there associated "best match" spectra present?			X
Are any target compounds listed as TICs?		X	
Quantitation and Detection Limits			
Are the reporting limits adjusted to reflect sample dilutions, and for soils, sample moisture?	X		
Standard Data			
Are the quantitation reports and reconstructed ion chromatograms present for the initial and continuing calibration standards?	X		
Initial Calibration			
Are the initial calibration forms present for each instrument used?	X		
Are the response factor RSDs within specified limits?	X		
Are the average RRF equal to or greater than minimum requirements?	X		
Continuing Calibration			
Are the continuing calibration forms present for each day and each instrument?	X		
Has a continuing calibration standard been analyzed for each twelve hours of analysis per instrument?	X		
All %D within acceptable limits?		X	
Are all RF equal to or greater than minimum requirements?	X		
Internal Standards			
Are internal standard areas of every samples and blank within the upper and lower limits for each continuing calibration?	X		
Field Duplicates			
Where field duplicates submitted with the samples?		X	

Volatile Qualifier Summary
Holding Time, Surrogates, Internal Standards

Sample ID	Holding Time	Surrogates			Internal Standards		
		TOL	BFB	DCE	BCM	DFB	CBZ
A66536	OK for all samples	OK for all samples			OK for all samples		
A66537							

Surrogates:
TOL Toluene-d8
BFB Bromofluorobenzene
DCE 1,4-Dichloroethane-d4

Internal Standards:
BCM Bromochloromethane
DFB 1,4-Difluorobenzene
CBZ Chlorobenzene-d5

Volatile Calibration Outliers

Instrument: L
Matrix: WATER
Level: LOW

Date/Time	10/21/93		10/28 1249					
	Initial Cal.		Cont. Cal.		Cont. Cal.		Cont. Cal.	
	RF	%RSD	RF	%D	RF	%D	RF	%D
Chloromethane								
Bromomethane								
Vinyl chloride								
Chloroethane								
Methylene chloride								
Acetone				48.9				
Carbon disulfide								
1,1-Dichloroethene								
1,1-Dichloroethane								
1,2-Dichloroethene (total)								
Chloroform								
1,2-Dichloroethane								
2-Butanone				38.9				
1,1,1-Trichloroethane								
Carbon tetrachloride								
Bromodichloromethane								
1,2-Dichloropropane								
cis-1,3-Dichloropropene								
Trichloroethene								
Dibromochloromethane								
1,1,2-Trichloroethane								
Benzene								
trans-1,3-Dichloropropene								
Bromoform								
4-methyl-2-Pentanone								
2-Hexanone								
Tetrachloroethene								
1,1,2,2-Tetrachloroethane								
Toluene								

Volatile Calibration Outliers - Page 2

Date/Time	10/21/93		10/28 1249					
	Initial Cal.		Cont. Cal.		Cont. Cal.		Cont. Cal.	
	RF	%RSD	RF	%D	RF	%D	RF	%D
Chlorobenzene								
Ethylbenzene								
Styrene								
Xylene (total)								

Affected Samples:				
		A66536		
		A66537		

Corrected Sample Analysis Data Sheets

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

A66536

Lab Name: AQUATEC, INC. Contract: 91082

Lab Code: AQUAI Case No.: OLM SAS No.: SDG No.: 40278

Matrix: (soil/water) WATER Lab Sample ID: 201814

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: M201814V.D

Level: (low/med) LOW Date Received: 10/21/93

% Moisture: not dec. _____ Data Analyzed: 10/28/93

GC Column:CAP ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____(uL) Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-87-3	Chloromethane	10	U
74-83-9	Bromomethane	10	U
75-01-4	Vinyl Chloride	10	U
75-00-3	Chloroethane	10	U
75-09-2	Methylene Chloride	10	U
67-64-1	Acetone	10	U J
75-15-0	Carbon Disulfide	10	U
75-35-4	1,1-Dichloroethene	10	U
75-34-3	1,1-Dichloroethane	10	U
540-59-0	1,2-Dichloroethene (total)	10	U
67-66-3	Chloroform	10	U
107-06-2	1,2-Dichloroethane	10	U
78-93-3	2-Butanone	10	U J
71-55-6	1,1,1-Trichloroethane	10	U
56-23-5	Carbon Tetrachloride	10	U
75-27-4	Bromodichloromethane	10	U
78-87-5	1,2-Dichloropropane	10	U
10061-01-5	cis-1,3-Dichloropropene	10	U
79-01-6	Trichloroethene	10	U
124-48-1	Dibromochloromethane	10	U
79-00-5	1,1,2-Trichloroethane	10	U
71-43-2	Benzene	10	U
10061-02-6	trans-1,3-Dichloropropene	10	U
75-25-2	Bromoform	10	U
108-10-1	4-Methyl-2-Pentanone	10	U
591-78-6	2-Hexanone	10	U
127-18-4	Tetrachloroethene	10	U
79-34-5	1,1,2,2-Tetrachloroethane	10	U
108-88-3	Toluene	10	U
108-90-7	Chlorobenzene	10	U
100-41-4	Ethylbenzene	10	U
100-42-5	Styrene	10	U
1330-20-7	Xylene (total)	10	U

1E
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

A66536

Lab Name: AQUATEC, INC. Contract: 91082

Lab Code: AQUAI Case No.: OLM SAS No.: SDG No.: 40278

Matrix: (soil/water) WATER Lab Sample ID: 201814

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: M201814V.D

Level: (low/med) LOW Date Received: 10/21/93

% Moisture: not dec. _____ Data Analyzed: 10/28/93

GC Column:CAP ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____(uL) Soil Aliquot Volume: _____(uL)

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.				
2.				
3.				
4.				
5.				
6.				
7.				
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10.				
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23.				
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28.				
29.				
30.				

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

A66537

Lab Name: AQUATEC, INC. Contract: 91082

Lab Code: AQUAI Case No.: OLM SAS No.: SDG No.: 40278

Matrix: (soil/water) WATER Lab Sample ID: 201815

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: M201815V.D

Level: (low/med) LOW Date Received: 10/21/93

% Moisture: not dec. _____ Data Analyzed: 10/28/93

GC Column:CAP ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____(uL) Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q	
74-87-3	Chloromethane	10	U	
74-83-9	Bromomethane	10	U	
75-01-4	Vinyl Chloride	10	U	
75-00-3	Chloroethane	10	U	
75-09-2	Methylene Chloride	10	U	
67-64-1	Acetone	10	U	J
75-15-0	Carbon Disulfide	10	U	
75-35-4	1,1-Dichloroethene	10	U	
75-34-3	1,1-Dichloroethane	10	U	
540-59-0	1,2-Dichloroethene (total)	10	U	
67-66-3	Chloroform	10	U	
107-06-2	1,2-Dichloroethane	10	U	
78-93-3	2-Butanone	10	U	J
71-55-6	1,1,1-Trichloroethane	10	U	
56-23-5	Carbon Tetrachloride	10	U	
75-27-4	Bromodichloromethane	10	U	
78-87-5	1,2-Dichloropropane	10	U	
10061-01-5	cis-1,3-Dichloropropene	10	U	
79-01-6	Trichloroethene	10	U	
124-48-1	Dibromochloromethane	10	U	
79-00-5	1,1,2-Trichloroethane	10	U	
71-43-2	Benzene	10	U	
10061-02-6	trans-1,3-Dichloropropene	10	U	
75-25-2	Bromoform	10	U	
108-10-1	4-Methyl-2-Pentanone	10	U	
591-78-6	2-Hexanone	10	U	
127-18-4	Tetrachloroethene	10	U	
79-34-5	1,1,2,2-Tetrachloroethane	10	U	
108-88-3	Toluene	10	U	
108-90-7	Chlorobenzene	10	U	
100-41-4	Ethylbenzene	10	U	
100-42-5	Styrene	10	U	
1330-20-7	Xylene (total)	10	U	

1E

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

A66537

Lab Name: AQUATEC, INC. Contract: 91082

Lab Code: AQUAI Case No.: OLM SAS No.: SDG No.: 40278

Matrix: (soil/water) WATER Lab Sample ID: 201815

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: M201815V.D

Level: (low/med) LOW Date Received: 10/21/93

% Moisture: not dec. _____ Data Analyzed: 10/28/93

GC Column:CAP ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____(uL) Soil Aliquot Volume: _____(uL)

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.				
2.				
3.				
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SEMIVOLATILE ANALYSES

Introduction

Analyses were performed according to the USEPA CLP SOW OLM01.8.

The data review process is intended to evaluate the data on a technical basis. It is assumed that the data package represents the best efforts of the laboratory and had already been subjected to adequate and sufficient quality review prior to submission.

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer. Results are qualified with the following codes in accordance with National Functional Guidelines:

- U The compound was analyzed for but not detected. The associated value is the compound quantitation limit.
- J The compound was positively identified; however, the associated numerical value is an estimated concentration only.
- B The compound has been found in the sample as well as its associated blank, its presence in the sample may be suspect.
- N The analysis indicates the presence of a compound for which there is presumptive evidence to make a tentative identification.
- JN The analysis indicates the presence of a compound for which there is presumptive evidence to make a tentative identification. The associated numerical value is an estimated concentration only.
- E The compound was quantitated above the calibration range.
- D Concentration is based on a diluted sample analysis.
- UJ The compound was not detected above the reported sample quantitation limit. However, the reported limit is approximate and may or may not represent the actual limit of quantitation.
- R The sample results are rejected.

Two facts should be noted by all data users. First, the "R" flag means that the associated value is unusable. In other words, due to significant QC problems, the analysis is invalid and provides no information as to whether the compound is present or not. "R" values should not appear on data tables because they cannot be relied upon, even as a last resort. The second fact to keep in mind is that no compound concentration, even if it has passed all QC test, is guaranteed to be accurate. Strict QC serves to increase confidence in data but any value potentially contains error.

Data Assessment

1. Holding Time

The QAPP- specified holding times for semivolatile analyses of water samples under OLM01.8 are 5 days from sample receipt to extraction and 40 days from the start of extraction to analysis. The technical holding times are 7 days from sample collection ot extraction and 40 days to analysis. No deviations from these holding times were noted.

2. Blank Contamination

Quality assurance blanks, i.e., method, trip, field, or rinse blanks are prepared to identify any contamination which may have been introduced in to the samples during sample preparation or field activity. Method blanks measure laboratory contamination. Field and rinse blanks measure cross contamination of samples during field operations.

Bis(2-ethylhexyl)phthalate was detected in method blank SBLK4Q and the associated samples A66536 and A66537. Data for this compound have been qualified as undetected based on the blank content.

In addition to the listed target compounds two non-target peaks were found in both the blanks and the samples. Their presence in the samples should be considered laboratory artifacts and, as such, has been rejected.

3. Mass Spectrometer Tuning

Mass spectrometer performance was acceptable.

4. Calibration

Satisfactory instrument calibration is established to insure that the instrument is capable of producing acceptable quantitative data. An initial calibration demonstrates that the instrument is capable of giving acceptable performance at the beginning of an experimental sequence. The continuing calibration verifies that the instrument is giving satisfactory daily performance.

4.1 Initial Calibration

The % relative standard deviation (%RSD) for all compounds was less than 30% for all compounds. All response factors were above the minimum required RF of 0.05.

4.2 Continuing Calibration

All compounds in the continuing calibration standard were within the 25% difference (%D) of the initial calibration, with the following exceptions:

Instrument Q 11/1/93 08:42

3-Nitroaniline	26.6%
4-Nitroaniline	28.5%

Data the listed compounds have been qualified as estimated in method blank SBLK4Q based on the %D.

Instrument Q 11/3/93 00:34

2,2'-oxybis(1-Chloropropane)	27.6%
N-Nitroso-di-n-propylamine	30.8%
Nitrobenzene	33.0%
Isophorone	28.8%
2-Nitroaniline	34.3%
3,3'-Dichlorobenzidine	50.6%

Data for the listed compounds have been qualified as estimated in the associated samples A66536 and A66537 based on the %D.

5. Surrogates / System Monitoring Compounds

All samples to be analyzed for organic compounds are spiked with surrogate compounds prior to sample preparation to evaluate overall laboratory performance and efficiency of the analytical technique.

All surrogate recoveries were within control limits.

6. Internal Standard Performance

Internal standard performance criteria insure that the GC/MS sensitivity and response are stable during every experimental run.

All internal standard recoveries were within established limits.

7. Compound Identification

Compounds are identified on the GC/MS by using the analyte's relative retention time (RRT) and ion spectra.

All identified compounds met the specified criteria.

8. Matrix Spike/Matrix Spike Duplicate/Laboratory Duplicate

Matrix spike, matrix spike duplicate, and laboratory duplicate data are used to assess the precision and accuracy of the analytical method.

No matrix spike was included in this data set.

9. Field Duplicates

No field duplicates were included with this data set.

10. System Performance and Overall Assessment

Overall system performance was acceptable. Other than those deviations specifically mentioned in this review, the overall data quality is within the guidelines listed in the analytical method.

Data Validation Checksheets

Semi-Volatile Organics Data Validation Checklist

	YES	NO	NA
Data Completeness and Deliverables			
Is there a narrative or cover letter present?	X		
Are the samples numbers included in the narrative?	X		
Are the sample chain-of-custodies present?	X		
Do the chain-of-custodies indicate any problems with sample receipt or sample condition?		X	
Holding Times			
Have any holding times been exceeded?		X	
Surrogate Recovery			
Are the surrogate recovery forms present?	X		
Are all the samples listed on the appropriate surrogate recovery form?	X		
Are the outliers correctly marked with an asterisk?			X
Were two or more base-neutral or acid surrogate recoveries outside of specified limits for any sample or blank?		X	
If yes, were the samples reanalyzed?			X
Were the method blanks reanalyzed?			X
Matrix Spikes			
Is there a matrix spike recovery form present?		X	
Were matrix spikes analyzed at the required frequency?		X	
How many spike recoveries were outside of QC limits?			
0 out of 0			
How many RPDs for matrix spike and matrix spike duplicate were outside of QC limits?			
0 out of 0			
Blanks			
Is the method blank summary form present?	X		
Has a method blank been analyzed for each set of samples or for each 20 samples, whichever is more frequent?	X		
Has a blank been analyzed for each GC/MS system used?	X		

Semi-Volatile Data Validation Checklist - Page 2

	YES	NO	NA
Is the chromatographic performance acceptable for each instrument?	X		
Do any method/reagent/instrument blanks have positive results?	X		
Do any field/rinse blanks have positive results?			X
Are there field/rinse/equipment blanks associated with every sample?		X	
Tuning and Mass Calibration			
Are the GC/MS tuning forms present for DFTPP?	X		
Are the bar graph spectrum and mass/charge listing provided for each DFTPP?	X		
Has a DFTPP been analyzed for each twelve hours of analysis per instrument?	X		
Have the ion abundance criteria been met for each instrument used?	X		
Target Analytes			
Is an organics analysis data sheet present for each of the following:			
Samples	X		
Matrix spikes	X		
Blanks	X		
Has GPC cleanup been performed on all soil/sediment sample extracts?			X
Are the reconstructed ion chromatograms present for each of the following:			
Samples	X		
Matrix spikes	X		
Blanks	X		

Semi-Volatile Data Validation Checklist - Page 3

	YES	NO	NA
Is the chromatographic performance acceptable with respect to:			
Baseline stability	X		
Resolution	X		
Peak shape	X		
Are the mass spectra of the identified compounds present?			X
Tentatively Identified Compounds			
Are all the TIC summary forms present?	X		
Are the mass spectra for the tentatively identified compounds and there associated "best match" spectra present?			X
Are any target compounds listed as TICs?		X	
Quantitation and Detection Limits			
Are the reporting limits adjusted to reflect sample dilutions, and for soils, sample moisture?	X		
Standard Data			
Are the quantitation reports and reconstructed ion chromatograms present for the initial and continuing calibration standards?	X		
Initial Calibration			
Are the initial calibration forms present for each instrument used?	X		
Are the response factor RSDs within specified limits?	X		
Are the average RRF equal to or greater than minimum requirements?	X		
Continuing Calibration			
Are the continuing calibration forms present for each day and each instrument?	X		
Has a continuing calibration standard been analyzed for each twelve hours of analysis per instrument?	X		
All %D within acceptable limits?		X	
Are all RF equal to or greater than minimum requirements?	X		
Internal Standards			

Semi-Volatile Data Validation Checklist - Page 4

	YES	NO	NA
Are internal standard areas of every samples and blank within the upper and lower limits for each continuing calibration?	X		
Field Duplicates			
Where field duplicates submitted with the samples?		X	

Semi-Volatile Qualifier Summary
Holding Time, Surrogates, Internal Standards

Sample ID	Holding Time	Surrogates						Internal Standards					
		NBZ	FBP	TPH	PHL	2FP	TBP	DCB	NPT	ANT	PHN	CRY	PRY
A66536	OK for all samples	OK for all samples						OK for all samples					
A66537													

Surrogates:
NBZ Nitrobenzene-d5
FBP 2-Fluorobiphenyl
TPH Terphenyl-d14
PHL Phenol-d5
2FP 2-Fluorophenol
TBP 2,4,6-Tribromophenol

Internal Standards:
DCB 1,4-Dichlorobenzene-d4
NPT Naphthalene-d8
ANT Acenaphthene-d10
PHN Phenanthrene-d10
CRY Chrysene-d12
PRY Perylene-d12

Semi-Volatile Calibration Outliers

Instrument: Q

Date/Time	10/29/93		11/1 08:42		11/3 00:34					
	Initial Cal.		Cont. Cal.		Cont. Cal.		Cont. Cal.		Cont. Cal.	
	RF	%RSD	RF	%D	RF	%D	RF	%D	RF	%D
Phenol										
bis(2-Chloroethyl)ether										
2-Chlorophenol										
1,3-Dichlorobenzene										
1,4-Dichlorobenzene										
1,2-Dichlorobenzene										
2-Methylphenol										
2,2'oxybis(1-Chloropropane)						27.6				
4-Methylphenol										
N-Nitroso-di-n-propylamine						30.8				
Hexachloroethane										
Nitrobenzene						33.0				
Isophorone						28.8				
2-Nitrophenol										
2,4-Dimethylphenol										
bis(2-Chloroethoxy)methane										
2,4-Dichlorophenol										
1,2,4-Trichlorobenzene										
Naphthalene										
4-Chloroaniline										
Hexachlorobutadiene										
4-Chloro-3-methylphenol										
2-Methylnaphthalene										
Hexachlorocyclopentadiene										
2,4,6-Trichlorophenol										
2,4,5-Trichlorophenol										
2-Chloronaphthalene										
2-Nitroaniline						34.3				
Dimethylphthalate										
Acenaphthylene										

Semi-Volatile Calibration Outliers - Page 2

Date/Time	10/29/93		11/1 08:42		11/3 00:34					
	Initial Cal.		Cont. Cal.		Cont. Cal.		Cont. Cal.		Cont. Cal.	
	RF	%RSD	RF	%D	RF	%D	RF	%D	RF	%D
2,6-Dinitrotoluene										
3-Nitroaniline				26.6						
Acenaphthene										
2,4-Dinitrophenol										
4-Nitrophenol										
Dibenzofuran										
2,4-Dinitrotoluene										
Diethylphthalate										
4-Chlorophenyl-phenylether										
Fluorene										
4-Nitroaniline				28.5						
4,6-Dinitro-2-methylphenol										
N-Nitrosodiphenylamine										
4-Bromophenyl-phenylether										
Hexachlorobenzene										
Pentachlorophenol										
Phenanthrene										
Anthracene										
Carbazole										
Di-n-butylphthalate										
Fluoranthene										
Pyrene										
Butylbenzylphthalate										
3,3'-Dichlorobenzidine						50.6				
Benzo(a)anthracene										
Chrysene										
bis(2-ethylhexyl)phthalate										
Di-n-octylphthalate										
Benzo(b)fluoranthene										
Benzo(k)fluoranthene										
Benzo(a)pyrene										
Indeno(1,2,3-cd)pyrene										

Semi-Volatile Calibration Outliers - Page 3

Date/Time	10/29/93		11/1 08:42		11/3 00:34					
	Initial Cal.		Cont. Cal.		Cont. Cal.		Cont. Cal.		Cont. Cal.	
	RF	%RSD	RF	%D	RF	%D	RF	%D	RF	%D
Dibenz(a,h)anthracene										
Benzo(g,h,i)perylene										

Affected Samples:					
		SBLK4Q	A66536		
			A66537		

Corrected Sample Analysis Data Sheets

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

A66536

Lab Name: AQUATEC, INC. Contract: 91082

Lab Code: AQUAI Case No.: OLM SAS No.: SDG No.: 40278

Matrix: (soil/water) WATER Lab Sample ID: 201814

Sample wt/vol: 1002 (g/mL) ML Lab File ID: Q201814S.D

Level: (low/med) LOW Date Received: 10/21/93

% Moisture: _____ decanted: (Y/N)___ Date Extracted: 10/25/93

Concentrated Extract Volume: 1000(UL) Date Analyzed: 11/03/93

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH:

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q	
108-95-2	Phenol	10	U	
111-44-4	bis(-2-Chloroethyl)Ether	10	U	
95-57-8	2-Chlorophenol	10	U	
541-73-1	1,3-Dichlorobenzene	10	U	
106-46-7	1,4-Dichlorobenzene	10	U	
95-50-1	1,2-Dichlorobenzene	10	U	
95-48-7	2-Methylphenol	10	U	
108-60-1	2,2'-oxybis(1-Chloropropane)	10	U	J
106-44-5	4-Methylphenol	10	U	
621-64-7	N-Nitroso-di-n-propylamine	10	U	J
67-72-1	Hexachloroethane	10	U	
98-95-3	Nitrobenzene	10	U	J
78-59-1	Isophorone	10	U	J
88-75-5	2-Nitrophenol	10	U	
105-67-9	2,4-Dimethylphenol	10	U	
111-91-1	bis(2-Chloroethoxy)methane	10	U	
120-83-2	2,4-Dichlorophenol	10	U	
120-82-1	1,2,4-Trichlorobenzene	10	U	
91-20-3	Naphthalene	10	U	
106-47-8	4-Chloroaniline	10	U	
87-68-3	Hexachlorobutadiene	10	U	
59-50-7	4-Chloro-3-Methylphenol	10	U	
91-57-6	2-Methylnaphthalene	10	U	
77-47-4	Hexachlorocyclopentadiene	10	U	
88-06-2	2,4,6-Trichlorophenol	10	U	
95-95-4	2,4,5-Trichlorophenol	25	U	
91-58-7	2-Chloronaphthalene	10	U	
88-74-4	2-Nitroaniline	25	U	J
131-11-3	Dimethylphthalate	10	U	
208-96-8	Acenaphthylene	10	U	
606-20-2	2,6-Dinitrotoluene	10	U	
99-09-2	3-Nitroaniline	25	U	
83-32-9	Acenaphthene	10	U	

1C
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

A66536

Lab Name: AQUATEC, INC. Contract: 91082

Lab Code: AQUAI Case No.: OLM SAS No.: SDG No.: 40278

Matrix: (soil/water) WATER Lab Sample ID: 201814

Sample wt/vol: 1002 (g/mL) ML Lab File ID: Q201814S.D

Level: (low/med) LOW Date Received: 10/21/93

% Moisture: _____ decanted: (Y/N)___ Date Extracted: 10/25/93

Concentrated Extract Volume: 1000(UL) Date Analyzed: 11/03/93

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH:

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
51-28-5	2,4-Dinitrophenol	25	U
100-02-7	4-Nitrophenol	25	U
132-64-9	Dibenzofuran	10	U
121-14-2	2,4-Dinitrotoluene	10	U
84-66-2	Diethylphthalate	10	U
7005-72-3	4-Chlorophenyl-phenylether	10	U
86-73-7	Fluorene	10	U
100-01-6	4-Nitroaniline	25	U
534-52-1	4,6-Dinitro-2-methylphenol	25	U
86-30-6	N-nitrosodiphenylamine (1)	10	U
101-55-3	4-Bromophenyl-phenylether	10	U
118-74-1	Hexachlorobenzene	10	U
87-86-5	Pentachlorophenol	25	U
85-01-8	Phenanthrene	10	U
120-12-7	Anthracene	10	U
86-74-8	Carbazole	10	U
84-74-2	Di-n-butylphthalate	10	U
206-44-0	Fluoranthene	10	U
129-00-0	Pyrene	10	U
85-68-7	Butylbenzylphthalate	10	U
91-94-1	3,3'-Dichlorobenzidine	10	U J
56-55-3	Benzo(a)anthracene	10	U
218-01-9	Chrysene	10	U
117-81-7	bis(2-Ethylhexyl)phthalate	10 ~~B~~	~~JB~~ U
117-84-0	Di-n-octylphthalate	10	U
205-99-2	Benzo(b)fluoranthene	10	U
207-08-9	Benzo(k)fluoranthene	10	U
50-32-8	Benzo(a)pyrene	10	U
193-39-5	Indeno(1,2,3-cd)pyrene	10	U
53-70-3	Dibenz(a,h)anthracene	10	U
191-24-2	Benzo(g,h,i)perylene	10	U

(1) - Cannot be separated from Diphenylamine

1F

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

A66536

Lab Name: AQUATEC, INC. Contract: 91082

Lab Code: AQUAI Case No.: OLM SAS No.: SDG No.: 40278

Matrix: (soil/water) WATER Lab Sample ID: 201814

Sample wt/vol: 1002 (g/mL) ML Lab File ID: Q201814S.D

Level: (low/med) LOW Date Received: 10/21/93

% Moisture: _____ decanted: (Y/N)___ Date Extracted: 10/25/93

Concentrated Extract Volume: 1000(uL) Date Analyzed: 11/03/93

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH:_____

Number TICs found: 2

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
~~1. 123-42-2~~	~~2-Pentanone, 4-hydroxy-4-met~~	~~6.363~~	~~17~~	~~NJAB~~ R
~~2.~~	~~Unknown~~	~~30.545~~	~~3~~	~~BJ~~ R
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1B
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

A66537

Lab Name: AQUATEC, INC. Contract: 91082

Lab Code: AQUAI Case No.: OLM SAS No.: SDG No.: 40278

Matrix: (soil/water) WATER Lab Sample ID: 201815

Sample wt/vol: 1000 (g/mL) ML Lab File ID: Q201815S.D

Level: (low/med) LOW Date Received: 10/21/93

% Moisture: _____ decanted: (Y/N)___ Date Extracted: 10/25/93

Concentrated Extract Volume: 1000(UL) Date Analyzed: 11/03/93

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH:

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q	
108-95-2	Phenol	10	U	
111-44-4	bis(-2-Chloroethyl)Ether	10	U	
95-57-8	2-Chlorophenol	10	U	
541-73-1	1,3-Dichlorobenzene	10	U	
106-46-7	1,4-Dichlorobenzene	10	U	
95-50-1	1,2-Dichlorobenzene	10	U	
95-48-7	2-Methylphenol	10	U	
108-60-1	2,2'-oxybis(1-Chloropropane)	10	U	J
106-44-5	4-Methylphenol	10	U	
621-64-7	N-Nitroso-di-n-propylamine	10	U	J
67-72-1	Hexachloroethane	10	U	
98-95-3	Nitrobenzene	10	U	J
78-59-1	Isophorone	10	U	J
88-75-5	2-Nitrophenol	10	U	
105-67-9	2,4-Dimethylphenol	10	U	
111-91-1	bis(2-Chloroethoxy)methane	10	U	
120-83-2	2,4-Dichlorophenol	10	U	
120-82-1	1,2,4-Trichlorobenzene	10	U	
91-20-3	Naphthalene	10	U	
106-47-8	4-Chloroaniline	10	U	
87-68-3	Hexachlorobutadiene	10	U	
59-50-7	4-Chloro-3-Methylphenol	10	U	
91-57-6	2-Methylnaphthalene	10	U	
77-47-4	Hexachlorocyclopentadiene	10	U	
88-06-2	2,4,6-Trichlorophenol	10	U	
95-95-4	2,4,5-Trichlorophenol	25	U	
91-58-7	2-Chloronaphthalene	10	U	
88-74-4	2-Nitroaniline	25	U	J
131-11-3	Dimethylphthalate	10	U	
208-96-8	Acenaphthylene	10	U	
606-20-2	2,6-Dinitrotoluene	10	U	
99-09-2	3-Nitroaniline	25	U	
83-32-9	Acenaphthene	10	U	

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

A66537

Lab Name: AQUATEC, INC. Contract: 91082

Lab Code: AQUAI Case No.: OLM SAS No.: SDG No.: 40278

Matrix: (soil/water) WATER Lab Sample ID: 201815

Sample wt/vol: 1000 (g/mL) ML Lab File ID: Q201815S.D

Level: (low/med) LOW Date Received: 10/21/93

% Moisture: _____ decanted: (Y/N)___ Date Extracted: 10/25/93

Concentrated Extract Volume: 1000(UL) Date Analyzed: 11/03/93

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH:

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
51-28-5	2,4-Dinitrophenol	25	U
100-02-7	4-Nitrophenol	25	U
132-64-9	Dibenzofuran	10	U
121-14-2	2,4-Dinitrotoluene	10	U
84-66-2	Diethylphthalate	10	U
7005-72-3	4-Chlorophenyl-phenylether	10	U
86-73-7	Fluorene	10	U
100-01-6	4-Nitroaniline	25	U
534-52-1	4,6-Dinitro-2-methylphenol	25	U
86-30-6	N-nitrosodiphenylamine (1)	10	U
101-55-3	4-Bromophenyl-phenylether	10	U
118-74-1	Hexachlorobenzene	10	U
87-86-5	Pentachlorophenol	25	U
85-01-8	Phenanthrene	10	U
120-12-7	Anthracene	10	U
86-74-8	Carbazole	10	U
84-74-2	Di-n-butylphthalate	10	U
206-44-0	Fluoranthene	10	U
129-00-0	Pyrene	10	U
85-68-7	Butylbenzylphthalate	10	U
91-94-1	3,3'-Dichlorobenzidine	10	U J
56-55-3	Benzo(a)anthracene	10	U
218-01-9	Chrysene	10	U
117-81-7	bis(2-Ethylhexyl)phthalate	10 ~~2~~	~~JB~~ U
117-84-0	Di-n-octylphthalate	10	U
205-99-2	Benzo(b)fluoranthene	10	U
207-08-9	Benzo(k)fluoranthene	10	U
50-32-8	Benzo(a)pyrene	10	U
193-39-5	Indeno(1,2,3-cd)pyrene	10	U
53-70-3	Dibenz(a,h)anthracene	10	U
191-24-2	Benzo(g,h,i)perylene	10	U

(1) - Cannot be separated from Diphenylamine

1F

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

A66537

Lab Name: AQUATEC, INC. Contract: 91082

Lab Code: AQUAI Case No.: OLM SAS No.: SDG No.: 40278

Matrix: (soil/water) WATER Lab Sample ID: 201815

Sample wt/vol: 1000 (g/mL) ML Lab File ID: Q201815S.D

Level: (low/med) LOW Date Received: 10/21/93

% Moisture: _____ decanted: (Y/N)___ Date Extracted: 10/25/93

Concentrated Extract Volume: 1000(uL) Date Analyzed: 11/03/93

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH:_____

Number TICs found: 2

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
~~1. 123-42-2~~	~~2-Pentanone, 4-hydroxy-4-met~~	~~6.370~~	~~19~~	~~NJAB~~ R
~~2.~~	~~Unknown~~	~~30.539~~	~~3~~	~~BJ~~ R
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PESTICIDE/PCB ANALYSES

Introduction

Analyses were performed according to the USEPA CLP SOW OLM01.8.

The data review process is intended to evaluate the data on a technical basis. It is assumed that the data package represents the best efforts of the laboratory and had already been subjected to adequate and sufficient quality review prior to submission.

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer. Results are qualified with the following codes in accordance with National Functional Guidelines:

- U The compound was analyzed for but not detected. The associated value is the compound quantitation limit.
- J The compound was positively identified; however, the associated numerical value is an estimated concentration only.
- B The compound has been found in the sample as well as its associated blank, its presence in the sample may be suspect.
- N The analysis indicates the presence of a compound for which there is presumptive evidence to make a tentative identification.
- JN The analysis indicates the presence of a compound for which there is presumptive evidence to make a tentative identification. The associated numerical value is an estimated concentration only.
- E The compound was quantitated above the calibration range.
- D Concentration is based on a diluted sample analysis.
- C Identification confirmed by GC/MS.
- UJ The compound was not detected above the reported sample quantitation limit. However, the reported limit is approximate and may or may not represent the actual limit of quantitation.
- R The sample results are rejected.

Two facts should be noted by all data users. First, the "R" flag means that the associated value is unusable. In other words, due to significant QC problems, the analysis is invalid and provides no information as to whether the compound is present or not. "R" values should not appear on data tables because they cannot be relied upon, even as a last resort. The second fact to keep in mind is that no compound concentration, even if it has passed all QC test, is guaranteed to be accurate. Strict QC serves to increase confidence in data but any value potentially contains error.

Data Assessment

1. Holding Time

The QAPP-specified holding times for semivolatile analyses of water samples under OLM01.8 is 5 days from sample receipt to extraction and 40 days from the start of extraction to analysis. The technical holding times are 7 days from sample collection to extraction and 40 days to analysis. No deviations from these holding times were noted.

2. Blank Contamination

Quality assurance blanks, i.e., method, field, or rinse blanks are prepared to identify any contamination which may have been introduced in to the samples during sample preparation or field activity. Method blanks measure laboratory contamination. Field and rinse blanks measure cross contamination of samples during field operations.

No target compounds were detected in the method blank.

3. System Performance

System performance and column resolution were acceptable.

4. Calibration

Satisfactory instrument calibration is established to insure that the instrument is capable of producing acceptable quantitative data. An initial calibration demonstrates that the instrument is capable of giving acceptable performance at the beginning of an experimental sequence. The continuing calibration verifies that the instrument is giving satisfactory daily performance.

4.1 Initial Calibration

A maximum RSD of 20% is allowed. All initial calibrations were within the specified limit.

4.2 Continuing Calibration

A maximum RPD of 25% is allowed. All continuing calibrations were within the specified limit.

5. Surrogates / System Monitoring Compounds

All samples to be analyzed for organic compounds are spiked with surrogate compounds prior to sample preparation to evaluate overall laboratory performance and efficiency of the analytical technique. If the measured surrogate recoveries were outside specified limits, qualifications may be applied to the samples.

All surrogate recoveries were within control limits.

6. Compound Identification

The retention times of pesticide/PCB compounds must fall within the calculated retention time windows for both the primary and confirmation columns.

All compounds fell within the appropriate retention time windows. The quantitated concentrations between the two columns did not exceed the 25% difference limit for any of the samples.

7. Matrix Spike/Matrix Spike Duplicate

Matrix spike and matrix spike duplicate data are used to assess the precision and accuracy of the analytical method.

No matrix spike was included in this data set.

8. Field Duplicates

No field duplicates were included in this data set.

9. System Performance and Overall Assessment

Overall system performance was acceptable. Other than those deviations specifically mentioned in this review, the overall data quality is within the guidelines listed in the analytical method.

Data Validation Checksheets

Pesticide/PCB Data Validation Checklist

	YES	NO	NA
Data Completeness and Deliverables			
Is there a narrative or cover letter present?	X		
Are the samples numbers included in the narrative?	X		
Are the sample chain-of-custodies present?	X		
Do the chain-of-custodies indicate any problems with sample receipt or sample condition?		X	
Holding Times			
Have any holding times been exceeded?		X	
Surrogate Recovery			
Are the surrogate recovery forms present?	X		
Are all the samples listed on the appropriate surrogate recovery form?	X		
Are the outliers correctly marked with an asterisk?			X
Were recoveries of TCMX or DCB outside of specified limits for any sample or blank?		X	
If yes, were the samples reanalyzed?			X
Were the method blanks reanalyzed?			X
Matrix Spikes			
Is there a matrix spike recovery form present?		X	
Were matrix spikes analyzed at the required frequency?		X	
How many spike recoveries were outside of QC limits?			
0 out of 0			
How many RPDs for matrix spike and matrix spike duplicate were outside of QC limits?			
0 out of 0			
Blanks			
Is the method blank summary form present?	X		
Has a method blank been analyzed for each set of samples or for each 20 samples, whichever is more frequent?	X		
Has an instrument blank been analyzed at the beginning of each 12 hour period following the initial calibration?	X		

Pesticide/PCB Data Validation Checklist - Page 2

	YES	NO	NA
Is the chromatographic performance acceptable for each instrument?	X		
Do any method/reagent/instrument blanks have positive results?		X	
Do any field/rinse blanks have positive results?			X
Are there field/rinse/equipment blanks associated with every sample?		X	
Calibration and GC Performance			
Are the following chromatograms and data printouts present for all samples, blanks, and MS/MSD?			
peak resolution check	X		
performance evaluation mixtures (PEM)	X		
Aroclors 1016, 1221, 1232, 1242, 1248, 1254, and 1260	X		
Toxaphene	X		
low points individual mixtures A & B (INDA and INDB)	X		
mid points INDA and INDB	X		
high points INDA and INDB	X		
instrument blanks	X		
Are Forms VI 1-4 present and complete for each column and analytical sequence?	X		
Are the linearity criteria for the initial analyses if INDA and INDB within limits for both columns?	X		
Is the resolution between any two adjacent peaks in the resolution check mixture > 60% for both columns?	X		
Is Form VII-1 present for each PEM analyzed for both columns?	X		
Has the individual % breakdown exceeded 20% on either column for:			
4,4'-DDT		X	
endrin		X	
Has the combined breakdown for 4,4'-DDT and endrin exceeded 30% on either column?		X	

Pesticide/PCB Data Validation Checklist - Page 3

	YES	NO	NA
Are all the relative percent difference (RPD) values for all PEM analytes < 25%?	X		
Have all samples been injected within a 12 hour period beginning with the injection of an instrument blank?	X		
Is Form VII-2 present and complete for each INDA and INDB analyzed?	X		
Are RPD values for all INDA and INDB compounds < 25%?	X		
Analytical Sequence Check			
Is Form VIII present and complete for each column and each period of analyses?	X		
Was the proper analytical sequence followed?	X		
Cleanup Efficiency Verification			
Is Form IX-1 present for each lot of Florisil cartridges used?	X		
Are all samples listed on the form?	X		
If GPC cleanup was performed, is From IX-2 present?			X
Are percent recoveries of the compounds used to check the efficiency of the cleanup procedure within QC limits for:			
Florisil cartridge check (80-120%)	X		
GPC calibration (80-110%)			X
Pesticide/PCB Identification			
Is a Form X present for every sample in which a pesticide or PCB was detected?	X		
Was GC/MS confirmation provided when required?	X		
Is the percent difference (%D) calculated for the positive sample results on the two columns less than 25%?	X		
Were there any false negatives?		X	
Compound Quantitation and Reported Detection Limits			
Are the reporting limits adjusted to reflect sample dilutions, and for soils, sample moisture?	X		

Pesticide/PCB Data Validation Checklist - Page 4

	YES	NO	NA
Chromatogram Quality			
Were the baselines stable?	X		
Were any electronegative displacement (negative peaks) or unusual peaks detected?		X	
Field Duplicates			
Where field duplicates submitted with the samples?		X	

Pesticide/PCB Qualifier Summary
Holding Time and Surrogates

Sample ID	Holding Time	Surrogates - Column 1		Surrogates - Column 2	
		TCX	DCB	TCX	DCB
A66536	ok	ok	ok	ok	ok
A66537	ok	ok	ok	ok	ok

Surrogates:
TCX Tetrachloro-m-xylene
DCB Decachlorobiphenyl

Qualifiers:
D Surrogate diluted out
↑ Recovery high
↓ Recovery low

Unless otherwise noted, all samples are within specified limits.

