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**Water Quality and Sediment Sampling Report  
For  
Former National Zinc Site  
Cherryvale, Montgomery County, Kansas**

April 2004

**ACCEPTED INTO  
ADMINISTRATIVE  
RECORD FILE**

**Presented to:**

**Kansas Department of Health  
& Environment**

**Prepared By:**

**Salomon Smith Barney Holdings, Inc.  
United States Steel Corporation  
&  
A & M Engineering and Environmental Services, Inc.**

**BER SCANNED**

**JUL 16 2013**



## A & M ENGINEERING & ENVIRONMENTAL SERVICES, INC.

10010 E. 16TH STREET  
TULSA, OK 74128-4813

ENGINEERING • ENVIRONMENTAL • CONSTRUCTION  
(918) 665-6575 • FAX (918) 665-6576  
EMAIL: aandm@aandmengineering.com

April 16, 2004

### VIA FEDERAL EXPRESS

Mr. Kurt Limesand  
Environmental Geologist  
Bureau of Environmental Remediation  
Kansas Department of Health and Environment  
1000 Southwest Jackson, Ste. 410  
Topeka, KS 66612-1366

RE: National Zinc Site, Cherryvale, Kansas  
Consent Order Case No. 03-E-0022

Dear Mr. Limesand:

We have prepared a summary report (Report) of Drum Creek water quality and sediment data, including data from samples that were collected in January and March of this year, and therefore is not presented in the "Analytical Report Surface Water Sediment and EPA Repository Soil Sampling", dated October 2003. That Report is enclosed with this letter. Below is a brief summary of the Report.

### **Water Quality**

Tables 1 and 3 of the Report compare the Drum Creek water quality data to both drinking water standards (MCLs), and to the Kansas Surface Water Quality Standard for potential impact on aquatic life at low, normal and high flow levels.

First, as to MCLs, there were only four samples which were not in compliance with drinking water standards. One of these was taken at sample point 6 (upstream from the confluence of Drum Creek and Unnamed Creek, hereinafter the "Confluence"), and exceeded the MCL for lead during high flow conditions. This sample was clearly impacted by the effluent discharge from the new Cherryvale waste treatment system, and is therefore not relevant.

Of the remaining three samples which exceeded MCLs, two marginally exceeded the MCL for lead at sample point 8 and sample point 10, respectively, both during high flow conditions, and a third marginally exceeded the MCL for cadmium at sample point 8, also during high flow conditions. Sampling point 8 is at the Confluence, and sampling point 10 is 75 feet downstream from the Confluence. All other samples downstream from sample point 10 were in compliance with MCLs at all flow levels.

Secondly, with regard to the Kansas Surface Water Quality Standards, A&M calculated the formula applicable to the potential impact on aquatic life, designated "Dependent Aquatic Life Support Criteria". Both the acute and chronic criterions were calculated. The results were similar to the MCL data. Only four samples (excluding sampling point 6) exceed either the acute or chronic criterion levels, all of which were taken during high flow conditions at either the Confluence or the sampling point 75 feet below the Confluence.

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To sum up, the only samples which exceeded either MCLs or the Kansas Surface Water Quality Standard for potential impact on aquatic life during any flow condition were the above described samples taken during high flow conditions at only two locations: the Confluence, and 75 feet downstream from the Confluence.

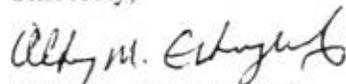
### Sediments

The sediment sample results are set forth in Table 2 of the Report. The samples taken at the Confluence and in the first 300 feet below the Confluence are elevated, comparable to the sediment samples from Unnamed Creek.

Among the four background sediment samples taken from Drum Creek (S-15-D8, S-14-D7, S-14-D6, and S-10-D2), the highest toxic metal concentrations recorded are: Arsenic 7.16 mg/kg; Cadmium 4.63 mg/kg; Chromium 13.90 mg/kg; and Lead 24.50 mg/kg. The sediment sample taken at the Low Water Crossing (Sample S-17-D10) showed the following metal concentrations: Arsenic 18.5 mg/kg; Cadmium 14.3 mg/kg; Chromium 11.6 mg/kg; Lead 48.2 mg/kg and Zinc 517 mg/kg. The new sediment sample taken January 30, 2004 at 300 feet downstream of the Low Water Crossing showed the following concentrations: Arsenic 6.76 mg/kg; Cadmium 2.99 mg/kg; Chromium 14.6 mg/kg; Lead 9.73 mg/kg and Zinc 24.9 mg/kg. The comparison of the above data clearly indicates that the metal concentrations in the sediment samples taken from sediments downstream from the Confluence area are similar to background concentrations. The new sample taken 300 feet downstream from the Low Water Crossing shows a very noticeable reduction in the metal concentrations in the sediments.

I am sending you nine copies of the Report, so that you may distribute them as appropriate at KDHE as well as to the attendees at our meeting at the Site next week. I look forward to seeing you at that time. Please give me a call if you have any questions.

Sincerely,

  
Altay M. Ertugrul, P.E.

Enclosure

cc: Ellen O'Brien, Esq. (w/encl.) – Via Federal Express  
William C. Anderson, Esq. (w/encl.) – Via U.S. Mail  
David Smiga, Esq. (w/encl.) – Via Federal Express  
Mark Rupnow (w/encl.) – Via Federal Express

**Water Quality and Sediment Sampling Report  
For  
Former National Zinc Site  
Cherryvale, Montgomery County, Kansas**

**April 2004**

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**Kansas Department of Health  
& Environment**

**Prepared By:**

**Salomon Smith Barney Holdings, Inc.  
United States Steel Corporation  
&  
A & M Engineering and Environmental Services, Inc.**

## INTRODUCTION

This analytical report presents a summary of the sediment and water quality samples collected by the Respondents (U.S. Steel Corporation and Salomon Smith Barney Holdings, Inc.) and their consultant, A & M Engineering and Environmental Services, Inc. (A & M Engineering) at three different times from Drum Creek in the vicinity of the former National Zinc site, Cherryvale, Kansas.

The three sampling events referenced above are:

1. The sediment and water quality sampling conducted by A & M Engineering during June 24, 25 and 26<sup>th</sup> of 2003. The objective of this sampling event was to comply with the Phase II Work Plan pursuant to Kansas Department of Health and Environment's (KDHE) Consent Order No. 03-E-0022 (Consent Order). The analytical data resulting from this sampling event was provided to KDHE in the report titled "Analytical Report Surface Water Sediment and EPA Repository Soil Sampling" (Analytical Report) which was dated October 2003.
2. The sediment and water quality sampling conducted January 30, 2004. The purpose of this sampling event was to gather water quality data during the high water flow conditions in Drum Creek and also to collect a sediment sample from sediment accumulation downstream from the low water crossing.
3. The water quality sampling conducted March 1, 2004. The purpose of this sampling was to gather water quality data from Drum Creek during normal water flow conditions.

The second and third sampling events were conducted following receipt of verbal comments from KDHE on the Analytical Report that the first sampling event represented the low water flow conditions in Drum Creek and KDHE would require additional sampling representing the high water flow and normal water flow conditions of Drum Creek.

KDHE's concern was that during the high water flow conditions the sediments in Drum Creek would impact the water quality at a greater degree than the low water flow conditions.

Respondents authorized A & M Engineering to observe the flow conditions and collect water quality samples during the high and normal water flow conditions in order to address KDHE's concerns.

The laboratory reports for the first sampling event are included in the Analytical Report. The laboratory reports for the second and third sampling events listed above are included in Appendix A. Pictures taken during the January 2004 sampling event are also included in Appendix A.

## **ANALYTICAL DATA**

### **1. Drinking Water Standards**

The purpose of collecting the additional water samples was to study the fluctuation, if any, of metal concentrations in stream water under high and normal flow conditions.

The laboratory data shown in Table 1 is a summary of three separate sampling events collected at varying levels of water flow in Drum Creek. In Table 1 the items in blue represent low water flow conditions; the items in red represents high water flow conditions and the items in black represents normal water flow conditions. Some of the samples were taken in identical spots at varying water levels. These areas are identified in the far right column in Table 1. The Maximum Contaminant Levels (MCL), as outlined in the EPA's Standard for Safe Drinking Water, are shown at the bottom of the table.

The sample marked "effluent" is the effluent discharge from the new City lagoons. The City discharge is located upstream from the mouth of the Unnamed Creek and was not in place at the time of the sampling reported in the Analytical Report. In Table 1, samples 1 through 6 were taken upstream from where Unnamed Creek empties into Drum Creek. Samples 7 and 8

were taken at the confluence of Unnamed Creek and Drum Creek. Samples 9 through 19 are taken downstream from the confluence of Unnamed and Drum Creeks.

The samples taken in identical locations at different water levels are samples 4 and 5; 7 and 8; 9 and 10; 14, 15 and 16; and 17 and 18.

Mercury and Arsenic are all below detection limits in all samples. Cadmium levels are all below detection limits with the exception of one at the mouth of Drum Creek during high flow. Chromium showed non-detect in all low water and normal water levels. Chromium was detected in all samples during high water flows, but was below its MCL. Lead concentrations showed non-detect in all low and normal water level flows. During high water flows, lead showed traces in the City effluent discharge, at the stream confluence, and 75 feet downstream from the mouth of Unnamed Creek. Zinc showed up sporadically in multiple samples in low and high water level conditions, but showed non-detect during normal water levels. Zinc in all cases was far below its MCL. Figure 1 shows the water sampling locations in Drum Creek.

## **2. Sediments**

There were 10 original sediment samples taken from visible sediment areas in June 2003 during low water levels and included in the Analytical Report. There was one additional sediment sample taken January 30, 2004, during high water flow, 300 feet below the low water crossing. Samples 1 through 4 are upstream of Unnamed Creek. Sample 5 is at the confluence of Drum Creek and Unnamed Creek. Samples 6 through 8 are within 300 feet downstream of the confluence. Samples 5 through 8 combined take into account the first 300 feet at and below the confluence of Unnamed and Drum Creeks. Sample 9 is at the Main Street Bridge, approximately 1,000 feet downstream of the confluence. Sample 10 is at the low water crossing, approximately 6,000 feet downstream, and Sample 11 is 300 feet below the low water crossing. The sediment laboratory results are summarized in Table 2.

In Table 2 the laboratory results of samples within the first 300 feet downstream from the confluence with Unnamed Creek are shaded in light gray. Except for the samples in this 300 foot area, the constituents in all other samples resemble the background levels. Figure 2 shows the sediment sampling locations in Drum Creek.

### **3. Kansas Surface Water Quality Standards – Aquatic Life Criteria (KAR 28-16-28)**

The Respondents, addressing the issues of aquatic life criteria for Drum Creek (under the Kansas Surface Water Quality Standards as adopted by reference and outlined in Article 16 of the KDHE regulations), have conducted calculations using the criteria in Table 1b of the regulations referenced above. The calculations are set forth in Appendix B, and the results of those calculations are set forth in Table 3. Sampling locations listed on Table 1 that were below detection limits are excluded from Table 3.

Data presented in Table 3 show the following: Cadmium had one occurrence above the chronic criteria at the confluence of Unnamed Creek and Drum Creek during high flow conditions. Mercury, Arsenic and Chromium were all below the acute and chronic criteria at all flow conditions. Lead had two occurrences above the chronic criteria levels. Both were during high flow water conditions. One is at the confluence of Drum Creek and the other is 75 feet below the confluence of Drum Creek. Zinc had one occurrence that was above both the acute and chronic criteria. It occurred at the confluence of Drum Creek during high water flow conditions. There were no exceedences for any metals under any flow conditions at all locations below 75 feet from the confluence with Unnamed Creek

