



TECHNICAL MEMORANDUM

TO: LAURA ALVEY, MONTANA DEQ
FROM: MARK NITZ, HYDROSOLUTIONS INC
SUBJECT: FULTON FUEL, FRED & GEORGE CREEK CRUDE RELEASE (CVID #7972), STAGE 1 REMEDIATION
DATE: 2/16/05
CC: TOM OSBORNE, GARY McDERMOTT

Introduction

HydroSolutions (HSI) was retained by Fulton Fuel Company (FFC) and its attorney on June 9, 2004 to conduct remedial investigation and remediation for a crude oil spill near Fred and George Creek in Toole County, Montana (Figure 1). A reconnaissance field trip was performed on June 17, 2004. A second sampling trip was conducted on August 31, 2004. Preliminary results indicated a need for excavation remediation activities. HSI provided a Work Plan to Montana Department of Environmental Quality (DEQ) in September of 2004. The Work Plan outlined the measures to be taken for remediation of the creek bed and banks as well as any monitoring that may be necessary. The following technical memorandum is intended to outline the procedures taken and summarize results of sampling and excavation.

Site History

A crude release into Fred and George Creek was discovered on February 29, 2004. Measures were taken to respond to the release by Fulton Fuel Co. and Prewitt Excavation staffs. Details and notes from the emergency response are included in Appendix A.

Following Montana DEQ's approval of the Work Plan, dated September 28, 2004, full scale field sampling and remediation activities were commenced. Excavation of materials affected by the release began on December 1, 2004. This excavation and the sampling that was conducted during excavation were considered part of Stage 1 of the environmental remediation process for this crude oil release.

During initial remediation activity, data suggesting a more accurate location on the pipeline leak was presented by the contractor, indicating the leak may have occurred somewhat uphill from the originally identified location. The location was originally suggested to be in or at the stream bed at the south end of what would become the excavation area. The factors leading to this suggestion are clear. The crude followed the

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backfill trench 'conduit' that was created when the pipeline was installed. As fluids follow the path of least resistance, any disturbed gravel material is a more likely route than undisturbed, well compacted sediments. Since the pipeline was originally constructed perpendicular to, and through the stream bed, the crude followed the gradient and more porous route created by pipeline construction procedures to the stream, where it was exposed at the surface and migrated into the stream. This exposure was the initial observation of the release made by Fulton Fuel staff.

### **Geologic Setting**

Geology in the excavation includes a two to three feet thick layer of silty topsoil, a two to three feet thick layer of gravel and sand, and a layer of clay/shale at the depth terminus of the excavation. This clay/shale layer is weathered bedrock, and is not readily permeable. The units are representative of glacial deposits and stream bed weathering and deposition. The gravel and sand portion of the unit being excavated is considered a meandering stream channel deposit, comprised of sandy and silty gravels with surrounding silt and clay deposits.

### **Remediation Activity**

#### *Pre-Excavation Sampling and observations*

During the June 2004 and August 2004 field visits, background soil samples were collected from various locations in the vicinity of the crude release into Fred and George Creek. Two background samples were collected from material upstream of the identified release location, and a third sample was collected downstream, approximately ½ mile east of the siphon dam location (Figure 2).

Background samples for TPH and TEH indicate local and regional TPH levels to be as high as 65 mg/kg possibly due to natural organic interferences. The manner in which impacted areas are assessed and interpreted should be adjusted to include consideration of current background levels, and confirmatory samples taken within the project area can be assessed in this manner as well.

#### *Excavation Progress*

During the course of excavation, crude oil from the pipeline break was evident in the excavation area through both visual and olfactory observations.

Within the excavation area, confirmation samples were taken at standard depth intervals and in lateral locations that represented worst case conditions, as well as representative conditions of 'lesser' contamination. At each location samples were taken at 2 feet, 4 feet, 6 feet, and 8 feet below ground surface (bgs). In the event a sample was not obtainable at a specific depth, an interval was targeted for sample extraction. In places where the excavation did not extend to 8 feet deep the 6 feet bgs sample depth was considered the terminal sample for that location. Due to slumping of sidewalls, certain locations had samples taken only from intervals varying from 2 to 4 feet thick.