Corrected Sample Analysis Data Sheets

1D
PESTICIDE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

A66536

I Name: AQUATEC INC Contract: 91082

Lab Code: AQUAI Case No.: OLM SAS No.: SDG No.: 40278

Matrix: (soil/water) WATER Lab Sample ID: 201814

Sample wt/vol: 1000 (g/mL) ML Lab File ID:

% Moisture: decanted: (Y/N) Date Received: 10/21/93

Extraction: (SepF/Cont/Sonc) SEPF Date Extracted: 10/25/93

Concentrated Extract Volume: 10000 (uL) Date Analyzed: 11/04/93

Injection Volume: 1.00 (uL) Dilution Factor: 1.00

GPC Cleanup: (Y/N) N pH: Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
319-84-6	alpha-BHC	0.050	U
319-85-7	beta-BHC	0.050	U
319-86-8	delta-BHC	0.050	U
58-89-9	gamma-BHC (Lindane)	0.050	U
76-44-8	Heptachlor	0.050	U
309-00-2	Aldrin	0.050	U
1024-57-3	Heptachlor epoxide	0.050	U
959-98-8	Endosulfan I	0.050	U
60-57-1	Dieldrin	0.10	U
72-55-9	4,4'-DDE	0.10	U
72-20-8	Endrin	0.10	U
33213-65-9	Endosulfan II	0.10	U
72-54-8	4,4'-DDD	0.10	U
1031-07-8	Endosulfan sulfate	0.10	U
50-29-3	4,4'-DDT	0.10	U
72-43-5	Methoxychlor	0.50	U
53494-70-5	Endrin ketone	0.10	U
7421-93-4	Endrin aldehyde	0.10	U
5103-71-9	alpha-Chlordane	0.050	U
5103-74-2	gamma-Chlordane	0.050	U
8001-35-2	Toxaphene	5.0	U
12674-11-2	Aroclor-1016	1.0	U
11104-28-2	Aroclor-1221	2.0	U
11141-16-5	Aroclor-1232	1.0	U
53469-21-9	Aroclor-1242	1.0	U
12672-29-6	Aroclor-1248	1.0	U
11097-69-1	Aroclor-1254	1.0	U
11096-82-5	Aroclor-1260	1.0	U

1D
PESTICIDE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

A66537

Name: AQUATEC INC Contract: 91082

Lab Code: AQUAI Case No.: OLM SAS No.: SDG No.: 40278

Matrix: (soil/water) WATER Lab Sample ID: 201815

Sample wt/vol: 1000 (g/mL) ML Lab File ID:

% Moisture: decanted: (Y/N) Date Received: 10/21/93

Extraction: (SepF/Cont/Sonc) SEPF Date Extracted: 10/25/93

Concentrated Extract Volume: 10000 (uL) Date Analyzed: 11/04/93

Injection Volume: 1.00 (uL) Dilution Factor: 1.00

GPC Cleanup: (Y/N) N pH: Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
319-84-6	alpha-BHC	0.050	U
319-85-7	beta-BHC	0.050	U
319-86-8	delta-BHC	0.050	U
58-89-9	gamma-BHC (Lindane)	0.050	U
76-44-8	Heptachlor	0.050	U
309-00-2	Aldrin	0.050	U
1024-57-3	Heptachlor epoxide	0.050	U
959-98-8	Endosulfan I	0.050	U
60-57-1	Dieldrin	0.10	U
72-55-9	4,4'-DDE	0.10	U
72-20-8	Endrin	0.10	U
33213-65-9	Endosulfan II	0.10	U
72-54-8	4,4'-DDD	0.10	U
1031-07-8	Endosulfan sulfate	0.10	U
50-29-3	4,4'-DDT	0.10	U
72-43-5	Methoxychlor	0.50	U
53494-70-5	Endrin ketone	0.10	U
7421-93-4	Endrin aldehyde	0.10	U
5103-71-9	alpha-Chlordane	0.050	U
5103-74-2	gamma-Chlordane	0.050	U
8001-35-2	Toxaphene	5.0	U
12674-11-2	Aroclor-1016	1.0	U
11104-28-2	Aroclor-1221	2.0	U
11141-16-5	Aroclor-1232	1.0	U
53469-21-9	Aroclor-1242	1.0	U
12672-29-6	Aroclor-1248	1.0	U
11097-69-1	Aroclor-1254	1.0	U
11096-82-5	Aroclor-1260	1.0	U

INORGANIC ANALYSES

Introduction

Analyses were performed according to USEPA CLP SOW ILM02.2.

The data validation process is intended to evaluate the data on a technical basis rather than a contract compliance basis. It is assumed that the data package represents the best efforts of the laboratory and had already been subjected to adequate and sufficient quality review prior to submission for validation. During the validation process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this valuation, qualifier codes may be added, deleted, or modified by the data validator. Validator qualified results are annotated with the following codes in accordance with National Functional Guidelines:

Concentration (C) qualifiers:

- U The analyte was analyzed for but not detected. The associated value is the analyte contract required detection limit.
- B The reported value was obtained from a reading less than the contract required detection limit (CRDL) but greater than or equal to the instrument detection limit (IDL).

Quantitation (Q) qualifiers:

- E The reported value is estimated due to the presence of interference.
- M Duplicate injection precision not met.
- N Spiked sample recovery not within control limits.
- S Reported value was determined by the method of standard additions (MSA).
- W Post-digestion spike for Furnace-AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
- * Duplicate analysis not within control limits.
- + Correlation coefficient for MSA is less than 0.995.

Method (M) qualifiers:

- P ICP
- F Furnace AA
- CV Cold vapor AA
- C Manual spectrometric

Validation qualifiers:

J The analyte was positively identified; however, the associated numerical value is an estimated concentration only.

UJ The analyte was not detected above the reported sample detection limit. However, the reported limit is approximate and may or may not represent the actual limit of detection.

R The sample results are rejected.

Two facts should be noted by all data users. First, the "R" flag means that the associated value is unusable. In other words, due to significant QC problems, the analysis is invalid and provides no information as to whether the compound is present or not. "R" values should not appear on data tables because they cannot be relied upon, even as a last resort. The second fact to keep in mind is that no compound concentration, even if it has passed all QC test, is guaranteed to be accurate. Strict QC serves to increase confidence in data but any value potentially contains error.

Data Assessment

1. Holding Time

The QAPP-specified holding times for inorganic analyses under CLP protocols are as follows. All holding times are measured from validated time of sample receipt (VTSR).

Metals (other than mercury)	180 days
Mercury	26 days
Cyanide	12 days

The technical holding times (measured from date of collection) are as follows:

Metals (other than mercury)	180 days
Mercury	28 days
Cyanide	14 days

All samples were analyzed and/or distilled within specified holding times.

2. Blank Contamination

Quality assurance blanks, i.e., method, field, or rinse blanks are prepared to identify any contamination which may have been introduced in to the samples during sample preparation or field activity. Method blanks (including initial and continuing calibration blanks and preparation blanks) measure laboratory contamination. Field and rinse blanks measure cross contamination of samples during field operations.

All calibration and preparation blanks were found to be acceptable, with no analytes detected above the CRQL. No rinse blanks were submitted with the samples.

3. Calibration

Satisfactory instrument calibration is established to insure that the instrument is capable of producing acceptable quantitative data. An initial calibration demonstrates that the instrument is capable of giving acceptable performance at the beginning of an experimental sequence. The continuing calibration verifies that the instrument is giving satisfactory daily performance.

3.1 Initial Calibration

The correct number and type of standard were analyzed. The correlation coefficient of the initial calibration was greater than the minimum required 0.995 for all non-ICP analytes.

3.2 Continuing Calibration

All continuing calibration verification standards were acceptable.

3.3 CRDL Standard

All CRDL standard recoveries were within acceptable limits, with the following exceptions:

Mercury	160.0%
Cadmium (final)	122.8%

No data for these analytes fell within the affected range; therefore, no data qualification was necessary.

4. Matrix Spike/Laboratory Duplicate

Matrix spike and laboratory duplicate data are used to assess the precision and accuracy of the analytical method.

4.1 Matrix spike

No matrix spike was included in this data set.

4.2 Laboratory Duplicate

No laboratory duplicate was included in this data set.

5. Field Duplicate

No field duplicate was submitted with this data set.

6. Laboratory Control Sample (LCS)

All LCS recoveries were within control limits.

7. Serial Dilution

All required percent differences were within acceptable limits.

8. Furnace QC

The relative percent difference (RPD) between all furnace duplicates were within acceptable limits.

The following furnace analytical spikes were outside the 85-115% control limits:

Selenium	A66036	80.7%
	A66037	77.9%

Data for selenium in the listed samples have been qualified as estimated based on the recovery.

9. Method of Standard Additions (MSA)

All samples analyzed by furnace require an analytical spike recoveries of which are to be within 85 and 115%. Spikes selenium were outside these limits. Results for these compounds in the associated samples have been flagged "J" as estimated. MSA analysis was not, however, required because sample absorbance was less than 50% of spike absorbance.

10. System Performance and Overall Assessment

Overall system performance was acceptable. Other than for those deviations specifically mentioned in this review, the overall data quality is within the guidelines specified in the method.

Data Validation Checksheets

Inorganic Data Validation Checklist

	YES	NO	NA
Data Completeness and Deliverables			
Is there a narrative or cover letter present?	X		
Are the sample numbers included in the narrative?	X		
Are the sample chain-of-custodies present?	X		
Do the chain-of-custodies indicate any problems with sample receipt or sample condition?		X	
Form I to IX			
Are all the Form I through Form IX labeled with:			
Laboratory name?	X		
Sample No.?	X		
SDG No.?	X		
Correct units?	X		
Matrix?	X		
Raw Data			
Is the digestion log for flame AA/ICP present?	X		
Is the digestion log for furnace AA present?	X		
Is the distillation log for mercury present?	X		
Is the distillation log for cyanides present?	X		
Are pH values listed?		X	
pH for metals analyses <2 (waters)?			X
pH for cyanide analyses >12 (waters)?			X
Percent solids calculation present for soils/sediments?			X
Are preparation dates present on sample preparation logs/bench sheets?	X		
Are the measurement read out records present for:			
ICP	X		
Flame AA			X
Furnace AA	X		
Mercury	X		
Cyanides	X		

Inorganic Data Validation Checklist - Page 2

	YES	NO	NA
Is the data legible?	X		
Is the data properly labeled?	X		
Holding Times			
Were mercury analyses performed within 28 days?	X		
Were cyanide distillations performed within 14 days?	X		
Were other metal analysis performed within 6 months?	X		
Form I (Final Data)			
Are all forms complete?	X		
Are correct units indicated on Form I's?	X		
Are soil sample results for each parameter corrected for percent solids?	X		
Are all "less than IDL" values properly coded with "U"?	X		
Are the correct concentration qualifiers used with final data?	X		
Was a brief physical description of samples given on Form I's?	X		
Calibration			
Is a record of at least 2 point calibration present for ICP analysis?	X		
Is a record of 5 point calibration present for Hg analysis?	X		
Is a record of 4 point calibration present for:			
Flame AA?			X
Furnace AA?	X		
Cyanides?	X		
Is one calibration standard at the CRDL level for all AA (except Hg) and cyanides analyses?	X		
Is correlation coefficient less than .995 for:			
Mercury Analysis?	X		
Cyanide Analysis?	X		
Atomic Absorption Analysis?			X

Inorganic Data Validation Checklist - Page 3

	YES	NO	NA
Form II A (Initial and Continuing Calibration Verification)			
Present and complete for every metal and cyanide?	X		
Are all calibration standards (initial and continuing) within control limits for:			
Metals (90-110 %R)?	X		
Hg (80-120 %R)?	X		
Cyanides (85-115 %R)?	X		
Was continuing calibration performed every 10 samples or every 2 hours?	X		
Was the ICV for cyanides distilled?	X		
Form II B (CRDL Standards for AA and ICP)			
Was a CRDL standard (CRA) analyzed after initial calibration for all AA metals (except Hg)?	X		
Was a mid-range calibration verification standard distilled and analyzed for cyanide analysis?	X		
Was a 2xCRDL (or 2xIDL when IDL>CRDL) analyzed (CRI) for each ICP run?	X		
Was CRI analyzed after ICV/ICB and before the final CCV/CCB, and twice every eight hours of ICP run?	X		
Are CRA and CRI standards within control limits for metals (60-120 %R)?		X	
Is mid-range standard within control limits for cyanide (80-120 %R)	X		
Form III (Initial and Continuing Calibration Blanks)			
Present and complete?	X		
Was an initial calibration blank analyzed?	X		
Was a continuing calibration blank analyzed after every 10 samples or every 2 hours (which ever is more frequent)?	X		
Are all calibration blanks (when IDL<CRDL) less than or equal to the Contract Required Detection Limits (CRDLs)?	X		
Are all calibration blanks less than two times Instrument Detection Limit (when IDL>CRDL)?			X

	YES	NO	NA
Form III (Preparation Blank)			
Was one prep. blank analyzed for:			
each Sample Delivery Group SDG)?	X		
each batch of digested samples?	X		
each matrix type?	X		
Is concentration of prep. blank value greater than the CRDL when IDL is less than or equal to CRDL?		X	
If yes, is the concentration of the sample with the least concentrated analyte less than 10 times the prep. blank?			X
Is concentration of prep. blank value less than two times IDL, when IDL is greater than CRDL?			X
Is concentration of prep. blank below the negative CRDL?		X	
Form IV (ICP Interference Check Sample)			
Present and complete?	X		
Was ICS analyzed at beginning and end of run (or at least twice every 8 hours)?	X		
Are all Interference Check Sample results inside the control limits (±20%)?	X		
If no, is concentration of Al, Ca, Fe, or Mg lower than the respective concentration in ICS?			X
Form V A (Spiked Sample Recovery - Pre-Digestion/Pre-Distillation)			
Present and complete for:			
each SDG?		X	
each matrix type?		X	
Was field blank used for spiked sample?		X	
Are all recoveries within control limits (75-125)?			X
If no, is sample concentration greater than or equal to four times spike concentration?			X
Are results outside the control limits (75-125%) flagged with "N" on Form I's and Form VA?			X

	YES	NO	NA
Aqueous			
Are any spike recoveries:			
less than 30%?			X
between 30-74%?			X
between 126-150%?			X
greater then 150%?			X
Soil/Sediment			
Are any spike recoveries:			
less than 10%?			X
between 10-74%?			X
between 126-200%?			X
greater than 200%?			X
Form VI (Lab Duplicates)			
Present and complete for:			
each SDG?		X	
each matrix type?		X	
Was field blank used for duplicate analysis?		X	
Are all values within control limits (RPD 20% or difference ≤ ±CRDL)?			X
If no, are all results outside the control limits flagged with an * on Form I's and VI?			X
Aqueous			
Is any RPD greater than 50% where sample and duplicate are both greater than or equal to 5 times CRDL?			X
Is any difference between sample and duplicate greater than CRDL where sample and/or duplicate is less than 5 times CRDL?			X
Soil/Sediment			
Is any RPD (where sample and duplicate are both greater than or equal to 5 times CRDL) > 100%?			X
Is any difference between sample and duplicate (where sample and/or duplicate is less than 5xCRDL) > 2xCRDL?			X

	YES	NO	NA
Field Duplicates			
Were field duplicates analyzed?		X	
Aqueous			
is any RPD greater than 50% where sample and duplicate are both greater than or equal to 5 times CRDL?			X
Is any difference between sample and duplicate greater than CRDL where sample and/or duplicate is less than 5 times CRDL?			X
Soil/Sediment			
Is any RPD (where sample and duplicate are both greater than 5 times CRDL) > 100%?			X
Is any difference between sample and duplicate (where sample and/or duplicate is less than 5x CRDL) >2xCRDL?			X
Form VII (Laboratory Control Sample)			
Was one LCS prepared and analyzed for:			
each SDG?	X		
each batch samples digested/distilled?	X		
Aqueous LCS			
Is any LCS recovery:			
less than 50%?		X	
between 50% and 79%?		X	
between 121% and 150%?		X	
greater than 150%?		X	
Solid LCS			
Is LLCS "Found" value higher than the control limits on Form VII?			X
Is LCS "Found" lower than the control limits on Form VII?			X
Form IX (ICP Serial Dilution)			
Was Serial Dilution analysis performed for:			
each SDG?	X		
each matrix type?	X		

	YES	NO	NA
Was field blank(s) used for Serial Dilution Analysis?		X	
Are results outside control limit flagged with an "E"" on Form I's and Form IX when initial concentration on Form IX is equal to 50 times IDL or greater.			X
Are any % difference values:			
> 10%?		X	
≥100%?		X	
Furnace Atomic Absorbtion (AA) QC Analysis			
Are duplicate injections present in furnace raw data (except during full Method of Standard Addition) for each sample analyzed be GFAA?	X		
Do the duplicate injection readings agree within 20% Relative Standard Deviation (RSD) or coefficient of Variation (CV) for concentration greater than CRDL?	X		
Was a dilution analyzed for sample with analytical spike recovery less than 40%?			X
Is analytical spike recovery outside the control limits (85-115%) for any sample?	X		
Form VIII (Method of Standard Addition Results)			
Present?		X	
If no, is any Form I result coded with "S" or a "+"?		X	
Is coefficient of correlation for MSA less than 0.990 for any sample?			X
Was MSA required for any sample but not performed?		X	
Is coefficient of correlation for MSA less than 0.995?			X
Are MSA calculations outside the linear range of the calibration curve generated at the beginning of the analytical run?			X
Was proper quantitation procedure followed as outlined in the SOW on page E-23?			X
Dissolved/Total for Inorganic/Total Analytes			
Were any analyses performed for dissolved as well as total analytes on the same sample(s).		X	

	YES	NO	NA
Is the concentration of any dissolved (or inorganic) analyte greater than its total concentration by more than 10%? (if greater than CRDL)			X
Is the concentration of any dissolved (or inorganic) analyte greater than its total concentration by more than 50%?			X
Field Blank			
Is field blank concentration less than CRDL (or 2 x IDL when IDL > CRDL) for all parameters of associated aqueous and soil samples?			X
If no, was field blank value already rejected due to other QC criteria?			X
Form X, XI, XII (Verification of Instrumental Parameters)			
Is verification report present for :			
Instrument Detection Limits (quarterly)?	X		
ICP Interelement Correlation Factors (annually)?	X		
ICP Linear Ranges (quarterly)?	X		
Form X (Instrument Detection Limits)			
Are IDLs present for:			
all the analytes?	X		
all the instruments used?	X		
Is IDL greater than CRDL for any analyte?		X	
If yes, is the concentration of Form I of the sample analyzed on the instrument whose IDL exceeds CRDL, greater than 5 x IDL.			X
Was any sample result higher linear range of ICP.		X	
Was any sample result higher than the highest calibration standard for non-ICP parameters?		X	
If yes for any of the above, was the sample diluted to obtain the result on Form I?			X
Are percent solids in sediment(s):			
< 50%?			X
< 10%?			X

Corrected Sample Analysis Data Sheets

U.S. EPA - CLP

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INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

A66536

Lab Name: AQUATEC Contract: 91082

Lab Code: AQUAI Case No.: OLM SAS No.: SDG No.: 40278

Matrix (soil/water): WATER Lab Sample ID: 201814

Level (low/med): LOW Date Received: 10/21/93

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	44.9	U		P
7440-36-0	Antimony	52.8	U		P
7440-38-2	Arsenic	5.9	B		F
7440-39-3	Barium	84.0	B		P
7440-41-7	Beryllium	0.30	U		P
7440-43-9	Cadmium	3.3	U		P
7440-70-2	Calcium	74200			P
7440-47-3	Chromium	2.5	U		P
7440-48-4	Cobalt	4.9	U		P
7440-50-8	Copper	3.7	U		P
7439-89-6	Iron	1010			P
7439-92-1	Lead	2.7	B		F
7439-95-4	Magnesium	22200			P
7439-96-5	Manganese	112			P
7439-97-6	Mercury	0.07	U		CV
7440-02-0	Nickel	4.1	U		P
7440-09-7	Potassium	1430	B		P
7782-49-2	Selenium	1.1	U	SW	F
7440-22-4	Silver	6.7	U		P
7440-23-5	Sodium	20300			P
7440-28-0	Thallium	1.8	U		F
7440-62-2	Vanadium	3.3	U		P
7440-66-6	Zinc	3.4	B		P
	Cyanide	10.0	U		C

Color Before: YELLOW Clarity Before: CLOUDY Texture:

Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:

U.S. EPA - CLP

1

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

A66537

Lab Name: AQUATEC Contract: 91082

Lab Code: AQUAI Case No.: OLM SAS No.: SDG No.: 40278

Matrix (soil/water): WATER Lab Sample ID: 201815

Level (low/med): LOW Date Received: 10/21/93

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	44.7	U		P
7440-36-0	Antimony	52.5	U		P
7440-38-2	Arsenic	6.9	B		F
7440-39-3	Barium	82.6	B		P
7440-41-7	Beryllium	0.30	U		P
7440-43-9	Cadmium	3.3	U		P
7440-70-2	Calcium	74000			P
7440-47-3	Chromium	2.5	U		P
7440-48-4	Cobalt	4.9	U		P
7440-50-8	Copper	3.7	U		P
7439-89-6	Iron	1050			P
7439-92-1	Lead	1.3	B		F
7439-95-4	Magnesium	22300			P
7439-96-5	Manganese	129			P
7439-97-6	Mercury	0.07	U		CV
7440-02-0	Nickel	4.1	U		P
7440-09-7	Potassium	1370	B		P
7782-49-2	Selenium	1.1	U	JW	F
7440-22-4	Silver	6.7	U		P
7440-23-5	Sodium	19500			P
7440-28-0	Thallium	1.8	U		F
7440-62-2	Vanadium	3.3	U		P
7440-66-6	Zinc	4.0	B		P
	Cyanide	10.0	U		C

Color Before: YELLOW Clarity Before: CLOUDY Texture:

Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:

CONVENTIONAL ANALYSES

Introduction

Analyses were performed according to the following method:

Total Suspended Solids EPA 160.2

The data validation process is intended to evaluate the data on a technical basis. It is assumed that the data package represents the best efforts of the laboratory and had already been subjected to adequate and sufficient quality review prior to submission for validation.

During the validation process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this valuation, qualifier codes may be added, deleted, or modified by the data validator. Validator qualified results are annotated with the following codes in accordance with National Functional Guidelines:

- U The analyte was analyzed for but not detected. The associated value is the analyte method detection limit.
- J The analyte was positively identified; however, the associated numerical value is an estimated concentration only.
- UJ The analyte was not detected above the reported sample detection limit. However, the reported limit is approximate and may or may not represent the actual limit of detection.
- R The sample results are rejected.

Two facts should be noted by all data users. First, the "R" flag means that the associated value is unusable. In other words, due to significant QC problems, the analysis is invalid and provides no information as to whether the compound is present or not. "R" values should not appear on data tables because they cannot be relied upon, even as a last resort. The second fact to keep in mind is that no compound concentration, even if it has passed all QC test, is guaranteed to be accurate. Strict QC serves to increase confidence in data but any value potentially contains error.

Data Assessment

1. Holding Time

All samples were analyzed within specified holding times.

2. Blank Contamination

Quality assurance blanks, i.e., method, field, or rinse blanks are prepared to identify any contamination which may have been introduced in to the samples during sample preparation or field activity. Method blanks (including initial and continuing calibration blanks and preparation blanks) measure laboratory contamination. Field and rinse blanks measure cross contamination of samples during field operations.

All blanks were found to be acceptable, with no analytes detected above the detection limit.

3. Calibration

Satisfactory instrument calibration is established to insure that the instrument is capable of producing acceptable quantitative data. An initial calibration demonstrates that the instrument is capable of giving acceptable performance at the beginning of an experimental sequence. The continuing calibration verifies that the instrument is giving satisfactory daily performance.

3.1 Initial Calibration

Total suspended solids analyses have no calibration correlation coefficient requirements.

3.2 Continuing Calibration

Total suspended solids analyses have no continuing calibration verification standard requirements.

4. Laboratory Duplicate

Laboratory duplicate data are used to assess the precision of the analytical method.

All laboratory duplicate relative percent differences (RPDs) were within acceptable limits.

5. Field Duplicate

No filed duplicate was included in this data set.

6. Laboratory Control Sample (LCS)

All recoveries were within the acceptable recovery limits.

7. System Performance and Overall Assessment

Overall system performance was acceptable. Other than those deviation specifically mentioned in this review, the overall data quality is within the guidelines specified in the method.

CONVENTIONAL ANALYSIS SAMPLE RESULTS

Sample	Total Suspended Solids (mg/l)
A66536	9.2
A66537	8.6

CHAIN OF CUSTODY

BLASLAND & BOUCK ENGINEERS, P.C.
6723 Towpath Road, Box 66
Syracuse, New York 13214-0066
TEL: 315-446-9120
FAX: 315-449-0017

CHAIN OF CUSTODY RECORD

PROJ. NO.: 645.51
PROJECT NAME: Kalamazoo River/Portage Creek
SAMPLERS: (Signature)

STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION	Number of Containers	PCB's & Pesticides	Semivolatiles	TAL - Metals	CN-	TSS	Volatiles	Temp	REMARKS
SWP-2	10-20	10:05		✓	A66536	9	2	2	1	1	1	2		Do CLP TCL/TAL
—	10-20	—			Temp Blank	1							1	Cooler # 61

Relinquished by: (Signature)	DATE	TIME	Received by: (Signature)	Relinquished by: (Signature)	DATE	TIME	Relinquished by: (Signature)
	10-20-93	17:00					
Relinquished by: (Signature)	DATE	TIME	Received by: (Signature)	Relinquished by: (Signature)	DATE	TIME	Relinquished by: (Signature)
Relinquished by: (Signature)	DATE	TIME	Received for Laboratory by: (Signature)	DATE	TIME	Remarks:	
			Pat Poundstone	10/21/93	1000	Temp blank = 0°C	

7/12/93
1393786HCDR

Distribution: Original Accompanies Shipment; Copy to Coordinator Field Files

000003

KB54501477

BLASLAND & BOUCK ENGINEERS, P.C.
6723 Towpath Road, Box 66
Syracuse, New York 13214-0066
TEL: 315-446-9120
FAX: 315-449-0017

CHAIN OF CUSTODY RECORD

PROJ. NO.: 645.51
PROJECT NAME: Kalamazoo River/Portage Creek
SAMPLERS: (Signature) [illegible], Brian D Lord

STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION	Number of Containers	PCB's Pesticides	Semivolatiles	TAL-Metals	CN-	TSS	Volatiles	TEMP	REMARKS
SWP-1	10-20	10:45		✓	A66537	9	2	2	1	1	1	2		Do CLP TCL/TAL
—	10-20				Temp Blank	1							1	Cooler #BBL-100

Relinquished by: (Signature)	DATE	TIME	Received by: (Signature)	Relinquished by: (Signature)	DATE	TIME	Relinquished by: (Signature)
[illegible]	10-20-93	17:00					
Relinquished by: (Signature)	DATE	TIME	Received by: (Signature)	Relinquished by: (Signature)	DATE	TIME	Relinquished by: (Signature)
Relinquished by: (Signature)	DATE	TIME	Received for Laboratory by: (Signature) Pat Poundstone	DATE 10/21/93	TIME 1000	Remarks: Temp. blank = 0°C	

7/12/93
1393786HCOR

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KB54501478

DATA REVIEW FOR

ALLIED PAPER, INC./PORTAGE CREEK/KALAMAZOO RIVER SUPERFUND SITE

SDG# 41106

PCB ANALYSES

ALLIED OPERABLE UNIT

Analyses performed by:

Aquatec, Inc.
Colchester, Vermont

Review performed by:

Blasland, Bouck & Lee, Inc.
Syracuse, New York

Summary

The following is an assessment of the PCB data package for SDG # 41106 for the surface water sampling of the Allied operable Unit from the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site. Included with this assessment are the data review check sheets used in the review of the package and sample results for PCB and total suspended solids analyses. Analyses were performed on the following samples:

Sample ID	Lab ID	Matrix	Sample Date
A66542	205986	surface water	12/2/93
A66543	205987	surface water	12/2/93
A66544	205988	surface water	12/2/93
A66545	205989	surface water	12/2/93
A66546	205990	surface water	12/2/93
A66547	205991	surface water	12/2/93
A66548	205992	surface water	12/3/93
A66549	205993	surface water	12/3/93
A66550*	205994	surface water	12/3/93
A66551	205996	surface water	12/3/93
A66552	205997	surface water	12/3/93

* MS/MSD analysis performed on sample.

Introduction

Analyses were performed according to the USEPA SW-846 method 8081, modified for PCB only analysis.

The data review process is intended to evaluate the data on a technical basis. It is assumed that the data package represents the best efforts of the laboratory and had already been subjected to adequate and sufficient quality review prior to submission.

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer. Results are qualified with the following codes in accordance with National Functional Guidelines:

- U The compound was analyzed for but not detected. The associated value is the compound quantitation limit.
- J The compound was positively identified; however, the associated numerical value is an estimated concentration only.
- B The compound has been found in the sample as well as its associated blank, its presence in the sample may be suspect.
- N The analysis indicates the presence of a compound for which there is presumptive evidence to make a tentative identification.
- JN The analysis indicates the presence of a compound for which there is presumptive evidence to make a tentative identification. The associated numerical value is an estimated concentration only.
- E The compound was quantitated above the calibration range.
- D Concentration is based on a diluted sample analysis.
- UJ The compound was not detected above the reported sample quantitation limit. However, the reported limit is approximate and may or may not represent the actual limit of quantitation.
- R The sample results are rejected.

Two facts should be noted by all data users. First, the "R" flag means that the associated value is unusable. In other words, due to significant QC problems, the analysis is invalid and provides no information as to whether the compound is present or not. "R" values should not appear on data tables because they cannot be relied upon, even as a last resort. The second fact to keep in mind is that no compound concentration, even if it has passed all QC test, is guaranteed to be accurate. Strict QC serves to increase confidence in data but any value potentially contains error.

The data presented in the package has been derived using a procedure developed by Aquatec, Inc. in an attempt to improve the analytical process of calibration, identification, and quantitation of PCBs as Aroclors. Key components of this procedure include:

Calibration

The response function of the electron capture detector is inherently non-linear, and while significant linearization is achieved for this detector by electronic means, some non-linearity remains. Power function linearization is used to "straighten the curve" and allow the use of response factors for calibration purposes.

During the initial calibration a response factor is calculated for each peak in the individual Aroclors.

A weighted response factor calculation has been used to adjust for non-linearity at the low end of the calibration curve.

Identification

Peak retention times are relative. Retention times are in set windows relative to the time markers DCB and TCMX. Time markers adjust for minor variations in column flow or instrument condition and allow the use of very tight windows which minimizes the number of both false positive and false negative peak identifications.

The determination of "which Aroclor or mixture of Aroclors will produce a chromatogram most similar to that of the residue" is made by expressing the unknown sample chromatogram as a linear combination of the Aroclors. The "most similar" Aroclor or mixture of Aroclors is determined by using a least squares minimization of the difference between the unknown chromatogram and the linear combination of Aroclors. This is similar to the procedure presented by L.E. Slivon, P.M. Schumacher and A. Alford-Stevens for the determination of Aroclor composition from GC/MS level of chlorination results.

Identification/quantitation of Aroclors in samples is based on the combined response of two columns, typically RTX-5 and RTX-35. The pooling of response combines the unique qualities of both columns to derive a more defined Aroclor pattern which less likely to be affected by interferents. Identification/quantitation data for the individual columns is provided in the package and can be used as a check on the combined column results.

Data Assessment

1. Holding Time

The QAPP-specified holding times for PCB analyses of water samples is 5 days from date of sample receipt to extraction and 40 days from extraction to analysis. The technical holding times are 7 days from sample collection to extraction and 40 days to anlaysis.

All samples were originally extracted and analyzed within the specified holding times. Due to poor surrogate performance, all samples were re-extracted over the holding time. Data for all reanalyzed samples have been qualified as estimated based on the holding time violation.

2. Blank Contamination

Quality assurance blanks, i.e., method, field or rinse blanks, are prepared to identify any contamination which may have been introduced in to the samples during sample preparation or field activity. Method blanks measure laboratory contamination. Field and rinse blanks measure contamination of samples during field operations.

No target compounds were detected in the method blanks. No rinse blanks were submitted with the samples.

3. System Performance

System performance was acceptable for both columns.

4. Calibration

Satisfactory instrument calibration is established to insure that the instrument is capable of producing acceptable quantitative data. An initial calibration demonstrates that the instrument is capable of giving acceptable performance at the beginning of an experimental sequence. The continuing calibration verifies that the instrument is giving satisfactory daily performance.

4.1 Initial Calibration

The method allows a maximum RSD of 20%. The %RSD was within acceptable limits for all Aroclors.

4.2 Continuing Calibration

A maximum %D of 15 is allowed. All continuing calibrations were within the specified limits.

5. Surrogates / System Monitoring Compounds

All samples to be analyzed for organic compounds are spiked with surrogate compounds prior to sample preparation to evaluate overall laboratory performance and efficiency of the analytical technique.

Recoveries for one surrogate were below control limits in samples A66542, A66542RE, A66543, A66543RE, A66544RE, A66545, A66545RE, A66546, A66546RE, A66547, A66547RE, A66548RE, A66549, A66549RE, A66550, A66550RE, A66551 A66551RE, A66552 and A66552RE. Since recoveries for the remaining surrogate were within control limits, no data have been qualified based on surrogate performance. Recovery for one surrogate was less than 10 percent in samples A66544 and A66548. Data for all non-detected target compounds have been rejected and all detected target compounds have been qualified as estimated in these samples based on the low recovery.

6. Compound Identification

The determination of Aroclor presence is made by expressing the unknown sample chromatogram as a linear combination of the Aroclors. The most similar Aroclor or mixture of Aroclors is determined by using a least squares minimization of the difference between the unknown chromatogram and the linear combination of Aroclors.

Identification/quantitation of Aroclors is based on the combined response of the RTX-5 and RTX-35 columns. Identification/quantitation data for the individual columns is provided in the package and has been used as a check on the combined column results.

A review of the sample chromatograms indicate that the Aroclors have been correctly identified/quantitated.

7. Matrix Spike/Matrix Spike Duplicate/Matrix Spike Blank

Matrix spike and matrix spike duplicate data are used to assess the precision and accuracy of the analytical method.

All matrix spike and matrix spike duplicate recoveries and relative percent difference (RPD) between recoveries were within control limits. All recoveries in the matrix spike blank were also within control limits.

8. Field Duplicates

Results for duplicate samples are summarized below:

Sample ID/ Duplicate ID	Analyte	Sample Result	Duplicate Result	RPD
A66550 / A66552	Aroclor 1016	0.030J	0.028J	6.9%

The duplicate results are acceptable.

9. General Comments

The initial analyses results should be used for all samples with the following exceptions:

A66544 and A66544-RE
The data from the re-extracted sample A66544-RE should be used for all compound results. The original extract, A66544, exhibited surrogate recoveries below 10 percent, resulting in data rejection.

A66547 and A66547-RE
The data from the re-extracted sample A66547-RE should be used for all compound results. The original extract, A66547, exhibited surrogate recoveries below 10 percent, resulting in data rejection.

Only that data for the reanalyses which are recommended for use are included in the attached data analysis summary sheets.

10. System Performance and Overall Assessment

Overall system performance was acceptable. Other than those deviations specifically mentioned in this review, the overall data quality is within the guidelines listed in the analytical method.

DATA REVIEW CHECKLIST

PCB Data Review Checklist

	YES	NO	NA
Data Completeness and Deliverables			
Is there a narrative or cover letter present?	X		
Are the samples numbers included in the narrative?	X		
Are the sample chain-of-custodies present?	X		
Do the chain-of-custodies indicate any problems with sample receipt or sample condition?		X	
Holding Times			
Have any holding times been exceeded?	X		
Surrogate Recovery			
Are surrogate recovery forms present?	X		
Are all the samples listed on the appropriate surrogate recovery form?	X		
Are the outliers correctly marked with an asterisk?	X		
Were recoveries of TCMX or DCB outside of specified limits for any sample or blank?	X		
If yes, were the samples reanalyzed?	X		
Matrix Spikes			
Is there a matrix spike recovery form present?	X		
Were matrix spikes analyzed at the required frequency?	X		
How many spike recoveries were outside of QC limits? 0 out of 8			
How many RPDs for matrix spike and matrix spike duplicate were outside of QC limits? 0 out of 4			
Blanks			
Is a Method Blank Summary Form present?	X		
Has a method blank been analyzed for each set of samples or for each 20 samples, whichever is more frequent?	X		
Is the chromatographic performance acceptable for each instrument?	X		
Do any method/reagent/instrument blanks have positive results?		X	

PCB Data Review Checklist - Page 2

	YES	NO	NA
Do any field/rinse blanks have positive results?			X
Are there field/rinse/equipment blanks associated with every sample?		X	
Calibration and GC Performance			
Are the following chromatograms and data printouts present?			
Aroclor 1016/1260	X		
Aroclor 1221	X		
Aroclor 1232	X		
Aroclor 1242	X		
Aroclor 1248	X		
Aroclor 1254	X		
Are Initial Calibration Summary Forms present and complete for each column and analytical sequence?	X		
Are the linearity criteria for the initial analyses within limits for both columns (20% RSD)	X		
Have all samples been injected within a 12 hour period beginning with the injection of an instrument blank?	X		
Is a Calibration Verification Summary Form present and complete for each continuing standard analyzed?	X		
Are %D values for all compounds within limits (less than 15%)?	X		
Analytical Sequence Check			
Is a analytical sequence form present and complete for each column and each period of analyses?	X		
Was the proper analytical sequence followed?	X		
Cleanup Efficiency Verification			
If GPC cleanup was performed, is Gel Permeation Chromatography Check Form present?		X	
Are percent recoveries of the compounds used to check the efficiency of the cleanup procedure within QC limits?			X

PCB Data Review Checklist - Page 3

	YES	NO	NA
PCB Identification			
Is both a combined and single column Aroclor Identification Report present for every sample?	X		
Do the combined column and individual column Aroclor identifications agree?	X		
Were there any false negatives?		X	
Was GC/MS confirmation provided when required?			X
Compound Quantitation and Reported Detection Limits			
Are the reporting limits adjusted to reflect sample dilutions, and for soils, sample moisture?	X		
Chromatogram Quality			
Were the baselines stable?	X		
Were any electronegative displacement (negative peaks) or unusual peaks detected?		X	
Field Duplicates			
Where field duplicates submitted with the samples?	X		

PCB Holding Time and Surrogate Recovery Summary

Sample ID	Holding Time	Surrogates - Column 1		Surrogates - Column 2	
		TCX	DCB	TCX	DCB
A66542				↓ (58)	
A66542RE	+42	↓ (48)		↓ (43)	
A66543		↓ (38)		↓ (54)	
A66543RE	+42	↓ (50)		↓ (44)	
A66544		↓ (7)		↓ (5)	
A66544RE	+42	↓ (47)		↓ (41)	
A66545				↓ (57)	
A66545RE	+42	↓ (55)		↓ (48)	
A66546		↓ (54)		↓ (48)	
A66546RE	+42	↓ (50)		↓ (44)	
A66547		↓ (5)		↓ (4)	
A66547RE	+42	↓ (53)		↓ (47)	
A66548		↓ (59)		↓ (54)	
A66548RE	+41	↓ (50)		↓ (44)	
A66549				↓ (58)	
A66549RE	+41	↓ (51)		↓ (45)	
A66550				↓ (58)	
A66550RE	+41	↓ (53)		↓ (46)	
A66550MS				↓ (58)	
A66550MSRE	+41	↓ (55)		↓ (48)	
A66550MSD				↓ (59)	
A66550MSDRE	+41	↓ (55)		↓ (48)	
A66551				↓ (54)	
A66551RE	+41	↓ (49)		↓ (42)	
A66552				↓ (57)	
A66552RE	+41	↓ (52)		↓ (45)	

Surrogate Standards
TCX Tetrachloro-m-xylene
DCB Decachlorobiphenyl

Qualifiers:
D Surrogates diluted out
↑ Recovery high
↓ Recovery low

Unless otherwise noted, all parameters are within specified limits.