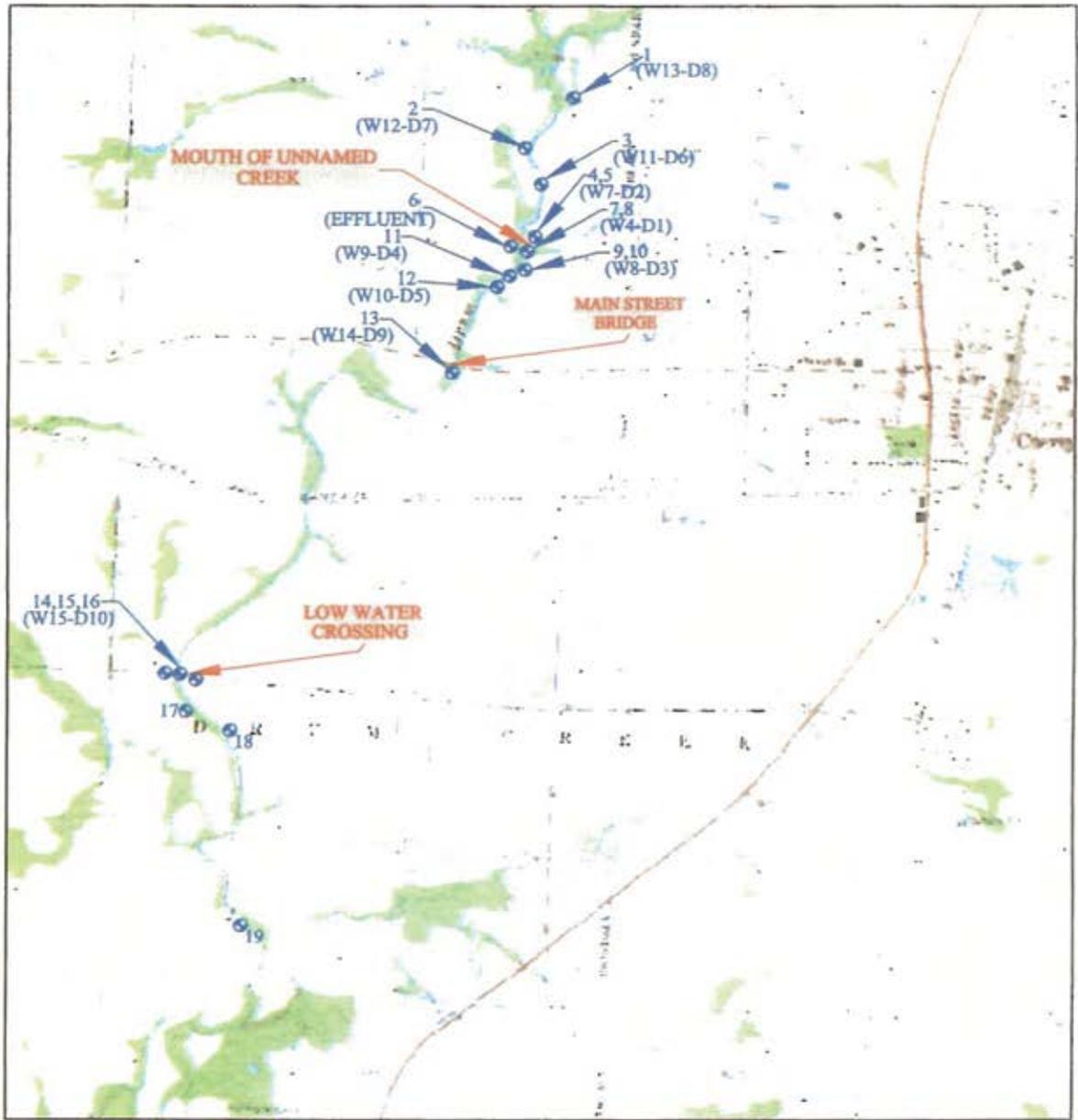
## **OBSERVATIONS AND CONCLUSIONS**

1. During low flow conditions, the segment of Drum Creek starting approximately 300 feet downstream from the mouth of Unnamed Creek and extending to the low water crossing is in the form of a long narrow pond. The ponding effect was created by the raised stream bottom elevations at the low water crossing and, possibly, at the bridge crossings located throughout this segment of the creek. During low water flow

conditions the only visible and accessible sediments in this segment of Drum Creek (between Unnamed Creek and the low water crossing) are those located within 300 feet downstream from the mouth of Unnamed Creek. Any other sediments are inundated even during low flow conditions.

2. The water quality has not been jeopardized in Drum Creek during all flow level conditions.
3. The metal concentrations in Drum Creek do not appear to be increasing with the flow rate with the exception of Lead and Chromium during high water flow.
4. Chromium exceeded detection levels in several samples during high water flow conditions. None the less, the levels of Chromium in Drum Creek under all of the flow conditions (low, normal and high) were below its MCL.
5. The trace amount of Lead detected in Sample 6 is from the new City treatment plant. The trace amounts detected in Samples 8 and 10 are within 75 feet of the confluence.
6. Except for the first 300 feet below the confluence of Unnamed and Drum Creeks, the sediment contamination levels appear to be very similar to background levels.
7. The sediments in Drum Creek do not present a risk to the drinking water quality, unless the sediments are disturbed.
8. The ponding in Drum Creek between the mouth of Unnamed Creek and the low water crossing, approximately 6,000 feet downstream, provides a natural control system that limits the distribution of the contaminated sediments downstream below the low water crossing.

9. All aquatic criteria exceedences were minor and occurred within 75 feet of the confluence of Drum Creek and Unnamed Creek.



• SAMPLE POINTS

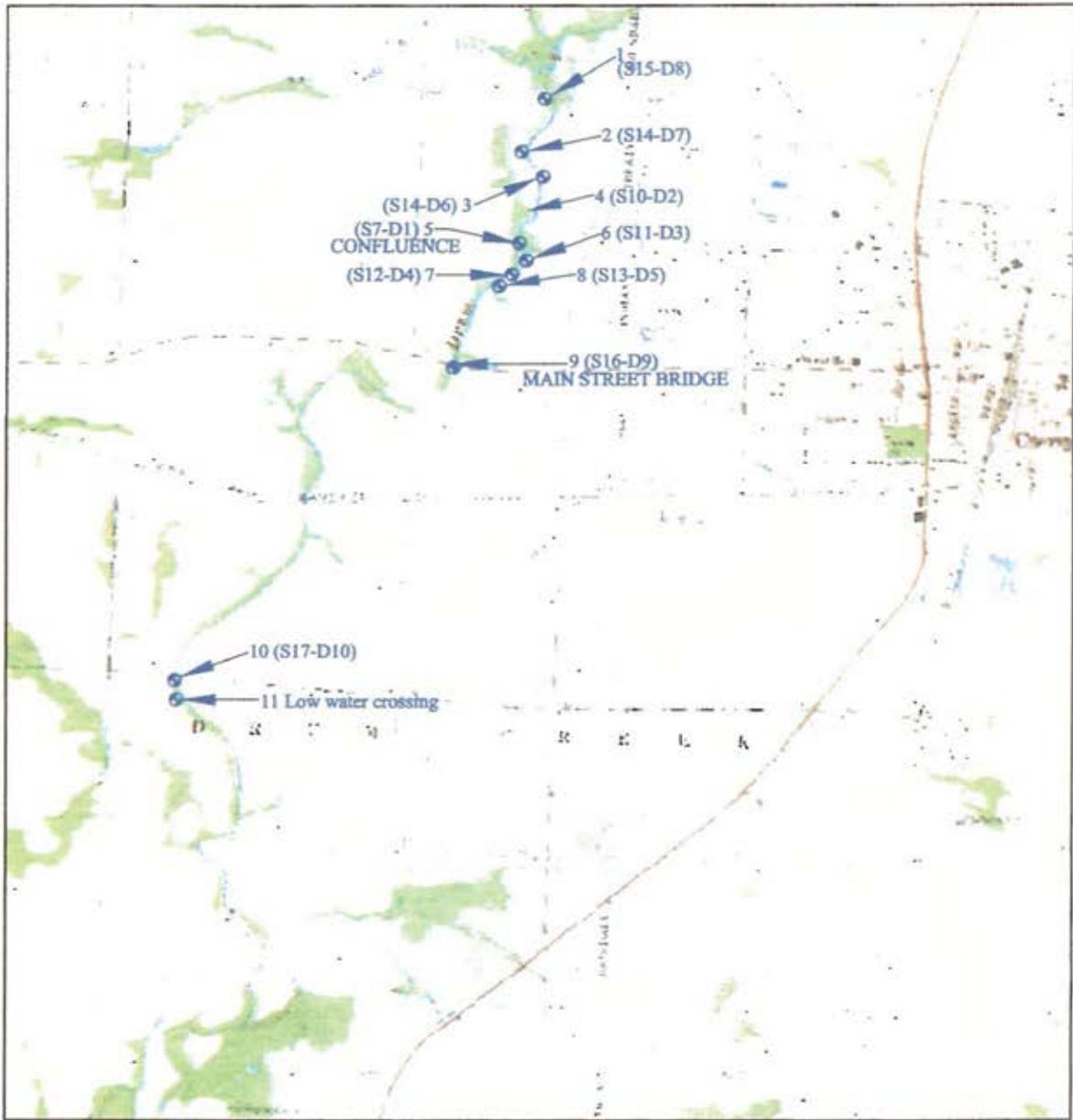


A & M ENGINEERING AND ENVIRONMENTAL SERVICES, INC.

ENGINEERING - ENVIRONMENTAL - CONSTRUCTION

WATER QUALITY SAMPLING LOCATIONS FOR DRUM CREEK

SCALE: NOT TO SCALE	DATE: 03/31/04	FIGURE NO. FIGURE 1
APPROVED BY: AME	DRAWN BY: TME	PROJECT NO. 1804-002-1002



• SAMPLE POINTS



**A & M ENGINEERING AND ENVIRONMENTAL SERVICES, INC.**

ENGINEERING — ENVIRONMENTAL — CONSTRUCTION

**SEDIMENT SAMPLING LOCATIONS FOR DRUM CREEK**

SCALE: NOT TO SCALE	DATE: 03/31/04	FIGURE NO. FIGURE 2
APPROVED BY: AME	DRAWN BY: TME	PROJECT NO. 1804-002-1002

**Table 1  
Water Quality Analytical Data  
Drum Creek**

Sampling point	Date	Mercury	Arsenic	Cadmium	Chromium	Lead	Zinc	Sampling locations
1	6/24/03	BDL	BDL	BDL	BDL	BDL	BDL	W13-D8
2	6/24/03	BDL	BDL	BDL	BDL	BDL	BDL	W12-D7
3	6/24/03	BDL	BDL	BDL	BDL	BDL	BDL	W11-D6
4	6/24/03	BDL	BDL	BDL	BDL	BDL	BDL	W7-D2
5	1/30/04	BDL	BDL	BDL	0.027	BDL	BDL	Upstream same location as #4
6	1/30/04	BDL	BDL	BDL	0.024	0.00938	0.034	Effluent
7	6/24/03	BDL	BDL	BDL	BDL	BDL	0.0322	W4-D1
8	1/30/04	BDL	BDL	0.0112	0.0961	0.0358	1.07	(Confluence) same location as #7
9	6/24/03	BDL	BDL	BDL	BDL	BDL	0.132	W8-D3
10	1/30/04	BDL	BDL	BDL	0.069	0.0251	0.0152	75FT Downstream same as #9
11	6/24/03	BDL	BDL	BDL	BDL	BDL	0.132	W9-D4
12	6/24/03	BDL	BDL	BDL	BDL	BDL	0.0544	W10-D5
13	6/24/03	BDL	BDL	BDL	BDL	BDL	BDL	W14-D9
14	6/24/03	BDL	BDL	BDL	BDL	BDL	0.0204	W15-D10
15	1/30/04	BDL	BDL	BDL	0.028	BDL	0.0205	Low water crossing same location as #14
16	3/1/04	BDL	BDL	BDL	BDL	BDL	BDL	Low water crossing same location as #'s 14 and 15
17	1/30/04	BDL	BDL	BDL	0.028	BDL	0.036	300FT Below low water crossing
18	3/1/04	BDL	BDL	BDL	BDL	BDL	BDL	300FT Below low water crossing same as #17
19	3/1/04	BDL	BDL	BDL	BDL	BDL	BDL	2 miles downstream

\* Blue indicates low water levels and is reported in the Analytical Report

\* Red indicates high water levels

\* Black indicates normal water levels

Note: Parameters are in mg/L

MCL's  
0.002      0      0.005      0.1      0      5

**Table 2**  
**Sediment Analytical Data**  
**Drum Creek**

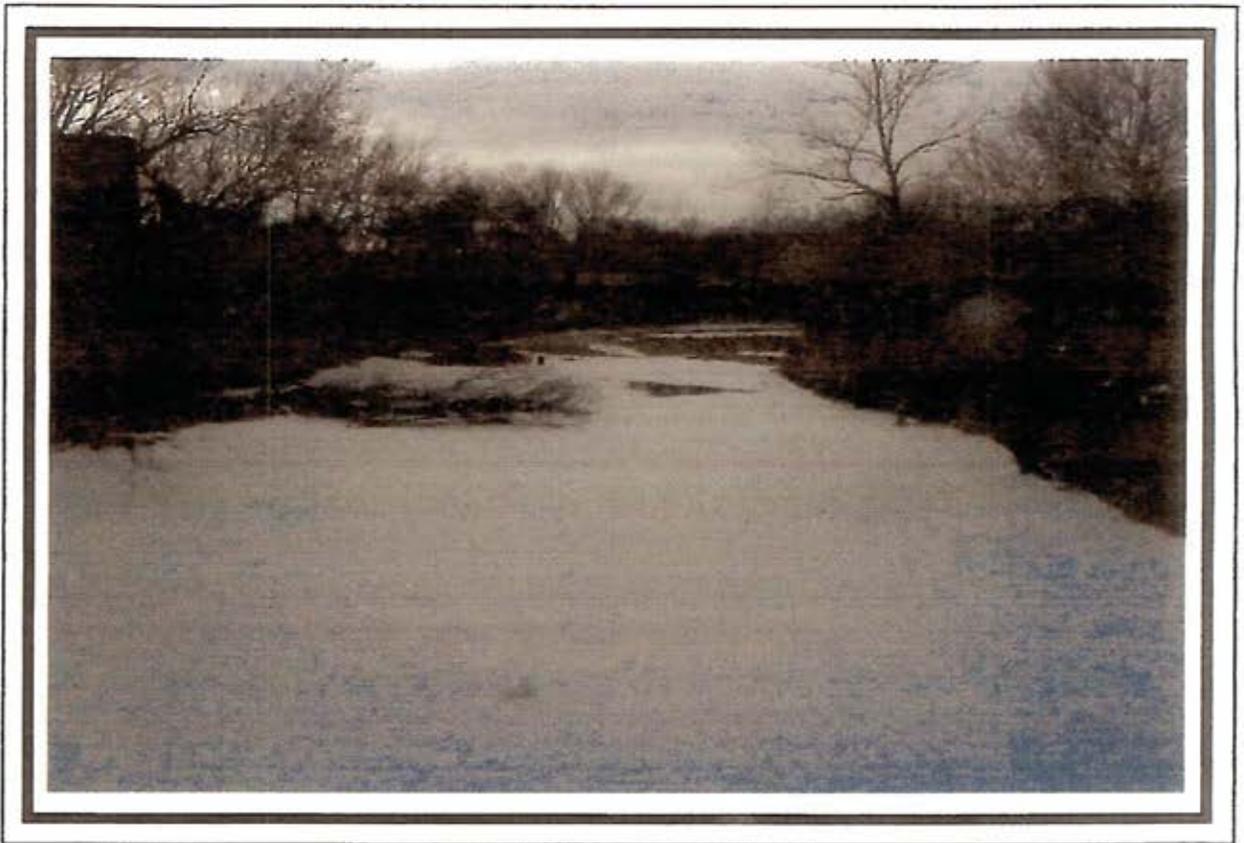
Sampling point	Date	Mercury	Arsenic	Cadmium	Chromium	Lead	Zinc	Sampling location
1	6/24/03	0.038	2.3	1.8	8.68	8.87	49.9	S15-D8
2	6/24/03	0.052	1.81	1.7	8.2	16	81.2	S14-D7
3	6/24/03	0.18	3.17	2.55	9.7	24.5	94.6	S14-D6
4	6/24/03	0.086	7.16	4.63	13.9	20.6	78.8	S10-D2
5	6/24/03	0.13	30.7	430	14	473	10,300	(Confluence) S7-D1
6	6/24/03	0.099	11.4	90.4	11.7	144	3,680	S11-D3
7	6/24/03	0.12	13.9	73	13.5	223	5,950	S12-D4
8	6/24/03	0.1	8.84	71.1	18.6	109	1,520	300' downstream from #5 S13-D5
9	6/24/03	0.046	1.66	1.77	8.86	10.1	49.6	Main Street bridge S16-D9
10	6/24/03	0.051	18.5	14.3	11.6	48.2	517	Low water crossing S17-D10
11	1/30/04	BDL	6.76	2.99	14.6	9.73	24.9	300' below low water crossing

