

HENRY, LOWERRE,  
JOHNSON, HESS & FREDERICK  
ATTORNEYS AT LAW  
202 WEST 17th STREET  
AUSTIN, TEXAS 78701  
(512) 479-8125  
FAX (512) 479-8269

MARY E. KELLY  
Of Counsel  
(512) 474-1082

*Rec'd 1-30*  
January 29, 1997

Mr. Robert O'Connell  
Allegation Coordinator  
Office of Nuclear Material Safety and Safeguards  
U.S. Nuclear Regulatory Commission  
Washington, D.C. 20555-0001

Regarding: Allegation NMSS-96-A-0001; Falls City UMTRA Site

Dear Mr. O'Connell:

This letter is responsive to your letter of November 22, 1996, which was in turn responsive to our letters of January 26, February 14, and March 8, 1996. (Mr. Lowerre, one of my partners, authored our letters in my absence.)

Accompanying this letter is a two-page letter, with three pages of schematic map attachments, from Dr. Alan Eggleston. Dr. Eggleston's letter responds to the four numbered questions you posed in your November 22nd letter. Briefly, tailings subjected both to uranium extraction efforts and, then, to more than 30 inches/year rainfall (the Falls City figure) would be expected to release uranium to the environment, and that uranium would be much more mobile than would be radium in areas, such as South Texas, that are characterized by clay soils. Regarding the number of soil samples, Dr. Eggleston's letter itemizes the nine samples we earlier referenced and elaborates a bit on how the ratios should be calculated. Dr. Eggleston's letter recounts how foreign substances used in the UMTRA site remediation provide a visual marker of the source of sediments in and along Tordilla Creek. Finally, Dr. Eggleston elaborates on the deficiencies, as we see it, of reliance on U/Ra ratios to screen for tailings-derived residues.

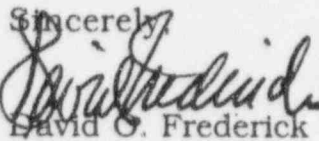
On the matter of the October 1993 stormwater sampling: (1) the samples were analyzed in both the filtered and unfiltered state, (2) the samples were sealed and refrigerated from collection to receipt at the testing lab, and (3) the samples were analyzed per the method noted in the lab results report. Accompanying this letter are the field notes and chain of custody documentation bearing on these samples. The lab results report that accompanied our February 14th letter reflects (second column) the method of analysis used for each constituent, the report also reflects (next to last column) the analysis date. Note that the date at the top of the report does not indicate the date of analysis; it indicates the date the report was prepared. The "test name" column of the report indicates whether the

9702050043 970129  
PDR WASTE  
WM-65 PDR

*W204 1/1*  
*WM-65*

results were for an unfiltered or for an filtered sample.

Concord Oil remains very apprehensive DOE's methodology for identifying tailings contamination is in fact inadequate to identify many instances of that contamination. If this apprehension is correct, Coficord's property, being down-gradient from the UMTRA site, will remain subject to continuing contamination from the un-remediated tailings wastes at the site. Thus, Concord is eager to provide any assistance NRC will accept to the end of causing DOE to fully remediate the site.

Sincerely,  
  
David G. Frederick

xc: Ms. Elaine Brummett, NRC  
Mr. Tom Pawel  
Alan Dr. Eggleston  
Mr. Ed Oakes

encs: Daily activity log (10/20/93), John Bryant, 8 pp.  
Chain of custody report, Tordilla Creek samples

**EGGLESTON HOLMES AND ASSOCIATES**

13706 RESEARCH BOULEVARD, SUITE 113

AUSTIN, TEXAS 78750

Telephone 512 250 0727 Fax 512 250 1322

Mr. David Frederick  
Henry, Lowerre, Johnson, Hess and Frederick  
202 West 17th Street  
Austin, Texas 78701

January 24, 1997

Re: NRC Questions - Bargmann Tract, Concord Oil Company

Dear Mr. Frederick:

I have responded to the four questions from NRC pertaining to the report on the use of uranium to radium ratios in determining whether a soil or sediment contains tailings or materials from some other source.