PCB Calibration Summary

Instrument: HP2087
Column: RTX-5 / RTX-35

Date:	1/8 0354	1/12/94	1/12/94	1/12/94	1/12/94	1/13/94	1/13/94
Time:	to 1/9 0122	1504	1542	2239	2317	0652	0730
	Initial Cal.	Cont. Cal.	Cont. Cal.	Cont. Cal.	Cont. Cal.	Cont. Cal.	Cont. Cal.
	%RSD	%D	%D	%D	%D	%D	%D
Aroclor 1016	3.2 / 4.4						
Aroclor 1221	3.0 / 3.9						
Aroclor 1232	4.5 / 4.2						
Aroclor 1242	4.0 / 4.3		7.5				
Aroclor 1248	5.5 / 6.2	7.0		13.0		12.5	
Aroclor 1254	3.9 / 6.2				10.5		
Aroclor 1260	3.9 / 4.1						7.0
Tetrachloro-m-xylene	10.1 / 3.5						
Decachlorobiphenyl	8.8 / 13.7						
Affected Samples:							

PCB Calibration Summary - Page 2

Instrument: HP2087
Column: RTX-5 / RTX-35

Date:		1/13/94	1/13/94				
Time:		1505	1543				
	Initial Cal.	Cont. Cal.	Cont. Cal.	Cont. Cal.	Cont. Cal.	Cont. Cal.	Cont. Cal.
	%RSD	%D	%D	%D	%D	%D	%D
Aroclor 1016			10.0				
Aroclor 1221							
Aroclor 1232							
Aroclor 1242							
Aroclor 1248		15.0					
Aroclor 1254							
Aroclor 1260							
Tetrachloro-m-xylene							
Decachlorobiphenyl							

Affected Samples:

PCB Calibration Summary - Page 3

Instrument: HP2404
Column: RTX-35 / RTX-5

Date:	1/28 1801	1/31/94	1/31/94	2/1/94	2/1/94	2/1/94	2/1/94
Time:	to 1/28 1457	1807	1844	0207	0244	1007	1044
	Initial Cal.	Cont. Cal.	Cont. Cal.	Cont. Cal.	Cont. Cal.	Cont. Cal.	Cont. Cal.
	%RSD	%D	%D	%D	%D	%D	%D
Aroclor 1016	4.3 / 3.6		10.5				
Aroclor 1221	4.1 / 3.5						
Aroclor 1232	3.3 / 2.4						
Aroclor 1242	3.6 / 3.0				6.5		
Aroclor 1248	3.6 / 2.7	9.0		5.0		3.0	
Aroclor 1254	9.5 / 9.6						4.0
Aroclor 1260	2.9 / 2.7						
Tetrachloro-m-xylene	18.5 / 6.8						
Decachlorobiphenyl	6.5 / 7.7						
Affected Samples:							

PCB Calibration Summary - Page 4

Instrument: HP2404
Column: RTX-35 / RTX-3

Date:		2/1/94	2/1/94				
Time:		1618	1655				
	Initial Cal.	Cont. Cal.	Cont. Cal.	Cont. Cal.	Cont. Cal.	Cont. Cal.	Cont. Cal.
	%RSD	%D	%D	%D	%D	%D	%D
Aroclor 1016							
Aroclor 1221							
Aroclor 1232							
Aroclor 1242							
Aroclor 1248		3.5					
Aroclor 1254							
Aroclor 1260			8.0				
Tetrachloro-m-xylene							
Decachlorobiphenyl							

Affected Samples:

CORRECTED ANALYSIS SUMMARY FORMS

FORM 1
AROCLOR ANALYSIS DATA SHEET

EPA SAMPLE NO.

A66542

Lab Name: Aquatec, Inc. Lab Code: AQUAI

Contract: 91082 Case: PCB SDG: 41106

Phase Type: Water

Phase Volume: 1003 (mL)

Injection Volume: 1.0 (uL)

Dilution Factor: 1.0

Lab Sample ID: 205986

Date Received: 12/04/93

Date Extracted: 12/09/93

Date Analyzed: 01/13/94

Sulfur Clean-up: N (Y/N)

CAS NO.	COMPOUND	CONCENTRATION (ug/L)	Q
12674-11-2	Aroclor-1016	0.050	U
11104-28-2	Aroclor-1221	0.050	U
11141-16-5	Aroclor-1232	0.050	U
53469-21-9	Aroclor-1242	0.050	U
12672-29-6	Aroclor-1248	0.050	U
11097-69-1	Aroclor-1254	0.050	U
11096-82-5	Aroclor-1260	0.050	U

FORM 1
AROCLOR ANALYSIS DATA SHEET

EPA SAMPLE NO.

A66543

Lab Name: Aquatec, Inc. Lab Code: AQUAI

Contract: 91082 Case: PCB SDG: 41106

Phase Type: Water

Phase Volume: 1005 (mL)

Injection Volume: 1.0 (uL)

Dilution Factor: 1.0

Lab Sample ID: 205987

Date Received: 12/04/93

Date Extracted: 12/09/93

Date Analyzed: 01/13/94

Sulfur Clean-up: N (Y/N)

CAS NO.	COMPOUND	CONCENTRATION (ug/L)	Q
12674-11-2	Aroclor-1016	0.050	U
11104-28-2	Aroclor-1221	0.050	U
11141-16-5	Aroclor-1232	0.050	U
53469-21-9	Aroclor-1242	0.050	U
12672-29-6	Aroclor-1248	0.050	U
11097-69-1	Aroclor-1254	0.050	U
11096-82-5	Aroclor-1260	0.050	U

FORM 1
AROCLOR ANALYSIS DATA SHEET

EPA SAMPLE NO.

A66544

Lab Name: Aquatec, Inc. Lab Code: AQUAI

Contract: 91082 Case: PCB SDG: 41106

Phase Type: Water Lab Sample ID: 205988

Phase Volume: 1000 (mL) Date Received: 12/04/93

Injection Volume: 1.0 (uL) Date Extracted: 12/09/93

Dilution Factor: 1.0 Date Analyzed: 01/13/94

Sulfur Clean-up: N (Y/N)

CAS NO.	COMPOUND	CONCENTRATION (ug/L)	Q
12674-11-2	~~Aroclor-1016~~	~~0.050~~	~~U~~
11104-28-2	~~Aroclor-1221~~	~~0.050~~	~~U~~
11141-16-5	~~Aroclor-1232~~	~~0.050~~	~~U~~
53469-21-9	Aroclor-1242	0.038	J
12672-29-6	~~Aroclor-1248~~	~~0.050~~	~~U~~
11097-69-1	~~Aroclor-1254~~	~~0.050~~	~~U~~
11096-82-5	~~Aroclor-1260~~	~~0.050~~	~~U~~

use reanalysis

FORM 1
AROCLOR ANALYSIS DATA SHEET

EPA SAMPLE NO.

A66544~~RE~~

Lab Name: Aquatec, Inc. Lab Code: AQUAI

Contract: 91082 Case: PCB SDG: 41106

Phase Type: Water
Phase Volume: 1002 (mL)
Injection Volume: 1.0 (uL)
Dilution Factor: 1.0

Lab Sample ID: 205988R1
Date Received: 12/04/93
Date Extracted: 01/20/94
Date Analyzed: 02/01/94
Sulfur Clean-up: N (Y/N)

CAS NO.	COMPOUND	CONCENTRATION (ug/L)	Q
12674-11-2	Aroclor-1016	0.050	U J
11104-28-2	Aroclor-1221	0.050	U J
11141-16-5	Aroclor-1232	0.050	U J
53469-21-9	Aroclor-1242	0.040	J
12672-29-6	Aroclor-1248	0.050	U J
11097-69-1	Aroclor-1254	0.050	U J
11096-82-5	Aroclor-1260	0.050	U J

FORM 1
AROCLOR ANALYSIS DATA SHEET

EPA SAMPLE NO.

A66545

Lab Name: Aquatec, Inc. Lab Code: AQUAI

Contract: 91082 Case: PCB SDG: 41106

Phase Type: Water
Phase Volume: 990 (mL)
Injection Volume: 1.0 (uL)
Dilution Factor: 1.0

Lab Sample ID: 205989
Date Received: 12/04/93
Date Extracted: 12/09/93
Date Analyzed: 01/13/94
Sulfur Clean-up: N (Y/N)

CAS NO.	COMPOUND	CONCENTRATION (ug/L)	Q
12674-11-2	Aroclor-1016	0.051	U
11104-28-2	Aroclor-1221	0.051	U
11141-16-5	Aroclor-1232	0.051	U
53469-21-9	Aroclor-1242	0.051	U
12672-29-6	Aroclor-1248	0.051	U
11097-69-1	Aroclor-1254	0.051	U
11096-82-5	Aroclor-1260	0.051	U

FORM 1
AROCLOR ANALYSIS DATA SHEET

EPA SAMPLE NO.

A66546

Lab Name: Aquatec, Inc. Lab Code: AQUAI

Contract: 91082 Case: PCB SDG: 41106

Phase Type: Water Lab Sample ID: 205990

Phase Volume: 1000 (mL) Date Received: 12/04/93

Injection Volume: 1.0 (uL) Date Extracted: 12/09/93

Dilution Factor: 1.0 Date Analyzed: 01/13/94

Sulfur Clean-up: N (Y/N)

CAS NO.	COMPOUND	CONCENTRATION (ug/L)	Q
12674-11-2	Aroclor-1016	0.034	J
11104-28-2	Aroclor-1221	0.050	U
11141-16-5	Aroclor-1232	0.050	U
53469-21-9	Aroclor-1242	0.050	U
12672-29-6	Aroclor-1248	0.050	U
11097-69-1	Aroclor-1254	0.050	U
11096-82-5	Aroclor-1260	0.050	U

FORM 1
AROCLOR ANALYSIS DATA SHEET

EPA SAMPLE NO.

A66547

Lab Name: Aquatec, Inc. Lab Code: AQUAI

Contract: 91082 Case: PCB SDG: 41106

Phase Type: Water Lab Sample ID: 205991

Phase Volume: 999 (mL) Date Received: 12/04/93

Injection Volume: 1.0 (uL) Date Extracted: 12/09/93

Dilution Factor: 1.0 Date Analyzed: 01/12/94

Sulfur Clean-up: N (Y/N)

CAS NO.	COMPOUND	CONCENTRATION (ug/L)	Q
~~12674-11-2~~	~~Aroclor-1016~~	~~0.051~~	~~U~~ R
~~11104-28-2~~	~~Aroclor-1221~~	~~0.051~~	~~U~~ R
~~11141-16-5~~	~~Aroclor-1232~~	~~0.051~~	~~U~~ R
~~53469-21-9~~	~~Aroclor-1242~~	~~0.051~~	~~U~~ R
~~12672-29-6~~	~~Aroclor-1248~~	~~0.051~~	~~U~~ R
~~11097-69-1~~	~~Aroclor-1254~~	~~0.051~~	~~U~~ R
~~11096-82-5~~	~~Aroclor-1260~~	~~0.051~~	~~U~~ R

use reanalysis

FORM 1
AROCLOR ANALYSIS DATA SHEET

EPA SAMPLE NO.

A66547RE

Lab Name: Aquatec, Inc. Lab Code: AQUAI

Contract: 91082 Case: PCB SDG: 41106

Phase Type: Water

Phase Volume: 1002 (mL)

Injection Volume: 1.0 (uL)

Dilution Factor: 1.0

Lab Sample ID: 205991R1

Date Received: 12/04/93

Date Extracted: 01/20/94

Date Analyzed: 02/01/94

Sulfur Clean-up: N (Y/N)

CAS NO.	COMPOUND	CONCENTRATION (ug/L)	Q
12674-11-2	Aroclor-1016	0.050	U J
11104-28-2	Aroclor-1221	0.050	U J
11141-16-5	Aroclor-1232	0.050	U J
53469-21-9	Aroclor-1242	0.050	U J
12672-29-6	Aroclor-1248	0.050	U J
11097-69-1	Aroclor-1254	0.050	U J
11096-82-5	Aroclor-1260	0.050	U J

FORM 1
AROCLOR ANALYSIS DATA SHEET

EPA SAMPLE NO.

A66548

Lab Name: Aquatec, Inc. Lab Code: AQUAI

Contract: 91082 Case: PCB SDG: 41106

Phase Type: Water
Phase Volume: 1000 (mL)
Injection Volume: 1.0 (uL)
Dilution Factor: 1.0

Lab Sample ID: 205992
Date Received: 12/04/93
Date Extracted: 12/09/93
Date Analyzed: 01/12/94
Sulfur Clean-up: N (Y/N)

CAS NO.	COMPOUND	CONCENTRATION (ug/L)	Q
12674-11-2	Aroclor-1016	0.039	J
11104-28-2	Aroclor-1221	0.050	U
11141-16-5	Aroclor-1232	0.050	U
53469-21-9	Aroclor-1242	0.050	U
12672-29-6	Aroclor-1248	0.050	U
11097-69-1	Aroclor-1254	0.050	U
11096-82-5	Aroclor-1260	0.050	U

FORM 1
AROCLOR ANALYSIS DATA SHEET

EPA SAMPLE NO.

A66549

Lab Name: Aquatec, Inc. Lab Code: AQUAI

Contract: 91082 Case: PCB SDG: 41106

Phase Type: Water
Phase Volume: 991 (mL)
Injection Volume: 1.0 (uL)
Dilution Factor: 1.0

Lab Sample ID: 205993
Date Received: 12/04/93
Date Extracted: 12/09/93
Date Analyzed: 01/12/94
Sulfur Clean-up: N (Y/N)

CAS NO.	COMPOUND	CONCENTRATION (ug/L)	Q
12674-11-2	Aroclor-1016	0.051	U
11104-28-2	Aroclor-1221	0.051	U
11141-16-5	Aroclor-1232	0.051	U
53469-21-9	Aroclor-1242	0.051	U
12672-29-6	Aroclor-1248	0.051	U
11097-69-1	Aroclor-1254	0.051	U
11096-82-5	Aroclor-1260	0.051	U

FORM 1
AROCLOR ANALYSIS DATA SHEET

EPA SAMPLE NO.

A66550

Lab Name: Aquatec, Inc. Lab Code: AQUAI

Contract: 91082 Case: PCB SDG: 41106

Phase Type: Water
Phase Volume: 999 (mL)
Injection Volume: 1.0 (uL)
Dilution Factor: 1.0

Lab Sample ID: 205994
Date Received: 12/04/93
Date Extracted: 12/09/93
Date Analyzed: 01/12/94
Sulfur Clean-up: N (Y/N)

CAS NO.	COMPOUND	CONCENTRATION (ug/L)	Q
12674-11-2	Aroclor-1016	0.030	J
11104-28-2	Aroclor-1221	0.051	U
11141-16-5	Aroclor-1232	0.051	U
53469-21-9	Aroclor-1242	0.051	U
12672-29-6	Aroclor-1248	0.051	U
11097-69-1	Aroclor-1254	0.051	U
11096-82-5	Aroclor-1260	0.051	U

FORM 1
AROCLOR ANALYSIS DATA SHEET

EPA SAMPLE NO.

A66551

Lab Name: Aquatec, Inc. Lab Code: AQUAI

Contract: 91082 Case: PCB SDG: 41106

Phase Type: Water
Phase Volume: 988 (mL)
Injection Volume: 1.0 (uL)
Dilution Factor: 1.0

Lab Sample ID: 205996
Date Received: 12/04/93
Date Extracted: 12/09/93
Date Analyzed: 01/12/94
Sulfur Clean-up: N (Y/N)

CAS NO.	COMPOUND	CONCENTRATION (ug/L)	Q
12674-11-2	Aroclor-1016	0.051	U
11104-28-2	Aroclor-1221	0.051	U
11141-16-5	Aroclor-1232	0.051	U
53469-21-9	Aroclor-1242	0.051	U
12672-29-6	Aroclor-1248	0.051	U
11097-69-1	Aroclor-1254	0.051	U
11096-82-5	Aroclor-1260	0.051	U

FORM 1
AROCLOR ANALYSIS DATA SHEET

EPA SAMPLE NO.

A66552

Lab Name: Aquatec, Inc. Lab Code: AQUAI

Contract: 91082 Case: PCB SDG: 41106

Phase Type: Water
Phase Volume: 999 (mL)
Injection Volume: 1.0 (uL)
Dilution Factor: 1.0

Lab Sample ID: 205997
Date Received: 12/04/93
Date Extracted: 12/09/93
Date Analyzed: 01/12/94
Sulfur Clean-up: N (Y/N)

CAS NO.	COMPOUND	CONCENTRATION (ug/L)	Q
12674-11-2	Aroclor-1016	0.028	J
11104-28-2	Aroclor-1221	0.051	U
11141-16-5	Aroclor-1232	0.051	U
53469-21-9	Aroclor-1242	0.051	U
12672-29-6	Aroclor-1248	0.051	U
11097-69-1	Aroclor-1254	0.051	U
11096-82-5	Aroclor-1260	0.051	U

CONVENTIONAL ANALYSES

Introduction

Analyses were performed according to the following method:

Total Suspended Solids	EPA 160.2

The data validation process is intended to evaluate the data on a technical basis. It is assumed that the data package represents the best efforts of the laboratory and had already been subjected to adequate and sufficient quality review prior to submission for validation.

During the validation process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this valuation, qualifier codes may be added, deleted, or modified by the data validator. Validator qualified results are annotated with the following codes in accordance with National Functional Guidelines:

U The analyte was analyzed for but not detected. The associated value is the analyte method detection limit.

J The analyte was positively identified; however, the associated numerical value is an estimated concentration only.

UJ The analyte was not detected above the reported sample detection limit. However, the reported limit is approximate and may or may not represent the actual limit of detection.

R The sample results are rejected.

Two facts should be noted by all data users. First, the "R" flag means that the associated value is unusable. In other words, due to significant QC problems, the analysis is invalid and provides no information as to whether the compound is present or not. "R" values should not appear on data tables because they cannot be relied upon, even as a last resort. The second fact to keep in mind is that no compound concentration, even if it has passed all QC test, is guaranteed to be accurate. Strict QC serves to increase confidence in data but any value potentially contains error.

Data Assessment

1. Holding Time

All samples were analyzed within specified holding times.

2. Blank Contamination

Quality assurance blanks, i.e., method, field, or rinse blanks are prepared to identify any contamination which may have been introduced in to the samples during sample preparation or field activity. Method blanks (including initial and continuing calibration blanks and preparation blanks) measure laboratory contamination. Field and rinse blanks measure cross contamination of samples during field operations.

All blanks were found to be acceptable, with no analytes detected above the detection limit.

3. Calibration

Satisfactory instrument calibration is established to insure that the instrument is capable of producing acceptable quantitative data. An initial calibration demonstrates that the instrument is capable of giving acceptable performance at the beginning of an experimental sequence. The continuing calibration verifies that the instrument is giving satisfactory daily performance.

3.1 Initial Calibration

Total suspended solids analyses have no calibration correlation coefficient requirements.

3.2 Continuing Calibration

Total suspended solids analyses have no continuing calibration verification standard requirements.

4. Laboratory Duplicate

Laboratory duplicate data are used to assess the precision of the analytical method.

All laboratory duplicate relative percent differences (RPDs) were within acceptable limits.

5. Field Duplicates

Results for duplicate samples are summarized below:

Sample ID/ Duplicate ID	Analyte	Sample Result	Duplicate Result	RPD
A66550 / A66552	Total Suspended Solids	6.1	4.8	23.9%

The duplicate results are acceptable.

6. Laboratory Control Sample (LCS)

All LCS recoveries were within control limits.

7. System Performance and Overall Assessment

Overall system performance was acceptable. Other than those deviation specifically mentioned in this review, the overall data quality is within the guidelines specified in the method.

CONVENTIONAL ANALYSIS SAMPLE RESULTS

Sample	Total Suspended Solids (mg/L)
A66542	9.3
A66543	7.3
A66544	12.6
A66545	9.1
A66546	10.8
A66547	8.0
A66548	7.6
A66549	6.7
A66550	6.1
A66551	5.8
A66552	4.8

CHAIN OF CUSTODY

LTI–Limno-Tech, Inc.
Environmental Engineering
2395 Huron Parkway, Ann Arbor, MI 48104

CHAIN OF CUSTODY RECORD

000003

KB54501481

PROJ. NO. 645.51

PROJECT NAME: KALAMAZOO RIVER-PORTAGE CREEK

SAMPLERS: (Signature)

STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	PCB's	TKN					Temp	REMARKS
A66542	12-2	14:00		✓	SWP-2	3	2	1						
A66543	12-2	14:40		✓	SWP-1	3	2	1						
A66544	12-2	17:45		✓	SWP-2	3	2	1						
A66545	12-2	18:20		✓	SWP-1	3	2	1						
					Temp BLANK	1							1	Cooler # LTI-1

Please Return Cooler To

LIMNO-TECH INC.
1804 NAZARETH Rd
KALAMAZOO MI 49001
(616) 388-2038

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
	12-3-93 18:20	12/4/93 1200			
Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)

COMMENTS: Sampled for Blasland + Bouck ENGINEERS P.C.

LTI–Limno-Tech, Inc.
Environmental Engineering
2395 Huron Parkway, Ann Arbor, MI 48104

CHAIN OF CUSTODY RECORD

000004

PROJ. NO. 645.51

PROJECT NAME: KALAMAZOO RIVER-PORTAGE CREEK

SAMPLERS: (Signature) [signature] / [signature]

STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	PCBs	TSS					Temp	REMARKS
A66546	12-2	21:15		✓	SWP-2	3	2	1						
A66547	12-2	21:45		✓	SWP-1	3	2	1						
A66548	12-3	9:15		✓	SWP-2	3	2	1						
A66549	12-3	9:40		✓	SWP-1	3	2	1						
					Temp Blank	2							2	Cooler # LTI-2
														Please Return Coolers To
														LIMNO TECH INC;
														1804 NAZARETH Rd
														KALAMAZOO MI 49001
														(616) 388-2038

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
[signature]	12-3-93 18:20	[signature] 12/4/93 1200			
Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)

COMMENTS: SAMPLED FOR BLASLAND + BOUCK ENGINEERS P.C.

LTI–Limno-Tech, Inc.
Environmental Engineering
2395 Huron Parkway, Ann Arbor, MI 48104

CHAIN OF CUSTODY RECORD

PROJ. NO.: 645.51
PROJECT NAME: KALAMAZOO RIVER-PORTAGE CREEK
SAMPLERS: (Signature) [signature], [signature]

STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	PCB's	TSS					Temp	REMARKS
A66550	12-3	14:50		✓	SWP-2	7	6	1						Do PCB's AS (MS/MSD)
A66551	12-3	15:40		✓	SWP-1	3	2	1						
A66552				✓	DUPLICATE	3	2	1						
—					Temp Blank	1							1	Cooler # LTI-3
														Please Return Cooler To.
														LIMNO TECH INC. 1804 NAZARETH Rd KALAMAZOO MI 49001 (616) 388-2038

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
[signature]	12-3-93 18:20	[signature] 12/4/93 1200			
Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)

COMMENTS: SAMPLED FOR BLASLAND & BOUCK ENGINEERS P.C.

DATA REVIEW FOR

ALLIED PAPER, INC./PORTAGE CREEK/KALAMAZOO RIVER SUPERFUND SITE

SDG# 41311

PCB ANALYSES

ALLIED OPERABLE UNIT

Analyses performed by:

Aquatec, Inc.
Colchester, Vermont

Review performed by:

Blasland, Bouck & Lee, Inc.
Syracuse, New York

Summary

The following is an assessment of the PCB data package for SDG # 41311 for the surface water sampling of the Allied Operable Unit from the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site. Included with this assessment are the data review check sheets used in the review of the package and sample results for PCB and total suspended solids analyses. Analyses were performed on the following samples:

Sample ID	Lab ID	Matrix	Sample Date
A64003	206891	surface water	12/15/93
A64004	206892	surface water	12/15/93
A64005	207546	surface water	12/28/93
A64006	207547	surface water	12/28/93
A64007	207548	surface water	12/28/93

Introduction

Analyses were performed according to the USEPA SW-846 method 8081, modified for PCB only analysis.

The data review process is intended to evaluate the data on a technical basis. It is assumed that the data package represents the best efforts of the laboratory and had already been subjected to adequate and sufficient quality review prior to submission.

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer. Results are qualified with the following codes in accordance with National Functional Guidelines:

- U The compound was analyzed for but not detected. The associated value is the compound quantitation limit.
- J The compound was positively identified; however, the associated numerical value is an estimated concentration only.
- B The compound has been found in the sample as well as its associated blank, its presence in the sample may be suspect.
- N The analysis indicates the presence of a compound for which there is presumptive evidence to make a tentative identification.
- JN The analysis indicates the presence of a compound for which there is presumptive evidence to make a tentative identification. The associated numerical value is an estimated concentration only.
- E The compound was quantitated above the calibration range.
- D Concentration is based on a diluted sample analysis.
- UJ The compound was not detected above the reported sample quantitation limit. However, the reported limit is approximate and may or may not represent the actual limit of quantitation.
- R The sample results are rejected.

Two facts should be noted by all data users. First, the "R" flag means that the associated value is unusable. In other words, due to significant QC problems, the analysis is invalid and provides no information as to whether the compound is present or not. "R" values should not appear on data tables because they cannot be relied upon, even as a last resort. The second fact to keep in mind is that no compound concentration, even if it has passed all QC test, is guaranteed to be accurate. Strict QC serves to increase confidence in data but any value potentially contains error.

The data presented in the package has been derived using a procedure developed by Aquatec, Inc. in an attempt to improve the analytical process of calibration, identification, and quantitation of PCBs as Aroclors. Key components of this procedure include:

Calibration

The response function of the electron capture detector is inherently non-linear, and while significant linearization is achieved for this detector by electronic means, some non-linearity remains. Power function linearization is used to "straighten the curve" and allow the use of response factors for calibration purposes.

During the initial calibration a response factor is calculated for each peak in the individual Aroclors.

A weighted response factor calculation has been used to adjust for non-linearity at the low end of the calibration curve.

Identification

Peak retention times are relative. Retention times are in set windows relative to the time markers DCB and TCMX. Time markers adjust for minor variations in column flow or instrument condition and allow the use of very tight windows which minimizes the number of both false positive and false negative peak identifications.

The determination of "which Aroclor or mixture of Aroclors will produce a chromatogram most similar to that of the residue" is made by expressing the unknown sample chromatogram as a linear combination of the Aroclors. The "most similar" Aroclor or mixture of Aroclors is determined by using a least squares minimization of the difference between the unknown chromatogram and the linear combination of Aroclors. This is similar to the procedure presented by L.E. Slivon, P.M. Schumacher and A. Alford-Stevens for the determination of Aroclor composition from GC/MS level of chlorination results.

Identification/quantitation of Aroclors in samples is based on the combined response of two columns, typically RTX-5 and RTX-35. The pooling of response combines the unique qualities of both columns to derive a more defined Aroclor pattern which less likely to be affected by interferents. Identification/quantitation data for the individual columns is provided in the package and can be used as a check on the combined column results.

Data Assessment

1. Holding Time

The QAPP-specified holding times for PCB analyses of water samples are 5 days from date of sample receipt to extraction and 40 days from extraction to analysis. The technical holding times are 7 days from sample collection to extraction and 40 days to analysis.

All samples were extracted and analyzed within the specified holding times.

2. Blank Contamination

Quality assurance blanks, i.e., method, field or rinse blanks, are prepared to identify any contamination which may have been introduced in to the samples during sample preparation or field activity. Method blanks measure laboratory contamination. Field and rinse blanks measure contamination of samples during field operations.

No target compounds were detected in the method blanks. No rinse blanks were submitted with the samples.

3. System Performance

The system performance was acceptable for both columns.

4. Calibration

Satisfactory instrument calibration is established to insure that the instrument is capable of producing acceptable quantitative data. An initial calibration demonstrates that the instrument is capable of giving acceptable performance at the beginning of an experimental sequence. The continuing calibration verifies that the instrument is giving satisfactory daily performance.

4.1 Initial Calibration

The method allows a maximum RSD of 20%. The %RSD was within acceptable limits for all Aroclors.

4.2 Continuing Calibration

A maximum %D of 15 is allowed. All continuing calibrations were within the specified limits with the following exception:

Instrument HP2087 - 1/13/94 23:19

Aroclor 1248 24.0%

All data in the associated samples A64003 and A64004 have been qualified as estimated based on the deviation.

5. Surrogates / System Monitoring Compounds

All samples to be analyzed for organic compounds are spiked with surrogate compounds prior to sample preparation to evaluate overall laboratory performance and efficiency of the analytical technique.

All sample surrogate recoveries were within control limits. Recoveries for one surrogate were, however, below control limits in method blanks PBLK3I and PBLK5I. Since recoveries for the remaining surrogate were within control limits and since all sample surrogate recoveries were within control limits, no data have been qualified based on the deviations.

6. Compound Identification

The determination of Aroclor presence is made by expressing the unknown sample chromatogram as a linear combination of the Aroclors. The most similar Aroclor or mixture of Aroclors is determined by using a least squares minimization of the difference between the unknown chromatogram and the linear combination of Aroclors.

Identification/quantitation of Aroclors is based on the combined response of the RTX-5 and RTX-35 columns. Identification/quantitation data for the individual columns is provided in the package and has been used as a check on the combined column results.

A review of the sample chromatograms indicate that the Aroclors have been correctly identified/quantitated.

7. Matrix Spike/Matrix Spike Duplicate/Matrix Spike Blank

Matrix spike and matrix spike duplicate data are used to assess the precision and accuracy of the analytical method.

No matrix spike or matrix spike duplicate was included in this data set.

8. Field Duplicates

Results for duplicate samples are summarized below:

Sample ID/ Duplicate ID	Analyte	Sample Result	Duplicate Result	RPD*
A64005 / A64007	Aroclor 1016	0.037J	0.042J	11.4%
	Aroclor 1248	0.021J	0.023J	

* RPD based on total PCB content.

The duplicate results are acceptable.

9. General Comments

Samples were received at the laboratory with incorrect sample identification numbers. The sample IDs have been changed to reflect the correct identification numbers, as summarized below:

Initial ID	Lab ID	Corrected ID	Sample Date
A66003	206891	A64003	12/15/93
A66004	206892	A64004	12/15/93
A66005	207546	A64005	12/28/93
A66006	207547	A64006	12/28/93
A66007	207548	A64007	12/28/93

10. System Performance and Overall Assessment

Overall system performance was acceptable. Other than for those deviations specifically mentioned in this review, the overall data quality is within the guidelines listed in the analytical method.

DATA REVIEW CHECKLIST

PCB Data Review Checklist

	YES	NO	NA
Data Completeness and Deliverables			
Is there a narrative or cover letter present?	X		
Are the samples numbers included in the narrative?	X		
Are the sample chain-of-custodies present?	X		
Do the chain-of-custodies indicate any problems with sample receipt or sample condition?		X	
Holding Times			
Have any holding times been exceeded?		X	
Surrogate Recovery			
Are surrogate recovery forms present?	X		
Are all the samples listed on the appropriate surrogate recovery form?	X		
Are the outliers correctly marked with an asterisk?	X		
Were recoveries of TCMX or DCB outside of specified limits for any sample or blank?	X		
If yes, were the samples reanalyzed?		X	
Matrix Spikes			
Is there a matrix spike recovery form present?		X	
Were matrix spikes analyzed at the required frequency?		X	
How many spike recoveries were outside of QC limits? 0 out of 0			
How many RPDs for matrix spike and matrix spike duplicate were outside of QC limits? 0 out of 0			
Blanks			
Is a Method Blank Summary Form present?	X		
Has a method blank been analyzed for each set of samples or for each 20 samples, whichever is more frequent?	X		
Is the chromatographic performance acceptable for each instrument?	X		
Do any method/reagent/instrument blanks have positive results?		X	

PCB Data Review Checklist - Page 2

	YES	NO	NA
Do any field/rinse blanks have positive results?			X
Are there field/rinse/equipment blanks associated with every sample?		X	
Calibration and GC Performance			
Are the following chromatograms and data printouts present?			
Aroclor 1016/1260	X		
Aroclor 1221	X		
Aroclor 1232	X		
Aroclor 1242	X		
Aroclor 1248	X		
Aroclor 1254	X		
Are Initial Calibration Summary Forms present and complete for each column and analytical sequence?	X		
Are the linearity criteria for the initial analyses within limits for both columns (20% RSD)	X		
Have all samples been injected within a 12 hour period beginning with the injection of a calibration standard?	X		
Is a Calibration Verification Summary Form present and complete for each continuing standard analyzed?	X		
Are %D values for all compounds within limits (less than 15%)?		X	
Analytical Sequence Check			
Is a analytical sequence form present and complete for each column and each period of analyses?	X		
Was the proper analytical sequence followed?	X		
Cleanup Efficiency Verification			
If GPC cleanup was performed, is Gel Permeation Chromatography Check Form present?		X	
Are percent recoveries of the compounds used to check the efficiency of the cleanup procedure within QC limits?			X

PCB Data Review Checklist - Page 3

	YES	NO	NA
PCB Identification			
Is both a combined and single column Aroclor Identification Report present for every sample?	X		
Do the combined column and individual column Aroclor identifications agree?	X		
Were there any false negatives?		X	
Was GC/MS confirmation provided when required?			X
Compound Quantitation and Reported Detection Limits			
Are the reporting limits adjusted to reflect sample dilutions, and for soils, sample moisture?	X		
Chromatogram Quality			
Were the baselines stable?	X		
Were any electronegative displacement (negative peaks) or unusual peaks detected?		X	
Field Duplicates			
Where field duplicates submitted with the samples?	X		

PCB Holding Time and Surrogate Recovery Summary

Sample ID	Holding Time	Surrogates - Column 1		Surrogates - Column 2	
		TCX	DCB	TCX	DCB
A66003	OK for all samples	OK	OK	OK	OK
A66004					
A66005					
A66006					
A66007					

Surrogate Standards
TCX Tetrachloro-m-xylene
DCB Decachlorobiphenyl

Qualifiers:
D Surrogates diluted out
↑ Recovery high
↓ Recovery low

Unless otherwise noted, all parameters are within specified limits.

PCB Calibration Summary

Instrument: HP2087
Column: RTX-5 / RTX-35

Date:	1/8 0354	1/13/93	1/13/93	1/13/94	1/13/93		
Time:	to 1/9 0122	1505	1534	2319	2357		
	Initial Cal.	Cont. Cal.	Cont. Cal.	Cont. Cal.	Cont. Cal.	Cont. Cal.	Cont. Cal.
	%RSD	%D	%D	%D	%D	%D	%D
Aroclor 1016	3.2 / 4.4		10.0				
Aroclor 1221	3.0 / 3.9						
Aroclor 1232	4.5 / 4.2						
Aroclor 1242	4.0 / 4.3				11.2		
Aroclor 1248	5.5 / 6.2	15.0		24.0			
Aroclor 1254	3.9 / 6.2						
Aroclor 1260	3.9 / 4.1						
Tetrachloro-m-xylene	10.1 / 3.5						
Decachlorobiphenyl	8.8 / 15.3						
Affected Samples:				A64003			
				A64004			

PCB Calibration Summary - Page 2

Instrument: HP2618
Column: RTX-35 / RTX-5

Date:	1/14 1607	1/18/93	1/18/93	1/18/93	1/18/93		
Time:	to 1/15 1207	0400	0435	1139	1214		
	Initial Cal.	Cont. Cal.	Cont. Cal.	Cont. Cal.	Cont. Cal.	Cont. Cal.	Cont. Cal.
	%RSD	%D	%D	%D	%D	%D	%D
Aroclor 1016	4.6 / 6.0						
Aroclor 1221	4.5 / 2.8						
Aroclor 1232	3.1 / 3.0						
Aroclor 1242	2.7 / 3.4		9.0				
Aroclor 1248	2.9 / 3.2	8.5		8.0			
Aroclor 1254	2.9 / 2.7				6.0		
Aroclor 1260	3.7 / 3.8						
Tetrachloro-m-xylene	15.5 / 4.6						
Decachlorobiphenyl	8.6 / 4.8						
Affected Samples:							

CORRECTED ANALYSIS SUMMARY FORMS

FORM 1
AROCLOR ANALYSIS DATA SHEET

EPA SAMPLE NO.
A64003
~~A66003~~

Lab Name: Aquatec, Inc. Lab Code: AQUAI

Contract: 91082 Case: PCB SDG: 41311

Phase Type: Water
Phase Volume: 995 (mL)
Injection Volume: 1.0 (uL)
Dilution Factor: 1.0

Lab Sample ID: 206891
Date Received: 12/16/93
Date Extracted: 12/20/93
Date Analyzed: 01/13/94
Sulfur Clean-up: N (Y/N)

CAS NO.	COMPOUND	CONCENTRATION (ug/L)	Q
12674-11-2	Aroclor-1016	0.051	U J
11104-28-2	Aroclor-1221	0.051	U J
11141-16-5	Aroclor-1232	0.051	U J
53469-21-9	Aroclor-1242	0.051	U J
12672-29-6	Aroclor-1248	0.051	U J
11097-69-1	Aroclor-1254	0.051	U J
11096-82-5	Aroclor-1260	0.051	U J

FORM 1
AROCLOR ANALYSIS DATA SHEET

EPA SAMPLE NO.

A64004
~~A66004~~

Lab Name: Aquatec, Inc. Lab Code: AQUAI

Contract: 91082 Case: PCB SDG: 41311

Phase Type: Water
Phase Volume: 993 (mL)
Injection Volume: 1.0 (uL)
Dilution Factor: 1.0

Lab Sample ID: 206892
Date Received: 12/16/93
Date Extracted: 12/20/93
Date Analyzed: 01/13/94
Sulfur Clean-up: N (Y/N)

CAS NO.	COMPOUND	CONCENTRATION (ug/L)	Q
12674-11-2	Aroclor-1016	0.051	UJ
11104-28-2	Aroclor-1221	0.051	UJ
11141-16-5	Aroclor-1232	0.051	UJ
53469-21-9	Aroclor-1242	0.051	UJ
12672-29-6	Aroclor-1248	0.051	UJ
11097-69-1	Aroclor-1254	0.051	UJ
11096-82-5	Aroclor-1260	0.051	UJ

FORM 1
AROCLOR ANALYSIS DATA SHEET

EPA SAMPLE NO.
AG4005
~~A66005~~

Lab Name: Aquatec, Inc. Lab Code: AQUAI

Contract: 91082 Case: PCB SDG: 41311

Phase Type: Water
Phase Volume: 1000 (mL)
Injection Volume: 1.0 (uL)
Dilution Factor: 1.0

Lab Sample ID: 207546
Date Received: 12/29/93
Date Extracted: 12/30/93
Date Analyzed: 01/18/94
Sulfur Clean-up: N (Y/N)

CAS NO.	COMPOUND	CONCENTRATION (ug/L)	Q
12674-11-2	Aroclor-1016	0.037	J
11104-28-2	Aroclor-1221	0.050	U
11141-16-5	Aroclor-1232	0.050	U
53469-21-9	Aroclor-1242	0.050	U
12672-29-6	Aroclor-1248	0.021	J
11097-69-1	Aroclor-1254	0.050	U
11096-82-5	Aroclor-1260	0.050	U

FORM 1
AROCLOR ANALYSIS DATA SHEET

EPA SAMPLE NO.
A64006
~~A66006~~

Lab Name: Aquatec, Inc. Lab Code: AQUAI

Contract: 91082 Case: PCB SDG: 41311

Phase Type: Water
Phase Volume: 1000 (mL)
Injection Volume: 1.0 (uL)
Dilution Factor: 1.0

Lab Sample ID: 207547
Date Received: 12/29/93
Date Extracted: 12/30/93
Date Analyzed: 01/18/94
Sulfur Clean-up: N (Y/N)

CAS NO.	COMPOUND	CONCENTRATION (ug/L)	Q
12674-11-2	Aroclor-1016	0.050	U
11104-28-2	Aroclor-1221	0.050	U
11141-16-5	Aroclor-1232	0.050	U
53469-21-9	Aroclor-1242	0.050	U
12672-29-6	Aroclor-1248	0.050	U
11097-69-1	Aroclor-1254	0.050	U
11096-82-5	Aroclor-1260	0.050	U

FORM 1
AROCLOR ANALYSIS DATA SHEET

EPA SAMPLE NO.
A64007
~~A66007~~

Lab Name: Aquatec, Inc. Lab Code: AQUAI

Contract: 91082 Case: PCB SDG: 41311

Phase Type: Water
Phase Volume: 1000 (mL)
Injection Volume: 1.0 (uL)
Dilution Factor: 1.0

Lab Sample ID: 207548
Date Received: 12/29/93
Date Extracted: 12/30/93
Date Analyzed: 01/18/94
Sulfur Clean-up: N (Y/N)

CAS NO.	COMPOUND	CONCENTRATION (ug/L)	Q
12674-11-2	Aroclor-1016	0.042	J
11104-28-2	Aroclor-1221	0.050	U
11141-16-5	Aroclor-1232	0.050	U
53469-21-9	Aroclor-1242	0.050	U
12672-29-6	Aroclor-1248	0.023	J
11097-69-1	Aroclor-1254	0.050	U
11096-82-5	Aroclor-1260	0.050	U

CONVENTIONAL ANALYSES

Introduction

Analyses were performed according to the following method:

- Total Suspended Solids EPA 160.2

The data validation process is intended to evaluate the data on a technical basis. It is assumed that the data package represents the best efforts of the laboratory and had already been subjected to adequate and sufficient quality review prior to submission for validation.

During the validation process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this valuation, qualifier codes may be added, deleted, or modified by the data validator. Validator qualified results are annotated with the following codes in accordance with National Functional Guidelines:

U The analyte was analyzed for but not detected. The associated value is the analyte method detection limit.

J The analyte was positively identified; however, the associated numerical value is an estimated concentration only.

UJ The analyte was not detected above the reported sample detection limit. However, the reported limit is approximate and may or may not represent the actual limit of detection.

R The sample results are rejected.