Note: Parameters are in mg/L



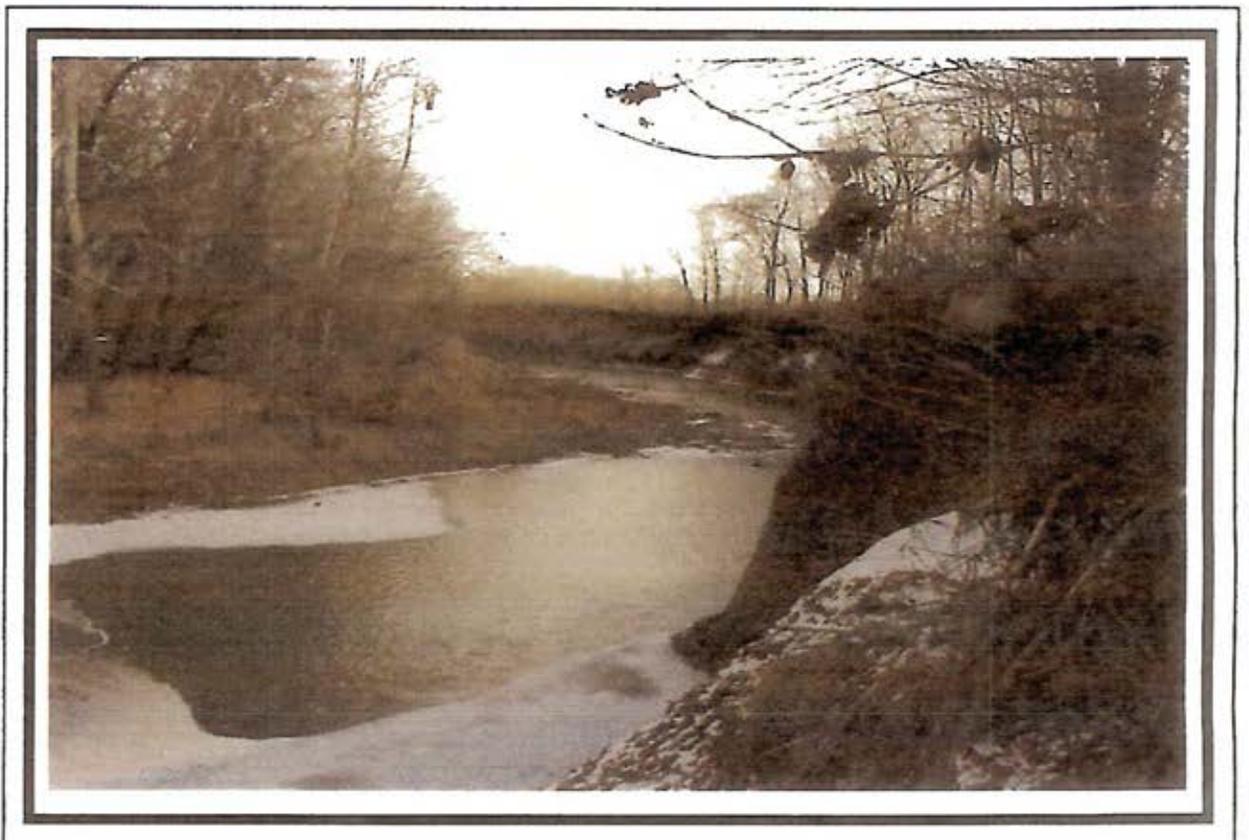
## APPENDIX A

#1



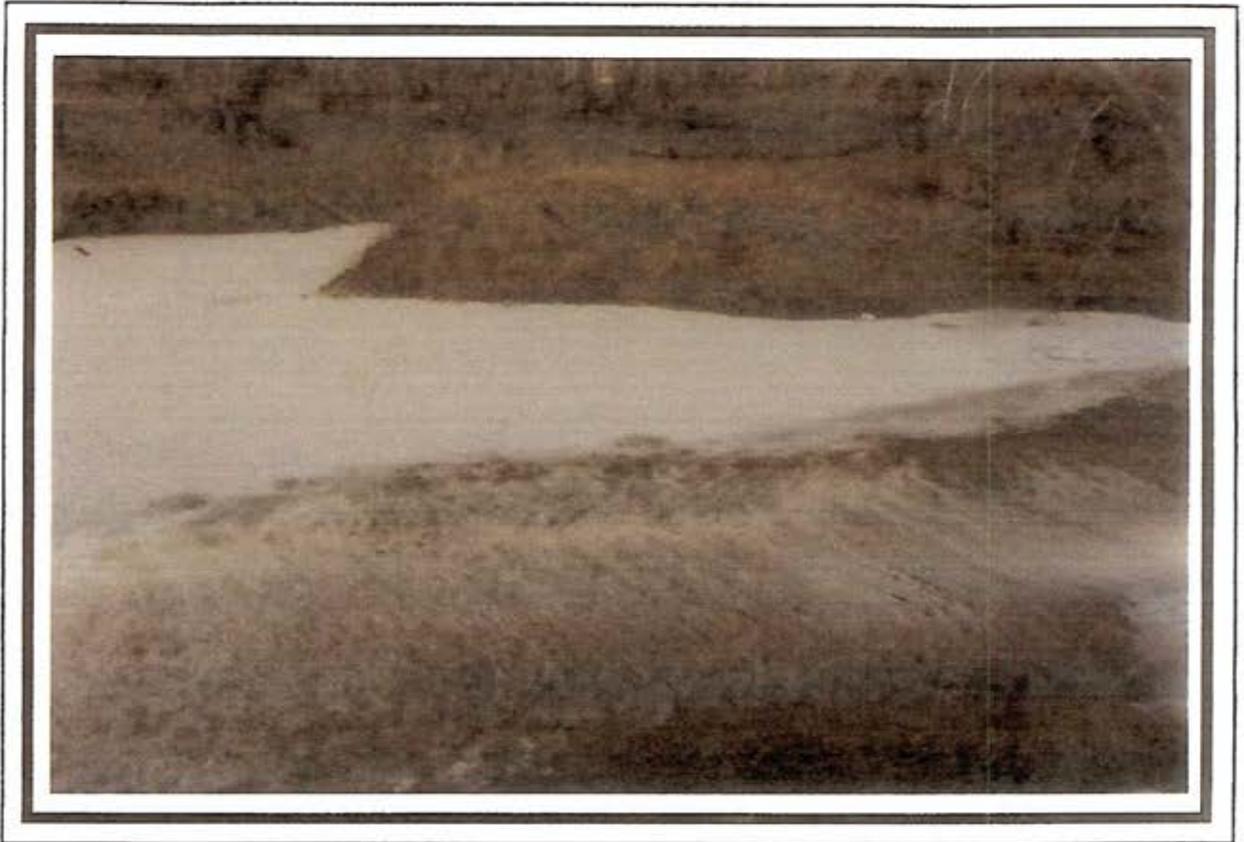
Original background location (5200 Street Bridge) looking south.

#2



Looking upstream from old sample point just above City discharge.

#3



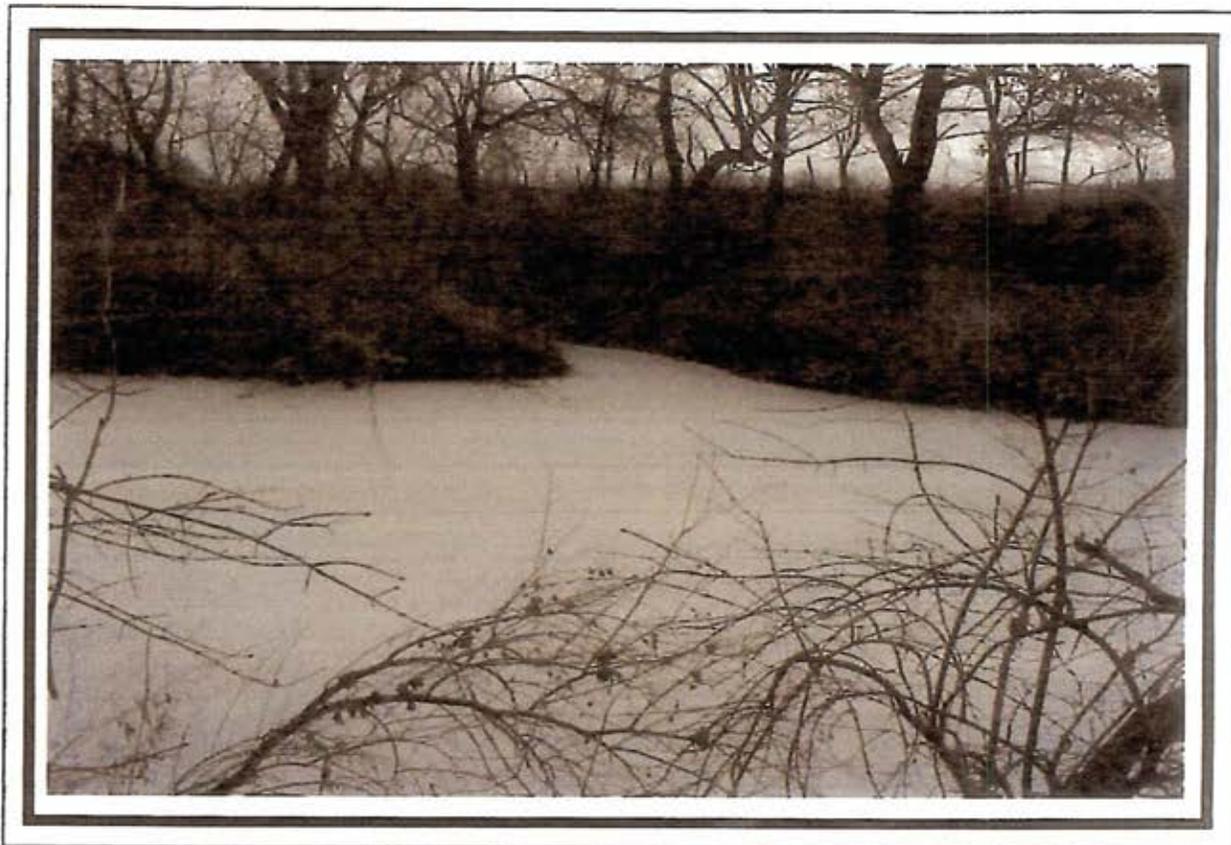
Sample point upstream of Unnamed Creek is also old sample point just above City discharge

#4



Effluent from City lagoons.