Answer to question 1.:

We assume that tailings contain oxidized and probably mobile uranium. These materials have been subjected to the extraction process used to remove uranium and it is unlikely the uranium remaining in the tails is unaffected by this process. This may be particularly true of near surface uranium deposits already oxidized. Rainfall, often heavy in this region of Texas, would be an adequate solvent to mobilize uranium, leaching it from tailings. Uranium mobility is far greater in the clay soils of south Texas than is the mobility of radium. This difference in mobility has been demonstrated in vertical penetration through clay soils and by horizontal movements associated with stream sediments. In both cases, uranium can be demonstrated to move independently of radium and uranium will accumulate at far greater depths in vertical profiles and far greater distances in horizontal profiles. Discharges of waters containing small amounts of radium and uranium show radium accumulations peaking near the discharge point on clay stream bottoms, whereas significant concentrations of uranium may appear far downstream from the discharge point.

Answer to question 2.:

The samples identified as tailings or same as tailings (such as tailings pond sediment) were:

(1)SE-S-10, (2)SE-S-12, (3)SE-S-8, (4)SE-S-7, (5)SE-S-9, (6)SE-S-4, (7)SE-S-5, (8)S-3-2, and (9)S-3-1. The sample locations are shown in the accompanying figures taken from the 1984 report. We do not understand where NRC has obtained its calculations. Did NRC staff allow for the specific activity of natural uranium? We understand the ratios to be ratios of concentrations, not activity.

Answer to question 3.:

The origin of the materials in the bottom of Tordilla Creek was not unknown when the samples were taken. The UMTRA site updrainage was overlain with introduced clays. These clays were colored differently than the natural Tordilla Creek sediments. These different color clays could be observed

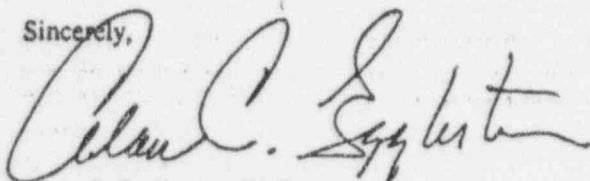
extending from the UMTRA site and on to the Bargmann tract at the time the samples were taken. It is not unreasonable to assume this observed event has also occurred over past history, including the times of mining and reclamation activity on the UMTRA site.

Answer to question 4.:

If one considers a uranium to radium ratio of 0.25 (or 0.3 rounded off to one decimal place) as representing tailings, then the outcropped sample referred to in this question, which demonstrates to one decimal place a U/Ra of 0.3, clearly meets the basic criterion of tailings. However, the application of the criterion does not require that tailings demonstrate this ratio, the statement is that such a ratio "may represent tailings". In fact, data presented in the first practical application of these ratios to determine site status suggested a sweeping range of values and probabilities of source to go with them. The applied ratios considered radium to uranium ratios of considerably less than 4 as "probably" representing tailings. It is the interpretation of these ratios without supporting information that creates the problem. Unless a great amount of information is available about a particular sample, using ratios of uranium to radium can be extremely misleading.

The question takes a very rigid approach to the problem and it implies greater certitude concerning the stated ratio than the protocol necessarily indicates - exactly the difficulty we see in applying these ratios.

Sincerely,

A handwritten signature in cursive script, reading "Alan C. Eggleston". The signature is written in dark ink and is positioned below the word "Sincerely,".

Alan C. Eggleston, Ph.D.