Two facts should be noted by all data users. First, the "R" flag means that the associated value is unusable. In other words, due to significant QC problems, the analysis is invalid and provides no information as to whether the compound is present or not. "R" values should not appear on data tables because they cannot be relied upon, even as a last resort. The second fact to keep in mind is that no compound concentration, even if it has passed all QC test, is guaranteed to be accurate. Strict QC serves to increase confidence in data but any value potentially contains error.

Data Assessment

1. Holding Time

All samples were analyzed within specified holding times.

2. Blank Contamination

Quality assurance blanks, i.e., method, field, or rinse blanks are prepared to identify any contamination which may have been introduced in to the samples during sample preparation or field activity. Method blanks (including initial and continuing calibration blanks and preparation blanks) measure laboratory contamination. Field and rinse blanks measure cross contamination of samples during field operations.

All blanks were found to be acceptable, with no analytes detected above the detection limit.

3. Calibration

Satisfactory instrument calibration is established to insure that the instrument is capable of producing acceptable quantitative data. An initial calibration demonstrates that the instrument is capable of giving acceptable performance at the beginning of an experimental sequence. The continuing calibration verifies that the instrument is giving satisfactory daily performance.

3.1 Initial Calibration

Total suspended solids analyses have no calibration correlation coefficient requirements.

3.2 Continuing Calibration

Total suspended solids analyses have no continuing calibration verification standard requirements.

4. Laboratory Duplicate

Laboratory duplicate data are used to assess the precision of the analytical method.

All laboratory duplicate relative percent differences (RPDs) were within acceptable limits.

5. Field Duplicates

Results for duplicate samples are summarized below:

Sample ID/ Duplicate ID	Analyte	Sample Result	Duplicate Result	RPD
A64005 / A64007	Total Suspended Solids	10.9	8.9	20.2%

The duplicate results are acceptable.

6. Laboratory Control Sample (LCS)

All recoveries were within control limits.

7. System Performance and Overall Assessment

Overall system performance was acceptable. Other than those deviation specifically mentioned in this review, the overall data quality is within the guidelines specified in the method.

CONVENTIONAL ANALYSIS SAMPLE RESULTS

Sample	Total Suspended Solids (mg/L)
A64003	3.6
A64004	4.7
A64005	10.9
A64006	9.1
A64007	8.9

CHAIN OF CUSTODY

BLASLAND & BOUCK ENGINEERS, P.C.
6723 Towpath Road, Box 66
Syracuse, New York 13214-0066
TEL: 315-446-9120
FAX: 315-449-0017

CHAIN OF CUSTODY RECORD

PROJ. NO.: 645.51
PROJECT NAME: Kalamazoo River / Portage Creek
SAMPLERS: (Signature) [signature], [signature]

STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION	Number of Containers	PCB's	TSS				TEMP	REMARKS
SWP-2	12-15-93	11:45		✓	A66003	3	2	1					
SWP-1	12-15-93	12:30		✓	A66004	3	2	1					
—	12-15	—			Temp Blank-	1						1	Cooler # LTI-6

Relinquished by: (Signature)	DATE	TIME	Received by: (Signature)	Relinquished by: (Signature)	DATE	TIME	Relinquished by: (Signature)
[signature]	12-15-93	15:30					
Relinquished by: (Signature)	DATE	TIME	Received by: (Signature)	Relinquished by: (Signature)	DATE	TIME	Relinquished by: (Signature)

Relinquished by: (Signature)	DATE	TIME	Received for Laboratory by: (Signature)	DATE	TIME	Remarks:
			[signature]	12/16/93	1000	

7/12/93
1393786HCDR

Distribution: Original Accompanies Shipment; Copy to Coordinator Field Files

KB54501486

000003

B-

BLASLAND & BOUCK ENGINEERS, P.C.
6723 Towpath Road, Box 66
Syracuse, New York 13214-0066
TEL: 315-446-9120
FAX: 315-449-0017

CHAIN OF CUSTODY RECORD

PROJ. NO.: 64551
PROJECT NAME: KALAMAZOO RIVER / PORTAGE CREEK
SAMPLERS: (Signature) [signature], Brian D Lord

STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION	Number of Containers	PCB's	TSS				Temp	REMARKS
SWP-2	12-28	12:35		✓	A66005	3	2	1					
SWP-1	12-28	13:10		✓	A66006	3	2	1					
Dup	12-28	—		✓	A66007	3	2	1					
Temp	12-28				TEMP BLANK							1	Cooler # - LTI-6
													Please Return Cooler To
													Limno-Tech —
													1804 NAZARETH Rd
													KALAMAZOO MI 49001
													(616) 388-2038

Relinquished by: (Signature)	DATE	TIME	Received by: (Signature)	Relinquished by: (Signature)	DATE	TIME	Relinquished by: (Signature)
[signature]	12-28-93	15:30					
Relinquished by: (Signature)	DATE	TIME	Received by: (Signature)	Relinquished by: (Signature)	DATE	TIME	Relinquished by: (Signature)

Relinquished by: (Signature)	DATE	TIME	Received for Laboratory by: (Signature)	DATE	TIME	Remarks:
			Pat Poundstone	12/29/93	1000	Cooler temperature = 3°C

7/12/93
1203786UCDD

Distribution: Original Accompanies Shipment; Copy to Coordinator Field Files

KB54501487

MEMORANDUM

BBL
BLASLAND, BOUCK & LEE, INC.
engineers & scientists

To: Doug Cowin **Date:** 7/16/99

From: Laurie Indick **cc:** MPB, AEG, file

Re: KRSG - Allied OU Sampling

Several surface water samples collected at the Allied-OU in 1993 and 1994 were assigned identification numbers which had been reserved for groundwater samples. In addition, two surface water samples collected in September 1994 were assigned non-standard identification numbers. To eliminate any confusion regarding the nature of the samples and to comply with database storage requirements, the numbers have been revised, as follows:

Sample Date	Original Identification Number (list on COC)	Revised Number
8/24/99	A66000	A64000
	A66001	A64001
	A66002	A64002
12/15/93	A66003	A64003
	A66004	A64004
	A66005	A64005
	A66006	A64006
	A66007	A64007
6/9/94	A66008	A64008
	A66009	A64009
9/8/94	A66010	A64010
	A66011	A64011
9/22/94	SWP-1	A64014
	SWP-2	A64013

lai/

DATA REVIEW FOR

ALLIED PAPER, INC./PORTAGE CREEK/KALAMAZOO RIVER
SUPERFUND SITE

SDG# 43546

PCB ANALYSES

ALLIED OU
SURFACE WATER INVESTIGATION

Analyses performed by:

Aquatec, Inc.
Colchester, Vermont

Review performed by:

Blasland, Bouck & Lee, Inc.
Syracuse, New York

Summary

The following is an assessment of the PCB data package for SDG# 43546 for the Surface Water Investigation sampling of the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site. Included with this assessment are the data review check sheets used in the review of the package and sample results for PCB and total suspended solids analyses. Analyses were performed on the following samples:

Sample ID	Lab ID	Matrix	Sample Date	Analyses	
				PCB	TSS
A66553	217792	water	4/11/94	x	x
A66554	217793	water	4/11/94	x	x
A66555	217794	water	4/12/94	x	x
A66556	217795	water	4/12/94	x	x
A66557*	217883	water	4/12/94	x	x
A66558	217885	water	4/12/94	x	x
A66559	217886	water	4/12/94	x	x
A66560	217887	water	4/12/94	x	x
A66561	217888	water	4/12/94	x	x
A66562	217889	water	4/12/94	x	x
A66563	217890	water	4/12/94	x	x
A66568	217891	water	4/12/94	x	x
A66569	217892	water	4/12/94	x	x
A66580	217893	water	4/13/94	x	x
A66581	217894	water	4/13/94	x	x
A66582	217895	water	4/14/94	x	x
A66583	217896	water	4/14/94	x	x
A66584	217897	water	4/14/94	x	x
A66585	217898	water	4/14/94	x	x
A66586	217899	water	4/14/94	x	x

* MS/MSD performed on this sample

PCB ANALYSES

Introduction

Analyses were performed according to the USEPA SW-846 method 8081, modified for PCB only analysis.

The data review process is intended to evaluate the data on a technical basis. It is assumed that the data package represents the best efforts of the laboratory and had already been subjected to adequate and sufficient quality review prior to submission.

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer. Results are qualified with the following codes in accordance with National Functional Guidelines:

- U The compound was analyzed for but not detected. The associated value is the compound quantitation limit.
- J The compound was positively identified; however, the associated numerical value is an estimated concentration only.
- B The compound has been found in the sample as well as its associated blank, its presence in the sample may be suspect.
- N The analysis indicates the presence of a compound for which there is presumptive evidence to make a tentative identification.
- JN The analysis indicates the presence of a compound for which there is presumptive evidence to make a tentative identification. The associated numerical value is an estimated concentration only.
- E The compound was quantitated above the calibration range.
- D Concentration is based on a diluted sample analysis.
- UJ The compound was not detected above the reported sample quantitation limit. However, the reported limit is approximate and may or may not represent the actual limit of quantitation.
- R The sample results are rejected.

Two facts should be noted by all data users. First, the "R" flag means that the associated value is unusable. In other words, due to significant QC problems, the analysis is invalid and provides no information as to whether the compound is present or not. "R" values should not appear on data tables because they cannot be relied upon, even as a last resort. The second fact to keep in mind is that no compound concentration, even if it has passed all QC test, is guaranteed to be accurate. Strict QC serves to increase confidence in data but any value potentially contains error.

The data presented in the package has been derived using a procedure developed by Aquatec, Inc. in an attempt to improve the analytical process of calibration, identification, and quantitation of PCBs as Aroclors. Key components of this procedure include:

Calibration

The response function of the electron capture detector is inherently non-linear, and while significant linearization is achieved for this detector by electronic means, some non-linearity remains. Power function linearization is used to "straighten the curve" and allow the use of response factors for calibration purposes.

During the initial calibration a response factor is calculated for each peak in the individual Aroclors.

A weighted response factor calculation has been used to adjust for non-linearity at the low end of the calibration curve.

Identification

Peak retention times are relative. Retention times are in set windows relative to the time markers DCB and TCMX. Time markers adjust for minor variations in column flow or instrument condition and allow the use of very tight windows which minimizes the number of both false positive and false negative peak identifications.

The determination of "which Aroclor or mixture of Aroclors will produce a chromatogram most similar to that of the residue" is made by expressing the unknown sample chromatogram as a linear combination of the Aroclors. The "most similar" Aroclor or mixture of Aroclors is determined by using a least squares minimization of the difference between the unknown chromatogram and the linear combination of Aroclors. This is similar to the procedure presented by L.E. Slivon, P.M. Schumacher and A. Alford-Stevens for the determination of Aroclor composition from GC/MS level of chlorination results.

Identification/quantitation of Aroclors in samples is based on the combined response of two columns, typically RTX-5 and RTX-35. The pooling of response combines the unique qualities of both columns to derive a more defined Aroclor pattern which less likely to be affected by interferents. Identification/quantitation data for the individual columns is provided in the package and can be used as a check on the combined column results.

Data Assessment

1. Holding Time

The QAPP-specified holding times for PCB analyses of water samples are 5 days from date of sample receipt to extraction and 40 days from extraction to analysis. The technical holding times are 7 days from sample collection to extraction and 40 days to analysis.

All samples were extracted and analyzed within the specified holding times.

2. Blank Contamination

Quality assurance blanks, i.e., method, field or rinse blanks, are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Method blanks measure laboratory contamination. Field and rinse blanks measure contamination of samples during field operations.

No target compounds were detected in the method blanks. No rinse blanks were submitted with the samples.

3. System Performance

System performance and column resolution were acceptable.

4. Calibration

Satisfactory instrument calibration is established to insure that the instrument is capable of producing acceptable quantitative data. An initial calibration demonstrates that the instrument is capable of giving acceptable performance at the beginning of an experimental sequence. The continuing calibration verifies that the instrument is giving satisfactory daily performance.

4.1 Initial Calibration

The method allows a maximum RSD of 20%. The %RSD was within acceptable limits for all Aroclors.

4.2 Continuing Calibration

A maximum %D of 15 is allowed. All continuing calibrations were within the specified limits.

5. Surrogates / System Monitoring Compounds

All samples to be analyzed for organic compounds are spiked with surrogate compounds prior to sample preparation to evaluate overall laboratory performance and efficiency of the analytical technique.

Samples A66553, A66554, A66556, A66557, A66560, A66561, A66563, A66580 and A66585 had recoveries for one surrogate below the control limit. Since recoveries for the remaining surrogate were withi control limiits, no data have been qualified based on the deviations. All other surrogate recoveries were within control limits.

6. Compound Identification

The determination of Aroclor presence is made by expressing the unknown sample chromatogram as a linear combination of the Aroclors. The most similar Aroclor or mixture of Aroclors is determined by using a least squares minimization of the difference between the unknown chromatogram and the linear combination of Aroclors.

Identification/quantitation of Aroclors is based on the combined response of the RTX-5 and RTX-35 columns. Identification/quantitation data for the individual columns is provided in the package and has been used as a check on the combined column results.

A review of the sample chromatograms indicate that the Aroclors have been correctly identified/quantitated.

7. Matrix Spike/Matrix Spike Duplicate/Matrix Spike Blank

Matrix spike and matrix spike duplicate data are used to assess the precision and accuracy of the analytical method.

All matrix spike recoveries and relative percent differences (RPD) between recoveries were within control limits.

8. Field Duplicates

Results for duplicate samples are summarized below:

Sample ID / Duplicate ID	Compound	Sample Result	Duplicate Result	RPD*
A66557 / A66559	Aroclor 1242	0.10	0.11	9.5%
A66580 / A66582	Aroclor 1242	0.059	0.074	22.6%

The duplicate results are acceptable.

9. System Performance and Overall Assessment

Overall system performance was acceptable. Other than for those deviations specifically mentioned in this review, the overall data quality is within the guidelines listed in the analytical method.

DATA REVIEW CHECKLIST

PCB Data Review Checklist

	YES	NO	NA
Data Completeness and Deliverables			
Is there a narrative or cover letter present?	X		
Are the sample numbers included in the narrative?	X		
Are the sample chain-of-custodies present?	X		
Do the chain-of-custodies indicate any problems with sample receipt or sample condition?		X	
Holding Times			
Have any holding times been exceeded?		X	
Surrogate Recovery			
Are surrogate recovery forms present?	X		
Are all the samples listed on the appropriate surrogate recovery form?	X		
Are the outliers correctly marked with an asterisk?	X		
Were recoveries of TCMX or DCB outside of specified limits for any sample or blank?	X		
If yes, were the samples reanalyzed?		X	
Matrix Spikes			
Is there a matrix spike recovery form present?	X		
Were matrix spikes analyzed at the required frequency?	X		
How many spike recoveries were outside of QC limits?			
0 out of 4			
How many RPDs for matrix spike and matrix spike duplicate were outside of QC limits?			
0 out of 2			
Blanks			
Is a Method Blank Summary Form present?	X		
Has a method blank been analyzed for each set of samples or for each 20 samples, whichever is more frequent?	X		
Is the chromatographic performance acceptable for each instrument?	X		
Do any method/reagent/instrument blanks have positive results?		X	

PCB Data Review Checklist - Page 2

	YES	NO	NA
Do any field/rinse blanks have positive results?			X
Are there field/rinse/equipment blanks associated with every sample?		X	
Calibration and GC Performance			
Are the following chromatograms and data printouts present?			
Aroclor 1016/1260	X		
Aroclor 1221	X		
Aroclor 1232	X		
Aroclor 1242	X		
Aroclor 1248	X		
Aroclor 1254	X		
Are Initial Calibration Summary Forms present and complete for each column and analytical sequence?	X		
Are the linearity criteria for the initial analyses within limits for both columns (20% RSD)	X		
Have all samples been injected within a 12 hour period beginning with the injection of a calibration standard?	X		
Is a Calibration Verification Summary Form present and complete for each continuing standard analyzed?	X		
Are %D values for all compounds within limits (less than 15%)?	X		
Analytical Sequence Check			
Is a analytical sequence form present and complete for each column and each period of analyses?	X		
Was the proper analytical sequence followed?	X		
Cleanup Efficiency Verification			
If GPC cleanup was performed, is Gel Permeation Chromatography Check Form present?		X	
Are percent recoveries of the compounds used to check the efficiency of the cleanup procedure within QC limits?			X

	YES	NO	NA
PCB Identification			
Is both a combined and single column Aroclor Identification Report present for every sample?	X		
Do the combined column and individual column Aroclor identifications agree?	X		
Were there any false negatives?		X	
Was GC/MS confirmation provided when required?			X
Compound Quantitation and Reported Detection Limits			
Are the reporting limits adjusted to reflect sample dilutions, and for soils, sample moisture?	X		
Chromatogram Quality			
Were the baselines stable?	X		
Were any electronegative displacement (negative peaks) or unusual peaks detected?		X	
Field Duplicates			
Were field duplicates submitted with the samples?	X		

PCB Holding Time and Surrogate Recovery Summary

Sample ID	Holding Time	Surrogates - Column 1		Surrogates - Column 2	
		TCX	DCB	TCX	DCB
A66553	OK for all samples	↓ (56)	ok	↓ (57)	ok
A66554		↓ (59)			
A66555					
A66556		↓ (55)		↓ (56)	
A66557		↓ (43)		↓ (43)	
A66557MS					
A66557MSD					
A66558					
A66559					
A66560		↓ (58)		↓ (56)	
A66561		↓ (50)		↓ (50)	
A66562					
A66563		↓ (58)		↓ (58)	
A66568					
A66569					
A66580		↓ (57)		↓ (56)	
A66581					
A66582					
A66583					
A66584					
A66585		↓ (57)		↓ (56)	
A66586					

Surrogate Standards
TCX Tetrachloro-m-xylene
DCB Decachlorobiphenyl

Qualifiers:
D Surrogates diluted out
↑ Recovery high
↓ Recovery low

Unless otherwise noted, all parameters are within specified limits.

PCB Calibration Summary

Instrument: HP2087
Column: RTX-35 / RTX-5

Date:	5/1/94 2255	5/4	5/4	5/4	5/4	5/5	5/5
Time:	to 5/2/94 1916	1122	1158	1833	1908	1752	1828
	Initial Cal.	Cont. Cal.	Cont. Cal.	Cont. Cal.	Cont. Cal.	Cont. Cal.	Cont. Cal.
	%RSD	%D	%D	%D	%D	%D	%D
Aroclor 1016	5.7 / 4.0						
Aroclor 1221	6.4 / 3.4						
Aroclor 1232	4.1 / 2.5						
Aroclor 1242	4.6 / 4.2		11.0				15.0
Aroclor 1248	5.1 / 4.5	8.5		5.5		14.5	
Aroclor 1254	4.9 / 4.8				9.5		
Aroclor 1260	3.6 / 3.0						
Tetrachloro-m-xylene	6.6 / 4.5						
Decachlorobiphenyl	6.5 / 8.5						
Affected Samples:							

PCB Calibration Summary - Page 2

Instrument: HP2087
Column: RTX-35 / RTX-5

Date:		5/6	5/6	5/6	5/6	5/6	5/6
Time:		0243	0319	1031	1107	1519	1555
	Initial Cal.	Cont. Cal.	Cont. Cal.	Cont. Cal.	Cont. Cal.	Cont. Cal.	Cont. Cal.
	%RSD	%D	%D	%D	%D	%D	%D
Aroclor 1016							4.5
Aroclor 1221							
Aroclor 1232							
Aroclor 1242							
Aroclor 1248		13.5		7.5		10.0	
Aroclor 1254			11.5				
Aroclor 1260					7.5		
Tetrachloro-m-xylene							
Decachlorobiphenyl							
Affected Samples:							

CORRECTED ANALYSIS SUMMARY FORMS

FORM 1
AROCLOR ANALYSIS DATA SHEET

EPA SAMPLE NO.

A66553

Lab Name: Aquatec, Inc. Lab Code: AQUAI

Contract: 91082 Case: PCB SDG: 43546

Phase Type: Water

Phase Volume: 1002 (mL)

Injection Volume: 1.0 (uL)

Dilution Factor: 1.0

Lab Sample ID: 217792

Date Received: 04/15/94

Date Extracted: 04/20/94

Date Analyzed: 05/04/94

Sulfur Clean-up: N (Y/N)

CAS NO.	COMPOUND	CONCENTRATION (ug/L)	Q
12674-11-2	Aroclor-1016	0.048	J
11104-28-2	Aroclor-1221	0.050	U
11141-16-5	Aroclor-1232	0.050	U
53469-21-9	Aroclor-1242	0.050	U
12672-29-6	Aroclor-1248	0.050	U
11097-69-1	Aroclor-1254	0.050	U
11096-82-5	Aroclor-1260	0.050	U

FORM 1
AROCLOR ANALYSIS DATA SHEET

EPA SAMPLE NO.

A66554

Lab Name: Aquatec, Inc. Lab Code: AQUAI

Contract: 91082 Case: PCB SDG: 43546

Phase Type: Water

Phase Volume: 1001 (mL)

Injection Volume: 1.0 (uL)

Dilution Factor: 1.0

Lab Sample ID: 217793

Date Received: 04/15/94

Date Extracted: 04/20/94

Date Analyzed: 05/04/94

Sulfur Clean-up: N (Y/N)

CAS NO.	COMPOUND	CONCENTRATION (ug/L)	Q
12674-11-2	Aroclor-1016	0.050	U
11104-28-2	Aroclor-1221	0.050	U
11141-16-5	Aroclor-1232	0.050	U
53469-21-9	Aroclor-1242	0.050	U
12672-29-6	Aroclor-1248	0.050	U
11097-69-1	Aroclor-1254	0.050	U
11096-82-5	Aroclor-1260	0.050	U

FORM 1
AROCLOR ANALYSIS DATA SHEET

EPA SAMPLE NO.

A66555

Lab Name: Aquatec, Inc. Lab Code: AQUAI

Contract: 91082 Case: PCB SDG: 43546

Phase Type: Water

Phase Volume: 1003 (mL)

Injection Volume: 1.0 (uL)

Dilution Factor: 1.0

Lab Sample ID: 217794

Date Received: 04/15/94

Date Extracted: 04/20/94

Date Analyzed: 05/04/94

Sulfur Clean-up: N (Y/N)

CAS NO.	COMPOUND	CONCENTRATION (ug/L)	Q
12674-11-2	Aroclor-1016	0.050	U
11104-28-2	Aroclor-1221	0.050	U
11141-16-5	Aroclor-1232	0.050	U
53469-21-9	Aroclor-1242	0.10	
12672-29-6	Aroclor-1248	0.050	U
11097-69-1	Aroclor-1254	0.050	U
11096-82-5	Aroclor-1260	0.050	U

FORM 1
AROCLOR ANALYSIS DATA SHEET

EPA SAMPLE NO.

A66556

Lab Name: Aquatec, Inc. Lab Code: AQUAI

Contract: 91082 Case: PCB SDG: 43546

Phase Type: Water

Phase Volume: 990 (mL)

Injection Volume: 1.0 (uL)

Dilution Factor: 1.0

Lab Sample ID: 217795

Date Received: 04/15/94

Date Extracted: 04/20/94

Date Analyzed: 05/04/94

Sulfur Clean-up: N (Y/N)

CAS NO.	COMPOUND	CONCENTRATION (ug/L)	Q
12674-11-2	Aroclor-1016	0.051	U
11104-28-2	Aroclor-1221	0.051	U
11141-16-5	Aroclor-1232	0.051	U
53469-21-9	Aroclor-1242	0.051	U
12672-29-6	Aroclor-1248	0.051	U
11097-69-1	Aroclor-1254	0.051	U
11096-82-5	Aroclor-1260	0.051	U

FORM 1
AROCLOR ANALYSIS DATA SHEET

EPA SAMPLE NO.

A66557

Lab Name: Aquatec, Inc. Lab Code: AQUAI

Contract: 91082 Case: PCB SDG: 43546

Phase Type: Water

Phase Volume: 1002 (mL)

Injection Volume: 1.0 (uL)

Dilution Factor: 1.0

Lab Sample ID: 217883

Date Received: 04/16/94

Date Extracted: 04/21/94

Date Analyzed: 05/05/94

Sulfur Clean-up: N (Y/N)

CAS NO.	COMPOUND	CONCENTRATION (ug/L)	Q
12674-11-2	Aroclor-1016	0.050	U
11104-28-2	Aroclor-1221	0.050	U
11141-16-5	Aroclor-1232	0.050	U
53469-21-9	Aroclor-1242	0.10	
12672-29-6	Aroclor-1248	0.050	U
11097-69-1	Aroclor-1254	0.050	U
11096-82-5	Aroclor-1260	0.050	U

FORM 1
AROCLOR ANALYSIS DATA SHEET

EPA SAMPLE NO.

A66558

Lab Name: Aquatec, Inc. Lab Code: AQUAI

Contract: 91082 Case: PCB SDG: 43546

Phase Type: Water

Phase Volume: 1002 (mL)

Injection Volume: 1.0 (uL)

Dilution Factor: 1.0

Lab Sample ID: 217885

Date Received: 04/16/94

Date Extracted: 04/21/94

Date Analyzed: 05/06/94

Sulfur Clean-up: N (Y/N)

CAS NO.	COMPOUND	CONCENTRATION (ug/L)	Q
12674-11-2	Aroclor-1016	0.050	U
11104-28-2	Aroclor-1221	0.050	U
11141-16-5	Aroclor-1232	0.050	U
53469-21-9	Aroclor-1242	0.050	U
12672-29-6	Aroclor-1248	0.050	U
11097-69-1	Aroclor-1254	0.050	U
11096-82-5	Aroclor-1260	0.050	U

FORM 1
AROCLOR ANALYSIS DATA SHEET

EPA SAMPLE NO.

A66559

Lab Name: Aquatec, Inc. Lab Code: AQUAI

Contract: 91082 Case: PCB SDG: 43546

Phase Type: Water

Phase Volume: 1000 (mL)

Injection Volume: 1.0 (uL)

Dilution Factor: 1.0

Lab Sample ID: 217886

Date Received: 04/16/94

Date Extracted: 04/21/94

Date Analyzed: 05/06/94

Sulfur Clean-up: N (Y/N)

CAS NO.	COMPOUND	CONCENTRATION (ug/L)	Q
12674-11-2	Aroclor-1016	0.050	U
11104-28-2	Aroclor-1221	0.050	U
11141-16-5	Aroclor-1232	0.050	U
53469-21-9	Aroclor-1242	0.11	
12672-29-6	Aroclor-1248	0.050	U
11097-69-1	Aroclor-1254	0.050	U
11096-82-5	Aroclor-1260	0.050	U

FORM 1
AROCLOR ANALYSIS DATA SHEET

EPA SAMPLE NO.

A66560

Lab Name: Aquatec, Inc. Lab Code: AQUAI

Contract: 91082 Case: PCB SDG: 43546

Phase Type: Water

Phase Volume: 1005 (mL)

Injection Volume: 1.0 (uL)

Dilution Factor: 1.0

Lab Sample ID: 217887

Date Received: 04/16/94

Date Extracted: 04/21/94

Date Analyzed: 05/06/94

Sulfur Clean-up: N (Y/N)

CAS NO.	COMPOUND	CONCENTRATION (ug/L)	Q
12674-11-2	Aroclor-1016	0.075	
11104-28-2	Aroclor-1221	0.050	U
11141-16-5	Aroclor-1232	0.050	U
53469-21-9	Aroclor-1242	0.050	U
12672-29-6	Aroclor-1248	0.037	J
11097-69-1	Aroclor-1254	0.050	U
11096-82-5	Aroclor-1260	0.050	U

FORM 1
AROCLOR ANALYSIS DATA SHEET

EPA SAMPLE NO.

A66561

Lab Name: Aquatec, Inc. Lab Code: AQUAI

Contract: 91082 Case: PCB SDG: 43546

Phase Type: Water

Phase Volume: 1001 (mL)

Injection Volume: 1.0 (uL)

Dilution Factor: 1.0

Lab Sample ID: 217888

Date Received: 04/16/94

Date Extracted: 04/21/94

Date Analyzed: 05/06/94

Sulfur Clean-up: N (Y/N)

CAS NO.	COMPOUND	CONCENTRATION (ug/L)	Q
12674-11-2	Aroclor-1016	0.050	U
11104-28-2	Aroclor-1221	0.050	U
11141-16-5	Aroclor-1232	0.050	U
53469-21-9	Aroclor-1242	0.050	U
12672-29-6	Aroclor-1248	0.050	U
11097-69-1	Aroclor-1254	0.050	U
11096-82-5	Aroclor-1260	0.050	U

FORM 1
AROCLOR ANALYSIS DATA SHEET

EPA SAMPLE NO.

A66562

Lab Name: Aquatec, Inc. Lab Code: AQUAI

Contract: 91082 Case: PCB SDG: 43546

Phase Type: Water

Phase Volume: 1005 (mL)

Injection Volume: 1.0 (uL)

Dilution Factor: 1.0

Lab Sample ID: 217889

Date Received: 04/16/94

Date Extracted: 04/21/94

Date Analyzed: 05/06/94

Sulfur Clean-up: N (Y/N)

CAS NO.	COMPOUND	CONCENTRATION (ug/L)	Q
12674-11-2	Aroclor-1016	0.052	
11104-28-2	Aroclor-1221	0.050	U
11141-16-5	Aroclor-1232	0.050	U
53469-21-9	Aroclor-1242	0.050	U
12672-29-6	Aroclor-1248	0.039	J
11097-69-1	Aroclor-1254	0.050	U
11096-82-5	Aroclor-1260	0.050	U

FORM 1
AROCLOR ANALYSIS DATA SHEET

EPA SAMPLE NO.

A66563

Lab Name: Aquatec, Inc. Lab Code: AQUAI

Contract: 91082 Case: PCB SDG: 43546

Phase Type: Water

Phase Volume: 1000 (mL)

Injection Volume: 1.0 (uL)

Dilution Factor: 1.0

Lab Sample ID: 217890

Date Received: 04/16/94

Date Extracted: 04/21/94

Date Analyzed: 05/06/94

Sulfur Clean-up: N (Y/N)

CAS NO.	COMPOUND	CONCENTRATION (ug/L)	Q
12674-11-2	Aroclor-1016	0.050	U
11104-28-2	Aroclor-1221	0.050	U
11141-16-5	Aroclor-1232	0.050	U
53469-21-9	Aroclor-1242	0.050	U
12672-29-6	Aroclor-1248	0.050	U
11097-69-1	Aroclor-1254	0.050	U
11096-82-5	Aroclor-1260	0.050	U

FORM 1
AROCLOR ANALYSIS DATA SHEET

EPA SAMPLE NO.

A66568

Lab Name: Aquatec, Inc. Lab Code: AQUAI

Contract: 91082 Case: PCB SDG: 43546

Phase Type: Water

Phase Volume: 987 (mL)

Injection Volume: 1.0 (uL)

Dilution Factor: 1.0

Lab Sample ID: 217891

Date Received: 04/16/94

Date Extracted: 04/21/94

Date Analyzed: 05/06/94

Sulfur Clean-up: N (Y/N)

CAS NO.	COMPOUND	CONCENTRATION (ug/L)	Q
12674-11-2	Aroclor-1016	0.051	U
11104-28-2	Aroclor-1221	0.051	U
11141-16-5	Aroclor-1232	0.051	U
53469-21-9	Aroclor-1242	0.023	J
12672-29-6	Aroclor-1248	0.051	U
11097-69-1	Aroclor-1254	0.051	U
11096-82-5	Aroclor-1260	0.051	U

FORM 1
AROCLOR ANALYSIS DATA SHEET

EPA SAMPLE NO.

A66569

Lab Name: Aquatec, Inc. Lab Code: AQUAI

Contract: 91082 Case: PCB SDG: 43546

Phase Type: Water

Phase Volume: 997 (mL)

Injection Volume: 1.0 (uL)

Dilution Factor: 1.0

Lab Sample ID: 217892

Date Received: 04/16/94

Date Extracted: 04/21/94

Date Analyzed: 05/06/94

Sulfur Clean-up: N (Y/N)

CAS NO.	COMPOUND	CONCENTRATION (ug/L)	Q
12674-11-2	Aroclor-1016	0.050	U
11104-28-2	Aroclor-1221	0.050	U
11141-16-5	Aroclor-1232	0.050	U
53469-21-9	Aroclor-1242	0.050	U
12672-29-6	Aroclor-1248	0.050	U
11097-69-1	Aroclor-1254	0.050	U
11096-82-5	Aroclor-1260	0.050	U

FORM 1
AROCLOR ANALYSIS DATA SHEET

EPA SAMPLE NO.

A66580

Lab Name: Aquatec, Inc. Lab Code: AQUAI

Contract: 91082 Case: PCB SDG: 43546

Phase Type: Water

Phase Volume: 997 (mL)

Injection Volume: 1.0 (uL)

Dilution Factor: 1.0

Lab Sample ID: 217893

Date Received: 04/16/94

Date Extracted: 04/21/94

Date Analyzed: 05/06/94

Sulfur Clean-up: N (Y/N)

CAS NO.	COMPOUND	CONCENTRATION (ug/L)	Q
12674-11-2	Aroclor-1016	0.050	U
11104-28-2	Aroclor-1221	0.050	U
11141-16-5	Aroclor-1232	0.050	U
53469-21-9	Aroclor-1242	0.059	
12672-29-6	Aroclor-1248	0.050	U
11097-69-1	Aroclor-1254	0.050	U
11096-82-5	Aroclor-1260	0.050	U

FORM 1
AROCLOR ANALYSIS DATA SHEET

EPA SAMPLE NO.

A66581

Lab Name: Aquatec, Inc. Lab Code: AQUAI

Contract: 91082 Case: PCB SDG: 43546

Phase Type: Water

Phase Volume: 988 (mL)

Injection Volume: 1.0 (uL)

Dilution Factor: 1.0

Lab Sample ID: 217894

Date Received: 04/16/94

Date Extracted: 04/21/94

Date Analyzed: 05/06/94

Sulfur Clean-up: N (Y/N)

CAS NO.	COMPOUND	CONCENTRATION (ug/L)	Q
12674-11-2	Aroclor-1016	0.051	U
11104-28-2	Aroclor-1221	0.051	U
11141-16-5	Aroclor-1232	0.051	U
53469-21-9	Aroclor-1242	0.051	U
12672-29-6	Aroclor-1248	0.051	U
11097-69-1	Aroclor-1254	0.051	U
11096-82-5	Aroclor-1260	0.051	U

FORM 1
AROCLOR ANALYSIS DATA SHEET

EPA SAMPLE NO.

A66582

Lab Name: Aquatec, Inc. Lab Code: AQUAI

Contract: 91082 Case: PCB SDG: 43546

Phase Type: Water

Phase Volume: 1002 (mL)

Injection Volume: 1.0 (uL)

Dilution Factor: 1.0

Lab Sample ID: 217895

Date Received: 04/16/94

Date Extracted: 04/21/94

Date Analyzed: 05/06/94

Sulfur Clean-up: N (Y/N)

CAS NO.	COMPOUND	CONCENTRATION (ug/L)	Q
12674-11-2	Aroclor-1016	0.050	U
11104-28-2	Aroclor-1221	0.050	U
11141-16-5	Aroclor-1232	0.050	U
53469-21-9	Aroclor-1242	0.074	
12672-29-6	Aroclor-1248	0.050	U
11097-69-1	Aroclor-1254	0.050	U
11096-82-5	Aroclor-1260	0.050	U

FORM 1
AROCLOR ANALYSIS DATA SHEET

EPA SAMPLE NO.

A66583

Lab Name: Aquatec, Inc. Lab Code: AQUAI

Contract: 91082 Case: PCB SDG: 43546

Phase Type: Water
Phase Volume: 994 (mL)
Injection Volume: 1.0 (uL)
Dilution Factor: 1.0

Lab Sample ID: 217896
Date Received: 04/16/94
Date Extracted: 04/21/94
Date Analyzed: 05/06/94
Sulfur Clean-up: N (Y/N)

CAS NO.	COMPOUND	CONCENTRATION (ug/L)	Q
12674-11-2	Aroclor-1016	0.038	J
11104-28-2	Aroclor-1221	0.050	U
11141-16-5	Aroclor-1232	0.050	U
53469-21-9	Aroclor-1242	0.050	U
12672-29-6	Aroclor-1248	0.050	U
11097-69-1	Aroclor-1254	0.050	U
11096-82-5	Aroclor-1260	0.050	U

FORM 1
AROCLOR ANALYSIS DATA SHEET

EPA SAMPLE NO.

A66584

Lab Name: Aquatec, Inc. Lab Code: AQUAI

Contract: 91082 Case: PCB SDG: 43546

Phase Type: Water

Phase Volume: 996 (mL)

Injection Volume: 1.0 (uL)

Dilution Factor: 1.0

Lab Sample ID: 217897

Date Received: 04/16/94

Date Extracted: 04/21/94

Date Analyzed: 05/06/94

Sulfur Clean-up: N (Y/N)

CAS NO.	COMPOUND	CONCENTRATION (ug/L)	Q
12674-11-2	Aroclor-1016	0.050	U
11104-28-2	Aroclor-1221	0.050	U
11141-16-5	Aroclor-1232	0.050	U
53469-21-9	Aroclor-1242	0.050	U
12672-29-6	Aroclor-1248	0.050	U
11097-69-1	Aroclor-1254	0.050	U
11096-82-5	Aroclor-1260	0.050	U

FORM 1
AROCLOR ANALYSIS DATA SHEET

EPA SAMPLE NO.

A66585

Lab Name: Aquatec, Inc. Lab Code: AQUAI

Contract: 91082 Case: PCB SDG: 43546

Phase Type: Water

Phase Volume: 1001 (mL)

Injection Volume: 1.0 (uL)

Dilution Factor: 1.0

Lab Sample ID: 217898

Date Received: 04/16/94

Date Extracted: 04/21/94

Date Analyzed: 05/06/94

Sulfur Clean-up: N (Y/N)

CAS NO.	COMPOUND	CONCENTRATION (ug/L)	Q
12674-11-2	Aroclor-1016	0.050	U
11104-28-2	Aroclor-1221	0.050	U
11141-16-5	Aroclor-1232	0.050	U
53469-21-9	Aroclor-1242	0.050	U
12672-29-6	Aroclor-1248	0.050	U
11097-69-1	Aroclor-1254	0.050	U
11096-82-5	Aroclor-1260	0.050	U

FORM 1
AROCLOR ANALYSIS DATA SHEET

EPA SAMPLE NO.

A66586

Lab Name: Aquatec, Inc. Lab Code: AQUAI

Contract: 91082 Case: PCB SDG: 43546

Phase Type: Water

Phase Volume: 1002 (mL)

Injection Volume: 1.0 (uL)

Dilution Factor: 1.0

Lab Sample ID: 217899

Date Received: 04/16/94

Date Extracted: 04/21/94

Date Analyzed: 05/06/94

Sulfur Clean-up: N (Y/N)

CAS NO.	COMPOUND	CONCENTRATION (ug/L)	Q
12674-11-2	Aroclor-1016	0.073	
11104-28-2	Aroclor-1221	0.050	U
11141-16-5	Aroclor-1232	0.050	U
53469-21-9	Aroclor-1242	0.050	U
12672-29-6	Aroclor-1248	0.022	J
11097-69-1	Aroclor-1254	0.050	U
11096-82-5	Aroclor-1260	0.050	U

TOTAL SUSPENDED SOLIDS

Introduction

Analyses were performed according to the following Methods:

Total Suspended Solids EPA Method 160.2

The data review process is intended to evaluate data on a technical basis. It is assumed that the data package represents the best efforts of the laboratory and has already been subjected to adequate quality review prior to submission for review.

During the review process, laboratory data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, modified or deleted by the data reviewer.

The following reviewer codes based on the National Functional Guidelines, will be used to qualify the data.

U - The material was analyzed for, but was not detected. The associated value is either the sample quantitation limit or the sample detection limit depending on the method.

J - The associated value is an estimated quantity.

R - The sample results are rejected.

UJ - The material was analyzed for, but was not detected. The associated value is approximate and may or may not represent the actual limit of quantitation/detection.

These qualifiers are recorded on the Laboratory Report forms contained within this package.

Two facts should be noted by all data users. First, the "R" flag means that the associated value is unusable. In other words, due to significant QC problems, the analysis is invalid and provides no information as to whether the compound is present or not. "R" values should not appear on data tables because they cannot be relied upon, even as a last resort. The second fact to keep in mind is that no compound concentration, even if it has passed all QC tests, is guaranteed to be accurate. Strict QC serves to increase confidence in data but any value potentially contains error.