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### *Excavation Area Sample Results and Fate and Attenuation Analyses*

A declining trend in contamination can be identified in the excavation area. Using spatial statistical analysis methods, the data from the excavation area confirmation samples was analyzed for vertical and horizontal trends. Results indicate that there is a vertically declining trend in the contamination levels within the excavation area. Figure 3 illustrates the relationship of vertical and horizontal sampling locations with TPH and TEH levels. The convention applied for sampling locations was based on lateral extent from the sidewalls and previously extracted samples (where applicable).

Analysis results from samples taken at 4 feet bgs suggest the greatest amount of contamination. During Stage 1 excavation this two foot zone, or thickness, was removed from the excavation area. The bedrock gradient in the excavation area is inclined east-north-east, and analysis results suggest this gradient as a factor in transport of released crude towards the creek bed. Fate and attenuation analyses modeling is planned for this project. This should provide the best overall estimation of the potential for natural degradation of the crude.

### *Stream bed and bank progress*

Soil samples collected in August 2004, prior to remediation activities, indicated a decreasing trend in contamination downstream of the release area (Appendix B2). A contaminant distribution map will be prepared and analyzed by HSI to determine the nature of the downstream contamination that existed previous to excavation and remediation activities.

Stream bed and bank remediation was conducted by Prewitt Construction staff in November 2004. Visual observation of standing water and bank soils in the remediated areas indicated some potential for residual surficial contamination. Confirmation samples were collected and sent to the lab for analysis. The results from these sample analyses suggest that, with the exception of the sample location immediately downstream of the excavation (Bank CFM #1, 2230 ppm TPH, see Figure 2 for location), contaminant levels were below RBSLs. (Appendix B1). One stream bank confirmation location, Bank CFM #3, had slightly elevated contaminant levels (95 ppm TPH). In the future, an additional confirmation sample may be taken at this location to ensure there was no cross-contamination, and to monitor natural attenuation progress.

The stream bed and banks were examined for signs of surface contamination. Based on visual observations, contaminated zones were hand-excavated, using shovels, trowels, and buckets for containment. Any signs or zones of surface water were also observed for signs of crude, and absorbent materials were applied to those areas. Any materials, including removed soils, used absorbent padding, and buckets and plastic bags, were removed from the site following the remediation activities.

### **Conclusion**

The lateral extent of contamination to the east of the stream bed will need to be determined. This will be done with boreholes and samples. Soil and lithologic materials will be obtained, examined and sampled using a geoprobe unit. Each hole will be

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completed to the depth of bedrock and samples collected every 2 feet using standard operating procedures (SOPs). Soil and sediment samples will be analyzed for EPH Screen and VPH. EPH Screen results greater than 50 ppm TEH will be fractionated and analyzed for PAH values. A second volume of soil will be retained from each sample interval for the purpose of obtaining a second and separate PAH analysis value, if necessary.

## **Recommendations**

### *Ongoing Remediation Strategy – Stage 2*

The current excavation area and stream reach affected by the crude release will remain under observation until the extent and magnitude of the release can be identified. Determining the extent and magnitude of the crude contamination will require further investigation, including drilling of boreholes and sampling of soils and sediments associated laterally and vertically with the release and excavation area. We anticipate completing 10 to 12 boreholes by the end of March 2005. With approval, we will also be prepared to convert three of these borings as 2 inch monitoring wells, if soil sampling and drilling events suggest the necessity.

The current extent of the excavation and backfill operation will remain unchanged until drilling and other confirmatory techniques can be completed to determine any necessity for continued excavation. In the event continued excavation is deemed necessary, a separate memorandum will be issued to indicate intended courses of action and progress in remediating the crude spill site.

In an effort to retain the integrity of the stream channel where excavation occurred, we will plan to proceed with reconstruction activities within a time frame reasonable to account for weather changes and precipitation potentials. Stream reconstruction activities are governed by the United States Army Corps of Engineers and are discussed in the Nationwide Permit 38 and attached conditions, Corps File Number 2004-90-737(Appendix C).

Field work items for continued remediation (Stage 2) will include:

1. Completion of stream reconstruction
2. Confirmation sampling of materials used for stream bed and bank reconstruction
3. Re-sample of confirmation locations #1 and #3 (to ensure sampling precision and the nature of contaminant degradation)
4. Completion of soil borings and potential monitoring well installation
5. Fate and attenuation modeling analysis completion
6. Report to follow all field and sampling activities, as well as monitoring and modeling analyses.