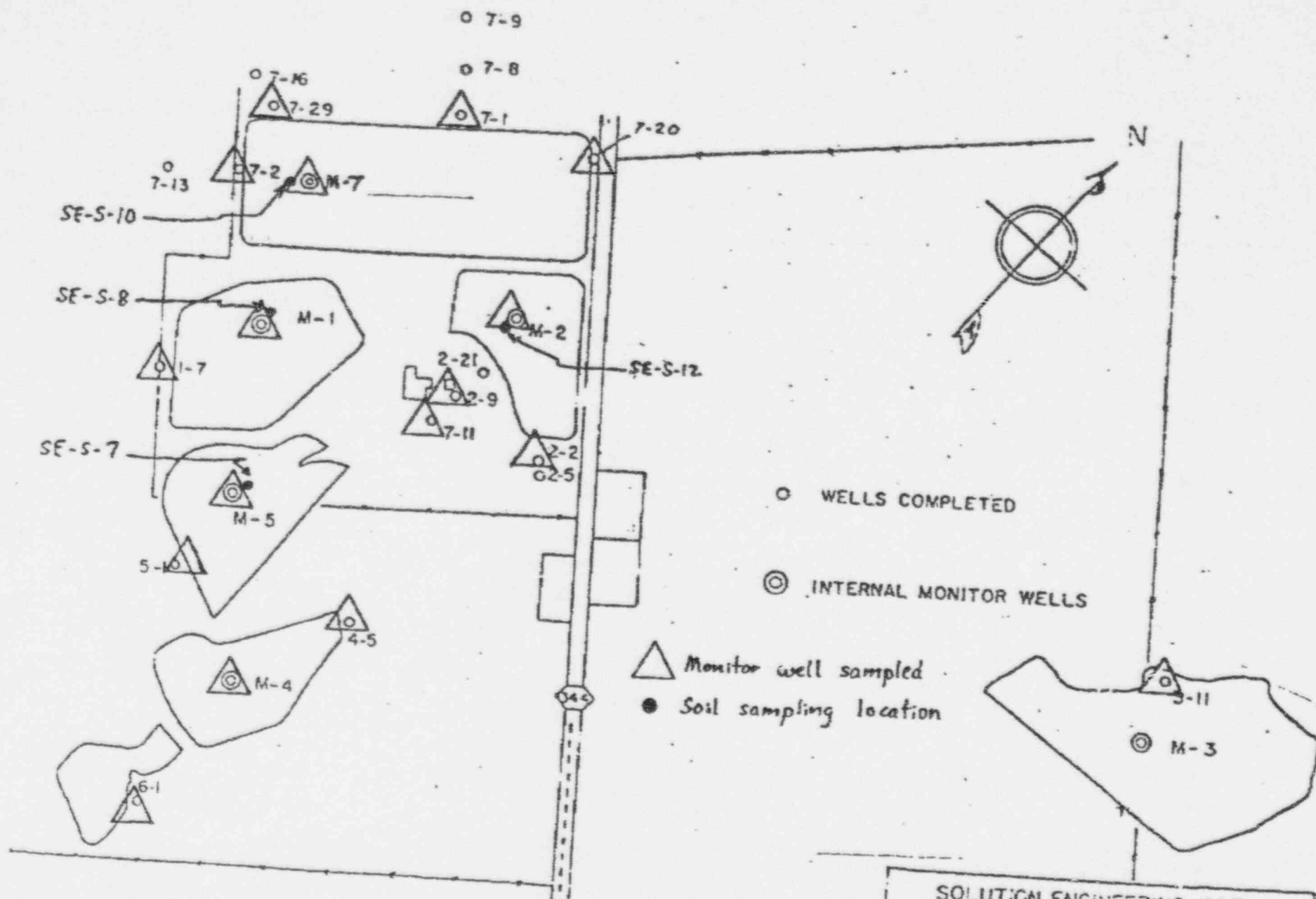


FIGURE 1

SOLUTION ENGINEERING INC.