Data Assessment

1. Holding Times

The method specified holding time for TSS is 7 days from sample receipt. All samples were analyzed with the specified holding time.

2. Calibration

The analyses have no specific calibration requirements.

3. Blank Contamination

No method blank contamination was reported.

4. Laboratory Duplicates

The laboratory duplicate results were acceptable.

5. Field Duplicates

Results for duplicate samples are summarized below:

Sample ID / Duplicate ID	Compound	Sample Result	Duplicate Result	RPD*
A66557 / A66559	TSS	30.0	26.0	14.3%
A66580 / A66582	TSS	21.0	13.0	47.0%

The duplicate results are acceptable.

6. Overall Assessment

Other than those deviations mentioned in this report, the analysis of the samples was in conformance with method specifications.

DATA REVIEW CHECKLIST

Supplemental Data Review Checklist

	YES	NO	NA
Data Completeness			
Is there a narrative or cover letter present?	X		
Are the sample numbers included in the narrative?	X		
Are the methods utilized notated?	X		
Are the sample chain-of-custodies present?	X		
Do the chain-of-custodies indicate any problems with sample receipt or sample condition?		X	
Holding Times			
Have any holding times been exceeded?		X	
Duplicates			
Were the laboratory duplicate results within control limits?	X		
Blanks			
Has a method blank been analyzed for each set of samples or for each 20 samples, whichever is more frequent:	X		
Do any have results above the reporting limit?		X	
Do any trip/field/rinse blanks have positive results?			X
Calibration			
Are initial calibrations within acceptable limits?			X
Are continuing calibration standards within acceptable limits?			X
Raw Data			
Is raw data present and complete for all samples and QC?	X		
Compound Quantitation and Reported Limits			
Are the reporting limits adjusted to reflect sample dilutions, and for soils, sample moisture?			X

Total Suspended Solids Results

Sample ID	Lab ID	Sample Date	Result (mg/L)
A66553	217792	4/11/94	8.5
A66554	217793	4/11/94	6.7
A66555	217794	4/12/94	27.0
A66556	217795	4/12/94	15.0
A66557	217883	4/12/94	30.0
A66558	217885	4/12/94	14.0
A66559	217886	4/12/94	26.0
A66560	217887	4/12/94	33.0
A66561	217888	4/12/94	19.0
A66562	217889	4/12/94	30.0
A66563	217890	4/12/94	16.0
A66568	217891	4/12/94	133.
A66569	217892	4/12/94	230.
A66580	217893	4/13/94	21.0
A66581	217894	4/13/94	12.0
A66582	217895	4/14/94	13.0
A66583	217896	4/14/94	14.0
A66584	217897	4/14/94	10.5
A66585	217898	4/14/94	13.0
A66586	217899	4/14/94	6.5

CHAIN OF CUSTODY

BLASLAND & BOUCK ENGINEERS, P.C.
6723 Towpath Road, Box 66
Syracuse, New York 13214-0066
TEL: 315-446-9120
FAX: 315-449-0017

CHAIN OF CUSTODY RECORD

000003

KB54502081

PROJ. NO. 64551

PROJECT NAME: Kalamazoo River - Portage Creek

SAMPLERS: (Signature)

STA. NO.	DATE (94)	TIME	COMP.	GRAB	STATION LOCATION	Number of Containers	PCB's	TSS				Temp	REMARKS
SWP-1	4-11	21:45		✓	A66553	3	2	1					
SWP-2	4-11	22:15		✓	A66554	3	2	1					
SWP-1	4-12	8:30		✓	A66555	3	2	1					
SWP-2	4-12	9:00		✓	A66556	3	2	1					
Temp	—	—	—	—	Temp Blank	1						1	Cooler # 171

Relinquished by: (Signature)	DATE	TIME	Received by: (Signature)	Relinquished by: (Signature)	DATE	TIME	Relinquished by: (Signature)
	4-14-94	12:30					

Relinquished by: (Signature)	DATE	TIME	Received by: (Signature)	Relinquished by: (Signature)	DATE	TIME	Relinquished by: (Signature)

Relinquished by: (Signature)	DATE	TIME	Received for Laboratory by: (Signature)	DATE	TIME	Remarks:
				4/15/94	1030	

7/12/93
1393798\CDR

Distribution: Original Accompanies Shipment; Copy to Coordinator Field Files

BLASLAND & BOUCK ENGINEERS, P.C.
6723 Towpath Road, Box 66
Syracuse, New York 13214-0066
TEL: 315-446-9120
FAX: 315-449-0017

CHAIN OF CUSTODY RECORD

PROJ. NO.: 645.51
PROJECT NAME: Kalamazoo River / Portage Creek
SAMPLERS: (Signature) [signature]

STA. NO.	DATE (94)	TIME	COMP.	GRAB	STATION LOCATION	Number of Containers	PCB's	PCB's As Ms/MSD	TSS			Temp	REMARKS
SWP-2	4-12	10:30		✓	A66557	7		6	1				PCB's As (Ms/MSD)
SWP-1	4-12	11:10		✓	A66558	3	2		1				
Dup	[redacted]	—		✓	A66559	3	2		1				
Temp	—	—	—	—	Temp	1						1	Cooler # – 200
						14							

Relinquished by: (Signature)	DATE	TIME	Received by: (Signature)	Relinquished by: (Signature)	DATE	TIME	Relinquished by: (Signature)
[signature]	4-15-94	12:00					
Relinquished by: (Signature)	DATE	TIME	Received by: (Signature)	Relinquished by: (Signature)	DATE	TIME	Relinquished by: (Signature)
Relinquished by: (Signature)	DATE	TIME	Received for Laboratory by: (Signature)	DATE	TIME	Remarks:	

7/12/93
1393786HCDR

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Syracuse, New York 13214-0066
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FAX: 315-449-0017

CHAIN OF CUSTODY RECORD

PROJ. NO.: 64551
PROJECT NAME: Kalamazoo River / Portage Creek
SAMPLERS: (Signature)

STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION	Number of Containers	PCBs	TKN				Temp	REMARKS
swp-7	4-12	12:30		✓	A66560	3	2	1					
swp-2	4-12	13:00		✓	A66561	3	2	1					
swp-7	4-12	14:30		✓	A66562	3	2	1					
swp-2	4-12	15:00		✓	A66563	3	2	1					
—	—	—	—	—	Temp	1						1	Cooler #LTI-2
						/13							
													PLEASE RETURN COOLER TO:
													LIMNU-TECH, INC.
													1804 NAZARETH RD.
													KALAMAZOO, MI 49001
													(616) 388-2038

Relinquished by: (Signature)	DATE	TIME	Received by: (Signature)	Relinquished by: (Signature)	DATE	TIME	Relinquished by: (Signature)
	4-15-94	12:00					
Relinquished by: (Signature)	**DATE**	**TIME**	**Received by: (Signature)**	**Relinquished by: (Signature)**	**DATE**	**TIME**	**Relinquished by: (Signature)**

Relinquished by: (Signature)	DATE	TIME	Received for Laboratory by: (Signature)	DATE	TIME	Remarks:

7/12/93
1393788HCDR

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Syracuse, New York 13214-0066
TEL: 315-446-9120
FAX: 315-449-0017

CHAIN OF CUSTODY RECORD

PROJ. NO.: 645.51
PROJECT NAME: Kalamazoo River/Portage Creek
SAMPLERS: (Signature)

STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION	Number of Containers	PCB's	TSS				Temp	REMARKS
SWP-2	4-12	21:00		✓	A66568	3	2	1				1	
SWP-2	4-12	21:30		✓	A66569	3	2	1				1	
SWP-2	4-12	23:30		✓	A66570	3	2	1				1	
SWP-2	4-12	23:55		✓	A66571	3	2	1				1	
					Temp	1						1	Cooler # - 261
						/13							

Relinquished by: (Signature)	DATE	TIME	Received by: (Signature)	Relinquished by: (Signature)	DATE	TIME	Relinquished by: (Signature)
	4-15-94	12:00					
Relinquished by: (Signature)	DATE	TIME	Received by: (Signature)	Relinquished by: (Signature)	DATE	TIME	Relinquished by: (Signature)
Relinquished by: (Signature)	DATE	TIME	Received for Laboratory by: (Signature)	DATE	TIME	Remarks:	

7/12/93
1393786HCDR

Distribution: Original Accompanies Shipment; Copy to Coordinator Field Files

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6723 Towpath Road, Box 66
Syracuse, New York 13214-0066
TEL: 315-446-9120
FAX: 315-449-0017

CHAIN OF CUSTODY RECORD

PROJ. NO.: 645.51
PROJECT NAME: Kalamazoo River / Portage Creek
SAMPLERS: (Signature) [signature]

STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION	Number of Containers	PCBs	PCBs MS/MSD	TSS			Temp	REMARKS
AWD SWP-2	4-13	22:30		✓	A66580	7		6	1				PCBs MS/MSD
SWP-2	4-13	23:00		✓	A66581	3	2		1				
Dup	—	—		✓	A66582	3	2		1				
													COOLER # LTI-1
					Temp	1						1	PLEASE RETURN COOLER TO:
						/14							LIMNO-TECH, INC.
													1400 NAZARETH RD.
													KALAMAZOO, MI 49001
													(616) 388-2038

Relinquished by: (Signature)	DATE	TIME	Received by: (Signature)	Relinquished by: (Signature)	DATE	TIME	Relinquished by: (Signature)
[signature]	4-15-91	12:00					
Relinquished by: (Signature)	DATE	TIME	Received by: (Signature)	Relinquished by: (Signature)	DATE	TIME	Relinquished by: (Signature)
Relinquished by: (Signature)	DATE	TIME	Received for Laboratory by: (Signature)	DATE	TIME	Remarks:	

7/12/93
1383786HCDR

Distribution: Original Accompanies Shipment; Copy to Coordinator Field Files

BLASLAND & BOUCK ENGINEERS, P.C.
6723 Towpath Road, Box 66
Syracuse, New York 13214-0066
TEL: 315-446-9120
FAX: 315-449-0017

CHAIN OF CUSTODY RECORD

PROJ. NO.: 645.51
PROJECT NAME: Kalamazoo River / Portage Creek
SAMPLERS: (Signature)

STA. NO.	DATE (-94)	TIME	COMP.	GRAB	STATION LOCATION	Number of Containers	PCB's	TSS				Temp	REMARKS
Swp-2	4-14	12:30		✓	A66583	3	2	1					
Swp-2	4-14	12:45		✓	A66584	3	2	1					
Swp-2	4-14	16:45		✓	A66585	3	2	1					
Swp-2	4-14	17:00		✓	A66586	3	2	1					
													Cooler #. 224
					Temp	1						1	
						13							

Relinquished by: (Signature)	DATE	TIME	Received by: (Signature)	Relinquished by: (Signature)	DATE	TIME	Relinquished by: (Signature)
	4-15-94	12:00					

Relinquished by: (Signature)	DATE	TIME	Received by: (Signature)	Relinquished by: (Signature)	DATE	TIME	Relinquished by: (Signature)

Relinquished by: (Signature)	DATE	TIME	Received for Laboratory by: (Signature)	DATE	TIME	Remarks:

7/12/93
1393786HCDR

Distribution: Original Accompanies Shipment; Copy to Coordinator Field Files

DATA REVIEW FOR

ALLIED PAPER, INC./PORTAGE CREEK/KALAMAZOO RIVER
SUPERFUND SITE

SDG# 43567

PCB ANALYSES

ALLIED OU
SURFACE WATER INVESTIGATION

Analyses performed by:

Aquatec, Inc.
Colchester, Vermont

Review performed by:

Blasland, Bouck & Lee, Inc.
Syracuse, New York

Summary

The following is an assessment of the PCB data package for SDG# 43567 for the Surface Water Investigation sampling of the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site. Included with this assessment are the data review check sheets used in the review of the package and sample results for PCB and total suspended solids analyses. Analyses were performed on the following samples:

Sample ID	Lab ID	Matrix	Sample Date	Analyses	
				PCB	TSS
A66587	217900	water	4/14/94	x	x
A66588	217901	water	4/14/94	x	x
A66589	217902	water	4/14/94	x	x

PCB ANALYSES

Introduction

Analyses were performed according to the USEPA SW-846 method 8081, modified for PCB only analysis.

The data review process is intended to evaluate the data on a technical basis. It is assumed that the data package represents the best efforts of the laboratory and had already been subjected to adequate and sufficient quality review prior to submission.

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer. Results are qualified with the following codes in accordance with National Functional Guidelines:

- U The compound was analyzed for but not detected. The associated value is the compound quantitation limit.
- J The compound was positively identified; however, the associated numerical value is an estimated concentration only.
- B The compound has been found in the sample as well as its associated blank, its presence in the sample may be suspect.
- N The analysis indicates the presence of a compound for which there is presumptive evidence to make a tentative identification.
- JN The analysis indicates the presence of a compound for which there is presumptive evidence to make a tentative identification. The associated numerical value is an estimated concentration only.
- E The compound was quantitated above the calibration range.
- D Concentration is based on a diluted sample analysis.
- UJ The compound was not detected above the reported sample quantitation limit. However, the reported limit is approximate and may or may not represent the actual limit of quantitation.
- R The sample results are rejected.

Two facts should be noted by all data users. First, the "R" flag means that the associated value is unusable. In other words, due to significant QC problems, the analysis is invalid and provides no information as to whether the compound is present or not. "R" values should not appear on data tables because they cannot be relied upon, even as a last resort. The second fact to keep in mind is that no compound concentration, even if it has passed all QC test, is guaranteed to be accurate. Strict QC serves to increase confidence in data but any value potentially contains error.

The data presented in the package has been derived using a procedure developed by Aquatec, Inc. in an attempt to improve the analytical process of calibration, identification, and quantitation of PCBs as Aroclors. Key components of this procedure include:

Calibration

The response function of the electron capture detector is inherently non-linear, and while significant linearization is achieved for this detector by electronic means, some non-linearity remains. Power function linearization is used to "straighten the curve" and allow the use of response factors for calibration purposes.

During the initial calibration a response factor is calculated for each peak in the individual Aroclors.

A weighted response factor calculation has been used to adjust for non-linearity at the low end of the calibration curve.

Identification

Peak retention times are relative. Retention times are in set windows relative to the time markers DCB and TCMX. Time markers adjust for minor variations in column flow or instrument condition and allow the use of very tight windows which minimizes the number of both false positive and false negative peak identifications.

The determination of "which Aroclor or mixture of Aroclors will produce a chromatogram most similar to that of the residue" is made by expressing the unknown sample chromatogram as a linear combination of the Aroclors. The "most similar" Aroclor or mixture of Aroclors is determined by using a least squares minimization of the difference between the unknown chromatogram and the linear combination of Aroclors. This is similar to the procedure presented by L.E. Slivon, P.M. Schumacher and A. Alford-Stevens for the determination of Aroclor composition from GC/MS level of chlorination results.

Identification/quantitation of Aroclors in samples is based on the combined response of two columns, typically RTX-5 and RTX-35. The pooling of response combines the unique qualities of both columns to derive a more defined Aroclor pattern which less likely to be affected by interferents. Identification/quantitation data for the individual columns is provided in the package and can be used as a check on the combined column results.

Data Assessment

1. Holding Time

The QAPP-specified holding times for PCB analyses of water samples are 5 days from date of sample receipt to extraction and 40 days from extraction to analysis. The technical holding times are 7 days from sample collection to extraction and 40 days to analysis.

All samples were extracted and analyzed within the specified holding times.

2. Blank Contamination

Quality assurance blanks, i.e., method, field or rinse blanks, are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Method blanks measure laboratory contamination. Field and rinse blanks measure contamination of samples during field operations.

No target compounds were detected in the method blank.

3. System Performance

The system performance was acceptable for both columns.

4. Calibration

Satisfactory instrument calibration is established to insure that the instrument is capable of producing acceptable quantitative data. An initial calibration demonstrates that the instrument is capable of giving acceptable performance at the beginning of an experimental sequence. The continuing calibration verifies that the instrument is giving satisfactory daily performance.

4.1 Initial Calibration

The method allows a maximum RSD of 20%. The %RSD was within acceptable limits for all Aroclors.

4.2 Continuing Calibration

A maximum %D of 15 is allowed. All continuing calibrations were within the specified limits.

5. Surrogates / System Monitoring Compounds

All samples to be analyzed for organic compounds are spiked with surrogate compounds prior to sample preparation to evaluate overall laboratory performance and efficiency of the analytical technique.

All surrogate recoveries were within control limits.

6. Compound Identification

The determination of Aroclor presence is made by expressing the unknown sample chromatogram as a linear combination of the Aroclors. The most similar Aroclor or mixture of Aroclors is determined by using a least squares minimization of the difference between the unknown chromatogram and the linear combination of Aroclors.

Identification/quantitation of Aroclors is based on the combined response of the RTX-5 and RTX-35 columns. Identification/quantitation data for the individual columns is provided in the package and has been used as a check on the combined column results.

A review of the sample chromatograms indicate that the Aroclors have been correctly identified/quantitated.

7. Matrix Spike/Matrix Spike Duplicate/Matrix Spike Blank

Matrix spike and matrix spike duplicate data are used to assess the precision and accuracy of the analytical method.

Matrix spike analysis was performed on a river sample submitted with the OU samples. All matrix spike recoveries and relative percent differences (RPD) between recoveries were within control limits.

8. Field Duplicates

Results for duplicate samples are summarized below:

Sample ID / Duplicate ID	Compound	Sample Result	Duplicate Result	RPD[1]
A66587 / A66589	Aroclor 1242	0.062	0.054	13.8%

The duplicate results are acceptable.

9. System Performance and Overall Assessment

Overall system performance was acceptable. Other than for those deviations specifically mentioned in this review, the overall data quality is within the guidelines listed in the analytical method.

DATA REVIEW CHECKLIST

PCB Data Review Checklist

	YES	NO	NA
Data Completeness and Deliverables			
Is there a narrative or cover letter present?	X		
Are the sample numbers included in the narrative?	X		
Are the sample chain-of-custodies present?	X		
Do the chain-of-custodies indicate any problems with sample receipt or sample condition?		X	
Holding Times			
Have any holding times been exceeded?		X	
Surrogate Recovery			
Are surrogate recovery forms present?	X		
Are all the samples listed on the appropriate surrogate recovery form?	X		
Are the outliers correctly marked with an asterisk?			X
Were recoveries of TCMX or DCB outside of specified limits for any sample or blank?		X	
If yes, were the samples reanalyzed?			X
Matrix Spikes			
Is there a matrix spike recovery form present?	X		
Were matrix spikes analyzed at the required frequency?	X		
How many spike recoveries were outside of QC limits? 0 out of 4			
How many RPDs for matrix spike and matrix spike duplicate were outside of QC limits? 0 out of 2			
Blanks			
Is a Method Blank Summary Form present?	X		
Has a method blank been analyzed for each set of samples or for each 20 samples, whichever is more frequent?	X		
Is the chromatographic performance acceptable for each instrument?	X		
Do any method/reagent/instrument blanks have positive results?		X	

PCB Data Review Checklist - Page 2

	YES	NO	NA
Do any field/rinse blanks have positive results?			X
Are there field/rinse/equipment blanks associated with every sample?		X	
Calibration and GC Performance			
Are the following chromatograms and data printouts present?			
Aroclor 1016/1260	X		
Aroclor 1221	X		
Aroclor 1232	X		
Aroclor 1242	X		
Aroclor 1248	X		
Aroclor 1254	X		
Are Initial Calibration Summary Forms present and complete for each column and analytical sequence?	X		
Are the linearity criteria for the initial analyses within limits for both columns (20% RSD)	X		
Have all samples been injected within a 12 hour period beginning with the injection of a calibration standard?	X		
Is a Calibration Verification Summary Form present and complete for each continuing standard analyzed?	X		
Are %D values for all compounds within limits (less than 15%)?	X		
Analytical Sequence Check			
Is a analytical sequence form present and complete for each column and each period of analyses?	X		
Was the proper analytical sequence followed?	X		
Cleanup Efficiency Verification			
If GPC cleanup was performed, is Gel Permeation Chromatography Check Form present?		X	
Are percent recoveries of the compounds used to check the efficiency of the cleanup procedure within QC limits?			X

PCB Data Review Checklist - Page 3

	YES	NO	NA
PCB Identification			
Is both a combined and single column Aroclor Identification Report present for every sample?	X		
Do the combined column and individual column Aroclor identifications agree?	X		
Were there any false negatives?		X	
Was GC/MS confirmation provided when required?			X
Compound Quantitation and Reported Detection Limits			
Are the reporting limits adjusted to reflect sample dilutions, and for soils, sample moisture?	X		
Chromatogram Quality			
Were the baselines stable?	X		
Were any electronegative displacement (negative peaks) or unusual peaks detected?		X	
Field Duplicates			
Were field duplicates submitted with the samples?	X		

PCB Holding Time and Surrogate Recovery Summary

Sample ID	Holding Time	Surrogates - Column 1		Surrogates - Column 2	
		TCX	DCB	TCX	DCB
A66587	OK for all samples				
A66588					
A66589					

Surrogate Standards
TCX Tetrachloro-m-xylene
DCB Decachlorobiphenyl

Qualifiers:
D Surrogates diluted out
↑ Recovery high
↓ Recovery low

Unless otherwise noted, all parameters are within specified limits.

PCB Calibration Summary

Instrument: HP2087
Column: RTX-35 / RTX-5

Date:	5/18/94 1800	5/20	5/20	5/20	5/20	5/21	5/21
Time:	to 5/19/94 1254	0848	0922	2236	2310	0551	0624
	Initial Cal.	Cont. Cal.	Cont. Cal.	Cont. Cal.	Cont. Cal.	Cont. Cal.	Cont. Cal.
	%RSD	%D	%D	%D	%D	%D	%D
Aroclor 1016	3.9 / 4.3				11.5		
Aroclor 1221	4.6 / 5.5						
Aroclor 1232	2.9 / 3.2						
Aroclor 1242	3.6 / 3.3						2.0
Aroclor 1248	3.1 / 3.0	3.0		2.5		6.5	
Aroclor 1254	3.0 / 3.0						
Aroclor 1260	3.2 / 2.3		4.0				
Tetrachloro-m-xylene	7.7 / 5.0						
Decachlorobiphenyl	7.2 / 8.8						
Affected Samples:							

PCB Calibration Summary - Page 2

Instrument: HP2087
Column: RTX-35 / RTX-5

Date:		5/21	5/21				
Time:		1231	1304				
	Initial Cal.	Cont. Cal.	Cont. Cal.	Cont. Cal.	Cont. Cal.	Cont. Cal.	Cont. Cal.
	%RSD	%D	%D	%D	%D	%D	%D
Aroclor 1016							
Aroclor 1221							
Aroclor 1232							
Aroclor 1242							
Aroclor 1248		5.5					
Aroclor 1254			3.5				
Aroclor 1260							
Tetrachloro-m-xylene							
Decachlorobiphenyl							
Affected Samples:							

CORRECTED ANALYSIS SUMMARY FORMS

FORM 1
AROCLOR ANALYSIS DATA SHEET

EPA SAMPLE NO.

A66587

Lab Name: Aquatec, Inc. Lab Code: AQUAI

Contract: 91082 Case: PCB SDG: 43567

Phase Type: Water

Phase Volume: 1002 (mL)

Injection Volume: 1.0 (uL)

Dilution Factor: 1.0

Lab Sample ID: 217900

Date Received: 04/16/94

Date Extracted: 04/21/94

Date Analyzed: 05/20/94

Sulfur Clean-up: N (Y/N)

CAS NO.	COMPOUND	CONCENTRATION (ug/L)	Q
12674-11-2	Aroclor-1016	0.050	U
11104-28-2	Aroclor-1221	0.050	U
11141-16-5	Aroclor-1232	0.050	U
53469-21-9	Aroclor-1242	0.062	
12672-29-6	Aroclor-1248	0.050	U
11097-69-1	Aroclor-1254	0.050	U
11096-82-5	Aroclor-1260	0.050	U

FORM 1
AROCLOR ANALYSIS DATA SHEET

EPA SAMPLE NO.

A66588

Lab Name: Aquatec, Inc. Lab Code: AQUAI

Contract: 91082 Case: PCB SDG: 43567

Phase Type: Water

Phase Volume: 972 (mL)

Injection Volume: 1.0 (uL)

Dilution Factor: 1.0

Lab Sample ID: 217901

Date Received: 04/16/94

Date Extracted: 04/21/94

Date Analyzed: 05/20/94

Sulfur Clean-up: N (Y/N)

CAS NO.	COMPOUND	CONCENTRATION (ug/L)	Q
12674-11-2	Aroclor-1016	0.051	U
11104-28-2	Aroclor-1221	0.051	U
11141-16-5	Aroclor-1232	0.051	U
53469-21-9	Aroclor-1242	0.051	U
12672-29-6	Aroclor-1248	0.051	U
11097-69-1	Aroclor-1254	0.051	U
11096-82-5	Aroclor-1260	0.051	U

FORM 1
AROCLOR ANALYSIS DATA SHEET

EPA SAMPLE NO.

A66589

Lab Name: Aquatec, Inc. Lab Code: AQUAI

Contract: 91082 Case: PCB SDG: 43567

Phase Type: Water
Phase Volume: 1001 (mL)
Injection Volume: 1.0 (uL)
Dilution Factor: 1.0

Lab Sample ID: 217902
Date Received: 04/16/94
Date Extracted: 04/21/94
Date Analyzed: 05/20/94
Sulfur Clean-up: N (Y/N)

CAS NO.	COMPOUND	CONCENTRATION (ug/L)	Q
12674-11-2	Aroclor-1016	0.050	U
11104-28-2	Aroclor-1221	0.050	U
11141-16-5	Aroclor-1232	0.050	U
53469-21-9	Aroclor-1242	0.054	
12672-29-6	Aroclor-1248	0.050	U
11097-69-1	Aroclor-1254	0.050	U
11096-82-5	Aroclor-1260	0.050	U

TOTAL SUSPENDED SOLIDS

Introduction

Analyses were performed according to the following method:

Total Suspended Solids	EPA Method 160.2

The data review process is intended to evaluate data on a technical basis. It is assumed that the data package represents the best efforts of the laboratory and has already been subjected to adequate quality review prior to submission for review.

During the review process, laboratory data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, modified or deleted by the data reviewer.

The following reviewer codes based on the National Functional Guidelines, will be used to qualify the data.

U	The material was analyzed for, but was not detected. The associated value is either the sample quantitation limit or the sample detection limit depending on the method.
J	The associated value is an estimated quantity.
R	The sample results are rejected.
UJ	The material was analyzed for, but was not detected. The associated value is approximate and may or may not represent the actual limit of quantitation/detection.

These qualifiers are recorded on the Laboratory Report forms contained within this package.

Two facts should be noted by all data users. First, the "R" flag means that the associated value is unusable. In other words, due to significant QC problems, the analysis is invalid and provides no information as to whether the compound is present or not. "R" values should not appear on data tables because they cannot be relied upon, even as a last resort. The second fact to keep in mind is that no compound concentration, even if it has passed all QC tests, is guaranteed to be accurate. Strict QC serves to increase confidence in data but any value potentially contains error.

Data Assessment

1. Holding Times

The method specified holding time for TSS is 7 days from sample collection. All samples were analyzed with the specified holding time.

2. Calibration

The analyses have no specific calibration requirements.

3. Blank Contamination

No method blank contamination was reported.

4. Laboratory Duplicates

The laboratory duplicate results were acceptable.

5. Field Duplicates

Results for duplicate samples are summarized below:

Sample ID / Duplicate ID	Analyte	Sample Result	Duplicate Result	RPD
A66587 / A66589	TSS	10.5	25.5	83.3%

The duplicate results are within Region 5 acceptance limits.

6. Overall Assessment

Other than those deviations mentioned in this report, the analysis of the samples was in conformance with method specifications.

DATA REVIEW CHECKLIST

Supplemental Data Review Checklist

	YES	NO	NA
Data Completeness			
Is there a narrative or cover letter present?	X		
Are the sample numbers included in the narrative?	X		
Are the methods utilized notated?	X		
Are the sample chain-of-custodies present?	X		
Do the chain-of-custodies indicate any problems with sample receipt or sample condition?		X	
Holding Times			
Have any holding times been exceeded?		X	
Duplicates			
Were the laboratory duplicate results acceptable?	X		
Blanks			
Has a method blank been analyzed for each set of samples or for each 20 samples, whichever is more frequent:	X		
Do any have results above the reporting limit?		X	
Do any trip/field/rinse blanks have positive results?			X
Calibration			
Are initial calibrations within acceptable limits?			X
Are continuing calibration standards within acceptable limits?			X
Raw Data			
Is raw data present and complete for all samples and QC?	X		
Compound Quantitation and Reported Limits			
Are the reporting limits adjusted to reflect sample dilutions, and for soils, sample moisture?			X

Total Suspended Solids Results

Sample ID	Lab ID	Sample Date	Results (mg/l)
A66587	217900	4/14/94	10.5
A66588	217901	4/14/94	6.5
A66589	217902	4/14/94	25.5

CHAIN OF CUSTODY

BLASLAND & BOUCK ENGINEERS, P.C.
6723 Towpath Road, Box 66
Syracuse, New York 13214-0066
TEL: 315-446-9120
FAX: 315-449-0017

CHAIN OF CUSTODY RECORD

PROJ. NO. 6451 PROJECT NAME Kalamazoo River / Portage Creek

SAMPLERS: (Signature)

STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION	Number of Containers	PCB's	TSS				Temp	REMARKS
SWP-1	4-14-94	23:30		✓	A66587	3	2	1					
SWP-2	4-14	23:50		✓	A66588	3	2	1					
Dup	—	—		✓	A66589	3	2	1					
													Cooler # - 8
—					Temp	1						1	
						/10							

Relinquished by: (Signature)	DATE	TIME	Received by: (Signature)	Relinquished by: (Signature)	DATE	TIME	Relinquished by: (Signature)
	4-15-94	12:00					

Relinquished by: (Signature)	DATE	TIME	Received by: (Signature)	Relinquished by: (Signature)	DATE	TIME	Relinquished by: (Signature)

Relinquished by: (Signature)	DATE	TIME	Received for Laboratory by: (Signature)	DATE	TIME	Remarks:
				4/16/94	1245	

7/12/93
1363788HCDR

Distribution: Original Accompanies Shipment; Copy to Coordinator Field Files

000003

KB54502084

DATA REVIEW FOR

ALLIED PAPER, INC./PORTAGE CREEK/KALAMAZOO RIVER
SUPERFUND SITE

SDG# 44723

ALLIED OU
SURFACE WATER INVESTIGATION

VOLATILE, SEMI-VOLATILE, PESTICIDE/PCB,
AND INORGANIC ANALYSES

Analyses performed by:

Aquatec, Inc.
Colchester, Vermont

Review performed by:

Blasland, Bouck & Lee, Inc.
Syracuse, New York

Summary

The following is an assessment of the data package for SDG# 44723 for the Surface Water sampling of the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site. Included with this assessment are the data review check sheets used in the review of the package and corrected sample results. Analyses were performed on the following samples:

Sample ID	Lab ID	Matrix	Sample Date	Analysis			
				VOA	BNA	Pest	TAL
A64008	223719	water	6/9/94	X	X	X	X
A64009	223720	water	6/9/94	X	X	X	X

VOLATILE ANALYSES

Introduction

Analyses were performed according to the USEPA CLP SOW OLM01.8.

The data review process is intended to evaluate the data on a technical basis. It is assumed that the data package represents the best efforts of the laboratory and had already been subjected to adequate and sufficient quality review prior to submission.

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer. Results are qualified with the following codes in accordance with National Functional Guidelines:

- U The compound was analyzed for but not detected. The associated value is the compound quantitation limit.
- J The compound was positively identified; however, the associated numerical value is an estimated concentration only.
- B The compound has been found in the sample as well as its associated blank, its presence in the sample may be suspect.
- N The analysis indicates the presence of a compound for which there is presumptive evidence to make a tentative identification.
- JN The analysis indicates the presence of a compound for which there is presumptive evidence to make a tentative identification. The associated numerical value is an estimated concentration only.
- E The compound was quantitated above the calibration range.
- D Concentration is based on a diluted sample analysis.
- UJ The compound was not detected above the reported sample quantitation limit. However, the reported limit is approximate and may or may not represent the actual limit of quantitation.
- R The sample results are rejected.

Two facts should be noted by all data users. First, the "R" flag means that the associated value is unusable. In other words, due to significant QC problems, the analysis is invalid and provides no information as to whether the compound is present or not. "R" values should not appear on data tables because they cannot be relied upon, even as a last resort. The second fact to keep in mind is that no compound concentration, even if it has passed all QC test, is guaranteed to be accurate. Strict QC serves to increase confidence in data but any value potentially contains error.

Data Assessment

1. Holding Time

The QAPP-specified holding time for volatile analyses of water samples under OLM01.8 is 10 days from date of sample receipt. The technical holding time for preserved water samples is 14 days from date of collection.

All samples were analyzed within the specified holding times.

2. Blank Contamination

Quality assurance blanks, i.e., method, trip, field, or rinse blanks, are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Method blanks measure laboratory contamination. Trip blanks measure cross contamination of samples during shipment. Field and rinse blanks measure cross contamination of samples during field operations.

No target compounds were detected in the method blank.

3. Mass Spectrometer Tuning

Mass spectrometer performance was acceptable.

4. Calibration

Satisfactory instrument calibration is established to insure that the instrument is capable of producing acceptable quantitative data. An initial calibration demonstrates that the instrument is capable of giving acceptable performance at the beginning of an experimental sequence. The continuing calibration verifies that the instrument is giving satisfactory daily performance.

4.1 Initial Calibration

The % relative standard deviation (%RSD) for all compounds was less than 30% and all response factors were above the minimum required RF of 0.05.

4.2 Continuing Calibration

All continuing calibration standards were within the 25% difference (%D) of the initial calibration.

5. Surrogates / System Monitoring Compounds

All samples to be analyzed for organic compounds are spiked with surrogate compounds prior to sample preparation to evaluate overall laboratory performance and efficiency of the analytical technique.

All surrogate recoveries were within control limits.

6. Internal Standard Performance

Internal standard performance criteria insure that the GC/MS sensitivity and response are stable during every experimental run.

All internal standard areas and retention times were within established limits.

7. Compound Identification

Compounds are identified on the GC/MS by using the analyte's relative retention time (RRT) and ion spectra.

All identified compounds met the specified criteria.

8. Matrix Spike/Matrix Spike Duplicate

Matrix spike and matrix spike duplicate data are used to assess the precision and accuracy of the analytical method.

No matrix spike or matrix spike duplicate samples were included in this sample delivery group.

9. Field Duplicates

No field duplicate samples were included in this sample delivery group.

10. System Performance and Overall Assessment

Overall system performance was acceptable. Other than for those deviations specifically mentioned in this review, the overall data quality is within the guidelines listed in the analytical method.

Data Validation Checksheets

Volatile Organics Data Validation Checklist

	YES	NO	NA
Data Completeness and Deliverables			
Is there a narrative or cover letter present?	X		
Are the samples numbers included in the narrative?	X		
Are the sample chain-of-custodies present?	X		
Do the chain-of-custodies indicate any problems with sample receipt or sample condition?		X	
Holding Times			
Have any holding times been exceeded?		X	
Surrogate Recovery			
Are the surrogate recovery forms present?	X		
Are all the samples listed on the appropriate surrogate recovery form?	X		
Are the outliers correctly marked with an asterisk?			X
Was one or more surrogate recovery outside of specified limits for any sample or blank?		X	
If yes, were the samples reanalyzed?			X
Were the method blanks reanalyzed?			X
Matrix Spikes			
Is there a matrix spike recovery form present?		X	
Were matrix spikes analyzed at the required frequency?		X	
How many spike recoveries were outside of QC limits?			
0 out of 0			
How many RPDs for matrix spike and matrix spike duplicate were outside of QC limits?			
0 out of 0			
Blanks			
Is the method blank summary form present?	X		
Has a method blank been analyzed for each set of samples or for each 20 samples, whichever is more frequent?	X		
Has a blank been analyzed at least once every twelve hours for each system used?	X		

sw44723

Volatile Organics Data Validation Checklist - Page 2

	YES	NO	NA
Is the chromatographic performance acceptable for each instrument?	X		
Do any method/reagent/instrument blanks have positive results?		X	
Do any trip/field/rinse blanks have positive results?			X
Are there field/rinse/equipment blanks associated with every sample?		X	
Tuning and Mass Calibration			
Are the GC/MS tuning forms present for BFB?	X		
Are the bar graph spectrum and mass/charge listing provided for each BFB?	X		
Has a BFB been analyzed for each twelve hours of analysis per instrument?	X		
Have the ion abundance criteria been met for each instrument used?	X		
Target Analytes			
Is an organics analysis data sheet present for each of the following:			
Samples	X		
Matrix spikes			X
Blanks	X		
Are the reconstructed ion chromatograms present for each of the following:			
Samples	X		
Matrix spikes			X
Blanks	X		
Is the chromatographic performance acceptable with respect to:			
Baseline stability	X		
Resolution	X		
Peak shape	X		
Are the mass spectra of the identified compounds present?			X

Volatile Organics Data Validation Checklist - Page 3

	YES	NO	NA
Tentatively Identified Compounds			
Are all the TIC summary forms present?	X		
Are the mass spectra for the tentatively identified compounds and there associated "best match" spectra present?			X
Are any target compounds listed as TICs?		X	
Quantitation and Detection Limits			
Are the reporting limits adjusted to reflect sample dilutions, and for soils, sample moisture?	X		
Standard Data			
Are the quantitation reports and reconstructed ion chromatograms present for the initial and continuing calibration standards?	X		
Initial Calibration			
Are the initial calibration forms present for each instrument used?	X		
Are the response factor RSDs within specified limits?	X		
Are the average RRF equal to or greater than minimum requirements?	X		
Continuing Calibration			
Are the continuing calibration forms present for each day and each instrument?	X		
Has a continuing calibration standard been analyzed for each twelve hours of analysis per instrument?	X		
All %D within acceptable limits?	X		
Are all RF equal to or greater than minimum requirements?	X		
Internal Standards			
Are internal standard areas of every sample and blank within the upper and lower limits for each continuing calibration?	X		
Field Duplicates			
Were field duplicates submitted with the samples?		X	

Volatile Qualifier Summary
Holding Time, Surrogates, Internal Standards

Sample ID	Holding Time	Surrogates			Internal Standards		
		TOL	BFB	DCE	BCM	DFB	CBZ
A64008	OK	OK	OK	OK	OK	OK	OK
A64009							

Surrogates:
TOL Toluene-d8
BFB Bromofluorobenzene
DCE 1,4-Dichloroethane-d4

Internal Standards:
BCM Bromochloromethane
DFB 1,4-Difluorobenzene
CBZ Chlorobenzene-d5

sw44723

Volatile Calibration Outliers

Instrument: L
Matrix: WATER
Level: LOW

Date/Time	6/2/94		6/17 10:32					
	Initial Cal.		Cont. Cal.		Cont. Cal.		Cont. Cal.	
	RF	%RSD	RF	%D	RF	%D	RF	%D
Chloromethane	OK	OK	OK	OK				
Bromomethane								
Vinyl chloride								
Chloroethane								
Methylene chloride								
Acetone								
Carbon disulfide								
1,1-Dichloroethene								
1,1-Dichloroethane								
1,2-Dichloroethene (total)								
Chloroform								
1,2-Dichloroethane								
2-Butanone								
1,1,1-Trichloroethane								
Carbon tetrachloride								
Bromodichloromethane								
1,2-Dichloropropane								
cis-1,3-Dichloropropene								
Trichloroethene								
Dibromochloromethane								
1,1,2-Trichloroethane								
Benzene								
trans-1,3-Dichloropropene								
Bromoform								
4-Methyl-2-pentanone								
2-Hexanone								
Tetrachloroethene								
1,1,2,2-Tetrachloroethane								
Toluene								

sw44723

Volatile Calibration Outliers - Page 2

Date/Time	6/2/94		6/17 10:32					
	Initial Cal.		Cont. Cal.		Cont. Cal.		Cont. Cal.	
	RF	%RSD	RF	%D	RF	%D	RF	%D
Chlorobenzene								
Ethylbenzene								
Styrene								
Xylene (total)								

Affected Samples:

sw44723

Corrected Sample Analysis Data Sheets

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

AG4008
~~A66008~~

Lab Name: AQUATEC, INC. Contract: 91082

Lab Code: AQUAI Case No.: OLM SAS No.: SDG No.: 44723

Matrix: (soil/water) WATER Lab Sample ID: 223719

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: L223719V.D

Level: (low/med) LOW Date Received: 06/11/94

% Moisture: not dec. _____ Date Analyzed: 06/17/94

GC Column:CAP ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____(uL) Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-87-3	Chloromethane	10	U
74-83-9	Bromomethane	10	U
75-01-4	Vinyl Chloride	10	U
75-00-3	Chloroethane	10	U
75-09-2	Methylene Chloride	10	U
67-64-1	Acetone	10	U
75-15-0	Carbon Disulfide	10	U
75-35-4	1,1-Dichloroethene	10	U
75-34-3	1,1-Dichloroethane	10	U
540-59-0	1,2-Dichloroethene (total)	10	U
67-66-3	Chloroform	10	U
107-06-2	1,2-Dichloroethane	10	U
78-93-3	2-Butanone	10	U
71-55-6	1,1,1-Trichloroethane	10	U
56-23-5	Carbon Tetrachloride	10	U
75-27-4	Bromodichloromethane	10	U
78-87-5	1,2-Dichloropropane	10	U
10061-01-5	cis-1,3-Dichloropropene	10	U
79-01-6	Trichloroethene	10	U
124-48-1	Dibromochloromethane	10	U
79-00-5	1,1,2-Trichloroethane	10	U
71-43-2	Benzene	10	U
10061-02-6	trans-1,3-Dichloropropene	10	U
75-25-2	Bromoform	10	U
108-10-1	4-Methyl-2-Pentanone	10	U
591-78-6	2-Hexanone	10	U
127-18-4	Tetrachloroethene	10	U
79-34-5	1,1,2,2-Tetrachloroethane	10	U
108-88-3	Toluene	10	U
108-90-7	Chlorobenzene	10	U
100-41-4	Ethylbenzene	10	U
100-42-5	Styrene	10	U
1330-20-7	Xylene (total)	10	U

1E

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

A64008
~~A66008~~

Lab Name: AQUATEC, INC. Contract: 91082

Lab Code: AQUAI Case No.: OLM SAS No.: SDG No.: 44723

Matrix: (soil/water) WATER Lab Sample ID: 223719

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: L223719V.D

Level: (low/med) LOW Date Received: 06/11/94

% Moisture: not dec. _____ Date Analyzed: 06/17/94

GC Column:CAP ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____(uL) Soil Aliquot Volume: _____(uL)

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.				
2.				
3.				
4.				
5.				
6.				
7.				
8.				
9.				
10.				
11.				
12.				
13.				
14.				
15.				
16.				
17.				
18.				
19.				
20.				
21.				
22.				
23.				
24.				
25.				
26.				
27.				
28.				
29.				
30.				