#5

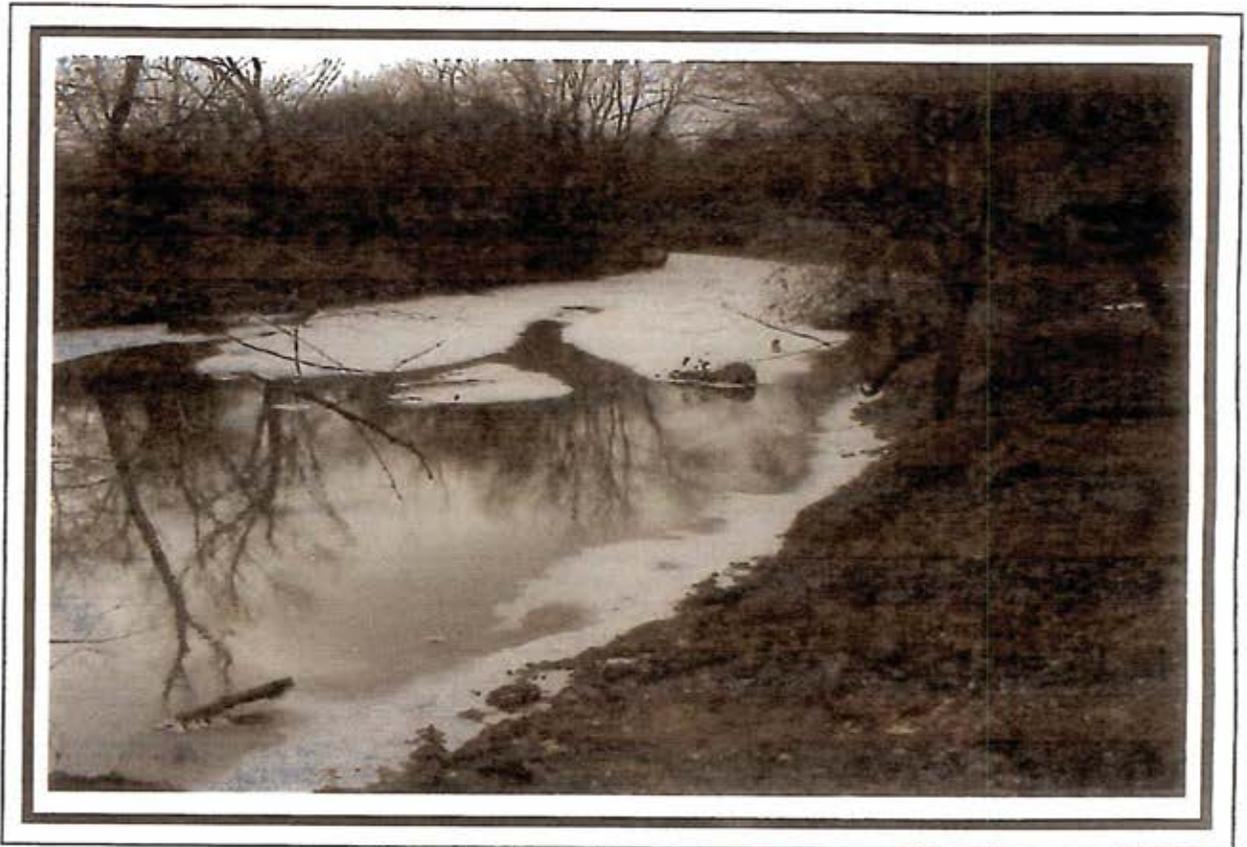


Mouth of Unnamed Creek.

#6

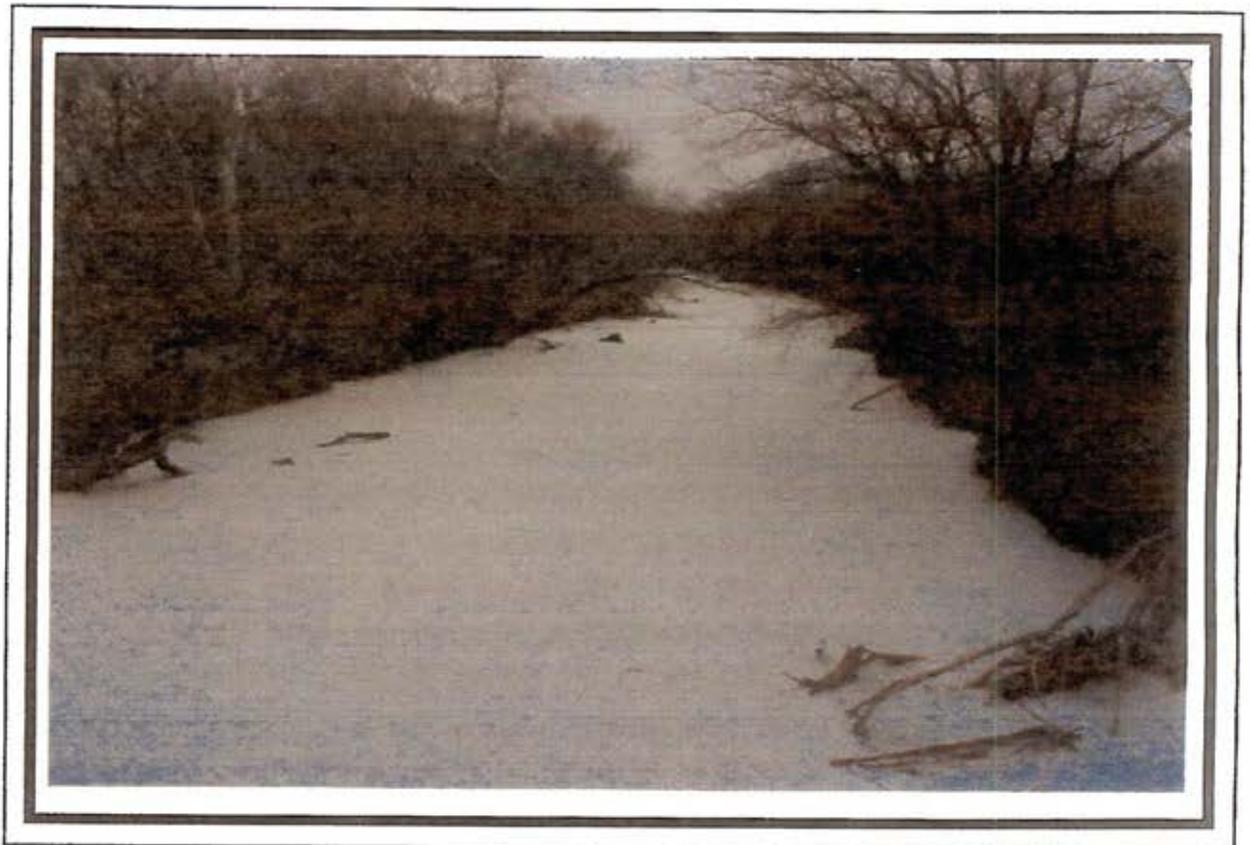


Sediment pile ~ 300' downstream of Unnamed Creek.



#7

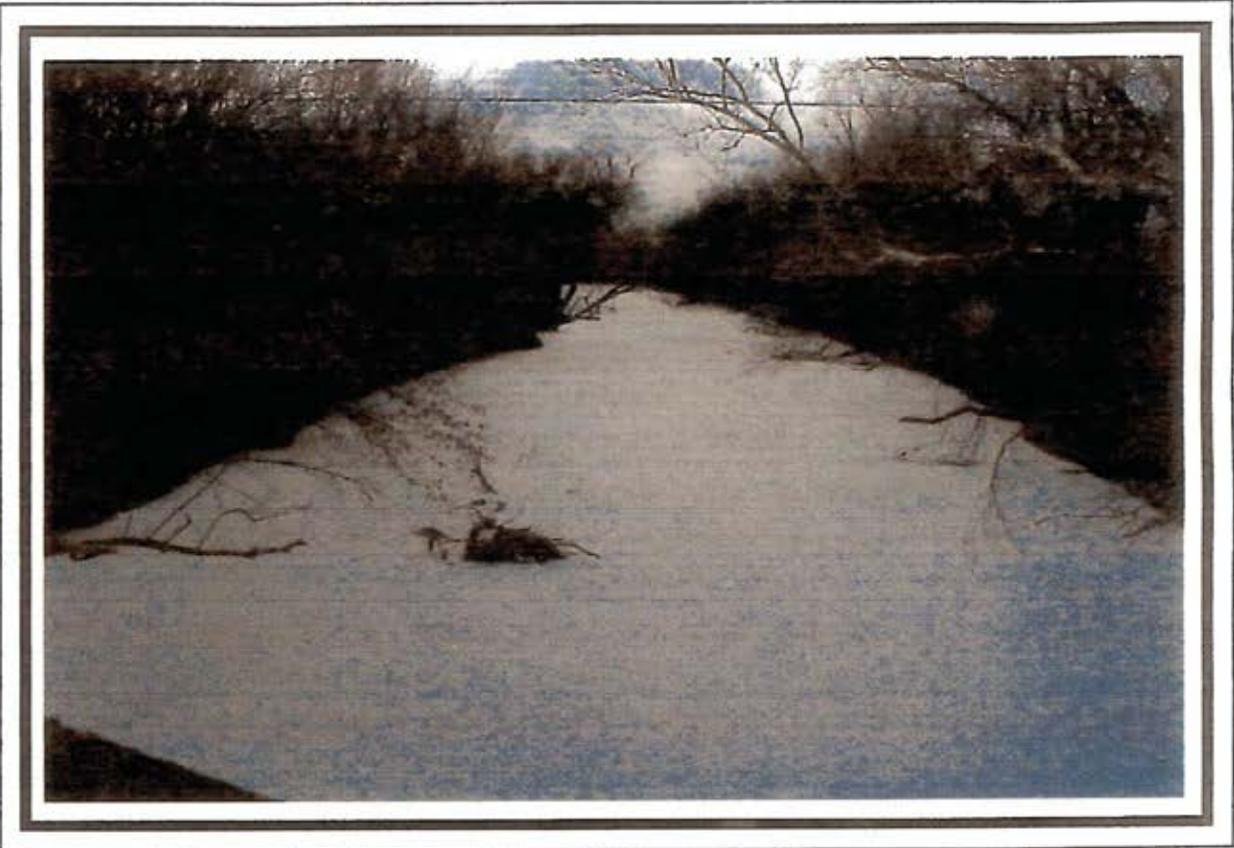
View looking downstream from previous picture (#6).



#8

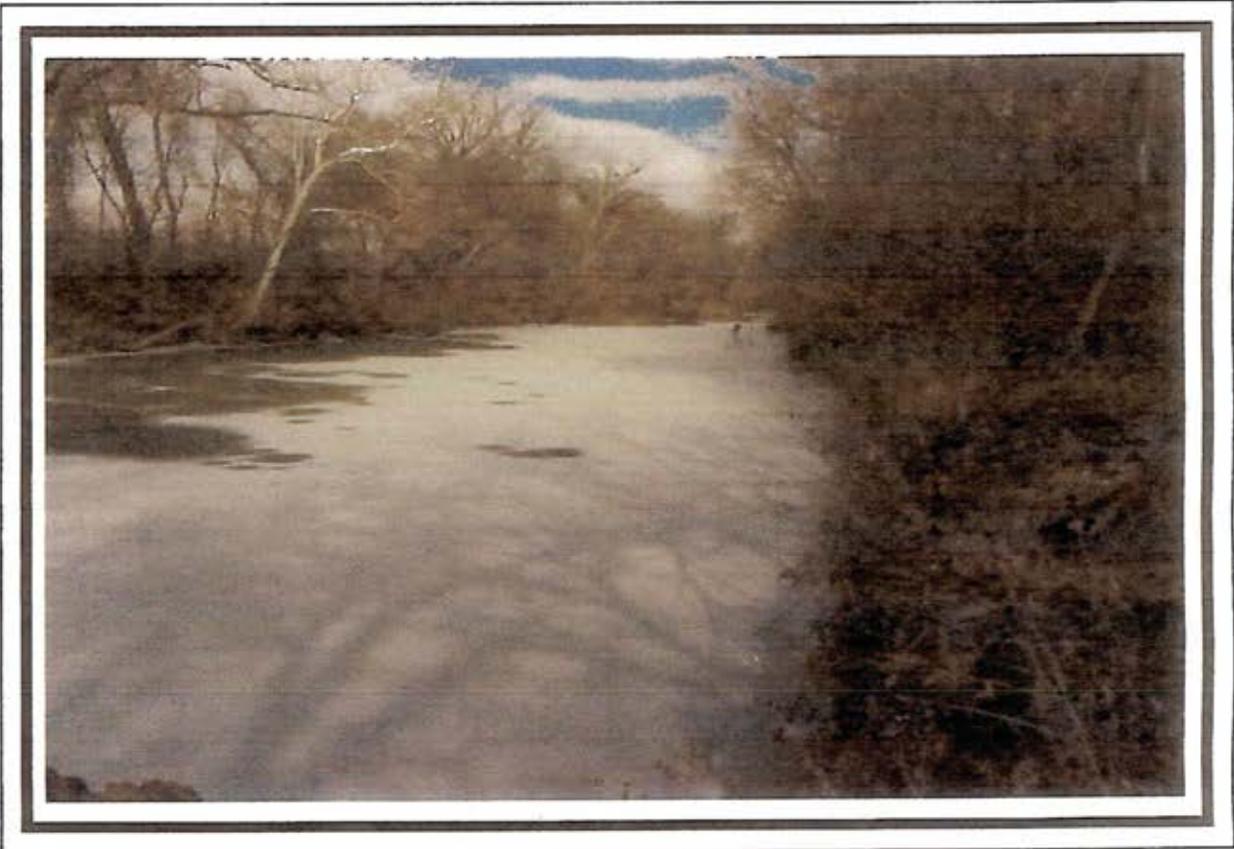
Looking north from Main Street Bridge toward picture #7 leave-off point.