INITIAL

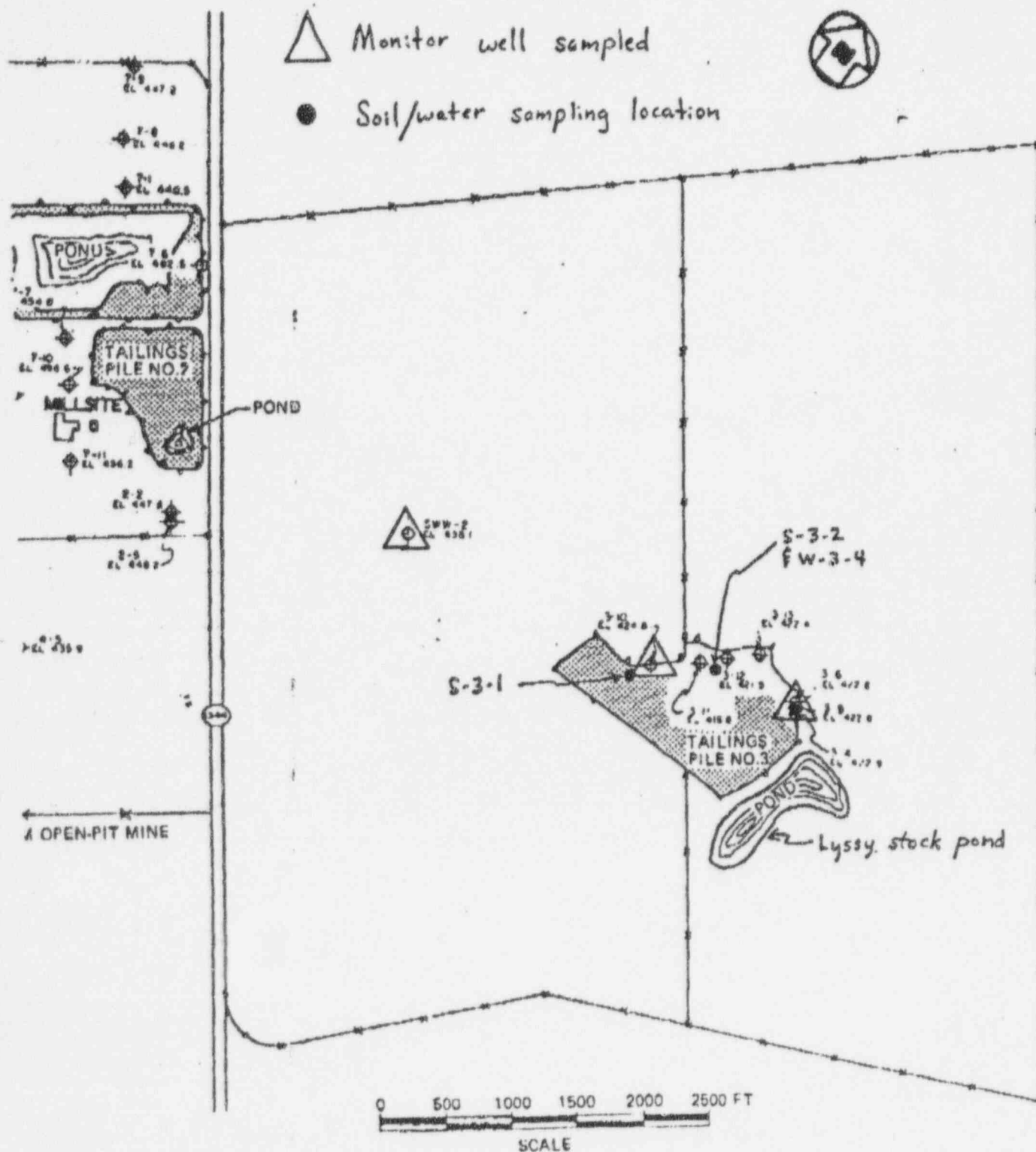


FIGURE 3





SWL

## DAILY ACTIVITY LOG

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Project Name: Stormwater Sampling; Falls City, TX		Project No: S.A. ECS NO.505994-619	
Field Activity Subject			
Description on Daily Activities and Events			
<p>~ 940 AM JB departs SA office, get fuel, then on to site</p> <p>~ 1120 AM JB arrives - v. light rain. Too muddy to drive back. I carry supplies in one cooler to the site. (I set my empty coffee mug &amp; my truck horn to gauge rainfall)</p> <p>1150 AM JB arrives at Tordilla Creek/property fence line.</p> <p>no rain at this time. there is no continuous flow at the creek. There are individual puddles but no flow between them.</p> <p>1155 AM light rain begins, I acquaint myself w/ site area and leave cooler on S side of creek, near the fence line. I collect several sticks and set them into the creek bed (wet mud) at 3 foot intervals which cross the area where flow should occur. I set 2 sticks</p>			
Visitors on Site: Bryant		Changes from Plans and Specifications and Other Special Orders and Important Decisions:	
Weather Conditions: OVERCAST: initially wet but not raining, then intermittent rain		Important Telephone Calls:	
Personnel on Site: Bryant			
Field Representative (Signature and Title):		Date: 10/20/23	



Project Name: Stormwater Sampling; Falls City, TX		Project No: S.A. ECS NO.505994-619	
Field Activity Subject			
Description on Daily Activities and Events			
<p>right in the creek center. Each of these sticks extends to a height of 1 foot above creek bed. I also set up some markers to mark a 20' length downstream of the previous sticks. I will use these to assist the calculation of surface water flow velocity. I took photos of all of these sticks prior to flooding.</p> <p>@ 1205 rainfall intensity increases significantly the rain is driving towards the south</p>			
Visitors on Site:		Changes from Plans and Specifications and Other Special Orders and Important Decisions:	
Weather Conditions:		Important Telephone Calls:	
Personnel on Site:			
Field Representative (Signature and Title):		Date:	