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

A64009
~~A66009~~

Lab Name: AQUATEC, INC. Contract: 91082

Lab Code: AQUAI Case No.: OLM SAS No.: SDG No.: 44723

Matrix: (soil/water) WATER Lab Sample ID: 223720

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: L223720V.D

Level: (low/med) LOW Date Received: 06/11/94

% Moisture: not dec. _____ Date Analyzed: 06/17/94

GC Column:CAP ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____(uL) Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-87-3	Chloromethane	10	U
74-83-9	Bromomethane	10	U
75-01-4	Vinyl Chloride	10	U
75-00-3	Chloroethane	10	U
75-09-2	Methylene Chloride	10	U
67-64-1	Acetone	10	U
75-15-0	Carbon Disulfide	10	U
75-35-4	1,1-Dichloroethene	10	U
75-34-3	1,1-Dichloroethane	10	U
540-59-0	1,2-Dichloroethene (total)	10	U
67-66-3	Chloroform	10	U
107-06-2	1,2-Dichloroethane	10	U
78-93-3	2-Butanone	10	U
71-55-6	1,1,1-Trichloroethane	10	U
56-23-5	Carbon Tetrachloride	10	U
75-27-4	Bromodichloromethane	10	U
78-87-5	1,2-Dichloropropane	10	U
10061-01-5	cis-1,3-Dichloropropene	10	U
79-01-6	Trichloroethene	10	U
124-48-1	Dibromochloromethane	10	U
79-00-5	1,1,2-Trichloroethane	10	U
71-43-2	Benzene	10	U
10061-02-6	trans-1,3-Dichloropropene	10	U
75-25-2	Bromoform	10	U
108-10-1	4-Methyl-2-Pentanone	10	U
591-78-6	2-Hexanone	10	U
127-18-4	Tetrachloroethene	10	U
79-34-5	1,1,2,2-Tetrachloroethane	10	U
108-88-3	Toluene	10	U
108-90-7	Chlorobenzene	10	U
100-41-4	Ethylbenzene	10	U
100-42-5	Styrene	10	U
1330-20-7	Xylene (total)	10	U

1E

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

A64009
~~A66009~~

Lab Name: AQUATEC, INC. Contract: 91082

Lab Code: AQUAI Case No.: OLM SAS No.: SDG No.: 44723

Matrix: (soil/water) WATER Lab Sample ID: 223720

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: L223720V.D

Level: (low/med) LOW Date Received: 06/11/94

% Moisture: not dec. _____ Date Analyzed: 06/17/94

GC Column:CAP ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____(uL) Soil Aliquot Volume: _____(uL)

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.				
2.				
3.				
4.				
5.				
6.				
7.				
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9.				
10.				
11.				
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28.				
29.				
30.				

SEMI-VOLATILE ANALYSES

Introduction

Analyses were performed according to the USEPA CLP SOW OLM01.8.

The data review process is intended to evaluate the data on a technical basis. It is assumed that the data package represents the best efforts of the laboratory and had already been subjected to adequate and sufficient quality review prior to submission.

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer. Results are qualified with the following codes in accordance with National Functional Guidelines:

- U The compound was analyzed for but not detected. The associated value is the compound quantitation limit.
- J The compound was positively identified; however, the associated numerical value is an estimated concentration only.
- B The compound has been found in the sample as well as its associated blank, its presence in the sample may be suspect.
- N The analysis indicates the presence of a compound for which there is presumptive evidence to make a tentative identification.
- JN The analysis indicates the presence of a compound for which there is presumptive evidence to make a tentative identification. The associated numerical value is an estimated concentration only.
- E The compound was quantitated above the calibration range.
- D Concentration is based on a diluted sample analysis.
- UJ The compound was not detected above the reported sample quantitation limit. However, the reported limit is approximate and may or may not represent the actual limit of quantitation.
- R The sample results are rejected.

Two facts should be noted by all data users. First, the "R" flag means that the associated value is unusable. In other words, due to significant QC problems, the analysis is invalid and provides no information as to whether the compound is present or not. "R" values should not appear on data tables because they cannot be relied upon, even as a last resort. The second fact to keep in mind is that no compound concentration, even if it has passed all QC test, is guaranteed to be accurate. Strict QC serves to increase confidence in data but any value potentially contains error.

Data Assessment

1. Holding Time

The QAPP-specified holding times for semi-volatile analyses of water samples under OLM01.8 are 5 days from validated time of sample receipt to extraction and 40 days from the start of extraction to analysis. The technical holding times are 7 days from collection to extraction and 40 days to analysis. No deviations from these holding times were noted.

2. Blank Contamination

Quality assurance blanks, i.e., method, field, or rinse blanks, are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Method blanks measure laboratory contamination. Field and rinse blanks measure cross contamination of samples during field operations.

Bis(2-Ethylhexyl)phthalate was detected in method blank SBLK3C and in the associated samples A64008 and A64009. Since bis(2-Ethylhexyl)phthalate was present in the samples at concentrations similar to that found in the method blank, the compound has been qualified as undetected in the samples.

3. Mass Spectrometer Tuning

Mass spectrometer performance was acceptable.

4. Calibration

Satisfactory instrument calibration is established to insure that the instrument is capable of producing acceptable quantitative data. An initial calibration demonstrates that the instrument is capable of giving acceptable performance at the beginning of an experimental sequence. The continuing calibration verifies that the instrument is giving satisfactory daily performance.

4.1 Initial Calibration

The % relative standard deviation (%RSD) of the five calibration level response factors was less than 30% for all compounds.

All response factors were above the minimum required RF of 0.05.

4.2 Continuing Calibration

All compounds in the continuing calibration standard were within the 25% difference (%D) of the initial calibration response factors, with the following exceptions:

Instrument P 7/1/94 10:18

Hexachlorocyclopentadiene	44.3%
2,4-Dinitrophenol	28.5%
Benzo(k)fluoranthene	27.6%

Data for the listed compounds have been qualified as estimated in the associated sample A64009.

Instrument P 7/5/94 15:54

2,4-Dinitrophenol	38.0%
3,3'-Dichlorobenzidine	27.8%
bis(2-Ethylhexyl)phthalate	31.5%
Di-n-octylphthalate	26.7%

Data for the listed compounds have been qualified as estimated in the associated sample A64008.

5. Surrogates / System Monitoring Compounds

All samples to be analyzed for organic compounds are spiked with surrogate compounds prior to sample preparation to evaluate overall laboratory performance and efficiency of the analytical technique.

Recovery for two surogates were above control limits in method blank SBLK3C. Since the remaining surrogate recoveries were acceptable and since all sample surrogate recoveries were within control limits, no data have been qualified based on the deviation.

6. Internal Standard Performance

Internal standard performance criteria insure that the GC/MS sensitivity and response are stable during every experimental run.

All internal standard recoveries and retention times were within established limits.

7. Compound Identification

Compounds are identified on the GC/MS by using the analyte's relative retention time (RRT) and ion spectra.

All identified compounds met the specified criteria.

8. Matrix Spike/Matrix Spike Duplicate

Matrix spike and matrix spike duplicate data are used to assess the precision and accuracy of the analytical method.

No matrix spike or matrix spike duplicate samples were included in this sample delivery group.

9. Field Duplicates

No field duplicate samples were included in this sample delivery group.

10. System Performance and Overall Assessment

Overall system performance was acceptable. Other than for those deviations specifically mentioned in this review, the overall data quality is within the guidelines listed in the analytical method.

Data Validation Checksheets

Semi-Volatile Organics Data Validation Checklist

	YES	NO	NA
Data Completeness and Deliverables			
Is there a narrative or cover letter present?	X		
Are the samples numbers included in the narrative?	X		
Are the sample chain-of-custodies present?	X		
Do the chain-of-custodies indicate any problems with sample receipt or sample condition?		X	
Holding Times			
Have any holding times been exceeded?		X	
Surrogate Recovery			
Are the surrogate recovery forms present?	X		
Are all the samples listed on the appropriate surrogate recovery form?	X		
Are the outliers correctly marked with an asterisk?	X		
Were two or more base-neutral or acid surrogate recoveries outside of specified limits for any sample or blank?	X		
If yes, were the samples reanalyzed?		X	
Were the method blanks reanalyzed?		X	
Matrix Spikes			
Is there a matrix spike recovery form present?		X	
Were matrix spikes analyzed at the required frequency?			X
How many spike recoveries were outside of QC limits?			
0 out of 0			
How many RPDs for matrix spike and matrix spike duplicate were outside of QC limits?			
0 out of 0			
Blanks			
Is the method blank summary form present?	X		
Has a method blank been analyzed for each set of samples or for each 20 samples, whichever is more frequent?	X		

Semi-Volatile Data Validation Checklist - Page 2

	YES	NO	NA
Has a blank been analyzed for each GC/MS system used?	X		
Is the chromatographic performance acceptable for each instrument?	X		
Do any method/reagent/instrument blanks have positive results?		X	
Do any field/rinse blanks have positive results?			X
Are there field/rinse/equipment blanks associated with every sample?		X	
Tuning and Mass Calibration			
Are the GC/MS tuning forms present for DFTPP?	X		
Are the bar graph spectrum and mass/charge listing provided for each DFTPP?	X		
Has a DFTPP been analyzed for each twelve hours of analysis per instrument?	X		
Have the ion abundance criteria been met for each instrument used?	X		
Target Analytes			
Is an organics analysis data sheet present for each of the following:			
Samples	X		
Matrix spikes			X
Blanks	X		
Has GPC cleanup been performed on all soil/sediment sample extracts?		X	
Are the reconstructed ion chromatograms present for each of the following:			
Samples	X		
Matrix spikes			X
Blanks	X		

Semi-Volatile Data Validation Checklist - Page 3

	YES	NO	NA
Is the chromatographic performance acceptable with respect to:			
Baseline stability	X		
Resolution	X		
Peak shape	X		
Are the mass spectra of the identified compounds present?	X		
Tentatively Identified Compounds			
Are all the TIC summary forms present?	X		
Are the mass spectra for the tentatively identified compounds and there associated "best match" spectra present?			X
Are any target compounds listed as TICs?		X	
Quantitation and Detection Limits			
Are the reporting limits adjusted to reflect sample dilutions, and for soils, sample moisture?	X		
Standard Data			
Are the quantitation reports and reconstructed ion chromatograms present for the initial and continuing calibration standards?	X		
Initial Calibration			
Are the initial calibration forms present for each instrument used?	X		
Are the response factor RSDs within specified limits?	X		
Are the average RRF equal to or greater than minimum requirements?	X		
Continuing Calibration			
Are the continuing calibration forms present for each day and each instrument?	X		
Has a continuing calibration standard been analyzed for each twelve hours of analysis per instrument?	X		
All %D within acceptable limits?		X	
Are all RF equal to or greater than minimum requirements?	X		

Semi-Volatile Data Validation Checklist - Page 4

	YES	NO	NA
Internal Standards			
Are internal standard areas of every sample and blank within the upper and lower limits for each continuing calibration?	X		
Field Duplicates			
Were field duplicates submitted with the samples?		X	

Semi-Volatile Qualifier Summary
Holding Time, Surrogates, Internal Standards

Sample ID	Holding Time	Surrogates						Internal Standards					
		NBZ	FBP	TPH	PHL	2FP	TBP	DCB	NPT	ANT	PHN	CRY	PRY
A64008	OK	OK						OK					
A64009													

Surrogates:

- NBZ Nitrobenzene-d5
- FBP 2-Fluorobiphenyl
- TPH Terphenyl-d14
- PHL Phenol-d5
- 2FP 2-Fluorophenol
- TBP 2,4,6-Tribromophenol

Internal Standards:

- DCB 1,4-Dichlorobenzene-d4
- NPT Naphthalene-d8
- ANT Acenaphthene-d10
- PHN Phenanthrene-d10
- CRY Chrysene-d12
- PRY Perylene-d12

↑ Percent recovery is above the acceptable control limit.
↓ Percent recovery is below the acceptable control limit.
R Internal standard recovery is below 25 percent.

sw44723

Semi-Volatile Calibration Outliers

Instrument: P

Date/Time	6/13/94		7/1 10:18		7/5 15:54			
	Initial Cal.		Cont. Cal.		Cont. Cal.		Cont. Cal.	
	RF	%RSD	RF	%D	RF	%D	RF	%D
Phenol	OK	OK	OK		OK			
bis(2-Chloroethyl)ether								
2-Chlorophenol								
1,3-Dichlorobenzene								
1,4-Dichlorobenzene								
1,2-Dichlorobenzene								
2-Methylphenol								
2,2'oxybis(1-Chloropropane)								
4-Methylphenol								
N-Nitroso-di-n-propylamine								
Hexachloroethane								
Nitrobenzene								
Isophorone								
2-Nitrophenol								
2,4-Dimethylphenol								
bis(2-Chloroethoxy)methane								
2,4-Dichlorophenol								
1,2,4-Trichlorobenzene								
Naphthalene								
4-Chloroaniline								
Hexachlorobutadiene								
4-Chloro-3-methylphenol								
2-Methylnaphthalene								
Hexachlorocyclopentadiene				44.3				
2,4,6-Trichlorophenol								
2,4,5-Trichlorophenol								
2-Chloronaphthalene								
2-Nitroaniline								
Dimethylphthalate								
Acenaphthylene								

Semi-Volatile Calibration Outliers - Page 2

Date/Time	6/13/94		7/1 10:18		7/5 15:54			
	Initial Cal.		Cont. Cal.		Cont. Cal.		Cont. Cal.	
	RF	%RSD	RF	%D	RF	%D	RF	%D
2,6-Dinitrotoluene								
3-Nitroaniline								
Acenaphthene								
2,4-Dinitrophenol				28.5		38.0		
4-Nitrophenol								
Dibenzofuran								
2,4-Dinitrotoluene								
Diethylphthalate								
4-Chlorophenyl-phenylether								
Fluorene								
4-Nitroaniline								
4,6-Dinitro-2-methylphenol								
N-Nitrosodiphenylamine								
4-Bromophenyl-phenylether								
Hexachlorobenzene								
Pentachlorophenol								
Phenanthrene								
Anthracene								
Carbazole								
Di-n-butylphthalate								
Fluoranthene								
Pyrene								
Butylbenzylphthalate								
3,3'-Dichlorobenzidine						27.8		
Benzo(a)anthracene								
Chrysene								
bis(2-ethylhexyl)phthalate						31.5		
Di-n-octylphthalate						26.7		
Benzo(b)fluoranthene								
Benzo(k)fluoranthene				27.6				
Benzo(a)pyrene								
Indeno(1,2,3-cd)pyrene								

Semi-Volatile Calibration Outliers - Page 3

Date/Time	6/13/94		7/1 10:18		7/5 15:54			
	Initial Cal.		Cont. Cal.		Cont. Cal.		Cont. Cal.	
	RF	%RSD	RF	%D	RF	%D	RF	%D
Dibenz(a,h)anthracene								
Benzo(g,h,i)perylene								
Affected Samples:			A64009		A64008			

sw44723

Corrected Sample Analysis Data Sheets

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

AG4008
~~A66008~~

Lab Name: AQUATEC, INC. Contract: 91082

Lab Code: AQUAI Case No.: OLM SAS No.: SDG No.: 44723

Matrix: (soil/water) WATER Lab Sample ID: 223719

Sample wt/vol: 1000 (g/mL) ML Lab File ID: P223719S.D

Level: (low/med) LOW Date Received: 06/11/94

% Moisture: _____ decanted: (Y/N)___ Date Extracted: 06/14/94

Concentrated Extract Volume: 1000(UL) Date Analyzed: 07/06/94

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 8.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
108-95-2	Phenol	10	U
111-44-4	bis(-2-Chloroethyl)Ether	10	U
95-57-8	2-Chlorophenol	10	U
541-73-1	1,3-Dichlorobenzene	10	U
106-46-7	1,4-Dichlorobenzene	10	U
95-50-1	1,2-Dichlorobenzene	10	U
95-48-7	2-Methylphenol	10	U
108-60-1	2,2'-oxybis(1-Chloropropane)	10	U
106-44-5	4-Methylphenol	10	U
621-64-7	N-Nitroso-di-n-propylamine	10	U
67-72-1	Hexachloroethane	10	U
98-95-3	Nitrobenzene	10	U
78-59-1	Isophorone	10	U
88-75-5	2-Nitrophenol	10	U
105-67-9	2,4-Dimethylphenol	10	U
111-91-1	bis(2-Chloroethoxy)methane	10	U
120-83-2	2,4-Dichlorophenol	10	U
120-82-1	1,2,4-Trichlorobenzene	10	U
91-20-3	Naphthalene	10	U
106-47-8	4-Chloroaniline	10	U
87-68-3	Hexachlorobutadiene	10	U
59-50-7	4-Chloro-3-Methylphenol	10	U
91-57-6	2-Methylnaphthalene	10	U
77-47-4	Hexachlorocyclopentadiene	10	U
88-06-2	2,4,6-Trichlorophenol	10	U
95-95-4	2,4,5-Trichlorophenol	25	U
91-58-7	2-Chloronaphthalene	10	U
88-74-4	2-Nitroaniline	25	U
131-11-3	Dimethylphthalate	10	U
208-96-8	Acenaphthylene	10	U
606-20-2	2,6-Dinitrotoluene	10	U
99-09-2	3-Nitroaniline	25	U
83-32-9	Acenaphthene	10	U

1C
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

A64008
~~A66008~~

Lab Name: AQUATEC, INC. Contract: 91082

Lab Code: AQUAI Case No.: OLM SAS No.: SDG No.: 44723

Matrix: (soil/water) WATER Lab Sample ID: 223719

Sample wt/vol: 1000 (g/mL) ML Lab File ID: P223719S.D

Level: (low/med) LOW Date Received: 06/11/94

% Moisture: _____ decanted: (Y/N)___ Date Extracted: 06/14/94

Concentrated Extract Volume: 1000(UL) Date Analyzed: 07/06/94

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 8.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q	
51-28-5	2,4-Dinitrophenol	25	U	J
100-02-7	4-Nitrophenol	25	U	
132-64-9	Dibenzofuran	10	U	
121-14-2	2,4-Dinitrotoluene	10	U	
84-66-2	Diethylphthalate	10	U	
7005-72-3	4-Chlorophenyl-phenylether	10	U	
86-73-7	Fluorene	10	U	
100-01-6	4-Nitroaniline	25	U	
534-52-1	4,6-Dinitro-2-methylphenol	25	U	
86-30-6	N-nitrosodiphenylamine (1)	10	U	
101-55-3	4-Bromophenyl-phenylether	10	U	
118-74-1	Hexachlorobenzene	10	U	
87-86-5	Pentachlorophenol	25	U	
85-01-8	Phenanthrene	10	U	
120-12-7	Anthracene	10	U	
86-74-8	Carbazole	10	U	
84-74-2	Di-n-butylphthalate	10	U	
206-44-0	Fluoranthene	10	U	
129-00-0	Pyrene	10	U	
85-68-7	Butylbenzylphthalate	10	U	
91-94-1	3,3'-Dichlorobenzidine	10	U	J
56-55-3	Benzo(a)anthracene	10	U	
218-01-9	Chrysene	10	U	
117-81-7	bis(2-Ethylhexyl)phthalate	10	~~J~~ U	
117-84-0	Di-n-octylphthalate	10	U	J
205-99-2	Benzo(b)fluoranthene	10	U	
207-08-9	Benzo(k)fluoranthene	10	U	
50-32-8	Benzo(a)pyrene	10	U	
193-39-5	Indeno(1,2,3-cd)pyrene	10	U	
53-70-3	Dibenz(a,h)anthracene	10	U	
191-24-2	Benzo(g,h,i)perylene	10	U	

(1) - Cannot be separated from Diphenylamine

1F

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

A64008
~~A66008~~

Lab Name: AQUATEC, INC. Contract: 91082

Lab Code: AQUAI Case No.: OLM SAS No.: SDG No.: 44723

Matrix: (soil/water) WATER Lab Sample ID: 223719

Sample wt/vol: 1000 (g/mL) ML Lab File ID: P223719S.D

Level: (low/med) LOW Date Received: 06/11/94

% Moisture: _____ decanted: (Y/N)___ Date Extracted: 06/14/94

Concentrated Extract Volume: 1000(uL) Date Analyzed: 07/06/94

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 8.0

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.				
2.				
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1B
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

A64009
~~A66009~~

Lab Name: AQUATEC, INC. Contract: 91082

Lab Code: AQUAI Case No.: OLM SAS No.: SDG No.: 44723

Matrix: (soil/water) WATER Lab Sample ID: 223720

Sample wt/vol: 1000 (g/mL) ML Lab File ID: P223720S.D

Level: (low/med) LOW Date Received: 06/11/94

% Moisture: _____ decanted: (Y/N)___ Date Extracted: 06/14/94

Concentrated Extract Volume: 1000(UL) Date Analyzed: 07/01/94

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH:

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
108-95-2	Phenol	10	U
111-44-4	bis(-2-Chloroethyl)Ether	10	U
95-57-8	2-Chlorophenol	10	U
541-73-1	1,3-Dichlorobenzene	10	U
106-46-7	1,4-Dichlorobenzene	10	U
95-50-1	1,2-Dichlorobenzene	10	U
95-48-7	2-Methylphenol	10	U
108-60-1	2,2'-oxybis(1-Chloropropane)	10	U
106-44-5	4-Methylphenol	10	U
621-64-7	N-Nitroso-di-n-propylamine	10	U
67-72-1	Hexachloroethane	10	U
98-95-3	Nitrobenzene	10	U
78-59-1	Isophorone	10	U
88-75-5	2-Nitrophenol	10	U
105-67-9	2,4-Dimethylphenol	10	U
111-91-1	bis(2-Chloroethoxy)methane	10	U
120-83-2	2,4-Dichlorophenol	10	U
120-82-1	1,2,4-Trichlorobenzene	10	U
91-20-3	Naphthalene	10	U
106-47-8	4-Chloroaniline	10	U
87-68-3	Hexachlorobutadiene	10	U
59-50-7	4-Chloro-3-Methylphenol	10	U
91-57-6	2-Methylnaphthalene	10	U
77-47-4	Hexachlorocyclopentadiene	10	U J
88-06-2	2,4,6-Trichlorophenol	10	U
95-95-4	2,4,5-Trichlorophenol	25	U
91-58-7	2-Chloronaphthalene	10	U
88-74-4	2-Nitroaniline	25	U
131-11-3	Dimethylphthalate	10	U
208-96-8	Acenaphthylene	10	U
606-20-2	2,6-Dinitrotoluene	10	U
99-09-2	3-Nitroaniline	25	U
83-32-9	Acenaphthene	10	U

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

A64009
~~A66009~~

Lab Name: AQUATEC, INC. Contract: 91082

Lab Code: AQUAI Case No.: OLM SAS No.: SDG No.: 44723

Matrix: (soil/water) WATER Lab Sample ID: 223720

Sample wt/vol: 1000 (g/mL) ML Lab File ID: P223720S.D

Level: (low/med) LOW Date Received: 06/11/94

% Moisture: _____ decanted: (Y/N)___ Date Extracted: 06/14/94

Concentrated Extract Volume: 1000(UL) Date Analyzed: 07/01/94

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH:

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q	
51-28-5	2,4-Dinitrophenol	25	U	J
100-02-7	4-Nitrophenol	25	U	
132-64-9	Dibenzofuran	10	U	
121-14-2	2,4-Dinitrotoluene	10	U	
84-66-2	Diethylphthalate	10	U	
7005-72-3	4-Chlorophenyl-phenylether	10	U	
86-73-7	Fluorene	10	U	
100-01-6	4-Nitroaniline	25	U	
534-52-1	4,6-Dinitro-2-methylphenol	25	U	
86-30-6	N-nitrosodiphenylamine (1)	10	U	
101-55-3	4-Bromophenyl-phenylether	10	U	
118-74-1	Hexachlorobenzene	10	U	
87-86-5	Pentachlorophenol	25	U	
85-01-8	Phenanthrene	10	U	
120-12-7	Anthracene	10	U	
86-74-8	Carbazole	10	U	
84-74-2	Di-n-butylphthalate	10	U	
206-44-0	Fluoranthene	10	U	
129-00-0	Pyrene	10	U	
85-68-7	Butylbenzylphthalate	10	U	
91-94-1	3,3'-Dichlorobenzidine	10	U	
56-55-3	Benzo(a)anthracene	10	U	
218-01-9	Chrysene	10	U	
117-81-7	bis(2-Ethylhexyl)phthalate	10 ~~8~~	~~BJ~~	U
117-84-0	Di-n-octylphthalate	10	U	
205-99-2	Benzo(b)fluoranthene	10	U	
207-08-9	Benzo(k)fluoranthene	10	U	J
50-32-8	Benzo(a)pyrene	10	U	
193-39-5	Indeno(1,2,3-cd)pyrene	10	U	
53-70-3	Dibenz(a,h)anthracene	10	U	
191-24-2	Benzo(g,h,i)perylene	10	U	

(1) - Cannot be separated from Diphenylamine

1F

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

A64009
~~A66009~~

Lab Name: AQUATEC, INC. Contract: 91082

Lab Code: AQUAI Case No.: OLM SAS No.: SDG No.: 44723

Matrix: (soil/water) WATER Lab Sample ID: 223720

Sample wt/vol: 1000 (g/mL) ML Lab File ID: P223720S.D

Level: (low/med) LOW Date Received: 06/11/94

% Moisture: _____ decanted: (Y/N)___ Date Extracted: 06/14/94

Concentrated Extract Volume: 1000(uL) Date Analyzed: 07/01/94

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH:_____

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.				
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PESTICIDE/PCB ANALYSES

Introduction

Analyses were performed according to the USEPA CLP SOW OLM01.8.

The data review process is intended to evaluate the data on a technical basis. It is assumed that the data package represents the best efforts of the laboratory and had already been subjected to adequate and sufficient quality review prior to submission.

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer. Results are qualified with the following codes in accordance with National Functional Guidelines:

- U The compound was analyzed for but not detected. The associated value is the compound quantitation limit.
- J The compound was positively identified; however, the associated numerical value is an estimated concentration only.
- B The compound has been found in the sample as well as its associated blank, its presence in the sample may be suspect.
- N The analysis indicates the presence of a compound for which there is presumptive evidence to make a tentative identification.
- JN The analysis indicates the presence of a compound for which there is presumptive evidence to make a tentative identification. The associated numerical value is an estimated concentration only.
- E The compound was quantitated above the calibration range.
- D Concentration is based on a diluted sample analysis.
- C Identification confirmed by GC/MS.
- UJ The compound was not detected above the reported sample quantitation limit. However, the reported limit is approximate and may or may not represent the actual limit of quantitation.
- R The sample results are rejected.

Two facts should be noted by all data users. First, the "R" flag means that the associated value is unusable. In other words, due to significant QC problems, the analysis is invalid and provides no information as to whether the compound is present or not. "R" values should not appear on data tables because they cannot be relied upon, even as a last resort. The second fact to keep in mind is that no compound concentration, even if it has passed all QC test, is guaranteed to be accurate. Strict QC serves to increase confidence in data but any value potentially contains error.

Data Assessment

1. Holding Time

The QAPP-specified holding times for pesticide/PCB analyses of water samples under OLM01.8 are 5 days from sample receipt to extraction and 40 days from the start of extraction to analysis. The technical holding times are 7 days from collection to extraction and 40 days to analysis.

All samples were extracted and analyzed within the specified holding times.

2. Blank Contamination

Quality assurance blanks, i.e., method, field, or rinse blanks, are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Method blanks measure laboratory contamination. Field and rinse blanks measure cross contamination of samples during field operations.

No target compounds were detected in the method blank.

3. System Performance

System performance and column resolution were acceptable.

4. Calibration

Satisfactory instrument calibration is established to insure that the instrument is capable of producing acceptable quantitative data. An initial calibration demonstrates that the instrument is capable of giving acceptable performance at the beginning of an experimental sequence. The continuing calibration verifies that the instrument is giving satisfactory daily performance.

4.1 Initial Calibration

A maximum RSD of 20% is allowed. All initial calibrations were within the specified limit.

4.2 Continuing Calibration

A maximum RPD of 25% is allowed. All continuing calibrations were within the specified limit.

5. Surrogates / System Monitoring Compounds

All samples to be analyzed for organic compounds are spiked with surrogate compounds prior to sample preparation to evaluate overall laboratory performance and efficiency of the analytical technique. If the measured surrogate recoveries were outside specified limits, qualifications may be applied to the samples.

All surrogate recoveries were within control limits.

6. Compound Identification

The retention times of pesticide/PCB compounds must fall within the calculated retention time windows for both the primary and confirmation columns.

All compounds fell within the appropriate retention time windows.

7. Matrix Spike/Matrix Spike Duplicate

Matrix spike and matrix spike duplicate data are used to assess the precision and accuracy of the analytical method.

No matrix spike or matrix spike duplicate samples were included in this sample delivery group.

8. Field Duplicates

No field duplicate samples were included in this sample delivery group.

9. System Performance and Overall Assessment

Overall system performance was acceptable. Other than for those deviations specifically mentioned in this review, the overall data quality is within the guidelines listed in the analytical method.

Data Validation Checksheets

Pesticide/PCB Data Validation Checklist

	YES	NO	NA
Data Completeness and Deliverables			
Is there a narrative or cover letter present?	X		
Are the samples numbers included in the narrative?	X		
Are the sample chain-of-custodies present?	X		
Do the chain-of-custodies indicate any problems with sample receipt or sample condition?		X	
Holding Times			
Have any holding times been exceeded?		X	
Surrogate Recovery			
Are the surrogate recovery forms present?	X		
Are all the samples listed on the appropriate surrogate recovery form?	X		
Are the outliers correctly marked with an asterisk?			X
Were recoveries of TCMX or DCB outside of specified limits for any sample or blank?		X	
If yes, were the samples reanalyzed?			X
Were the method blanks reanalyzed?			X
Matrix Spikes			
Is there a matrix spike recovery form present?		X	
Were matrix spikes analyzed at the required frequency?			X
How many spike recoveries were outside of QC limits?			
0 out of 0			
How many RPDs for matrix spike and matrix spike duplicate were outside of QC limits?			
0 out of 0			
Blanks			
Is the method blank summary form present?	X		
Has a method blank been analyzed for each set of samples or for each 20 samples, whichever is more frequent?	X		
Has an instrument blank been analyzed at the beginning of each 12 hour period following the initial calibration?	X		

Pesticide/PCB Data Validation Checklist - Page 2

	YES	NO	NA
Is the chromatographic performance acceptable for each instrument?	X		
Do any method/reagent/instrument blanks have positive results?		X	
Do any field/rinse blanks have positive results?			X
Are there field/rinse/equipment blanks associated with every sample?		X	
Calibration and GC Performance			
Are the following chromatograms and data printouts present for all samples, blanks, and MS/MSD?			
peak resolution check	X		
performance evaluation mixtures (PEM)	X		
Aroclors 1016, 1221, 1232, 1242, 1248, 1254, and 1260	X		
Toxaphene	X		
low points individual mixtures A & B (INDA and INDB)	X		
mid points INDA and INDB	X		
high points INDA and INDB	X		
instrument blanks	X		
Are Forms VI 1-4 present and complete for each column and analytical sequence?	X		
Are the linearity criteria for the initial analyses if INDA and INDB within limits for both columns?	X		
Is the resolution between any two adjacent peaks in the resolution check mixture > 60% for both columns?	X		
Is Form VII-1 present for each PEM analyzed for both columns?	X		
Has the individual % breakdown exceeded 20% on either column for:			
4,4'-DDT		X	
endrin		X	
Has the combined breakdown for 4,4'-DDT and endrin exceeded 30% on either column?		X	

Pesticide/PCB Data Validation Checklist - Page 3

	YES	NO	NA
Are all the relative percent difference (RPD) values for all PEM analytes < 25%?	X		
Have all samples been injected within a 12 hour period beginning with the injection of an instrument blank?	X		
Is Form VII-2 present and complete for each INDA and INDB analyzed?	X		
Are RPD values for all INDA and INDB compounds < 25%?	X		
Analytical Sequence Check			
Is Form VIII present and complete for each column and each period of analyses?	X		
Was the proper analytical sequence followed?	X		
Cleanup Efficiency Verification			
Is Form IX-1 present for each lot of Florisil cartridges used?	X		
Are all samples listed on the form?	X		
If GPC cleanup was performed, is Form IX-2 present?			X
Are percent recoveries of the compounds used to check the efficiency of the cleanup procedure within QC limits for:			
Florisil cartridge check (80-120%)	X		
GPC calibration (80-110%)			X
Pesticide/PCB Identification			
Is a Form X present for every sample in which a pesticide or PCB was detected?			X
Was GC/MS confirmation provided when required?			X
Is the percent difference (%D) calculated for the positive sample results on the two columns less than 25%?			X
Were there any false negatives?		X	
Compound Quantitation and Reported Detection Limits			
Are the reporting limits adjusted to reflect sample dilutions, and for soils, sample moisture?	X		

Pesticide/PCB Data Validation Checklist - Page 4

	YES	NO	NA
Chromatogram Quality			
Were the baselines stable?	X		
Were any electronegative displacement (negative peaks) or unusual peaks detected?		X	
Field Duplicates			
Were field duplicates submitted with the samples?		X	

Pesticide/PCB Qualifier Summary
Holding Time and Surrogates

Sample ID	Holding Time	Surrogates - Column 1		Surrogates - Column 2	
		TCX	DCB	TCX	DCB
A64008	OK	OK	OK	OK	OK
A64009					

Surrogates:
- TCX Tetrachloro-m-xylene
- DCB Decachlorobiphenyl

Qualifiers:
- D Surrogate diluted out
- ↑ Recovery high
- ↓ Recovery low

Unless otherwise noted, all samples are within specified limits.

sw44723

Pesticide/PCB Calibration Outliers

Instrument: 0850-1
Column: RTX-35

Date:			7/13/94	7/13	7/13	7/13			
Time:				0819	1625	2320			
Injection No.:			4-16	18	20-21	32			
	INDA/ INDB	PEM	Initial Cal.	PEM	INDA/B	PEM	INDA/B	PEM	INDA/B
			%RSD	%D	%D	%D	%D	%D	%D
alpha-BHC	INDA	X	OK	OK	OK	OK			
beta-BHC	INDB	X							
delta-BHC	INDB								
gamma-BHC (Lindane)	INDA	X							
Heptachlor	INDA								
Aldrin	INDB								
Heptaclor epoxide	INDB								
Endosulfan I	INDA								
Dieldrin	INDA								
4,4'-DDE	INDB								
Endrin	INDA	X							
Endosulfan II	INDB								
4,4'-DDD	INDA								
Endosulfan sulfate	INDB								
4,4'-DDT	INDA	X							
Methoxychlor	INDA	X							
Endrin ketone	INDB								
Endrin aldehyde	INDB								
alpha-Chlordane	INDB								
gamma-Chlordane	INDB								
Toxaphene									
Aroclor 1016									
Aroclor 1221									
Aroclor 1232									
Aroclor 1242									
Aroclor 1248									
Aroclor 1254									
Aroclor 1260									

Pesticide/PCB Calibration Outliers - Page 2

Date:			7/13/94	7/13	7/13	7/13			
Time:				0819	1625	2320			
Injection No.:			4-16	18	20-21	32			
	INDA/ INDB	PEM	Initial Cal.	PEM	INDA/B	PEM	INDA/B	PEM	INDA/B
			%RSD	%D	%D	%D	%D	%D	%D
Tetrachloro-m-xylene	INDA/B	X							
Decachlorobiphenyl	INDA/B	X							
Affected Samples:									

sw44723

Pesticide/PCB Calibration Outliers - Page 3

Instrument: 0850-2
Column: RTX-1710

Date:			7/13/94	7/13	7/13	7/13			
Time:				0819	1625	2320			
Injection No.:			4-16	18	20-21	32			
	INDA/ INDB	PEM	Initial Cal.	PEM	INDA/B	PEM	INDA/B	PEM	INDA/B
			%RSD	%D	%D	%D	%D	%D	%D
alpha-BHC	INDA	X	OK	OK	OK	OK			
beta-BHC	INDB	X							
delta-BHC	INDB								
gamma-BHC (Lindane)	INDA	X							
Heptachlor	INDA								
Aldrin	INDB								
Heptaclor epoxide	INDB								
Endosulfan I	INDA								
Dieldrin	INDA								
4,4'-DDE	INDB								
Endrin	INDA	X							
Endosulfan II	INDB								
4,4'-DDD	INDA								
Endosulfan sulfate	INDB								
4,4'-DDT	INDA	X							
Methoxychlor	INDA	X							
Endrin ketone	INDB								
Endrin aldehyde	INDB								
alpha-Chlordane	INDB								
gamma-Chlordane	INDB								
Toxaphene									
Aroclor 1016									
Aroclor 1221									
Aroclor 1232									
Aroclor 1242									
Aroclor 1248									

sw44723

Pesticide/PCB Calibration Outliers - Page 4

Date:			7/13/94	7/13	7/13	7/13			
Time:				0819	1625	2320			
Injection No.:			4-16	18	20-21	32			
	INDA/ INDB	PEM	Initial Cal.	PEM	INDA/B	PEM	INDA/B	PEM	INDA/B
			%RSD	%D	%D	%D	%D	%D	%D
Aroclor 1254									
Aroclor 1260									
Tetrachloro-m-xylene	INDA/B	X							
Decachlorobiphenyl	INDA/B	X							
Affected Samples:									

sw44723

Corrected Sample Analysis Data Sheets

1D

PESTICIDE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

A64008
~~A66008~~

Lab Name: AQUATEC INC Contract: 91082

Lab Code: AQUAI Case No.: OLM SAS No.: SDG No.: 44723

Matrix: (soil/water) WATER Lab Sample ID: 223719

Sample wt/vol: 998.0 (g/mL) ML Lab File ID:

% Moisture: decanted: (Y/N) Date Received: 06/11/94

Extraction: (SepF/Cont/Sonc) SEPF Date Extracted: 06/14/94

Concentrated Extract Volume: 10000 (uL) Date Analyzed: 07/13/94

Injection Volume: 1.00 (uL) Dilution Factor: 1.00

GPC Cleanup: (Y/N) N pH: Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
319-84-6	alpha-BHC	0.050	U
319-85-7	beta-BHC	0.050	U
319-86-8	delta-BHC	0.050	U
58-89-9	gamma-BHC (Lindane)	0.050	U
76-44-8	Heptachlor	0.050	U
309-00-2	Aldrin	0.050	U
1024-57-3	Heptachlor epoxide	0.050	U
959-98-8	Endosulfan I	0.050	U
60-57-1	Dieldrin	0.10	U
72-55-9	4,4'-DDE	0.10	U
72-20-8	Endrin	0.10	U
33213-65-9	Endosulfan II	0.10	U
72-54-8	4,4'-DDD	0.10	U
1031-07-8	Endosulfan sulfate	0.10	U
50-29-3	4,4'-DDT	0.10	U
72-43-5	Methoxychlor	0.50	U
53494-70-5	Endrin ketone	0.10	U
7421-93-4	Endrin aldehyde	0.10	U
5103-71-9	alpha-Chlordane	0.050	U
5103-74-2	gamma-Chlordane	0.050	U
8001-35-2	Toxaphene	5.0	U
12674-11-2	Aroclor-1016	1.0	U
11104-28-2	Aroclor-1221	2.0	U
11141-16-5	Aroclor-1232	1.0	U
53469-21-9	Aroclor-1242	1.0	U
12672-29-6	Aroclor-1248	1.0	U
11097-69-1	Aroclor-1254	1.0	U
11096-82-5	Aroclor-1260	1.0	U

1D

PESTICIDE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

A64009
~~A66009~~

Lab Name: AQUATEC INC Contract: 91082

Lab Code: AQUAI Case No.: OLM SAS No.: SDG No.: 44723

Matrix: (soil/water) WATER Lab Sample ID: 223720

Sample wt/vol: 1000 (g/mL) ML Lab File ID:

% Moisture: decanted: (Y/N) Date Received: 06/11/94

Extraction: (SepF/Cont/Sonc) SEPF Date Extracted: 06/14/94

Concentrated Extract Volume: 10000 (uL) Date Analyzed: 07/13/94

Injection Volume: 1.00 (uL) Dilution Factor: 1.00

GPC Cleanup: (Y/N) N pH: Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
319-84-6	alpha-BHC	0.050	U
319-85-7	beta-BHC	0.050	U
319-86-8	delta-BHC	0.050	U
58-89-9	gamma-BHC (Lindane)	0.050	U
76-44-8	Heptachlor	0.050	U
309-00-2	Aldrin	0.050	U
1024-57-3	Heptachlor epoxide	0.050	U
959-98-8	Endosulfan I	0.050	U
60-57-1	Dieldrin	0.10	U
72-55-9	4,4'-DDE	0.10	U
72-20-8	Endrin	0.10	U
33213-65-9	Endosulfan II	0.10	U
72-54-8	4,4'-DDD	0.10	U
1031-07-8	Endosulfan sulfate	0.10	U
50-29-3	4,4'-DDT	0.10	U
72-43-5	Methoxychlor	0.50	U
53494-70-5	Endrin ketone	0.10	U
7421-93-4	Endrin aldehyde	0.10	U
5103-71-9	alpha-Chlordane	0.050	U
5103-74-2	gamma-Chlordane	0.050	U
8001-35-2	Toxaphene	5.0	U
12674-11-2	Aroclor-1016	1.0	U
11104-28-2	Aroclor-1221	2.0	U
11141-16-5	Aroclor-1232	1.0	U
53469-21-9	Aroclor-1242	1.0	U
12672-29-6	Aroclor-1248	1.0	U
11097-69-1	Aroclor-1254	1.0	U
11096-82-5	Aroclor-1260	1.0	U

INORGANIC ANALYSES

Introduction

Analyses were performed according to USEPA CLP SOW ILM02.2.