#9

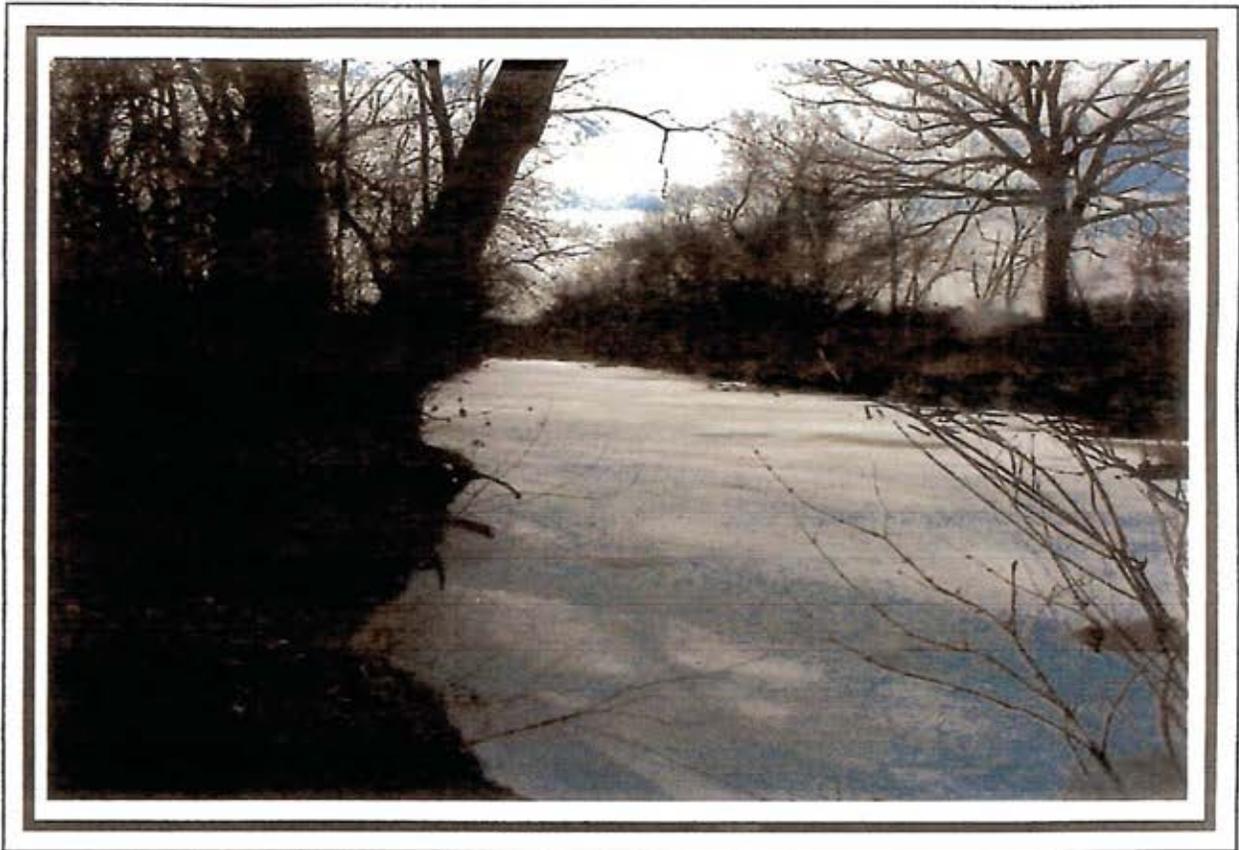


Looking south from Main Street Bridge original sample point labeled  
1000' downstream from Unnamed Creek.

#10



One half mile north of low water crossing looking north



#11

Same location as picture #10 looking south toward low water crossing.



#12

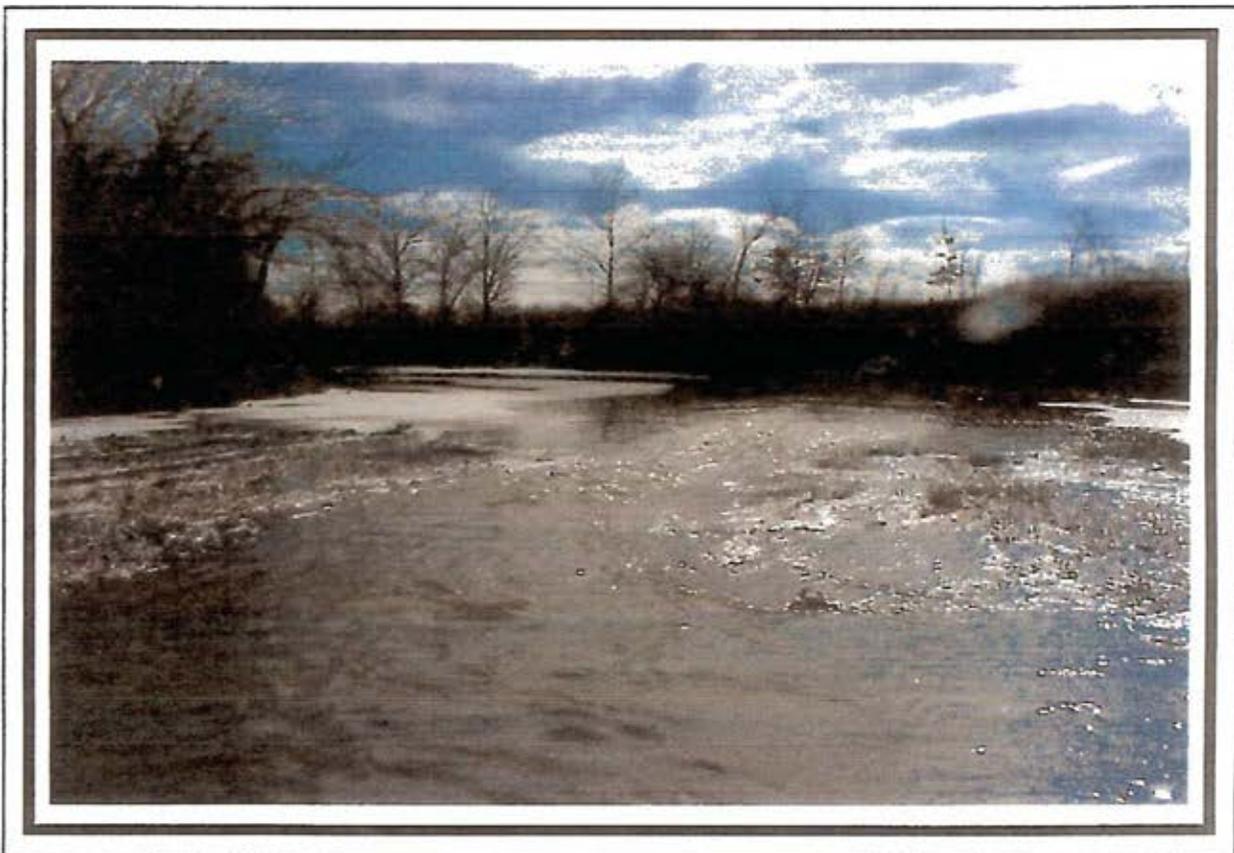
Typical side-slope bank of Drum Creek.

#13



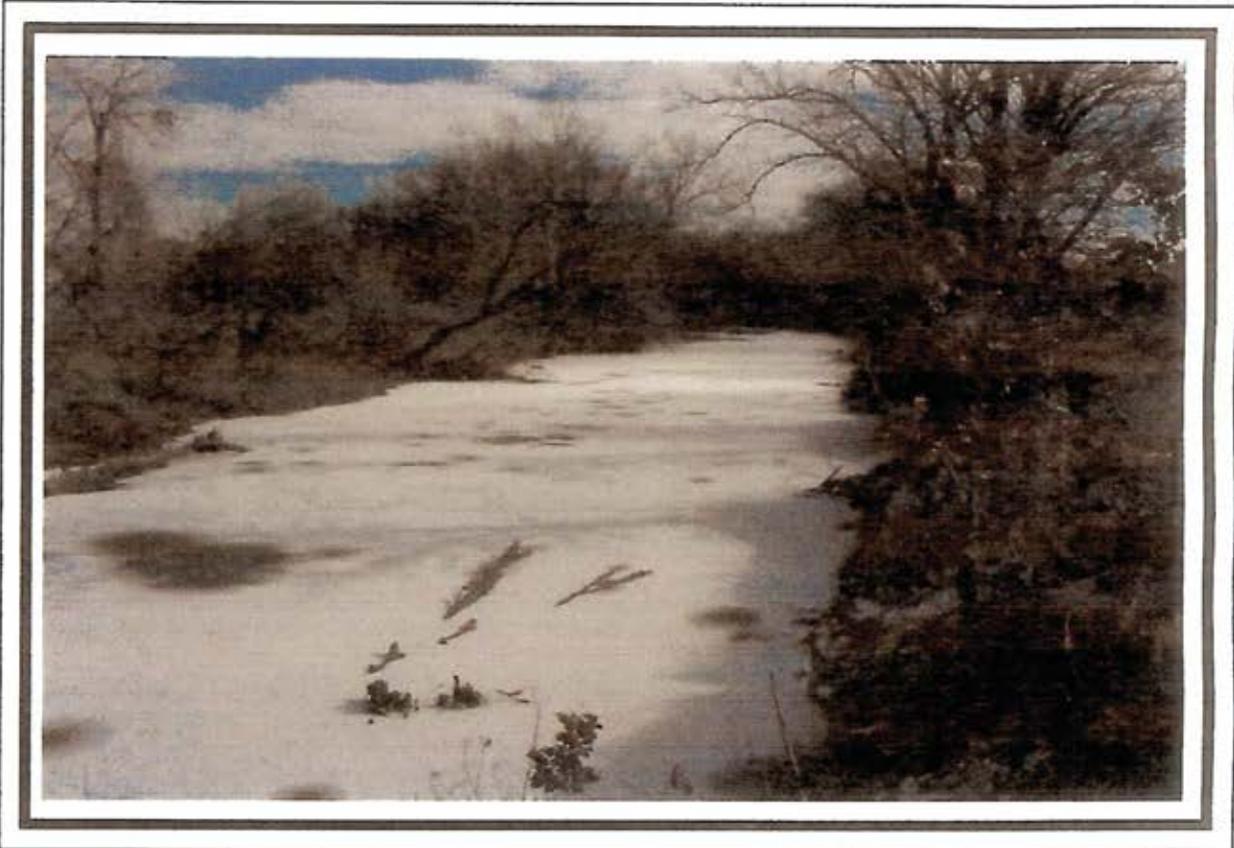
Low water crossing looking north.

#14



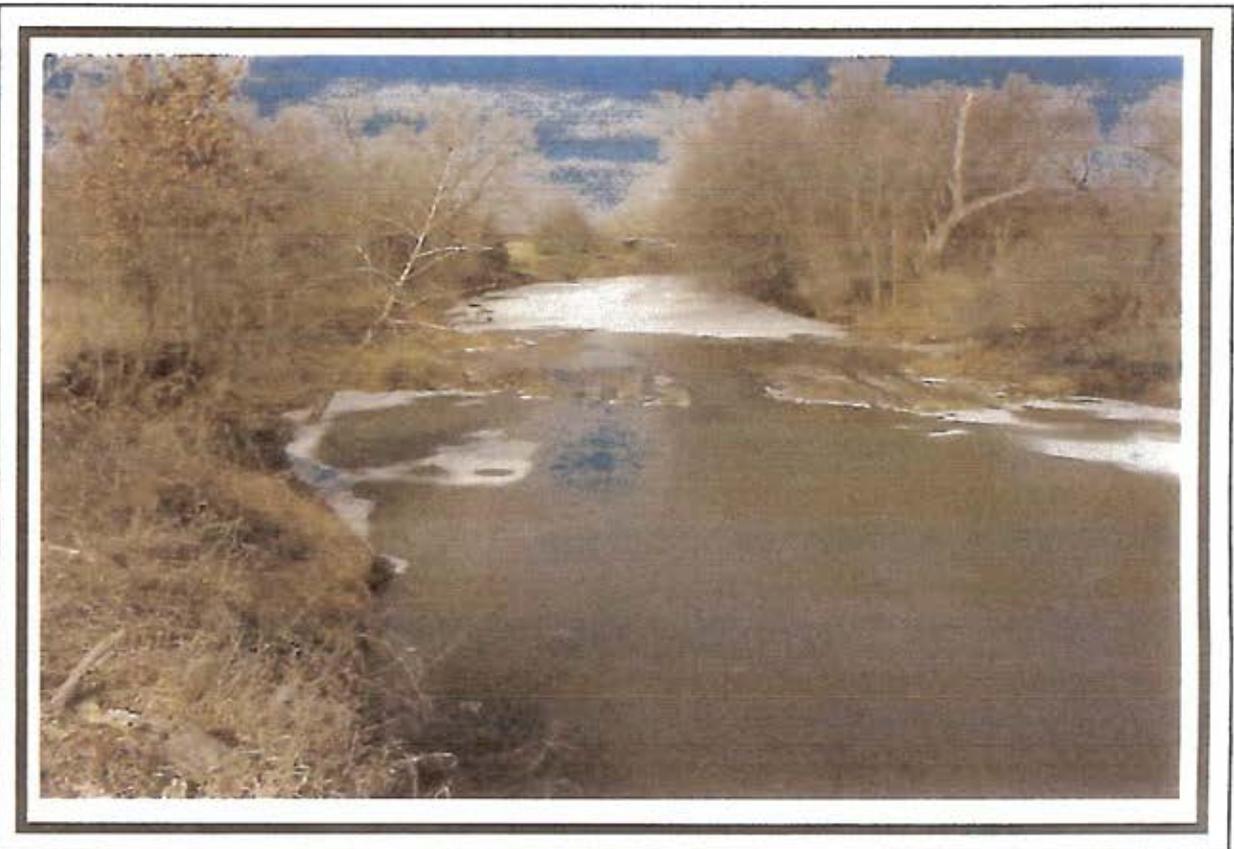
Low water crossing looking south toward sample point.