Project Name: Stormwater Sampling; Falls City, TX		Project No: S.A. ECS NO.505994-619	
Field Activity Subject			
Description on Daily Activities and Events			
<p>e 100 pm I am disappointed that I am not getting run off from the property (UMTIRA) east of the site. The only water that has been running in the creek since 1205 is apparently from on the Concord site. The water is running along, + west of the road and entering the creek @ the road. I don't think I'm supposed to sample this H<sub>2</sub>O, since its mostly runoff from Concord property</p>			
Visitors on Site:		Changes from Plans and Specifications and Other Special Orders and Important Decisions:	
Weather Conditions:		Important Telephone Calls:	
Personnel on Site:			
Field Representative (Signature and Title):		Date:	

Project Name: Stormwater Sampling: Falls City, TX		Project No: S.A. ECS NO.505994-619	
Field Activity Subject			
Description of Daily Activities and Events			
<p>1258 e <del>1258</del> pm I was facing away from the creek (because of southward driving rain) and I suddenly noticed the sound of running H<sub>2</sub>O - I turned around and was surprised to see approx. &gt;11412 inches of H<sub>2</sub>O in the center of the creek, and the creek is <math>\approx</math> 26.5 feet wide where I placed my transect of stakes. This is <math>\approx</math> 10' west of the fence line! I immediately filled 10 liter containers and 2 smaller containers. Sampling was done by 104pm</p>			
Visitors on Site:		Changes from Plans and Specifications and Other Special Orders and Important Decisions:	
Weather Conditions:		Important Telephone Calls:	
Personnel on Site:			
Field Representative (Signature and Title):		Date:	

Project Name: Stormwater Sampling; Falls City, TX

Project No: S.A. ECS NO.505994-619

## Field Activity Subject

## Description of Daily Activities and Events

all  $H_2O$  was in fast running  $H_2O$ , which was muddy colored - very turbid.

At 1:05-1:10 pm I gauged the velocity of floating sticks ~~that~~ I Threw upstream of my upstream markers, near center of creek. The following time readings were recorded for the sticks to traverse 420 ft

4 sec

3.5 sec

5 sec

4 sec

5 sec

6 sec

5 sec

I manually counted these out,

I used my watch to help calibrate my count, and 5-6 seconds seems most accurate

Visitors on Site:

Changes from Plans and Specifications and  
Other Special Orders and Important Decisions:

Weather Conditions:

Important Telephone Calls:

Personnel on Site:

Field Representative (Signature and Title):

Date:

SWL

## DAILY ACTIVITY LOG

p. 10 of 8

Project Name: Stormwater Sampling: Falls City, TX	Project No: S.A. ECS NO. 56: 4-619
Field Activity Subject	
Description of Daily Activities and Events	
<p>at the time of 1<sup>st</sup> sampling + gauging, the creek was approx 23' wide at the sampling location.</p> <p>≈ 1:10 pm rain stops, creek is obviously getting wider, by a few feet. JB took picture</p> <p>≈ 1:17 pm JB took photo of mesquite tree (small tree) to illustrate stream width.</p> <p>≈ 1:25 pm ± 5 seconds / 20 ft no rain, but light sprinkles lots of Thunder to East</p>	
Visitors on Site:	Changes from Plans and Specifications and Other Special Orders and Important Decisions:
Weather Conditions:	Important Telephone Calls:
Personnel on Site:	
Field Representative (Signature and Title):	Date:

Project Name: Stormwater Sampling: Falls City, TX

Project No: S.A. ECS NO.505994-619

Field Activity Subject:

Description of Daily Activities and Events

e137 Jtz completed placing a tape measure across the creek.

$$\text{width} = 28' - 2' = 26'$$

t = 5 sec

t = 6 sec

no rain

Lots Thunder to West

e140 - starting to rain again

e140 - took photo

e 142<sub>p</sub> - 148 pm Jtz obtained second round of samples

t = 5

t = 6

Visitors on Site:

Changes from Plans and Specifications and  
Other Special Orders and Important Decisions:

Weather Conditions:

Important Telephone Calls:

Personnel on Site:

Field Representative (Signature and Title):

Date:

# SWL

## DAILY ACTIVITY LOG

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Project Name: Stormwater Sampling; Falls City, TX

Project No: S.A. ECS NO.505994-619

Field Activity Subject

Description of Daily Activities and Events

@ 152 took last photo on film and left. I dragged/carried ice chest back to truck! ugh

(There was 1-inch H<sub>2</sub>O in my coffee mug, which ~~was~~ was narrower at mouth than in the bottom)

Stopped at Diamond Shamrock to wash up + call office.