The data validation process is intended to evaluate the data on a technical basis rather than a contract compliance basis. It is assumed that the data package represents the best efforts of the laboratory and had already been subjected to adequate and sufficient quality review prior to submission for validation. During the validation process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this valuation, qualifier codes may be added, deleted, or modified by the data validator. Validator qualified results are annotated with the following codes in accordance with National Functional Guidelines:

Concentration (C) qualifiers:

- U The analyte was analyzed for but not detected. The associated value is the analyte instrument detection limit.
- B The reported value was obtained from a reading less than the contract required detection limit (CRDL) but greater than or equal to the instrument detection limit (IDL).

Quantitation (Q) qualifiers:

- E The reported value is estimated due to the presence of interference.
- M Duplicate injection precision not met.
- N Spiked sample recovery not within control limits.
- S Reported value was determined by the method of standard additions (MSA).
- W Post-digestion spike for Furnace-AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
- * Duplicate analysis not within control limits.
- + Correlation coefficient for MSA is less than 0.995.

Method (M) qualifiers:

- P ICP
- CV Cold vapor AA
- AS Semi-automated spectrometric

Validation qualifiers:

J The analyte was positively identified; however, the associated numerical value is an estimated concentration only.

UJ The analyte was not detected above the reported sample detection limit. However, the reported limit is approximate and may or may not represent the actual limit of detection.

R The sample results are rejected.

Two facts should be noted by all data users. First, the "R" flag means that the associated value is unusable. In other words, due to significant QC problems, the analysis is invalid and provides no information as to whether the compound is present or not. "R" values should not appear on data tables because they cannot be relied upon, even as a last resort. The second fact to keep in mind is that no compound concentration, even if it has passed all QC test, is guaranteed to be accurate. Strict QC serves to increase confidence in data but any value potentially contains error.

Data Assessment

1. Holding Time

The specified holding times for inorganic analyses under CLP protocols is as follows. All holding times are measured from validated time of sample receipt (VTSR).

Metals (other than mercury)	180 days
Mercury	26 days
Cyanide	12 days

The technical holding times (measured from date of collection) are as follows:

Metals (other than mercury)	180 days
Mercury	28 days
Cyanide	14 days

All samples were analyzed within specified holding times.

2. Blank Contamination

Quality assurance blanks, i.e., method, field, or rinse blanks, are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Method blanks (including initial and continuing calibration blanks and preparation blanks) measure laboratory contamination. Field and rinse blanks measure cross contamination of samples during field operations.

All calibration and preparation blanks were found to be acceptable, with no analytes detected above the CRDL.

3. Calibration

Satisfactory instrument calibration is established to insure that the instrument is capable of producing acceptable quantitative data. An initial calibration demonstrates that the instrument is capable of giving acceptable performance at the beginning of an experimental sequence. The continuing calibration verifies that the instrument is giving satisfactory daily performance.

3.1 Initial Calibration

The proper number and type of standards were analyzed. The correlation coefficient of the initial calibration was greater than 0.995 for all non-ICP analytes.

3.2 Continuing Calibration

All continuing calibration verification standards were acceptable.

3.3 CRDL Standard

All CRDL standard recoveries were within acceptable limits.

4. Matrix Spike/Laboratory Duplicate

Matrix spike and laboratory duplicate data are used to assess the precision and accuracy of the analytical method.

4.1 Matrix spike

No matrix spike samples were included in this sample delivery group.

4.2 Laboratory Duplicate

No laboratory duplicate samples were included in this sample delivery group.

5. Field Duplicate

No field duplicate samples were included in this sample delivery group.

6. Laboratory Control Sample (LCS)

All LCS recoveries were within control limits.

7. Serial Dilution

The percent difference for sodium was above 10% in the serial dilution. All data for sodium have been flagged as estimated based on the deviation.

8. Furnace QC

No furnace analyses were performed.

9. Method of Standard Additions (MSA)

No MSA analyses were performed.

10. System Performance and Overall Assessment

Overall system performance was acceptable. Other than for those deviations specifically mentioned in this review, the overall data quality is within the guidelines specified in the method.

Data Validation Checksheets

Inorganic Data Validation Checklist

	YES	NO	NA
Data Completeness and Deliverables			
Is there a narrative or cover letter present?	X		
Are the sample numbers included in the narrative?	X		
Are the sample chain-of-custodies present?	X		
Do the chain-of-custodies indicate any problems with sample receipt or sample condition?		X	
Form I to IX			
Are all the Form I through Form IX labeled with:			
Laboratory name?	X		
Sample No.?	X		
SDG No.?	X		
Correct units?	X		
Matrix?	X		
Raw Data			
Is the digestion log for flame AA/ICP present?	X		
Is the digestion log for furnace AA present?			X
Is the distillation log for mercury present?	X		
Is the distillation log for cyanides present?	X		
Are pH values listed?	X		
pH for metals analyses <2 (waters)?	X		
pH for cyanide analyses >12 (waters)?	X		
Percent solids calculation present for soils/sediments?			X
Are preparation dates present on sample preparation logs/bench sheets?	X		
Are the measurement read out records present for:			
ICP	X		
Flame AA			X
Furnace AA			X
Mercury	X		
Cyanides	X		

sw44723

Inorganic Data Validation Checklist - Page 2

	YES	NO	NA
Is the data legible?	X		
Is the data properly labeled?	X		
Holding Times			
Were mercury analyses performed within 28 days?	X		
Were cyanide distillations performed within 14 days?	X		
Were other metal analysis performed within 6 months?	X		
Form I (Final Data)			
Are all forms complete?	X		
Are correct units indicated on Form I's?	X		
Are soil sample results for each parameter corrected for percent solids?			X
Are all "less than IDL" values properly coded with "U"?	X		
Are the correct concentration qualifiers used with final data?	X		
Was a brief physical description of samples given on Form I's?	X		
Calibration			
Is a record of at least 2 point calibration present for ICP analysis?	X		
Is a record of 5 point calibration present for Hg analysis?	X		
Is a record of 4 point calibration present for:			
Flame AA?			X
Furnace AA?			X
Cyanides?	X		
Is one calibration standard at the CRDL level for all AA (except Hg) and cyanides analyses?	X		
Is correlation coefficient less than .995 for:			
Mercury Analysis?	X		
Cyanide Analysis?	X		
Atomic Absorption Analysis?			X

Inorganic Data Validation Checklist - Page 3

	YES	NO	NA
Form II A (Initial and Continuing Calibration Verification)			
Present and complete for every metal and cyanide?	X		
Are all calibration standards (initial and continuing) within control limits for:			
Metals (90-110 %R)?	X		
Hg (80-120 %R)?	X		
Cyanides (85-115 %R)?	X		
Was continuing calibration performed every 10 samples or every 2 hours?	X		
Was the ICV for cyanides distilled?	X		
Form II B (CRDL Standards for AA and ICP)			
Was a CRDL standard (CRA) analyzed after initial calibration for all AA metals (except Hg)?			X
Was a mid-range calibration verification standard distilled and analyzed for cyanide analysis?	X		
Was a 2xCRDL (or 2xIDL when IDL>CRDL) analyzed (CRI) for each ICP run?	X		
Was CRI analyzed after ICV/ICB and before the final CCV/CCB, and twice every eight hours of ICP run?	X		
Are CRA and CRI standards within control limits for metals (60-120 %R)?	X		
Is mid-range standard within control limits for cyanide (80-120 %R)	X		
Form III (Initial and Continuing Calibration Blanks)			
Present and complete?	X		
Was an initial calibration blank analyzed?	X		
Was a continuing calibration blank analyzed after every 10 samples or every 2 hours (which ever is more frequent)?	X		
Are all calibration blanks (when IDL<CRDL) less than or equal to the Contract Required Detection Limits (CRDLs)?	X		
Are all calibration blanks less than two times Instrument Detection Limit (when IDL>CRDL)?			X

	YES	NO	NA
Form III (Preparation Blank)			
Was one prep. blank analyzed for:			
each Sample Delivery Group SDG)?	X		
each batch of digested samples?	X		
each matrix type?	X		
Is concentration of prep. blank value greater than the CRDL when IDL is less than or equal to CRDL?		X	
If yes, is the concentration of the sample with the least concentrated analyte less than 10 times the prep. blank?			X
Is concentration of prep. blank value less than two times IDL, when IDL is greater than CRDL?			X
Is concentration of prep. blank below the negative CRDL?		X	
Form IV (ICP Interference Check Sample)			
Present and complete?	X		
Was ICS analyzed at beginning and end of run (or at least twice every 8 hours)?	X		
Are all Interference Check Sample results inside the control limits (±20%)?	X		
If no, is concentration of Al, Ca, Fe, or Mg lower than the respective concentration in ICS?			X
Form V A (Spiked Sample Recovery - Pre-Digestion/Pre-Distillation)			
Present and complete for:			
each SDG?		X	
each matrix type?		X	
Was field blank used for spiked sample?		X	
Are all recoveries within control limits (75-125)?			X
If no, is sample concentration greater than or equal to four times spike concentration?			X
Are results outside the control limits (75-125%) flagged with "N" on Form I's and Form VA?			X

	YES	NO	NA
Aqueous			
Are any spike recoveries:			
less than 30%?			X
between 30-74%?			X
between 126-150%?			X
greater then 150%?			X
Soil/Sediment			
Are any spike recoveries:			
less than 10%?			X
between 10-74%?			X
between 126-200%?			X
greater than 200%?			X
Form VI (Lab Duplicates)			
Present and complete for:			
each SDG?		X	
each matrix type?		X	
Was field blank used for duplicate analysis?		X	
Are all values within control limits (RPD 20% or difference ≤ ±CRDL)?			X
If no, are all results outside the control limits flagged with an * on Form I's and VI?			X
Aqueous			
Is any RPD greater than 50% where sample and duplicate are both greater than or equal to 5 times CRDL?			X
Is any difference between sample and duplicate greater than CRDL where sample and/or duplicate is less than 5 times CRDL?			X
Soil/Sediment			
Is any RPD (where sample and duplicate are both greater than or equal to 5 times CRDL) > 100%?			X
Is any difference between sample and duplicate (where sample and/or duplicate is less than 5xCRDL) > 2xCRDL?			X

	YES	NO	NA
Field Duplicates			
Were field duplicates analyzed?		X	
Aqueous			
is any RPD greater than 50% where sample and duplicate are both greater than or equal to 5 times CRDL?			X
Is any difference between sample and duplicate greater than CRDL where sample and/or duplicate is less than 5 times CRDL?			X
Soil/Sediment			
Is any RPD (where sample and duplicate are both greater than 5 times CRDL) > 100%?			X
Is any difference between sample and duplicate (where sample and/or duplicate is less than 5x CRDL) >2xCRDL?			X
Form VII (Laboratory Control Sample)			
Was one LCS prepared and analyzed for:			
each SDG?	X		
each batch samples digested/distilled?	X		
Aqueous LCS			
Is any LCS recovery:			
less than 50%?		X	
between 50% and 79%?		X	
between 121% and 150%?		X	
greater than 150%?		X	
Solid LCS			
Is LLCS "Found" value higher than the control limits on Form VII?			X
Is LCS "Found" lower than the control limits on Form VII?			X
Form IX (ICP Serial Dilution)			
Was Serial Dilution analysis performed for:			
each SDG?	X		
each matrix type?	X		

	YES	NO	NA
Was field blank(s) used for Serial Dilution Analysis?		X	
Are results outside control limit flagged with an "E"" on Form I's and Form IX when initial concentration on Form IX is equal to 50 times IDL or greater.	X		
Are any % difference values:			
> 10%?	X		
≥100%?		X	
Furnace Atomic Absorbtion (AA) QC Analysis			
Are duplicate injections present in furnace raw data (except during full Method of Standard Addition) for each sample analyzed be GFAA?			X
Do the duplicate injection readings agree within 20% Relative Standard Deviation (RSD) or coefficient of Variation (CV) for concentration greater than CRDL?			X
Was a dilution analyzed for sample with analytical spike recovery less than 40%?			X
Is analytical spike recovery outside the control limits (85-115%) for any sample?			X
Form VIII (Method of Standard Addition Results)			
Present?		X	
If no, is any Form I result coded with "S" or a "+"?		X	
Is coefficient of correlation for MSA less than 0.990 for any sample?			X
Was MSA required for any sample but not performed?		X	
Is coefficient of correlation for MSA less than 0.995?			X
Are MSA calculations outside the linear range of the calibration curve generated at the beginning of the analytical run?			X
Was proper quantitation procedure followed as outlined in the SOW on page E-23?			X
Dissolved/Total for Inorganic/Total Analytes			
Were any analyses performed for dissolved as well as total analytes on the same sample(s).		X	

	YES	NO	NA
Is the concentration of any dissolved (or inorganic) analyte greater than its total concentration by more than 10%? (if greater than CRDL)			X
Is the concentration of any dissolved (or inorganic) analyte greater than its total concentration by more than 50%?			X
Field Blank			
Is field blank concentration less than CRDL (or 2 x IDL when IDL > CRDL) for all parameters of associated aqueous and soil samples?			X
If no, was field blank value already rejected due to other QC criteria?			X
Form X, XI, XII (Verification of Instrumental Parameters)			
Is verification report present for :			
Instrument Detection Limits (quarterly)?	X		
ICP Interelement Correlation Factors (annually)?	X		
ICP Linear Ranges (quarterly)?	X		
Form X (Instrument Detection Limits)			
Are IDLs present for:			
all the analytes?	X		
all the instruments used?	X		
Is IDL greater than CRDL for any analyte?		X	
If yes, is the concentration of Form I of the sample analyzed on the instrument whose IDL exceeds CRDL, greater than 5 x IDL.			X
Was any sample result higher linear range of ICP.		X	
Was any sample result higher than the highest calibration standard for non-ICP parameters?		X	
If yes for any of the above, was the sample diluted to obtain the result on Form I?			X
Are percent solids in sediment(s):			
< 50%?			X
< 10%?			X

Corrected Sample Analysis Data Sheets

U.S. EPA - CLP

1

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

A64008
~~A66008~~

Lab Name: AQUATEC Contract: 91082

Lab Code: AQUAI Case No.: OLM SAS No.: SDG No.: 44723

Matrix (soil/water): WATER Lab Sample ID: 223719

Level (low/med): LOW Date Received: 06/11/94

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	200			P
7440-36-0	Antimony	1.3	U		P
7440-38-2	Arsenic	6.2	B		P
7440-39-3	Barium	102	B		P
7440-41-7	Beryllium	0.10	U		P
7440-43-9	Cadmium	0.20	U		P
7440-70-2	Calcium	80000			P
7440-47-3	Chromium	1.3	B		P
7440-48-4	Cobalt	0.50	U		P
7440-50-8	Copper	2.1	B		P
7439-89-6	Iron	1080			P
7439-92-1	Lead	5.0			P
7439-95-4	Magnesium	25000			P
7439-96-5	Manganese	124			P
7439-97-6	Mercury	0.03	U		CV
7440-02-0	Nickel	1.1	B		P
7440-09-7	Potassium	1470	B		P
7782-49-2	Selenium	2.7	U		P
7440-22-4	Silver	0.50	U		P
7440-23-5	Sodium	21200		EJ	P
7440-28-0	Thallium	1.9	U		P
7440-62-2	Vanadium	1.1	B		P
7440-66-6	Zinc	6.9	B		P
	Cyanide	5.0	U		AS

Color Before: COLORLESS Clarity Before: CLEAR Texture:

Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:

U.S. EPA - CLP

1

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

A64009
~~A66009~~

Lab Name: AQUATEC Contract: 91082

Lab Code: AQUAI Case No.: OLM SAS No.: SDG No.: 44723

Matrix (soil/water): WATER Lab Sample ID: 223720

Level (low/med): LOW Date Received: 06/11/94

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	179	B		P
7440-36-0	Antimony	1.3	U		P
7440-38-2	Arsenic	5.2	B		P
7440-39-3	Barium	100	B		P
7440-41-7	Beryllium	0.10	U		P
7440-43-9	Cadmium	0.20	U		P
7440-70-2	Calcium	77800			P
7440-47-3	Chromium	1.2	B		P
7440-48-4	Cobalt	0.50	U		P
7440-50-8	Copper	1.3	B		P
7439-89-6	Iron	1110			P
7439-92-1	Lead	1.5	B		P
7439-95-4	Magnesium	24500			P
7439-96-5	Manganese	142			P
7439-97-6	Mercury	0.04	B		CV
7440-02-0	Nickel	0.87	B		P
7440-09-7	Potassium	1430	B		P
7782-49-2	Selenium	2.7	U		P
7440-22-4	Silver	0.50	U		P
7440-23-5	Sodium	20400		EJ	P
7440-28-0	Thallium	1.9	U		P
7440-62-2	Vanadium	1.0	B		P
7440-66-6	Zinc	7.4	B		P
	Cyanide	5.0	U		AS

Color Before: COLORLESS Clarity Before: CLEAR Texture:

Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:

CONVENTIONAL ANALYSES

Introduction

Analyses were performed according to the following method:

Total Suspended Solids	EPA 160.2

The data validation process is intended to evaluate the data on a technical basis. It is assumed that the data package represents the best efforts of the laboratory and had already been subjected to adequate and sufficient quality review prior to submission for validation.

During the validation process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this valuation, qualifier codes may be added, deleted, or modified by the data validator. Validator qualified results are annotated with the following codes in accordance with National Functional Guidelines:

- U The analyte was analyzed for but not detected. The associated value is the analyte method detection limit.
- J The analyte was positively identified; however, the associated numerical value is an estimated concentration only.
- UJ The analyte was not detected above the reported sample detection limit. However, the reported limit is approximate and may or may not represent the actual limit of detection.
- R The sample results are rejected.

Two facts should be noted by all data users. First, the "R" flag means that the associated value is unusable. In other words, due to significant QC problems, the analysis is invalid and provides no information as to whether the compound is present or not. "R" values should not appear on data tables because they cannot be relied upon, even as a last resort. The second fact to keep in mind is that no compound concentration, even if it has passed all QC test, is guaranteed to be accurate. Strict QC serves to increase confidence in data but any value potentially contains error.

Data Assessment

1. Holding Time

All samples were analyzed within the method-specified holding time.

2. Blank Contamination

Quality assurance blanks, i.e., method, field, or rinse blanks are prepared to identify any contamination which may have been introduced in to the samples during sample preparation or field activity. Method blanks (including initial and continuing calibration blanks and preparation blanks) measure laboratory contamination. Field and rinse blanks measure cross contamination of samples during field operations.

No method blank contamination was reported.

3. Calibration

Satisfactory instrument calibration is established to insure that the instrument is capable of producing acceptable quantitative data. An initial calibration demonstrates that the instrument is capable of giving acceptable performance at the beginning of an experimental sequence. The continuing calibration verifies that the instrument is giving satisfactory daily performance.

3.1 Initial Calibration

Total suspended solids analyses have no calibration correlation coefficient requirements.

3.2 Continuing Calibration

Total suspended solids analyses have no continuing calibration verification standard requirements.

4. Laboratory Duplicate

Laboratory duplicate data are used to assess the precision of the analytical method.

No laboratory duplicate data was included in the data package.

5. Field Duplicates

No field duplicates were included in this data set.

6. Laboratory Control Sample (LCS)

No LCS recoveries were included in the data package.

7. System Performance and Overall Assessment

Overall system performance was acceptable. Other than for those deviations specifically mentioned in this review, the overall data quality is within the guidelines specified in the method.

Total Suspended Solids Results

Total Suspended Solids Results

Sample ID	Lab ID	Matrix	Result (mg/l)
A64008	223719	surface water	14.3
A64009	223720	surface water	11.2

CHAIN OF CUSTODY

BLASLAND & BOUCK ENGINEERS, P.C.
6723 Towpath Road, Box 66
Syracuse, New York 13214-0066
TEL: 315-446-9120
FAX: 315-449-0017

CHAIN OF CUSTODY RECORD

PROJ. NO.: 645.51
PROJECT NAME: Kalamazoo River / Portage Creek
SAMPLERS: (Signature)

STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION	Number of Containers	Pesticides + PCBs	Semi Volatiles	TAL - METALS	CN -	TSS	Volatiles - VOAs	Temp	REMARKS
SWP-2	6-9	13:30		✓	A66008	9	2	2	1	1	1	2		Do CLP TCL/TAL
SWP-1	6-9	14:45		✓	A66009	9	2	2	1	1	1	2		
					Temp	1							1	Cooler # - LTI # - 3
						19								
														Please Return Cooler
														LIMNO-TECH
														1804 NAZARETH Rd
														KALAMAZOO MI 49001
														(616) -388-2038

Relinquished by: (Signature)	DATE	TIME	Received by: (Signature)	Relinquished by: (Signature)	DATE	TIME	Relinquished by: (Signature)
	6-10-94	18:00					
Relinquished by: (Signature)	DATE	TIME	Received by: (Signature)	Relinquished by: (Signature)	DATE	TIME	Relinquished by: (Signature)
Relinquished by: (Signature)	DATE	TIME	Received for Laboratory by: (Signature)	DATE	TIME	Remarks:	
				6/11/94	1130		

7/12/93
1393786HCDR

Distribution: Original Accompanies Shipment; Copy to Coordinator Field Files

KB54502126

MEMORANDUM

BBL
BLASLAND, BOUCK & LEE, INC.
engineers & scientists

To: Doug Cowin **Date:** 7/16/99

From: Laurie Indick **cc:** MPB, AEG, file

Re: KRSG - Allied OU Sampling

Several surface water samples collected at the Allied-OU in 1993 and 1994 were assigned identification numbers which had been reserved for groundwater samples. In addition, two surface water samples collected in September 1994 were assigned non-standard identification numbers. To eliminate any confusion regarding the nature of the samples and to comply with database storage requirements, the numbers have been revised, as follows:

Sample Date	Original Identification Number (list on COC)	Revised Number
8/24/99	A66000	A64000
	A66001	A64001
	A66002	A64002
12/15/93	A66003	A64003
	A66004	A64004
	A66005	A64005
	A66006	A64006
	A66007	A64007
6/9/94	A66008	A64008
	A66009	A64009
9/8/94	A66010	A64010
	A66011	A64011
9/22/94	SWP-1	A64014
	SWP-2	A64013

lai/

DATA REVIEW FOR

ALLIED PAPER, INC./PORTAGE CREEK/KALAMAZOO RIVER
SUPERFUND SITE

SDG# 46546

PCB ANALYSES

ALLIED OU
SURFACE WATER INVESTIGATION

Analyses performed by:

Aquatec, Inc.
Colchester, Vermont

Review performed by:

Blasland, Bouck & Lee, Inc.
Syracuse, New York

Summary

The following is an assessment of the PCB data package for SDG# 46546 for the Surface Water Investigation sampling of the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site. Included with this assessment are the data review check sheets used in the review of the package and sample results for PCB and total suspended solids analyses. Analyses were performed on the following samples:

Sample ID	Lab ID	Matrix	Sample Date	Analyses	
				PCB	TSS
A64010	233760	water	9/8/94	x	x
A64011	233761	water	9/8/94	x	x

PCB ANALYSES

Introduction

Analyses were performed according to the USEPA SW-846 method 8081, modified for PCB only analysis.

The data review process is intended to evaluate the data on a technical basis. It is assumed that the data package represents the best efforts of the laboratory and had already been subjected to adequate and sufficient quality review prior to submission.

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer. Results are qualified with the following codes in accordance with National Functional Guidelines:

- U The compound was analyzed for but not detected. The associated value is the compound quantitation limit.
- J The compound was positively identified; however, the associated numerical value is an estimated concentration only.
- B The compound has been found in the sample as well as its associated blank, its presence in the sample may be suspect.
- N The analysis indicates the presence of a compound for which there is presumptive evidence to make a tentative identification.
- JN The analysis indicates the presence of a compound for which there is presumptive evidence to make a tentative identification. The associated numerical value is an estimated concentration only.
- E The compound was quantitated above the calibration range.
- D Concentration is based on a diluted sample analysis.
- UJ The compound was not detected above the reported sample quantitation limit. However, the reported limit is approximate and may or may not represent the actual limit of quantitation.
- R The sample results are rejected.

Two facts should be noted by all data users. First, the "R" flag means that the associated value is unusable. In other words, due to significant QC problems, the analysis is invalid and provides no information as to whether the compound is present or not. "R" values should not appear on data tables because they cannot be relied upon, even as a last resort. The second fact to keep in mind is that no compound concentration, even if it has passed all QC test, is guaranteed to be accurate. Strict QC serves to increase confidence in data but any value potentially contains error.

The data presented in the package has been derived using a procedure developed by Aquatec, Inc. in an attempt to improve the analytical process of calibration, identification, and quantitation of PCBs as Aroclors. Key components of this procedure include:

Calibration

The response function of the electron capture detector is inherently non-linear, and while significant linearization is achieved for this detector by electronic means, some non-linearity remains. Power function linearization is used to "straighten the curve" and allow the use of response factors for calibration purposes.

During the initial calibration a response factor is calculated for each peak in the individual Aroclors.

A weighted response factor calculation has been used to adjust for non-linearity at the low end of the calibration curve.

Identification

Peak retention times are relative. Retention times are in set windows relative to the time markers DCB and TCMX. Time markers adjust for minor variations in column flow or instrument condition and allow the use of very tight windows which minimizes the number of both false positive and false negative peak identifications.

The determination of "which Aroclor or mixture of Aroclors will produce a chromatogram most similar to that of the residue" is made by expressing the unknown sample chromatogram as a linear combination of the Aroclors. The "most similar" Aroclor or mixture of Aroclors is determined by using a least squares minimization of the difference between the unknown chromatogram and the linear combination of Aroclors. This is similar to the procedure presented by L.E. Slivon, P.M. Schumacher and A. Alford-Stevens for the determination of Aroclor composition from GC/MS level of chlorination results.

Identification/quantitation of Aroclors in samples is based on the combined response of two columns, typically RTX-5 and RTX-35. The pooling of response combines the unique qualities of both columns to derive a more defined Aroclor pattern which less likely to be affected by interferents. Identification/quantitation data for the individual columns is provided in the package and can be used as a check on the combined column results.

Data Assessment

1. Holding Time

The QAPP-specified holding times for PCB analyses of water samples are 5 days from date of sample receipt to extraction and 40 days from extraction to analysis. The technical holding times are 7 days from collection to extraction and 40 days to analysis.

All samples were extracted and analyzed within the specified holding times.

2. Blank Contamination

Quality assurance blanks, i.e., method, field or rinse blanks, are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Method blanks measure laboratory contamination. Field and rinse blanks measure contamination of samples during field operations.

No target compounds were detected in the method blank.

3. System Performance

The system performance was acceptable for both columns.

4. Calibration

Satisfactory instrument calibration is established to insure that the instrument is capable of producing acceptable quantitative data. An initial calibration demonstrates that the instrument is capable of giving acceptable performance at the beginning of an experimental sequence. The continuing calibration verifies that the instrument is giving satisfactory daily performance.

4.1 Initial Calibration

The method allows a maximum RSD of 20%. The %RSD was within acceptable limits for all Aroclors.

4.2 Continuing Calibration

A maximum %D of 15 is allowed. All continuing calibrations were within the specified limits.

5. Surrogates / System Monitoring Compounds

All samples to be analyzed for organic compounds are spiked with surrogate compounds prior to sample preparation to evaluate overall laboratory performance and efficiency of the analytical technique.

All surrogate recoveries were within control limits.

6. Compound Identification

The determination of Aroclor presence is made by expressing the unknown sample chromatogram as a linear combination of the Aroclors. The most similar Aroclor or mixture of Aroclors is determined by using a least squares minimization of the difference between the unknown chromatogram and the linear combination of Aroclors.

Identification/quantitation of Aroclors is based on the combined response of the RTX-5 and RTX-35 columns. Identification/quantitation data for the individual columns is provided in the package and has been used as a check on the combined column results.

A review of the sample chromatograms indicate that the Aroclors have been correctly identified/quantitated.

7. Matrix Spike/Matrix Spike Duplicate/Matrix Spike Blank

Matrix spike and matrix spike duplicate data are used to assess the precision and accuracy of the analytical method.

No matrix spike or matrix spike duplicate samples were included in this sample delivery group. All recoveries for the matrix spike blank were, however, within control limits.

8. Field Duplicates

No field duplicates were included in this sample delivery group.

9. System Performance and Overall Assessment

Overall system performance was acceptable. Other than for those deviations specifically mentioned in this review, the overall data quality is within the guidelines listed in the analytical method.

DATA REVIEW CHECKLIST

PCB Data Review Checklist

	YES	NO	NA
Data Completeness and Deliverables			
Is there a narrative or cover letter present?	X		
Are the sample numbers included in the narrative?	X		
Are the sample chain-of-custodies present?	X		
Do the chain-of-custodies indicate any problems with sample receipt or sample condition?		X	
Holding Times			
Have any holding times been exceeded?		X	
Surrogate Recovery			
Are surrogate recovery forms present?	X		
Are all the samples listed on the appropriate surrogate recovery form?	X		
Are the outliers correctly marked with an asterisk?			X
Were recoveries of TCMX or DCB outside of specified limits for any sample or blank?		X	
If yes, were the samples reanalyzed?			X
Matrix Spikes			
Is there a matrix spike recovery form present?		X	
Were matrix spikes analyzed at the required frequency?			X

How many spike recoveries were outside of QC limits?

0 out of 0

How many RPDs for matrix spike and matrix spike duplicate were outside of QC limits?

0 out of 0

	YES	NO	NA
Blanks			
Is a Method Blank Summary Form present?	X		
Has a method blank been analyzed for each set of samples or for each 20 samples, whichever is more frequent?	X		
Is the chromatographic performance acceptable for each instrument?	X		
Do any method/reagent/instrument blanks have positive results?		X	

PCB Data Review Checklist - Page 2

	YES	NO	NA
Do any field/rinse blanks have positive results?			X
Are there field/rinse/equipment blanks associated with every sample?		X	
Calibration and GC Performance			
Are the following chromatograms and data printouts present?			
Aroclor 1016/1260	X		
Aroclor 1221	X		
Aroclor 1232	X		
Aroclor 1242	X		
Aroclor 1248	X		
Aroclor 1254	X		
Are Initial Calibration Summary Forms present and complete for each column and analytical sequence?	X		
Are the linearity criteria for the initial analyses within limits for both columns (20% RSD)	X		
Have all samples been injected within a 12 hour period beginning with the injection of an instrument blank?	X		
Is a Calibration Verification Summary Form present and complete for each continuing standard analyzed?	X		
Are %D values for all compounds within limits (less than 15%)?	X		
Analytical Sequence Check			
Is a analytical sequence form present and complete for each column and each period of analyses?	X		
Was the proper analytical sequence followed?	X		
Cleanup Efficiency Verification			
If GPC cleanup was performed, is Gel Permeation Chromatography Check Form present?		X	
Are percent recoveries of the compounds used to check the efficiency of the cleanup procedure within QC limits?			X

	YES	NO	NA
PCB Identification			
Is both a combined and single column Aroclor Identification Report present for every sample?	X		
Do the combined column and individual column Aroclor identifications agree?	X		
Were there any false negatives?		X	
Was GC/MS confirmation provided when required?			X
Compound Quantitation and Reported Detection Limits			
Are the reporting limits adjusted to reflect sample dilutions, and for soils, sample moisture?	X		
Chromatogram Quality			
Were the baselines stable?	X		
Were any electronegative displacement (negative peaks) or unusual peaks detected?		X	
Field Duplicates			
Were field duplicates submitted with the samples?		X	

PCB Holding Time and Surrogate Recovery Summary

Sample ID	Holding Time	Surrogates - Column 1		Surrogates - Column 2	
		TCX	DCB	TCX	DCB
A64010	OK for all samples	ok	ok	ok	ok
A64011					

Surrogate Standards
TCX Tetrachloro-m-xylene
DCB Decachlorobiphenyl

Qualifiers:
D Surrogates diluted out
↑ Recovery high
↓ Recovery low

Unless otherwise noted, all parameters are within specified limits.

PCB Calibration Summary

Instrument: HP2087
Column: RTX-35 / RTX-5

Date:	9/23/94 2048	9/27	9/27	9/27	9/27		
Time:	to 9/24/94 1554	1517	1551	2236	2310		
	Initial Cal.	Cont. Cal.	Cont. Cal.	Cont. Cal.	Cont. Cal.	Cont. Cal.	Cont. Cal.
	%RSD	%D	%D	%D	%D	%D	%D
Aroclor 1016	4.6 / 4.3						
Aroclor 1221	5.7 / 3.9						
Aroclor 1232	4.5 / 5.8						
Aroclor 1242	5.3 / 5.4		2.9				
Aroclor 1248	6.5 / 5.1	6.3		7.2			
Aroclor 1254	8.3 / 5.7				0.5		
Aroclor 1260	5.3 / 5.3						
Tetrachloro-m-xylene	9.4 / 10.3						
Decachlorobiphenyl	10.7 / 13.1						
Affected Samples:							

sw46546

CORRECTED ANALYSIS SUMMARY FORMS

FORM 1
AROCLOR ANALYSIS DATA SHEET

EPA SAMPLE NO.
A64010
~~A66~~010

Lab Name: Aquatec, Inc. Lab Code: AQUAI

Contract: 91082 Case: PCB SDG: 46546

Phase Type: Water
Phase Volume: 1001 (mL)
Injection Volume: 1.0 (uL)
Dilution Factor: 1.0

Lab Sample ID: 233760
Date Received: 09/10/94
Date Extracted: 09/15/94
Date Analyzed: 09/27/94
Sulfur Clean-up: N (Y/N)

CAS NO.	COMPOUND	CONCENTRATION (ug/L)	Q
12674-11-2	Aroclor-1016	0.050	U
11104-28-2	Aroclor-1221	0.050	U
11141-16-5	Aroclor-1232	0.050	U
53469-21-9	Aroclor-1242	0.050	U
12672-29-6	Aroclor-1248	0.050	U
11097-69-1	Aroclor-1254	0.050	U
11096-82-5	Aroclor-1260	0.050	U

FORM 1
AROCLOR ANALYSIS DATA SHEET

EPA SAMPLE NO.
A64011
~~A66011~~

Lab Name: Aquatec, Inc. Lab Code: AQUAI

Contract: 91082 Case: PCB SDG: 46546

Phase Type: Water
Phase Volume: 1000 (mL)
Injection Volume: 1.0 (uL)
Dilution Factor: 1.0

Lab Sample ID: 233761
Date Received: 09/10/94
Date Extracted: 09/15/94
Date Analyzed: 09/27/94
Sulfur Clean-up: N (Y/N)

CAS NO.	COMPOUND	CONCENTRATION (ug/L)	Q
12674-11-2	Aroclor-1016	0.050	U
11104-28-2	Aroclor-1221	0.050	U
11141-16-5	Aroclor-1232	0.050	U
53469-21-9	Aroclor-1242	0.16	
12672-29-6	Aroclor-1248	0.050	U
11097-69-1	Aroclor-1254	0.050	U
11096-82-5	Aroclor-1260	0.050	U

TOTAL SUSPENDED SOLIDS

Introduction

Analyses were performed according to the following method:

Total Suspended Solids EPA Method 160.2

The data review process is intended to evaluate data on a technical basis. It is assumed that the data package represents the best efforts of the laboratory and has already been subjected to adequate quality review prior to submission for review.

During the review process, laboratory data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, modified or deleted by the data reviewer.

The following reviewer codes based on the National Functional Guidelines, will be used to qualify the data.

U - The material was analyzed for, but was not detected. The associated value is either the sample quantitation limit or the sample detection limit depending on the method.

J - The associated value is an estimated quantity.

R - The sample results are rejected.

UJ - The material was analyzed for, but was not detected. The associated value is approximate and may or may not represent the actual limit of quantitation/detection.

Two facts should be noted by all data users. First, the "R" flag means that the associated value is unusable. In other words, due to significant QC problems, the analysis is invalid and provides no information as to whether the compound is present or not. "R" values should not appear on data tables because they cannot be relied upon, even as a last resort. The second fact to keep in mind is that no compound concentration, even if it has passed all QC tests, is guaranteed to be accurate. Strict QC serves to increase confidence in data but any value potentially contains error.

Data Assessment

1. Holding Times

The method-specified holding time for TSS is 7 days from sample collection. All samples were analyzed with the specified holding time.

2. Calibration

The analyses have no specific calibration requirements.

3. Blank Contamination

No method blank contamination was reported.

4. Laboratory Duplicates

The laboratory duplicate results were acceptable.

5. Field Duplicates

No field duplicates were included in this sample delivery group.

6. Overall Assessment

Other than for those deviations mentioned in this report, the analysis of the samples was in conformance with method specifications.