#15



Approximately 100 yards south of low water crossing looking downstream.

#16



Looking north at low water crossing from sample point.



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6825 E 38th Street  
Tulsa OK 74145  
(918)828-9977

Irfan Taner  
A & M Engineering  
10010 E. 16th St.  
Tulsa, OK 74128-4813  
TEL: (918)665-6574  
FAX ( ) 665-6576

February 10, 2004  
Order No.: T04010372

RE: Cherryvale

Dear Irfan Taner:

Sherry Laboratories received 7 samples on 1/30/2004 for the analyses presented in the following report.

In accordance with your instructions, Sherry Laboratories/Oklahoma conducted the analysis shown on the following pages on samples submitted by your company. The results related only to the items tested. Unless otherwise noted, all analysis was conducted using EPA approved methodologies. Test reports meet all the NELAC requirements. All relevant sampling information is on the attached chain-of-custody form. The initials SUB as the analyst designate any testing sub-contracted by SLO.

Certifications/Accreditation: OK - 7604  
AR - ADEQ  
KS - E-10232  
LA - 4002

A scope of Certified/Accredited parameters is available upon request. If you have any questions regarding these tests results, please feel free to call.

Sincerely,

Approved By:

  
\_\_\_\_\_  
Brian Duzan, Director  
Environmental Services



# SHERRY Laboratories

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Tulsa OK 74145  
(918)828-9977

Fax: (918)828-7756  
(800)324-5757

CLIENT: A & M Engineering  
Lab Order: T04010372  
Project: Cherryvale

Date Received: 1/30/2004  
Date Reported: 10-Feb-04

Lab ID: T04010372-01    Collection Date: 1/30/2004 11:00:00 A    Sample ID: Effluent

Matrix: AQUEOUS

<u>Analyses</u>	<u>Result</u>	<u>Detection Limit</u>	<u>Units</u>	<u>Date Analyzed</u>	<u>Analyst</u>
<b>MERCURY IN WATER, TOTAL</b>	<b>E245.2</b>				<b>KR</b>
Mercury	< 0.000100	0.000100	mg/L	2/2/2004	
<b>METALS IN WATER BY ICP, TOTAL</b>	<b>E200.7</b>				<b>KR</b>
Arsenic	< 0.00500	0.00500	mg/L	2/3/2004 3:27:10 P	
Cadmium	< 0.00100	0.00100	mg/L	2/3/2004 3:27:10 P	
Chromium	0.0240	0.0100	mg/L	2/3/2004 3:27:10 P	
Lead	0.00938	0.00500	mg/L	2/3/2004 3:27:10 P	
Silver	< 0.00200	0.00200	mg/L	2/3/2004 3:27:10 P	
Zinc	0.0340	0.0100	mg/L	2/3/2004 3:27:10 P	
<b>TOTAL SUSPENDED SOLIDS</b>	<b>E160.2</b>				<b>PB</b>
Suspended Solids (Residue, Non-Filterable)	34.0	10.0	mg/L	2/4/2004 9:55:00 A	

Lab ID: T04010372-02    Collection Date: 1/30/2004 1:30:00 PM    Sample ID: Low Water Crossing

Matrix: AQUEOUS

<u>Analyses</u>	<u>Result</u>	<u>Detection Limit</u>	<u>Units</u>	<u>Date Analyzed</u>	<u>Analyst</u>
<b>MERCURY IN WATER, TOTAL</b>	<b>E245.2</b>				<b>KR</b>
Mercury	< 0.000100	0.000100	mg/L	2/2/2004	
<b>METALS IN WATER BY ICP, TOTAL</b>	<b>E200.7</b>				<b>KR</b>
Arsenic	< 0.00500	0.00500	mg/L	2/3/2004 3:32:05 P	
Cadmium	< 0.00100	0.00100	mg/L	2/3/2004 3:32:05 P	
Chromium	0.0280	0.0100	mg/L	2/3/2004 3:32:05 P	
Lead	< 0.00500	0.00500	mg/L	2/3/2004 3:32:05 P	
Silver	< 0.00200	0.00200	mg/L	2/3/2004 3:32:05 P	
Zinc	0.0205	0.0100	mg/L	2/3/2004 3:32:05 P	
<b>TOTAL SUSPENDED SOLIDS</b>	<b>E160.2</b>				<b>PB</b>
Suspended Solids (Residue, Non-Filterable)	8.00	5.00	mg/L	2/4/2004 9:55:00 A	



**SHERRY**Laboratories

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6825 E 38th Street  
Tulsa OK 74145  
(918)828-9977

Fax: (918)828-7756  
(800)324-5757

**CLIENT:** A & M Engineering  
**Lab Order:** T04010372  
**Project:** Cherryvale

**Date Received:** 1/30/2004  
**Date Reported:** 10-Feb-04

**Lab ID:** T04010372-03 **Collection Date:** 1/30/2004 1:50:00 PM **Sample ID:** Downstream

**Matrix:** AQUEOUS

<u>Analyses</u>	<u>Result</u>	<u>Detection Limit</u>	<u>Units</u>	<u>Date Analyzed</u>	<u>Analyst</u>
<b>MERCURY IN WATER, TOTAL</b>	<b>E245.2</b>				<b>KR</b>
Mercury	< 0.000100	0.000100	mg/L	2/2/2004	
<b>METALS IN WATER BY ICP, TOTAL</b>	<b>E200.7</b>				<b>KR</b>
Arsenic	< 0.00500	0.00500	mg/L	2/3/2004 3:37:00 P	
Cadmium	< 0.00100	0.00100	mg/L	2/3/2004 3:37:00 P	
Chromium	0.0280	0.0100	mg/L	2/3/2004 3:37:00 P	
Lead	< 0.00500	0.00500	mg/L	2/3/2004 3:37:00 P	
Silver	< 0.00200	0.00200	mg/L	2/3/2004 3:37:00 P	
Zinc	0.0360	0.0100	mg/L	2/3/2004 3:37:00 P	
<b>TOTAL SUSPENDED SOLIDS</b>	<b>E160.2</b>				<b>PB</b>
Suspended Solids (Residue, Non-Filterable)	39.0	5.00	mg/L	2/4/2004 9:55:00 A	

**Lab ID:** T04010372-04 **Collection Date:** 1/30/2004 11:45:00 A **Sample ID:** Upstream

**Matrix:** AQUEOUS

<u>Analyses</u>	<u>Result</u>	<u>Detection Limit</u>	<u>Units</u>	<u>Date Analyzed</u>	<u>Analyst</u>
<b>MERCURY IN WATER, TOTAL</b>	<b>E245.2</b>				<b>KR</b>
Mercury	< 0.000100	0.000100	mg/L	2/2/2004	
<b>METALS IN WATER BY ICP, TOTAL</b>	<b>E200.7</b>				<b>KR</b>
Arsenic	< 0.00500	0.00500	mg/L	2/3/2004 3:41:49 P	
Cadmium	< 0.00100	0.00100	mg/L	2/3/2004 3:41:49 P	
Chromium	0.0270	0.0100	mg/L	2/3/2004 3:41:49 P	
Lead	< 0.00500	0.00500	mg/L	2/3/2004 3:41:49 P	
Silver	< 0.00200	0.00200	mg/L	2/3/2004 3:41:49 P	
Zinc	< 0.0100	0.0100	mg/L	2/3/2004 3:41:49 P	
<b>TOTAL SUSPENDED SOLIDS</b>	<b>E160.2</b>				<b>PB</b>
Suspended Solids (Residue, Non-Filterable)	7.00	5.00	mg/L	2/4/2004 9:55:00 A	



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CLIENT: A & M Engineering  
Lab Order: T04010372  
Project: Cherryvale

Date Received: 1/30/2004  
Date Reported: 10-Feb-04

Lab ID: T04010372-05    Collection Date: 1/30/2004 12:15:00 P    Sample ID: Unnamed Creek

Matrix: AQUEOUS

<u>Analyses</u>	<u>Result</u>	<u>Detection Limit</u>	<u>Units</u>	<u>Date Analyzed</u>	<u>Analyst</u>
MERCURY IN WATER, TOTAL	E245.2				KR
Mercury	< 0.000100	0.000100	mg/L	2/2/2004	
METALS IN WATER BY ICP, TOTAL	E200.7				KR
Arsenic	< 0.00500	0.00500	mg/L	2/5/2004 11:45:03	
Cadmium	0.0112	0.00100	mg/L	2/5/2004 11:45:03	
Chromium	0.0961	0.0100	mg/L	2/5/2004 11:45:03	
Lead	0.0358	0.00500	mg/L	2/5/2004 11:45:03	
Silver	< 0.00200	0.00200	mg/L	2/5/2004 11:45:03	
Zinc	1.07	0.0100	mg/L	2/5/2004 11:45:03	

Lab ID: T04010372-06    Collection Date: 1/30/2004 12:05:00 P    Sample ID: 75 Foot

Matrix: AQUEOUS

<u>Analyses</u>	<u>Result</u>	<u>Detection Limit</u>	<u>Units</u>	<u>Date Analyzed</u>	<u>Analyst</u>
MERCURY IN WATER, TOTAL	E245.2				KR
Mercury	< 0.000100	0.000100	mg/L	2/2/2004	
METALS IN WATER BY ICP, TOTAL	E200.7				KR
Arsenic	< 0.00500	0.00500	mg/L	2/5/2004 12:19:42	
Cadmium	< 0.00100	0.00100	mg/L	2/5/2004 12:19:42	
Chromium	0.0690	0.0100	mg/L	2/5/2004 12:19:42	
Lead	0.0251	0.00500	mg/L	2/5/2004 12:19:42	
Silver	< 0.00200	0.00200	mg/L	2/5/2004 12:19:42	
Zinc	0.0152	0.0100	mg/L	2/5/2004 12:19:42	
TOTAL SUSPENDED SOLIDS	E160.2				PB
Suspended Solids (Residue, Non-Filterable)	13.0	5.00	mg/L	2/4/2004 9:55:00 A	



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CLIENT: A & M Engineering  
Lab Order: T04010372  
Project: Cherryvale

Date Received: 1/30/2004

Date Reported: 10-Feb-04

Lab ID: T04010372-07    Collection Date: 1/30/2004 1:50:00 PM    Sample ID: Downstream Solid

Matrix: SOLID

<u>Analyses</u>	<u>Result</u>	<u>Detection Limit</u>	<u>Units</u>	<u>Date Analyzed</u>	<u>Analyst</u>
<b>MERCURY IN SOIL OR SLUDGE</b>					
Mercury	< 0.025	0.025	mg/Kg	2/3/2004	KR
<b>METALS IN SOIL OR SLUDGE BY ICP</b>					
Arsenic	6.76	0.500	mg/Kg	2/9/2004	KR
Cadmium	2.99	0.250	mg/Kg	2/9/2004	
Chromium	14.6	0.250	mg/Kg	2/9/2004	
Lead	9.73	0.125	mg/Kg	2/9/2004	
Silver	< 0.0500	0.0500	mg/Kg	2/9/2004	
Zinc	24.9	0.250	mg/Kg	2/9/2004	
<b>PH IN SOIL</b>					
pH	7.09	0.10	pH Units	2/2/2004 2:16:00 P	PB