@ 404 pm JB back to office.  
Shipped samples this morn - dropped at FedEx @ 7:15 pm

Visitors on Site:

Changes from Plans and Specifications and Other Special Orders and Important Decisions:

Weather Conditions:

Important Telephone Calls:

Personnel on Site:

Field Representative (Signature and Title):

Date:



## FLOW ESTIMATE

### FIRST SAMPLE

STREAM WIDTH (FT)  $\approx 23$

AVERAGE DEPTH (FT)  $\approx$  MAX IS EST  $\approx 1$  ft

'GUESSED' ESTIMATED AVG  $= .75$  ft

VELOCITY (FT/SEC)  $\approx 20$  ft

5 sec

stream bottom roughness  $\approx .8$  correction factor.

$\frac{20 \text{ ft}}{6 \text{ sec}}$

$$23 \text{ ft} \times 0.75 \text{ ft} \times \frac{20 \text{ ft}}{5 \text{ sec}} \times .8 = 55.2 \text{ FT}^3/\text{sec}$$

$$23 \text{ ft} \times 0.75 \text{ ft} \times \frac{20 \text{ ft}}{6} \times .8 = 46 \text{ FT}^3/\text{sec}$$

avg est = 50 CFS

### SECOND SAMPLE

W = 26 ft

Depth avg est = 0.75 ft - 0.8

V = 20' / 5 sec to 20' / 6 sec

roughness = .8

$$26' \times 0.75 \times \frac{20'}{5 \text{ sec}} \times .8 = 624 \text{ FT}^3/\text{sec}$$

e 0.8' depth = 66 CFS

$$26' \times 0.75' \times \frac{20'}{6 \text{ sec}} \times .8 = 52 \text{ FT}^3/\text{sec}$$

e 0.8' depth = 55 CFS

avg est estimate = 59 CFS

2 separate containers

Fedex 4437440943 = early

Fedex 4437440943 = late Analysis Request and Chain of Custody Record

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SOUTHWESTERN LABORATORIES

- ☒ HOUSTON EAS 222 CAVALCADE ST., HOUSTON, TEXAS 77009 (713) 692-9151  
☐ DALLAS EAS 2575 LONE STAR DR., DALLAS, TEXAS 75212 (214) 631-2700  
☐ MIDLAND EAS 1703 WEST INDUSTRIAL, MIDLAND, TEXAS 79701 (915) 683-3349

Project no.

5059-93-619

Client/Project

CONCORD OIL (Henry, Lowerre and Taylor) Tordilla Creek

Lab ID No.	Field Sample No. / Identification	Date and Time	Grab	Comp	Sample Container (Size/Mat'l)	Sample Type (Liquids, Sludge, Etc.)	Preservative	ANALYSIS REQUESTED	LABORATORY REMARKS
	Tordilla Creek EARLY	10/20/93 1:00pm	X		10-LIKES 2-750ml	WATER	NONE	AS Al, Ba, Br, Cd, Hex Cr, Triv. Cr, Cu, Pb, Mn, Hg, Mt, Ni, Se, Ag, Zn, Radium 226, Uranium, Thorium	
	Tordilla Creek-late	10/20/93 1:50pm	X		10-LIKES 2-750ml	WATER	NONE	SAME TESTING AS ABOVE	

<b>Signature</b> Relinquished by: <i>J Bryant</i> (Signature)		<b>Date:</b> 10/20/93 <b>Time:</b> 1:10		<b>Signature</b> Received by: <i>Chase Fuller</i> (Signature)		<b>Date:</b> 10-21-93 <b>Time:</b> 0830		<b>RECD ON ICE</b> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	
<b>Affiliation</b> SWL		<b>Relinquished by:</b> (Signature)		<b>Date:</b> <b>Time:</b>		<b>Received by Laboratory:</b> (Signature)		<b>Intact:</b> YES	
<b>Results by</b>		<b>REMARKS:</b> ALSO - see attached list for list of test parameters that are not currently required.		<b>Date Results To:</b>		1 J Bryant SWL SMTX 2		<b>Laboratory No.</b> 93-10-282	

Rush Charges Authorized

Yes ☐ No ☒