DATA REVIEW CHECKLIST

Supplemental Data Review Checklist

	YES	NO	NA
Data Completeness			
Is there a narrative or cover letter present?	X		
Are the sample numbers included in the narrative?	X		
Are the methods utilized notated?	X		
Are the sample chain-of-custodies present?	X		
Do the chain-of-custodies indicate any problems with sample receipt or sample condition?		X	
Holding Times			
Have any holding times been exceeded?		X	
Duplicates			
Were the laboratory duplicate results acceptable?	X		
Blanks			
Has a method blank been analyzed for each set of samples or for each 20 samples, whichever is more frequent:	X		
Do any have results above the reporting limit?		X	
Do any field/rinse blanks have positive results?			X
Calibration			
Are initial calibrations within acceptable limits?			X
Are continuing calibration standards within acceptable limits?			X
Raw Data			
Is raw data present and complete for all samples and QC?		X	
Compound Quantitation and Reported Limits			
Are the reporting limits adjusted to reflect sample dilutions, and for soils, sample moisture?			X

Total Suspended Solids Results

Sample ID	Lab ID	Sample Date	Result (mg/l)
A64010	233760	9/8/94	6.4
A64011	233761	9/8/94	13.2

CHAIN OF CUSTODY

BLASLAND & BOUCK ENGINEERS, P.C.
6723 Towpath Road, Box 66
Syracuse, New York 13214-0066
TEL: 315-446-9120
FAX: 315-449-0017

CHAIN OF CUSTODY RECORD

000003

KB54502176

PROJ. NO. 645.51
PROJECT NAME: ALLIED O.U. / PORTAGE CREEK
SAMPLERS: (Signature) Brian R. Ford

STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION	Number of Containers	PCBs	TSS				TEMP	REMARKS
SWP-1	9-8	16:40		✓	~~A66010~~ A6H010	3	2	1					
SWP-2	9-8	15:55		✓	~~A66011~~ A6H011	3	2	1					
					TEMP	1/7						1	COOLER # - LTI # 7
													PLEASE RETURN COOLER TO
													LIMNO-TECH, INC.
													1804 NAZARETH RD.
													KALAMAZOO, MI 49001
													616-388-2038

Relinquished by: (Signature)	DATE	TIME	Received by: (Signature)	Relinquished by: (Signature)	DATE	TIME	Relinquished by: (Signature)
Brian R. Ford	9-9-94	7:30					
Relinquished by: (Signature)	**DATE**	**TIME**	**Received by: (Signature)**	**Relinquished by: (Signature)**	**DATE**	**TIME**	**Relinquished by: (Signature)**
Relinquished by: (Signature)	**DATE**	**TIME**	**Received for Laboratory by: (Signature)**	**DATE**	**TIME**	**Remarks:**	
			Michael T. Hazlett	9/10/94	1100		

7/12/93
1383786HCDR

Distribution: Original Accompanies Shipment; Copy to Coordinator Field Files

MEMORANDUM

BBL
BLASLAND, BOUCK & LEE, INC.
engineers & scientists

To: Doug Cowin **Date:** 7/16/99

From: Laurie Indick **cc:** MPB, AEG, file

Re: KRSG - Allied OU Sampling

Several surface water samples collected at the Allied-OU in 1993 and 1994 were assigned identification numbers which had been reserved for groundwater samples. In addition, two surface water samples collected in September 1994 were assigned non-standard identification numbers. To eliminate any confusion regarding the nature of the samples and to comply with database storage requirements, the numbers have been revised, as follows:

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	A66006	A64006
	A66007	A64007
6/9/94	A66008	A64008
	A66009	A64009
9/8/94	A66010	A64010
	A66011	A64011
9/22/94	SWP-1	A64014
	SWP-2	A64013

lai/

DATA REVIEW FOR

ALLIED PAPER, INC./PORTAGE CREEK/KALAMAZOO RIVER SUPERFUND SITE

SDG# 46665

PCB ANALYSES

ALLIED OU
SURFACE WATER INVESTIGATION

Analyses performed by:

Aquatec, Inc.
Colchester, Vermont

Review performed by:

Blasland, Bouck & Lee, Inc.
Syracuse, New York

Summary

The following is an assessment of the PCB data package for SDG# 46665 for the Surface Water Investigation sampling of the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site. Included with this assessment are the data review check sheets used in the review of the package and sample results for PCB and total suspended solids analyses. Analyses were performed on the following samples:

Sample ID	Lab ID	Matrix	Sample Date	Analyses	
				PCB	TSS
A64014	235311	water	9/21/94	x	x
A64013	235312	water	9/21/94	x	x

PCB ANALYSES

Introduction

Analyses were performed according to the USEPA SW-846 method 8081, modified for PCB only analysis.

The data review process is intended to evaluate the data on a technical basis. It is assumed that the data package represents the best efforts of the laboratory and had already been subjected to adequate and sufficient quality review prior to submission.

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer. Results are qualified with the following codes in accordance with National Functional Guidelines:

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- B The compound has been found in the sample as well as its associated blank, its presence in the sample may be suspect.
- N The analysis indicates the presence of a compound for which there is presumptive evidence to make a tentative identification.
- JN The analysis indicates the presence of a compound for which there is presumptive evidence to make a tentative identification. The associated numerical value is an estimated concentration only.
- E The compound was quantitated above the calibration range.
- D Concentration is based on a diluted sample analysis.
- UJ The compound was not detected above the reported sample quantitation limit. However, the reported limit is approximate and may or may not represent the actual limit of quantitation.
- R The sample results are rejected.

Two facts should be noted by all data users. First, the "R" flag means that the associated value is unusable. In other words, due to significant QC problems, the analysis is invalid and provides no information as to whether the compound is present or not. "R" values should not appear on data tables because they cannot be relied upon, even as a last resort. The second fact to keep in mind is that no compound concentration, even if it has passed all QC tests, is guaranteed to be accurate. Strict QC serves to increase confidence in data but any value potentially contains error.

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The response function of the electron capture detector is inherently non-linear, and while significant linearization is achieved for this detector by electronic means, some non-linearity remains. Power function linearization is used to "straighten the curve" and allow the use of response factors for calibration purposes.

During the initial calibration a response factor is calculated for each peak in the individual Aroclors.

A weighted response factor calculation has been used to adjust for non-linearity at the low end of the calibration curve.

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The determination of "which Aroclor or mixture of Aroclors will produce a chromatogram most similar to that of the residue" is made by expressing the unknown sample chromatogram as a linear combination of the Aroclors. The "most similar" Aroclor or mixture of Aroclors is determined by using a least squares minimization of the difference between the unknown chromatogram and the linear combination of Aroclors. This is similar to the procedure presented by L.E. Slivon, P.M. Schumacher and A. Alford-Stevens for the determination of Aroclor composition from GC/MS level of chlorination results.

Identification/quantitation of Aroclors in samples is based on the combined response of two columns, typically RTX-5 and RTX-35. The pooling of response combines the unique qualities of both columns to derive a more defined Aroclor pattern which less likely to be affected by interferents. Identification/quantitation data for the individual columns is provided in the package and can be used as a check on the combined column results.

Data Assessment

1. Holding Time

The QAPP-specified holding times for PCB analyses of water samples are 5 days from date of sample receipt to extraction and 40 days from extraction to analysis. The technical holding times are 7 days from date of sample collection to extraction and 40 days from extraction to analysis.

All samples were extracted and analyzed within the specified holding times.

2. Blank Contamination

Quality assurance blanks, i.e., method, field or rinse blanks, are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Method blanks measure laboratory contamination. Field and rinse blanks measure contamination of samples during field operations.

No target compounds were detected in the method blank.

3. System Performance

System performance and column resolution were acceptable.

4. Calibration

Satisfactory instrument calibration is established to insure that the instrument is capable of producing acceptable quantitative data. An initial calibration demonstrates that the instrument is capable of giving acceptable performance at the beginning of an experimental sequence. The continuing calibration verifies that the instrument is giving satisfactory daily performance.

4.1 Initial Calibration

The method allows a maximum RSD of 20%. The %RSD was within acceptable limits for all Aroclors.

4.2 Continuing Calibration

A maximum %D of 15 is allowed. All continuing calibrations were within the specified limits.

5. Surrogates / System Monitoring Compounds

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All surrogate recoveries were within control limits.

6. Compound Identification

The determination of Aroclor presence is made by expressing the unknown sample chromatogram as a linear combination of the Aroclors. The most similar Aroclor or mixture of Aroclors is determined by using a least squares minimization of the difference between the unknown chromatogram and the linear combination of Aroclors.

Identification/quantitation of Aroclors is based on the combined response of the RTX-5 and RTX-35 columns. Identification/quantitation data for the individual columns is provided in the package and has been used as a check on the combined column results.

A review of the sample chromatograms indicate that the Aroclors have been correctly identified/quantitated.

7. Matrix Spike/Matrix Spike Duplicate/Matrix Spike Blank

Matrix spike and matrix spike duplicate data are used to assess the precision and accuracy of the analytical method.

Matrix spike analysis was performed on a river sample submitted along with the samples in this data set. All matrix spike and matrix spike duplicate recoveries and relative percent differences between recoveries were within control limits. All recoveries in the matrix spike blank were also within control limits.

8. Field Duplicates

No field duplicates were included in this data set.

9. System Performance and Overall Assessment

Overall system performance was acceptable. Other than for those deviations specifically mentioned in this review, the overall data quality is within the guidelines listed in the analytical method.

DATA REVIEW CHECKLIST

PCB Data Review Checklist

	YES	NO	NA
Data Completeness and Deliverables			
Is there a narrative or cover letter present?	X		
Are the sample numbers included in the narrative?	X		
Are the sample chain-of-custodies present?	X		
Do the chain-of-custodies indicate any problems with sample receipt or sample condition?		X	
Holding Times			
Have any holding times been exceeded?		X	
Surrogate Recovery			
Are surrogate recovery forms present?	X		
Are all the samples listed on the appropriate surrogate recovery form?	X		
Are the outliers correctly marked with an asterisk?			X
Were recoveries of TCMX or DCB outside of specified limits for any sample or blank?		X	
If yes, were the samples reanalyzed?			X
Matrix Spikes			
Is there a matrix spike recovery form present?	X		
Were matrix spikes analyzed at the required frequency?	X		

How many spike recoveries were outside of QC limits?

0 out of 4

How many RPDs for matrix spike and matrix spike duplicate were outside of QC limits?

0 out of 2

	YES	NO	NA
Blanks			
Is a Method Blank Summary Form present?	X		
Has a method blank been analyzed for each set of samples or for each 20 samples, whichever is more frequent?	X		
Is the chromatographic performance acceptable for each instrument?	X		
Do any method/reagent/instrument blanks have positive results?		X	

PCB Data Review Checklist - Page 2

	YES	NO	NA
Do any field/rinse blanks have positive results?			X
Are there field/rinse/equipment blanks associated with every sample?		X	
Calibration and GC Performance			
Are the following chromatograms and data printouts present?			
Aroclor 1016/1260	X		
Aroclor 1221	X		
Aroclor 1232	X		
Aroclor 1242	X		
Aroclor 1248	X		
Aroclor 1254	X		
Are Initial Calibration Summary Forms present and complete for each column and analytical sequence?	X		
Are the linearity criteria for the initial analyses within limits for both columns (20% RSD)	X		
Have all samples been injected within a 12 hour period beginning with the injection of a calibration standard?	X		
Is a Calibration Verification Summary Form present and complete for each continuing standard analyzed?	X		
Are %D values for all compounds within limits (less than 15%)?	X		
Analytical Sequence Check			
Is an analytical sequence form present and complete for each column and each period of analyses?	X		
Was the proper analytical sequence followed?	X		
Cleanup Efficiency Verification			
If GPC cleanup was performed, is Gel Permeation Chromatography Check Form present?		X	
Are percent recoveries of the compounds used to check the efficiency of the cleanup procedure within QC limits?			X

PCB Data Review Checklist - Page 3

	YES	NO	NA
PCB Identification			
Is both a combined and single column Aroclor Identification Report present for every sample?	X		
Do the combined column and individual column Aroclor identifications agree?	X		
Were there any false negatives?		X	
Was GC/MS confirmation provided when required?			X
Compound Quantitation and Reported Detection Limits			
Are the reporting limits adjusted to reflect sample dilutions, and for soils, sample moisture?	X		
Chromatogram Quality			
Were the baselines stable?	X		
Were any electronegative displacement (negative peaks) or unusual peaks detected?		X	
Field Duplicates			
Were field duplicates submitted with the samples?		X	

PCB Holding Time and Surrogate Recovery Summary

Sample ID	Holding Time	Surrogates - Column 1		Surrogates - Column 2	
		TCX	DCB	TCX	DCB
A64013					
A64014					

Surrogate Standards:
TCX Tetrachloro-m-xylene
DCB Decachlorobiphenyl

Qualifiers:
D Surrogates diluted out
↑ Recovery high
↓ Recovery low

Unless otherwise noted, all parameters are within specified limits.

PCB Calibration Summary

Instrument: HP2087
Column: RTX-35 / RTX-5

Date:	9/23/94 to 9/24/94	9/27	9/27	9/27	9/27	9/28	9/28
Time:		1517	1551	2236	2310	0554	2221
	Initial Cal.	Cont. Cal.	Cont. Cal.	Cont. Cal.	Cont. Cal.	Cont. Cal.	Cont. Cal.
	%RSD	%D	%D	%D	%D	%D	%D
Aroclor 1016	4.6 / 4.3						
Aroclor 1221	5.7 / 3.9						
Aroclor 1232	4.5 / 5.8						
Aroclor 1242	5.3 / 5.4		3.0				
Aroclor 1248	6.5 / 5.1	6.5		7.0			8.0
Aroclor 1254	8.3 / 5.7				0.5		
Aroclor 1260	5.3 / 5.3					5.5	
Tetrachloro-m-xylene	9.4 / 10.3						
Decachlorobiphenyl	10.7 / 13.1						
Affected Samples:							

PCB Calibration Summary - Page 2

Instrument: HP2087
Column: RTX-35 / RTX-5

Date:		10/1	10/1	10/1	10/1		
Time:		1550	1624	2020	2054		
	Initial Cal.	Cont. Cal.	Cont. Cal.	Cont. Cal.	Cont. Cal.	Cont. Cal.	Cont. Cal.
	%RSD	%D	%D	%D	%D	%D	%D
Aroclor 1016							
Aroclor 1221							
Aroclor 1232							
Aroclor 1242			12.5				
Aroclor 1248		1.5		2.5			
Aroclor 1254					10.5		
Aroclor 1260							
Tetrachloro-m-xylene							
Decachlorobiphenyl							
Affected Samples:							

PCB Calibration Summary - Page 3

Instrument: HP2087
Column: RTX-35 / RTX-5

Date:	10/4/94 to 10/5/94	10/14	10/14	10/15	10/15	10/15	10/15
Time:		2232	2306	0551	0624	1309	1342
	Initial Cal.	Cont. Cal.	Cont. Cal.	Cont. Cal.	Cont. Cal.	Cont. Cal.	Cont. Cal.
	%RSD	%D	%D	%D	%D	%D	%D
Aroclor 1016	3.4 / 6.6		7.0				
Aroclor 1221	4.8 / 4.4						
Aroclor 1232	3.9 / 3.4						
Aroclor 1242	4.7 / 4.5				9.0		
Aroclor 1248	3.8 / 3.0	2.5		0.0		2.0	
Aroclor 1254	5.0 / 4.7						1.0
Aroclor 1260	3.1 / 2.9						
Tetrachloro-m-xylene							
Decachlorobiphenyl							
Affected Samples:							

ao46665

CORRECTED ANALYSIS SUMMARY FORMS

FORM 1
AROCLOR ANALYSIS DATA SHEET

EPA SAMPLE NO.
A6H014
~~SWP1~~

Lab Name: Aquatec, Inc. Lab Code: AQUAI

Contract: 91082 Case: PCB SDG: 46665

Phase Type: Water
Phase Volume: 1000 (mL)
Injection Volume: 1.0 (uL)
Dilution Factor: 1.0

Lab Sample ID: 235311
Date Received: 09/23/94
Date Extracted: 09/26/94
Date Analyzed: 10/01/94
Sulfur Clean-up: N (Y/N)

CAS NO.	COMPOUND	CONCENTRATION (ug/L)	Q
12674-11-2	Aroclor-1016	0.050	U
11104-28-2	Aroclor-1221	0.050	U
11141-16-5	Aroclor-1232	0.050	U
53469-21-9	Aroclor-1242	0.050	U
12672-29-6	Aroclor-1248	0.050	U
11097-69-1	Aroclor-1254	0.050	U
11096-82-5	Aroclor-1260	0.050	U

FORM 1
AROCLOR ANALYSIS DATA SHEET

EPA SAMPLE NO.
A64013
~~SWP2~~

Lab Name: Aquatec, Inc. Lab Code: AQUAI

Contract: 91082 Case: PCB SDG: 46665

Phase Type: Water
Phase Volume: 1000 (mL)
Injection Volume: 1.0 (uL)
Dilution Factor: 1.0

Lab Sample ID: 235312
Date Received: 09/23/94
Date Extracted: 09/26/94
Date Analyzed: 10/01/94
Sulfur Clean-up: N (Y/N)

CAS NO.	COMPOUND	CONCENTRATION (ug/L)	Q
12674-11-2	Aroclor-1016	0.050	U
11104-28-2	Aroclor-1221	0.050	U
11141-16-5	Aroclor-1232	0.050	U
53469-21-9	Aroclor-1242	0.21	
12672-29-6	Aroclor-1248	0.050	U
11097-69-1	Aroclor-1254	0.050	U
11096-82-5	Aroclor-1260	0.050	U

TOTAL SUSPENDED SOLIDS ANALYSES

Introduction

Analyses were performed according to the following method:

Total Suspended Solids	EPA 160.2

The data review process is intended to evaluate data on a technical basis. It is assumed that the data package represents the best efforts of the laboratory and has already been subjected to adequate quality review prior to submission for review.

During the review process, laboratory data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, modified or deleted by the data reviewer.

The following reviewer codes based on the National Functional Guidelines, will be used to qualify the data.

U	The material was analyzed for, but was not detected. The associated value is either the sample quantitation limit or the sample detection limit depending on the method.
J	The associated value is an estimated quantity.
R	The sample results are rejected.
UJ	The material was analyzed for, but was not detected. The associated value is approximate and may or may not represent the actual limit of quantitation/detection.

Two facts should be noted by all data users. First, the "R" flag means that the associated value is unusable. In other words, due to significant QC problems, the analysis is invalid and provides no information as to whether the compound is present or not. "R" values should not appear on data tables because they cannot be relied upon, even as a last resort. The second fact to keep in mind is that no compound concentration, even if it has passed all QC tests, is guaranteed to be accurate. Strict QC serves to increase confidence in data but any value potentially contains error.

Data Assessment

1. Holding Times

The method-specified holding time for TSS is 7 days from sample collection. All samples were analyzed with the specified holding time.

2. Calibration

The analyses have no specific calibration requirements.

3. Blank Contamination

No method blank contamination was reported.

4. Laboratory Duplicates

The laboratory duplicate percent difference was within control limits.

5. Field Duplicates

No field dupplicates were included in this data set.

6. Overall Assessment

Other than those deviations mentioned in this report, the analysis of the samples was in conformance with method specifications.

DATA REVIEW CHECKLIST

Supplemental Data Review Checklist

	YES	NO	NA
Data Completeness			
Is there a narrative or cover letter present?	X		
Are the samples numbers included in the narrative?	X		
Are the methods utilized notated?	X		
Are the sample chain-of-custodies present?	X		
Do the chain-of-custodies indicate any problems with sample receipt or sample condition?		X	
Holding Times			
Have any holding times been exceeded?		X	
Duplicates			
Were the laboratory duplicate results acceptable?	X		
Blanks			
Has a method blank been analyzed for each set of samples or for each 20 samples, whichever is more frequent:	X		
Do any have results above the reporting limit?		X	
Do any field/rinse blanks have positive results?			X
Calibration			
Are initial calibrations within acceptable limits?			X
Are continuing calibration standards within acceptable limits?			X
Raw Data			
Is raw data present and complete for all samples and QC?	X		
Compound Quantitation and Reported Limits			
Are the reporting limits adjusted to reflect sample dilutions, and for soils, sample moisture?			X

Total Suspended Solids Results

Sample ID	Lab ID	Sample Date	Results (mg/l)
A64014	235311	9/21/94	7.2
A64013	235312	9/21/94	12.5

CHAIN OF CUSTODY

BLASLAND & BLACK ENGINEERS, P.C.

CHAIN OF CUSTODY RECORD

PROJ. NO. 645.51

PROJECT NAME: ALLIED O.U. / PORTAGE CREEK

SAMPLERS: (Signature) Brian R. Ford

STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	PCB's	TSS					REMARKS
SWP1	9/21	13:00		✓	SWP1	3	✓	✓					
SWP2	9/21	12:25		✓	SWP2	3	✓	✓					
					TEMP. BLANK	1							
						—							COOLER # LTI #7
						7							PLEASE RETURN COOLER
													TO: JOHN PETERSON
													1804 NAZARETH RD.
													KALAMAZOO, MI 49001

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Brian R. Ford	9/22/94 13:45				
Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Remarks	
			9/23/94 1000		

Distribution: Original Accompanies Shipment; Copy to Coordinator Field Files

000006

KB54502066

MEMORANDUM

BBL
BLASLAND, BOUCK & LEE, INC.
engineers & scientists

To: Doug Cowin **Date:** 7/16/99

From: Laurie Indick **cc:** MPB, AEG, file

Re: KRSG - Allied OU Sampling

Several surface water samples collected at the Allied-OU in 1993 and 1994 were assigned identification numbers which had been reserved for groundwater samples. In addition, two surface water samples collected in September 1994 were assigned non-standard identification numbers. To eliminate any confusion regarding the nature of the samples and to comply with database storage requirements, the numbers have been revised, as follows:

Sample Date	Original Identification Number (list on COC)	Revised Number
8/24/99	A66000	A64000
	A66001	A64001
	A66002	A64002
12/15/93	A66003	A64003
	A66004	A64004
	A66005	A64005
	A66006	A64006
	A66007	A64007
6/9/94	A66008	A64008
	A66009	A64009
9/8/94	A66010	A64010
	A66011	A64011
9/22/94	SWP-1	A64014
	SWP-2	A64013

lai/

DATA REVIEW FOR

ALLIED PAPER, INC./PORTAGE CREEK/KALAMAZOO RIVER SUPERFUND SITE

SDG# 64982

PCB ANALYSES

BRYANT MILL POND/PORTAGE CREEK

Analyses performed by:

ITS Environmental
Colchester, Vermont

Review performed by:

BBL
BLASLAND, BOUCK & LEE, INC.
engineers & scientists

Blasland, Bouck & Lee, Inc.
Syracuse, New York

Summary

The following is an assessment of the PCB data package for SDG# 64882 for the analysis of surface water samples from Bryant Mill Pond/Portage Creek at the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site. Included with this assessment are the data review check sheets used in the review of the package and sample results for PCB analyses. Analyses were performed on the following samples:

Sample ID	Lab ID	Matrix	Sample Date	Analysis	
				PCB	TSS
A64590	330949	water	5/19/97	x	x
A64591	330950	water	5/19/97	x	x
A64592	330951	water	5/19/97	x	x
A64593	330952	water	5/19/97	x	x

Introduction

Analyses were performed according to the USEPA SW-846 method 8081, modified for PCB only analysis.

The data review process is intended to evaluate the data on a technical basis. It is assumed that the data package represents the best efforts of the laboratory and had already been subjected to adequate and sufficient quality review prior to submission.

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer. Results are qualified with the following codes in accordance with National Functional Guidelines:

- U The compound was analyzed for but not detected. The associated value is the compound quantitation limit.
- J The compound was positively identified; however, the associated numerical value is an estimated concentration only.
- B The compound has been found in the sample as well as its associated blank, its presence in the sample may be suspect.
- N The analysis indicates the presence of a compound for which there is presumptive evidence to make a tentative identification.
- JN The analysis indicates the presence of a compound for which there is presumptive evidence to make a tentative identification. The associated numerical value is an estimated concentration only.
- E The compound was quantitated above the calibration range.
- D Concentration is based on a diluted sample analysis.
- UJ The compound was not detected above the reported sample quantitation limit. However, the reported limit is approximate and may or may not represent the actual limit of quantitation.
- R The sample results are rejected.

Two facts should be noted by all data users. First, the "R" flag means that the associated value is unusable. In other words, due to significant QC problems, the analysis is invalid and provides no information as to whether the compound is present or not. "R" values should not appear on data tables because they cannot be relied upon, even as a last resort. The second fact to keep in mind is that no compound concentration, even if it has passed all QC test, is guaranteed to be accurate. Strict QC serves to increase confidence in data but any value potentially contains error.

Data Assessment

1. Holding Time

The QAPP-specified holding times for PCB analyses of water samples are 5 days from date of sample receipt to extraction and 40 days from extraction to analysis. The technical holding times are 7 days from sample collection to extraction and 40 days to analysis.

All samples were extracted and analyzed within the specified holding times.

2. Blank Contamination

Quality assurance blanks, i.e., method, field or rinse blanks, are prepared to identify any contamination which may have been introduced in to the samples during sample preparation or field activity. Method blanks measure laboratory contamination. Field and rinse blanks measure contamination of samples during field operations.

No Aroclors were detected in the method blank. No rinse blanks were submitted with the samples.

3. System Performance

The system performance and column resolution were acceptable.

4. Calibration

Satisfactory instrument calibration is established to insure that the instrument is capable of producing acceptable quantitative data. An initial calibration demonstrates that the instrument is capable of giving acceptable performance at the beginning of an experimental sequence. The continuing calibration verifies that the instrument is giving satisfactory daily performance.

4.1 Initial Calibration

The method allows a maximum RSD of 20%. The %RSD was within this limit for all Aroclors.

4.2 Continuing Calibration

A maximum %D of 15 is allowed. All continuing calibrations were within the specified limit.

5. Surrogates / System Monitoring Compounds

All samples to be analyzed for organic compounds are spiked with surrogate compounds prior to sample preparation to evaluate overall laboratory performance and efficiency of the analytical technique.

All surrogate recoveries were within control limits.

6. Compound Identification

Aroclor presence is determined based on both peak retention time and pattern identification. All positively identified Aroclors are confirmed on a second column.

Although some pattern alteration was noted, all Aroclors were correctly identified and quantitated.

7. Matrix Spike/Matrix Spike Duplicate/Matrix Spike Blank

Matrix spike and matrix spike duplicate data are used to assess the precision and accuracy of the analytical method.

No matrix spike analyses were requested for any of the samples in this data set. Laboratory control sample recoveries were, however, acceptable.

8. Field Duplicates

The duplicate results are summarized below:

Sample ID/ Duplicate ID	Analyte	Sample Result	Duplicate Result	RPD
A64590 /A64592	Aroclor 1242	0.065	0.069	6.0%

The duplicate results are acceptable.

9. General Comments

The field sample identification numbers were changed post-sampling. Manual corrections have been made to the reported results to reflect these changes.

10. System Performance and Overall Assessment

Overall system performance was acceptable. Other than for those deviations specifically mentioned in this review, the overall data quality is within the guidelines listed in the analytical method.

DATA REVIEW CHECKLIST

PCB Data Review Checklist

	YES	NO	NA
Data Completeness and Deliverables			
Is there a narrative or cover letter present?	X		
Are the samples numbers included in the narrative?	X		
Are the sample chain-of-custodies present?	X		
Do the chain-of-custodies indicate any problems with sample receipt or sample condition?		X	
Holding Times			
Have any holding times been exceeded?		X	
Surrogate Recovery			
Are surrogate recovery forms present?	X		
Are all the samples listed on the appropriate surrogate recovery form?	X		
Were recoveries of TCX or DCB outside control limits for any sample or blank?		X	
If yes, were the samples reanalyzed?			X
Matrix Spikes			
Is there a matrix spike recovery form present?		X	
Were matrix spikes analyzed at the required frequency?	X		
How many spike recoveries were outside of QC limits? NA out of NA			
How many RPDs for matrix spike and matrix spike duplicate were outside of QC limits? NA out of NA			
Blanks			
Is a Method Blank Summary Form present?	X		
Has a method blank been analyzed for each set of samples or for each 20 samples, whichever is more frequent?	X		
Is the chromatographic performance acceptable for each instrument?	X		
Do any method/reagent/instrument blanks have positive results?		X	
Do any field/rinse blanks have positive results?			X

	YES	NO	NA
Are there field/rinse/equipment blanks associated with every sample?		X	
Calibration and GC Performance			
Are the following initial and continuing calibration chromatograms and data printouts present?			
Aroclor 1016/1260	X		
Aroclor 1221	X		
Aroclor 1232	X		
Aroclor 1242	X		
Aroclor 1248	X		
Aroclor 1254	X		
Are Initial Calibration Summary Forms present and complete for each column and analytical sequence?	X		
Are the linearity criteria for the initial calibration within acceptable limits (20% RSD)?	X		
Have all samples been injected within a 12 hour period beginning with the injection of a calibration standard?	X		
Is a Calibration Verification Summary Form present and complete for each continuing standard analyzed?	X		
Are %D values for all compounds within limits (less than 15%)?	X		
Analytical Sequence Check			
Is a analytical sequence form present and complete for each column and each period of analyses?	X		
Was the proper analytical sequence followed?	X		
Cleanup Efficiency Verification			
If GPC cleanup was performed, is Gel Permeation Chromatography Check Form present?			X
Are percent recoveries of the compounds used to check the efficiency of the cleanup procedure within QC limits?			X

PCB Data Review Checklist - Page 3

	YES	NO	NA
PCB Identification			
Were all positively identified Aroclors confirmed on a second column?	X		
Do both column Aroclor identifications agree?	X		
Were there any false negatives?		X	
Was GC/MS confirmation provided when required?			X
Compound Quantitation and Reported Detection Limits			
Are the reporting limits adjusted to reflect sample dilutions, and for soils, sample moisture?	X		
Chromatogram Quality			
Were the baselines stable?	X		
Were any electronegative displacement (negative peaks) or unusual peaks detected?		X	
Field Duplicates			
Where field duplicates submitted with the samples?	X		

PCB Holding Time and Surrogate Recovery Summary

Sample ID	Holding Time*	Surrogates*	
		TCX	DCB
A64590			
A64591			
A64592			
A64593			

Surrogate Standards
TCX Tetrachloro-m-xylene
DCB Decachlorobiphenyl

Qualifiers:
D Surrogates diluted out
↑ Recovery high
↓ Recovery low

* Unless otherwise noted, all parameters are within specified limits.

PCB Calibration Summary

Instrument: HP2404
Column: RTX-5

Date:	5/19/97-	5/28/97	5/29/97	5/29/97	5/29/97		
Time:	5/20/97	1847	0050	0118	0310		
	Initial Cal.	Cont. Cal.	Cont. Cal.	Cont. Cal.	Cont. Cal.	Cont. Cal.	Cont. Cal.
	r^2	%D	%D	%D	%D	%D	%D
Aroclor 1016	ok						
Aroclor 1221	--[1]						
Aroclor 1232	--[1]						
Aroclor 1242	ok			ok			
Aroclor 1248	ok	ok	ok		ok		
Aroclor 1254	ok						
Aroclor 1260	ok						
Tetrachloro-m-xylene	ok						
Decachlorobiphenyl	ok						
Affected Samples:							

1 Multi-point standards analyzed, correlation not calculated

CORRECTED ANALYSIS SUMMARY FORMS

FORM 1
OTHER ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.
A64590
~~A66590~~
~~A66552~~

Lab Name: ITS ENVIRONMENTAL Contract: 91082

Lab Code: INCHVT Case No.: PCB SAS No.: SDG No.: 64982

Matrix: (soil/water) WATER Lab Sample ID: 330949

Sample wt/vol: 995.0 (g/mL) ML Lab File ID: _____

% Moisture: _____ decanted: (Y/N)___ Date Received: 05/21/97

Extraction: (SepF/Cont/Sonc) SEPF Date Extracted: 05/22/97

Concentrated Extract Volume: 1 (mL) Date Analyzed: 05/28/97

Injection Volume: _____(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: ___ Sulfur Cleanup: (Y/N) Y

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
12674-11-2	Aroclor-1016	0.050	U
11104-28-2	Aroclor-1221	0.050	U
11141-16-5	Aroclor-1232	0.050	U
53469-21-9	Aroclor-1242	0.065	
12672-29-6	Aroclor-1248	0.050	U
11097-69-1	Aroclor-1254	0.050	U
11096-82-5	Aroclor-1260	0.050	U

FORM 1
OTHER ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.
A6459
~~A66591~~
~~A66553~~

Lab Name: ITS ENVIRONMENTAL Contract: 91082

Lab Code: INCHVT Case No.: PCB SAS No.: SDG No.: 64982

Matrix: (soil/water) WATER Lab Sample ID: 330950

Sample wt/vol: 1000 (g/mL) ML Lab File ID: _____

% Moisture: _____ decanted: (Y/N)___ Date Received: 05/21/97

Extraction: (SepF/Cont/Sonc) SEPF Date Extracted:05/22/97

Concentrated Extract Volume: 1(mL) Date Analyzed: 05/28/97

Injection Volume: _____(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: ___ Sulfur Cleanup: (Y/N) Y

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
12674-11-2------	Aroclor-1016	0.050	U
11104-28-2------	Aroclor-1221	0.050	U
11141-16-5------	Aroclor-1232	0.050	U
53469-21-9------	Aroclor-1242	0.050	U
12672-29-6------	Aroclor-1248	0.050	U
11097-69-1------	Aroclor-1254	0.050	U
11096-82-5------	Aroclor-1260	0.050	U

FORM 1
OTHER ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.
A64592
~~A66592~~
~~A66554~~

Lab Name: ITS ENVIRONMENTAL Contract: 91082

Lab Code: INCHVT Case No.: PCB SAS No.: SDG No.: 64982

Matrix: (soil/water) WATER Lab Sample ID: 330951

Sample wt/vol: 990.0 (g/mL) ML Lab File ID: _____

% Moisture: _____ decanted: (Y/N)___ Date Received: 05/21/97

Extraction: (SepF/Cont/Sonc) SEPF Date Extracted:05/22/97

Concentrated Extract Volume: 1(mL) Date Analyzed: 05/28/97

Injection Volume: _____(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: ___ Sulfur Cleanup: (Y/N) Y

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
12674-11-2	Aroclor-1016	0.050	U
11104-28-2	Aroclor-1221	0.050	U
11141-16-5	Aroclor-1232	0.050	U
53469-21-9	Aroclor-1242	0.069	
12672-29-6	Aroclor-1248	0.050	U
11097-69-1	Aroclor-1254	0.050	U
11096-82-5	Aroclor-1260	0.050	U

FORM 1
OTHER ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.
A64593
~~A66593~~
~~A66555~~

Lab Name: ITS ENVIRONMENTAL Contract: 91082

Lab Code: INCHVT Case No.: PCB SAS No.: SDG No.: 64982

Matrix: (soil/water) WATER Lab Sample ID: 330952

Sample wt/vol: 980.0 (g/mL) ML Lab File ID: _____

% Moisture: _____ decanted: (Y/N)___ Date Received: 05/21/97

Extraction: (SepF/Cont/Sonc) SEPF Date Extracted:05/22/97

Concentrated Extract Volume: 1(mL) Date Analyzed: 05/29/97

Injection Volume: _____(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: ___ Sulfur Cleanup: (Y/N) Y

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
12674-11-2	Aroclor-1016	0.051	U
11104-28-2	Aroclor-1221	0.051	U
11141-16-5	Aroclor-1232	0.051	U
53469-21-9	Aroclor-1242	0.066	
12672-29-6	Aroclor-1248	0.051	U
11097-69-1	Aroclor-1254	0.051	U
11096-82-5	Aroclor-1260	0.051	U

TOTAL SUSPENDED SOLIDS

Introduction

Analyses were performed according to the following method:

Total Suspended Solids EPA Method 160.2

The data review process is intended to evaluate data on a technical basis. It is assumed that the data package represents the best efforts of the laboratory and has already been subjected to adequate quality review prior to submission for review.

During the review process, laboratory data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, modified or deleted by the data reviewer.

The following reviewer codes based on the National Functional Guidelines, will be used to qualify the data.

U - The material was analyzed for, but was not detected. The associated value is either the sample quantitation limit or the sample detection limit depending on the method.

J - The associated value is an estimated quantity.

R - The sample results are rejected.

UJ - The material was analyzed for, but was not detected. The associated value is approximate and may or may not represent the actual limit of quantitation/detection.

Two facts should be noted by all data users. First, the "R" flag means that the associated value is unusable. In other words, due to significant QC problems, the analysis is invalid and provides no information as to whether the compound is present or not. "R" values should not appear on data tables because they cannot be relied upon, even as a last resort. The second fact to keep in mind is that no compound concentration, even if it has passed all QC tests, is guaranteed to be accurate. Strict QC serves to increase confidence in data but any value potentially contains error.

Data Assessment

1. Holding Times

The method-specified holding time for TSS is 7 days from sample collection. All samples were analyzed with the specified holding time.

2. Calibration

The analyses have no specific calibration requirements.

3. Blank Contamination

No method blank contamination was reported.

4. Laboratory Duplicates

The laboratory duplicate results were acceptable.

5. Field Duplicates

The duplicate results are summarized below:

Sample ID/ Duplicate ID	Analyte	Sample Result	Duplicate Result	RPD
A64590 / A64592	TSS	23.6	23.5	0.4%

The duplicate results are acceptable.

6. Overall Assessment

Other than for those deviations mentioned in this report, the analysis of the samples was in conformance with method specifications.

DATA REVIEW CHECKLIST

Supplemental Data Review Checklist

	YES	NO	NA
Data Completeness			
Is there a narrative or cover letter present?	X		
Are the sample numbers included in the narrative?	X		
Are the methods utilized notated?	X		
Are the sample chain-of-custodies present?	X		
Do the chain-of-custodies indicate any problems with sample receipt or sample condition?		X	
Holding Times			
Have any holding times been exceeded?		X	
Duplicates			
Were the laboratory duplicate results acceptable?	X		
Blanks			
Has a method blank been analyzed for each set of samples or for each 20 samples, whichever is more frequent:	X		
Do any have results above the reporting limit?		X	
Do any field/rinse blanks have positive results?			X
Calibration			
Are initial calibrations within acceptable limits?			X
Are continuing calibration standards within acceptable limits?			X
Raw Data			
Is raw data present and complete for all samples and QC?		X	
Compound Quantitation and Reported Limits			
Are the reporting limits adjusted to reflect sample dilutions, and for soils, sample moisture?			X

Total Suspended Solids Results

Sample ID	Lab ID	Results (mg/l)
A64590	330949	23.6
A64591	330950	9.6
A64592	330951	23.5
A64593	330952	20.6

CHAIN OF CUSTODY

BBL
BLASLAND, BOUCK & LEE, INC.
engineers & scientists
6723 Towpath Road, P.O. Box 66
Syracuse, New York 13214-0066
TEL: (315) 446-9120

CHAIN OF CUSTODY RECORD

000005

PROJ. NO. 645.24 PROJECT NAME KALAMAZOO River / Portage Creek

SAMPLERS: (Signature)

STA. NO.	DATE 97	TIME	COMP.	GRAB	STATION LOCATION	Number of Containers	PCB's	TSS				Temp	REMARKS
SWP2	5-19	11:55		✓	~~A66552~~ A64590	3	2	1					TAT - 7 DAYS
SWP1	5-19	17:00		✓	~~A66553~~ A64591	3	2	1					
Duplicate	5-19	—		✓	~~A66554~~ A64592	3	2	1					
Bryant H.	5-19	12:20		✓	~~A66555~~ A64593	3	2	1					
—	—	—	—	—	Temp Blank	1 / 13						1	Cooler #-34M

Relinquished by: (Signature)	DATE	TIME	Received by: (Signature)	Relinquished by: (Signature)	DATE	TIME	Relinquished by: (Signature)
[signature]	5-20-97	17:30					
Relinquished by: (Signature)	DATE	TIME	Received by: (Signature)	Relinquished by: (Signature)	DATE	TIME	Relinquished by: (Signature)
Relinquished by: (Signature)	DATE	TIME	Received for Laboratory by: (Signature)	DATE	TIME	Remarks:	
			[signature]	5/21/97	0930		

10/23/95
5951188L.CDR

Distribution: Original Accompanies Shipment; Copy to Coordinator Field Files

SUBJECT	PROJ. NO.	BY	DATE	SHEET
	645.51	AEG	7/29/97	1 of 1

The following samples collected by LTI were renumbered because the IDs had been previously used:

SAMPLE DATE	ORIGINAL ID		CORRECTED ID
5-19-97	A66552	→	A66590
	A66553	→	A66591
	A66554	→	A66592
	A66555	→	A66593
5-19-97	K34153	→	K34155
	K34154	→	K34156
	K34155	→	K34157
	K34156	→	K34158
	K34157	→	K34159

KB12000513