CLIENT: A & M Engineering  
 Work Order: T04010372  
 Project: Cherryvale

## QC SUMMARY REPORT

TestCode	Analyte	BatchID	QCType	Result	PQL	Units	%Rec	%RPD
HG_S	Mercury	R17390	MBLK	< 0.025	0.025	mg/Kg		
	Mercury	R17390	LCS	0.2482	0.025	mg/Kg	99.3	
	Mercury	R17390	MS	0.2389	0.025	mg/Kg	95.6	
	Mercury	R17390	MSD	0.2618	0.025	mg/Kg	105	9.15
HG_WW	Mercury	R17380	MBLK	< 0.00010	0.0001	mg/L		
	Mercury	R17380	LCS	0.001057	0.0001	mg/L	106	
	Mercury	R17380	MS	0.00099	0.0001	mg/L	99	
	Mercury	R17380	MSD	0.000993	0.0001	mg/L	99.3	0.303
MET_S_ICP	Arsenic	R17461	MBLK	< 0.50	0.5	mg/Kg		
	Cadmium	R17461	MBLK	< 0.25	0.25	mg/Kg		
	Chromium	R17461	MBLK	< 0.25	0.25	mg/Kg		
	Lead	R17461	MBLK	< 0.12	0.125	mg/Kg		
	Silver	R17461	MBLK	< 0.050	0.05	mg/Kg		
	Zinc	R17461	MBLK	< 0.25	0.25	mg/Kg		
	Arsenic	R17461	LCS	1.939	0.5	mg/Kg	97	
	Arsenic	R17461	LCS	1.976	0.5	mg/Kg	98.8	1.89
	Cadmium	R17461	LCS	1.982	0.25	mg/Kg	99.1	
	Cadmium	R17461	LCS	2.019	0.25	mg/Kg	101	1.85
	Chromium	R17461	LCS	2.01	0.25	mg/Kg	100	2.16
	Chromium	R17461	LCS	1.967	0.25	mg/Kg	98.4	
	Lead	R17461	LCS	1.977	0.125	mg/Kg	98.8	
	Lead	R17461	LCS	2.017	0.125	mg/Kg	101	2
	Silver	R17461	LCS	0.199	0.05	mg/Kg	99.5	2.03
	Silver	R17461	LCS	0.195	0.05	mg/Kg	97.5	
	Zinc	R17461	LCS	2.006	0.25	mg/Kg	100	1.41
	Zinc	R17461	LCS	1.978	0.25	mg/Kg	98.9	
	Arsenic	R17461	MS	2.074	0.5	mg/Kg	104	
	Cadmium	R17461	MS	2.16	0.25	mg/Kg	108	
	Chromium	R17461	MS	2.116	0.25	mg/Kg	106	
	Lead	R17461	MS	2.15	0.125	mg/Kg	108	
	Silver	R17461	MS	0.208	0.05	mg/Kg	104	
	Zinc	R17461	MS	2.172	0.25	mg/Kg	109	
	Arsenic	R17461	MSD	2.08	0.5	mg/Kg	104	0.289
	Cadmium	R17461	MSD	2.181	0.25	mg/Kg	109	0.968
Chromium	R17461	MSD	2.124	0.25	mg/Kg	106	0.377	
Lead	R17461	MSD	2.172	0.125	mg/Kg	109	1.02	
Silver	R17461	MSD	0.21	0.05	mg/Kg	105	0.957	
Zinc	R17461	MSD	2.191	0.25	mg/Kg	110	0.871	
MET_WW_ICP	Arsenic	1759	mbik	< 0.0050	0.005	mg/L		
	Arsenic	1763	mbik	< 0.0050	0.005	mg/L		
	Cadmium	1759	mbik	< 0.0010	0.001	mg/L		
	Cadmium	1763	mbik	< 0.0010	0.001	mg/L		
	Chromium	1759	mbik	< 0.010	0.01	mg/L		
	Chromium	1763	mbik	< 0.010	0.01	mg/L		
	Lead	1759	mbik	< 0.0050	0.005	mg/L		
	Lead	1763	mbik	< 0.0050	0.005	mg/L		
	Silver	1759	mbik	< 0.0020	0.002	mg/L		
	Silver	1763	mbik	< 0.0020	0.002	mg/L		
	Zinc	1759	mbik	< 0.010	0.01	mg/L		

CLIENT: A & M Engineering  
 Work Order: T04010372  
 Project: Cherryvale

## QC SUMMARY REPORT

TestCode	Analyte	BatchID	QCType	Result	PQL	Units	%Rec	%RPD
	Zinc	1763	mbik	< 0.010	0.01	mg/L		
	Arsenic	1759	lcs	1.965	0.005	mg/L	98.3	
	Arsenic	1763	lcs	2.009	0.005	mg/L	100	
	Cadmium	1759	lcs	1.974	0.001	mg/L	98.7	
	Cadmium	1763	lcs	2.008	0.001	mg/L	100	
	Chromium	1759	lcs	1.992	0.01	mg/L	99.6	
	Chromium	1763	lcs	2.088	0.01	mg/L	104	
	Lead	1759	lcs	2.043	0.005	mg/L	102	
	Lead	1763	lcs	2.108	0.005	mg/L	105	
	Silver	1759	lcs	0.1999	0.002	mg/L	99.9	
	Silver	1763	lcs	0.2058	0.002	mg/L	103	
	Zinc	1759	lcs	1.978	0.01	mg/L	98.9	
	Zinc	1763	lcs	2.028	0.01	mg/L	101	
	Arsenic	1759	ms	2.004	0.005	mg/L	100	
	Arsenic	1763	ms	2.165	0.005	mg/L	108	
	Cadmium	1759	ms	1.991	0.001	mg/L	99.5	
	Cadmium	1763	ms	2.122	0.001	mg/L	106	
	Chromium	1759	ms	1.995	0.01	mg/L	98.8	
	Chromium	1763	ms	2.129	0.01	mg/L	102	
	Lead	1759	ms	1.984	0.005	mg/L	97.7	
	Lead	1763	ms	2.077	0.005	mg/L	102	
	Silver	1759	ms	0.202	0.002	mg/L	99.3	
	Silver	1763	ms	0.2107	0.002	mg/L	105	
	Zinc	1759	ms	2.046	0.01	mg/L	101	
	Zinc	1763	ms	3.138	0.01	mg/L	103	
	Arsenic	1759	msd	1.99	0.005	mg/L	99.5	0.702
	Arsenic	1763	msd	2.159	0.005	mg/L	108	0.303
	Cadmium	1759	msd	1.982	0.001	mg/L	99.1	0.416
	Cadmium	1763	msd	2.111	0.001	mg/L	105	0.508
	Chromium	1759	msd	1.983	0.01	mg/L	98.2	0.6
	Chromium	1763	msd	2.138	0.01	mg/L	102	0.427
	Lead	1759	msd	1.961	0.005	mg/L	96.6	1.13
	Lead	1763	msd	2.08	0.005	mg/L	102	0.119
	Silver	1759	msd	0.2004	0.002	mg/L	98.5	0.775
	Silver	1763	msd	0.2086	0.002	mg/L	104	1
	Zinc	1759	msd	2.033	0.01	mg/L	100	0.623
	Zinc	1763	msd	3.125	0.01	mg/L	103	0.42
PH_S	pH	R17376	DUP	7.09	0.1	pH Units	0	0
TSS	Suspended Solids (Residue, Non-Filt	R17429	MBLK	< 5.0	5	mg/L		
	Suspended Solids (Residue, Non-Filt	R17429	LCS	85	5	mg/L	96.3	
	Suspended Solids (Residue, Non-Filt	R17429	DUP	17	5	mg/L	0	6.06
	Suspended Solids (Residue, Non-Filt	R17429	DUP	164	10	mg/L	0	1.21



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Page 1 of 1

## Chain of Custody Record

Laboratory Number 104010372

Collection		Grab	Comp	Sample Identification / Description	Preservative	Number / Type of Container	Matrix Code	Test Requested										Comments / Remarks
Date	Time							As	Mercury	Cadmium	Zinc	Arsenic	Chromium	Pb	5/10/15	PH		
1-30/04	11:00	1		effluent		2	Liq	X	X	X	X	X	X	X	X	X	pH on sediment	
1-30/04	13:30			low water crossing		2	Liq	X	X	X	X	X	X	X	X	X		
1-30/04	13:50			Downstream		3	Soil Liq	X	X	X	X	X	X	X	X	X	1 sediment.	
1-30/04	11:45			upstream		2	Liq	X	X	X	X	X	X	X	X	X		
1-30/04	12:15			Unnamed Creek		2	Liq	X	X	X	X	X	X	X	X	X	Unnamed Creek was not used for TSS. (User used water)	
1-30/04	12:05			75 foot		2	Liq	X	X	X	X	X	X	X	X	X		
													UPS / FedEx Airborne / Sherry (Hand / Mail)					

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P.O. Number

Relinquished by: (Signature)	Received by: (Signature)	Date	Time	Relinquished by: (Signature)	Received by: (Signature)	Date	Time
				<i>Jon Kuhn</i>	<i>[Signature]</i>	1/30/04	12:00

<b>Matrix Codes</b> DW = Drinking Water MW = Monitoring Well WW = Waste Water SL = Sludge SO = Soil O = Oil OT = Other	<b>Container Types</b> G = Glass P = Plastic	<b>Shipping Conditions</b> <input type="checkbox"/> Iced <input type="checkbox"/> Temp. _____ <input type="checkbox"/> Ambient	<b>Which Regulations Apply</b> <input type="checkbox"/> RCRA <input type="checkbox"/> Drinking Water <input type="checkbox"/> POTW <input type="checkbox"/> Other _____ <input type="checkbox"/> NPDES	Thank-you for using SHERRY LABORATORIES
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CLIENT: A & M Engineering  
Lab Order: T04010347  
Project: Cherryvale

Date Received: 1/29/2004  
Date Reported: 10-Feb-04

Lab ID: T04010347-01 Collection Date: 1/28/2004 5:30:00 PM Sample ID: Drum Creek

Matrix: AQUEOUS

<u>Analyses</u>	<u>Result</u>	<u>Detection Limit</u>	<u>Units</u>	<u>Date Analyzed</u>	<u>Analyst</u>
<b>MERCURY IN WATER, TOTAL</b>	<b>E245.2</b>				<b>KR</b>
Mercury	< 0.000100	0.000100	mg/L	2/2/2004	
<b>METALS IN WATER BY ICP, TOTAL</b>	<b>E200.7</b>				<b>KR</b>
Arsenic	< 0.00500	0.00500	mg/L	2/2/2004 8:57:28 P	
Cadmium	< 0.00100	0.00100	mg/L	2/2/2004 8:57:28 P	
Chromium	0.139	0.0100	mg/L	2/2/2004 8:57:28 P	
Lead	< 0.00500	0.00500	mg/L	2/2/2004 8:57:28 P	
Silver	< 0.00200	0.00200	mg/L	2/2/2004 8:57:28 P	
Zinc	< 0.0100	0.0100	mg/L	2/2/2004 8:57:28 P	
<b>TOTAL SUSPENDED SOLIDS</b>	<b>E160.2</b>				<b>PB</b>
Suspended Solids (Residue, Non-Filterable)	8.00	5.00	mg/L	2/2/2004 3:45:00 P	

Lab ID: T04010347-02 Collection Date: 1/28/2004 5:30:00 PM Sample ID: Drum Creek

Matrix: SOIL

<u>Analyses</u>	<u>Result</u>	<u>Detection Limit</u>	<u>Units</u>	<u>Date Analyzed</u>	<u>Analyst</u>
<b>MERCURY IN SOIL OR SLUDGE</b>	<b>SW7471</b>				<b>KR</b>
Mercury	< 0.025	0.025	mg/Kg	2/3/2004	
<b>METALS IN SOIL OR SLUDGE BY ICP</b>	<b>SW6010A</b>				<b>KR</b>
Arsenic	26.9	0.500	mg/Kg	2/2/2004	
Cadmium	15.7	0.250	mg/Kg	2/2/2004	
Chromium	19.3	0.250	mg/Kg	2/2/2004	
Lead	40.6	0.125	mg/Kg	2/2/2004	
Zinc	960	2.50	mg/Kg	2/2/2004	
<b>PH IN SOIL</b>	<b>SW9045C</b>				<b>PB</b>
pH	6.61	0.10	pH Units	1/30/2004 10:58:0	

CLIENT: A & M Engineering  
 Work Order: T04010347  
 Project: Cherryvale

QC SUMMARY REPORT

TestCode	Analyte	BatchID	QCType	Result	PQL	Units	%Rec	%RPD
HG_S	Mercury	R17390	MBLK	< 0.025	0.025	mg/Kg		
	Mercury	R17390	LCS	0.2482	0.025	mg/Kg	99.3	
	Mercury	R17390	MS	0.2389	0.025	mg/Kg	95.6	
	Mercury	R17390	MSD	0.2618	0.025	mg/Kg	105	9.15
HG_WW	Mercury	R17380	MBLK	< 0.00010	0.0001	mg/L		
	Mercury	R17380	LCS	0.001057	0.0001	mg/L	106	
	Mercury	R17380	MS	0.00099	0.0001	mg/L	99	
	Mercury	R17380	MSD	0.000993	0.0001	mg/L	99.3	0.303
MET_S_ICP	Arsenic	1756	MBLK	< 0.50	0.5	mg/Kg		
	Cadmium	1756	MBLK	< 0.25	0.25	mg/Kg		
	Chromium	1756	MBLK	< 0.25	0.25	mg/Kg		
	Lead	1756	MBLK	< 0.12	0.125	mg/Kg		
	Zinc	1756	MBLK	< 0.25	0.25	mg/Kg		
	Arsenic	1756	LCS	1.893	0.5	mg/Kg	94.6	
	Arsenic	1756	LCS	1.934	0.5	mg/Kg	96.7	2.14
	Cadmium	1756	LCS	1.951	0.25	mg/Kg	97.6	
	Cadmium	1756	LCS	1.986	0.25	mg/Kg	99.3	1.78
	Chromium	1756	LCS	2.132	0.25	mg/Kg	107	0.895
	Chromium	1756	LCS	2.113	0.25	mg/Kg	106	
	Lead	1756	LCS	1.916	0.125	mg/Kg	95.8	
	Lead	1756	LCS	1.962	0.125	mg/Kg	98.1	2.37
	Zinc	1756	LCS	1.959	0.25	mg/Kg	98	1.34
	Zinc	1756	LCS	1.933	0.25	mg/Kg	96.6	
	Arsenic	1756	MS	48.55	0.5	mg/Kg	97.1	
	Cadmium	1756	MS	52.14	0.25	mg/Kg	104	
	Chromium	1756	MS	60.91	0.25	mg/Kg	99.4	
	Lead	1756	MS	52.09	0.125	mg/Kg	104	
	Zinc	1756	MS	423.5	2.5	mg/Kg	82.6	
Arsenic	1756	MSD	47.94	0.5	mg/Kg	95.9	1.26	
Cadmium	1756	MSD	51.42	0.25	mg/Kg	103	1.39	
Chromium	1756	MSD	58.48	0.25	mg/Kg	94.5	4.08	
Lead	1756	MSD	51.42	0.125	mg/Kg	103	1.29	
Zinc	1756	MSD	418.9	2.5	mg/Kg	73.3	1.1	
MET_WW_ICP	Arsenic	1757	mblik	< 0.0050	0.005	mg/L		
	Cadmium	1757	mblik	< 0.0010	0.001	mg/L		
	Chromium	1757	mblik	< 0.010	0.01	mg/L		
	Lead	1757	mblik	< 0.0050	0.005	mg/L		
	Silver	1757	mblik	< 0.0020	0.002	mg/L		
	Zinc	1757	mblik	< 0.010	0.01	mg/L		
	Arsenic	1757	ics	1.933	0.005	mg/L	96.6	
	Cadmium	1757	ics	1.977	0.001	mg/L	98.8	
	Chromium	1757	ics	2.289	0.01	mg/L	114	
	Lead	1757	ics	1.971	0.005	mg/L	98.6	
	Silver	1757	ics	0.1902	0.002	mg/L	95.1	
	Zinc	1757	ics	1.971	0.01	mg/L	98.6	
	Arsenic	1757	ms	1.921	0.005	mg/L	96	
	Cadmium	1757	ms	1.942	0.001	mg/L	97.1	
	Chromium	1757	ms	2.273	0.01	mg/L	92.3	
	Lead	1757	ms	1.864	0.005	mg/L	93.2	

CLIENT: A & M Engineering  
 Work Order: T04010347  
 Project: Cherryvale

## QC SUMMARY REPORT

TestCode	Analyte	BatchID	QCType	Result	PQL	Units	%Rec	%RPD
	Silver	1757	ms	0.1904	0.002	mg/L	95.2	
	Zinc	1757	ms	2.09	0.01	mg/L	101	
	Arsenic	1757	msd	1.952	0.005	mg/L	97.6	1.64
	Cadmium	1757	msd	1.963	0.001	mg/L	98.2	1.08
	Chromium	1757	msd	2.305	0.01	mg/L	93.8	1.39
	Lead	1757	msd	1.883	0.005	mg/L	94.2	1.01
	Silver	1757	msd	0.1937	0.002	mg/L	96.8	1.71
	Zinc	1757	msd	2.11	0.01	mg/L	102	0.934
PH_S	pH	R17349	DUP	6.6	0.1	pH Units	0	0.151
TSS	Suspended Solids (Residue, Non-Filt	R17387	MBLK	< 5.0	5	mg/L		
	Suspended Solids (Residue, Non-Filt	R17387	LCS	94	5	mg/L	106	
	Suspended Solids (Residue, Non-Filt	R17387	DUP	54	5	mg/L	0	3.64
	Suspended Solids (Residue, Non-Filt	R17387	DUP	78	10	mg/L	0	7.41

6825 E 38th Street  
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(918)828-9977



Fax: (918)828-7756  
(800)324-5757

Altay Ertugrul  
A & M Engineering  
10010 E. 16th St.  
Tulsa, OK 74128-4813  
TEL: (918) 665-6574  
FAX ( ) 665-6576

March 05, 2004  
Order No.: T04030012

RE: Cherryvale

Dear Altay Ertugrul:

Sherry Laboratories received 3 samples on 3/1/2004 for the analyses presented in the following report.

In accordance with your instructions, Sherry Laboratories/Oklahoma conducted the analysis shown on the following pages on samples submitted by your company. The results related only to the items tested. Unless otherwise noted, all analysis was conducted using EPA approved methodologies. Test reports meet all the NELAC requirements. All relevant sampling information is on the attached chain-of-custody form. The initials SUB as the analyst designate any testing sub-contracted by SLO.

Certifications/Accreditation: OK - 7604

AR - ADEQ  
KS - E-10232  
LA - 4002

A scope of Certified/Accredited parameters is available upon request. If you have any questions regarding these tests results, please feel free to call.

Sincerely,

Approved By: \_\_\_\_\_

  
Brian Duzan, Director  
Environmental Services



**SHERRY**Laboratories

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(918)828-9977

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CLIENT: A & M Engineering  
Lab Order: T04030012  
Project: Cherryvale

Date Received: 3/1/2004  
Date Reported: 05-Mar-04

Lab ID: T04030012-01    Collection Date: 3/1/2004 12:00:00 PM    Sample ID: Low Water Crossing

Matrix: AQUEOUS

<u>Analyses</u>	<u>Result</u>	<u>Detection Limit</u>	<u>Units</u>	<u>Date Analyzed</u>	<u>Analyst</u>
MERCURY IN WATER, TOTAL	E245.2				KR
Mercury	< 0.000100	0.000100	mg/L	3/3/2004	
METALS IN WATER BY ICP, TOTAL	E200.7				KR
Arsenic	< 0.00500	0.00500	mg/L	3/4/2004 12:51:53	
Cadmium	< 0.00100	0.00100	mg/L	3/4/2004 12:51:53	
Chromium	< 0.0100	0.0100	mg/L	3/4/2004 12:51:53	
Lead	< 0.00500	0.00500	mg/L	3/4/2004 12:51:53	
Silver	< 0.00200	0.00200	mg/L	3/4/2004 12:51:53	
Zinc	< 0.0100	0.0100	mg/L	3/4/2004 12:51:53	

Lab ID: T04030012-02    Collection Date: 3/1/2004 12:10:00 PM    Sample ID: Below Low Water Crossing

Matrix: AQUEOUS

<u>Analyses</u>	<u>Result</u>	<u>Detection Limit</u>	<u>Units</u>	<u>Date Analyzed</u>	<u>Analyst</u>
MERCURY IN WATER, TOTAL	E245.2				KR
Mercury	< 0.000100	0.000100	mg/L	3/3/2004	
METALS IN WATER BY ICP, TOTAL	E200.7				KR
Arsenic	< 0.00500	0.00500	mg/L	3/4/2004 1:21:34 P	
Cadmium	< 0.00100	0.00100	mg/L	3/4/2004 1:21:34 P	
Chromium	< 0.0100	0.0100	mg/L	3/4/2004 1:21:34 P	
Lead	< 0.00500	0.00500	mg/L	3/4/2004 1:21:34 P	
Silver	< 0.00200	0.00200	mg/L	3/4/2004 1:21:34 P	
Zinc	< 0.0100	0.0100	mg/L	3/4/2004 1:21:34 P	



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CLIENT: A & M Engineering  
Lab Order: T04030012  
Project: Cherryvale

Date Received: 3/1/2004  
Date Reported: 05-Mar-04

Lab ID: T04030012-03    Collection Date: 3/1/2004 2:10:00 PM    Sample ID: Downstream

Matrix: AQUEOUS

<u>Analyses</u>	<u>Result</u>	<u>Detection Limit</u>	<u>Units</u>	<u>Date Analyzed</u>	<u>Analyst</u>
<b>MERCURY IN WATER, TOTAL</b>	<b>E245.2</b>				<b>KR</b>
Mercury	< 0.000100	0.000100	mg/L	3/3/2004	
<b>METALS IN WATER BY ICP, TOTAL</b>	<b>E200.7</b>				<b>KR</b>
Arsenic	< 0.00500	0.00500	mg/L	3/4/2004 1:26:32 P	
Cadmium	< 0.00100	0.00100	mg/L	3/4/2004 1:26:32 P	
Chromium	< 0.0100	0.0100	mg/L	3/4/2004 1:26:32 P	
Lead	< 0.00500	0.00500	mg/L	3/4/2004 1:26:32 P	
Silver	< 0.00200	0.00200	mg/L	3/4/2004 1:26:32 P	
Zinc	< 0.0100	0.0100	mg/L	3/4/2004 1:26:32 P	

CLIENT: A & M Engineering  
 Work Order: T04030012  
 Project: Cherryvale

QC SUMMARY REPORT

TestCode	Analyte	BatchID	QCType	Result	PQL	Units	%Rec	%RPD
HG_WW	Mercury	R17711	MBLK	< 0.00010	0.0001	mg/L		
	Mercury	R17711	LCS	0.001029	0.0001	mg/L	103	
	Mercury	R17711	MS	0.001024	0.0001	mg/L	102	
	Mercury	R17711	MSD	0.001028	0.0001	mg/L	103	0.39
met_ww_icpt	Arsenic	1799	mblk	< 0.0050	0.005	mg/L		
	Cadmium	1799	mblk	< 0.0010	0.001	mg/L		
	Chromium	1799	mblk	< 0.010	0.01	mg/L		
	Lead	1799	mblk	< 0.0050	0.005	mg/L		
	Silver	1799	mblk	< 0.0020	0.002	mg/L		
	Zinc	1799	mblk	< 0.010	0.01	mg/L		
	Arsenic	1799	ics	1.935	0.005	mg/L	96.8	
	Cadmium	1799	ics	2.066	0.001	mg/L	103	
	Chromium	1799	ics	1.963	0.01	mg/L	98.2	
	Lead	1799	ics	1.944	0.005	mg/L	97.2	
	Silver	1799	ics	0.1978	0.002	mg/L	98.9	
	Zinc	1799	ics	1.926	0.01	mg/L	96.3	
	Arsenic	1799	ms	2.022	0.005	mg/L	101	
	Cadmium	1799	ms	2.061	0.001	mg/L	103	
	Chromium	1799	ms	1.962	0.01	mg/L	98.1	
	Lead	1799	ms	1.872	0.005	mg/L	93.6	
	Silver	1799	ms	0.1958	0.002	mg/L	97.9	
	Zinc	1799	ms	1.941	0.01	mg/L	97	
	Arsenic	1799	msd	2.015	0.005	mg/L	101	0.304
	Cadmium	1799	msd	2.06	0.001	mg/L	103	0.0674
	Chromium	1799	msd	1.964	0.01	mg/L	98.2	0.121
	Lead	1799	msd	1.874	0.005	mg/L	93.7	0.0889
	Silver	1799	msd	0.195	0.002	mg/L	97.5	0.417
	Zinc	1799	msd	1.933	0.01	mg/L	96.6	0.42



## APPENDIX B

Table 1b. Formulae for calculation of hardness-dependent aquatic life support criteria for chromium III and total cadmium, total copper, total lead, total nickel, total silver and total zinc and pH-dependent aquatic life support criteria for pentachlorophenol. A WER value of 1.0 is applied in the hardness-dependent equations for total metals unless a site-specific WER has been determined and adopted by the department in accordance with K.A.R. 28-16-28e(a) and K.A.R. 28-16-28f(f). Hardness values in metal formulae are entered in units of mg/L as CaCO<sub>3</sub>. Pentachlorophenol formulae apply only over the pH range 6.5-8.5.

"Water-effect ratio (WER)" means the numerical toxicity (median lethal concentration or no-observed-effect level) of a chemical pollutant diluted in water from a given stream, lake, or wetland divided by the numerical toxicity of the same pollutant diluted in laboratory water.

28-16-28b. Definitions.

(o) "Condition of acute toxicity" means any concentration of a toxic substance that exceeds the applicable acute criterion for aquatic life support presented in K.A.R. 28-16-28e or, for substances not listed in K.A.R. 28-16-28e or for mixtures of toxic substances, any concentration that exceeds 0.3 times the median lethal concentration. The concentration at which acute toxicity exists shall be determined through laboratory toxicity tests conducted in accordance with the United States environmental protection agency's "methods for measuring the acute toxicity of effluents and receiving waters to freshwater and marine organisms," fourth edition, as published in August 1993, which is hereby adopted by reference.

(p) "Condition of chronic toxicity" means any concentration of a toxic substance that exceeds the applicable chronic criterion for aquatic life support presented in K.A.R. 28-16-28e or, for substances not listed in K.A.R. 28-16-28e or for mixtures of toxic substances, any concentration that exceeds the no-observed-effect level. The concentration at which chronic toxicity exists shall be determined through laboratory toxicity tests conducted in accordance with the United States environmental protection agency's "short-term methods for estimating the chronic toxicity of effluents and receiving waters to freshwater organisms," third edition, as published in July 1994, which is hereby adopted by reference.

**CADMIUM (ug/L):**

acute criterion =  $WER[EXP[(1.1280 * LN(hardness)) - 3.6867]]$

chronic criterion =  $WER[EXP[(0.7852 * LN(hardness)) - 2.715]]$

**CHROMIUM III (ug/L):**

acute criterion =  $WER[EXP[(0.819 * LN(hardness)) + 3.7256]]$

chronic criterion =  $WER[EXP[(0.819 * LN(hardness)) + 0.6848]]$

**LEAD (ug/L):**

acute criterion =  $WER[EXP[(1.273 * LN(hardness)) - 1.460]]$

chronic criterion =  $WER[EXP[(1.273 * LN(hardness)) - 4.705]]$

**ZINC (ug/L):**

acute criterion =  $WER[EXP[(0.8473 * LN(hardness)) + 0.884]]$

chronic criterion =  $WER[EXP[(0.8473 * LN(hardness)) + 0.884]]$