HydroSolutions will keep DEQ apprised of the occurrence and events associated with these activities. At each subsequent Stage of the operation HSI will issue a technical memorandum to update analyses and assessments.

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**Appendix A**

## **Oil Spill Journal in Chronological Order:**

**02/29/04**

10:00 AM leak discovered on the North Sunburst B Sand Unit flowline at the Fred & George Creek crossing by Mike Miller. Mike notified Mark Hesta.

12:00 PM Mark arrived on site, Mike and Mark determined the extent of the oil spill

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1:00 PM Mark contacted Gary McDermott, Dick Beatty and Prewett Excavation

1:00 PM Mike contacted Bryan Ratzburg and notified him of the spill

2:00 PM Ron Prewett arrived on site with a backhoe

2:30 PM Gary called Bryan Ratzburg to relay information about the oil spill and had to leave a message and asked Bryan to return the call

3:00-8:00 PM built containment dike with 4" water siphon, oil spill contained and clean water running out of water siphon

9:00 PM leave site

9:00 PM Bryan Ratzburg returned call to Gary, Gary gave him all the information available at that time, Bryan did not seem to be upset they also discussed previous injection line leaks and Bryan's previous discussions with Bill in the field

**Crew on site:** Mike Miller, Mark Hesta, Ron Prewett

**Estimated cost:** Prewett \$250.00

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**03/01/04**

- 8:00 AM Gary contacted Steve Sasaki with MBOGC, Dan Kenny with DEQ, Miss Johnson with NRC and given Case #714752.
- 9:00 AM Mark contacted Steve Sasaki and Dan Kenny and waited on instructions
- 9:00 AM Prewett Excavation, Fugle Welding and Rocky's Welding all directed to spill site
- 11:00 AM Bill Halverson of BOGC arrived at the Fred & George office, met with Mark and Mike, took him to the site. Bill Halvorson inspected the site
- 12:00 PM Bill Halvorson and Mark called Steve Sasaki and described the spill, Bill & Steve recommended the spilled oil be burned
- 1:10 PM Bill and Mark called Dan Kenny of the DEQ and reported the recommendation to burn
- 2:00 PM Bill Halvorson left the site
- 2:00-4:50PM Mark spoke to Dan Kenny, Dave Aguirre with DEQ Air Quality Board, Toole County Conservations District, Dick Beatty, Gary McDermott, Bill Fulton and Don McAlpine of the North Toole County Fire Department regarding a permit for a controlled Burn
- During this same time period, Prewett's crew and Rocky were lining the areas of oil accumulation with absorbent pads
- 4:30 PM Mark called Dave Aguirre again regarding a burn permit and was informed that Dave had left for the day. Mark took up the discussion with Ron Lowney, also of the DEQ Air Quality Board
- 4:50 PM Mark received Permit #E-131 from Ron Lowney with instructions on how to conduct the burn
- 5:00 PM Mark faxed the Permit to Gary McDermott, Dick Beatty and Carol Mundt

**03/01/04 Continued**

5:00-9:00 Crews replaced the 4" siphon with a 24" siphon, dug up the flow line on the North and South sides of the Fred & George Creek coulee and capped off both ends of the flowline to isolate the leak

9:00 PM leave site

**Crew on site:** Mike Miller, Mark Hesla  
Prewett - 1 operator, 2 roustabouts  
Fugle - 2 vac truck operators  
Rocky's Welding - Rocky and 1 helper

**Estimated cost:** Prewett - \$2,095.00  
Rocky's Welding - \$422.50  
Fugle - \$2,250.00

**03/02/04**

7:30 AM While waiting on fire control equipment, removed pads from the creek bed and place in garbage bags, removed bags from the burn area.

9:00 AM Located fire control equipment: Prewett with cat and backhoe on standby and Fugle's 2 vac trucks

Received burn permit #TC-04316 from North Toole County Fire Department

Loaded 3 - 500 gallon pickup mounted fire units and 2 - 80 bbl. vac trucks with fresh water

Contacted Bill Fulton, Doug Allen, Dick Beatty and Gary McDermott

9:15 AM Mark spoke to Karl Ratzburg to notify him of intent to burn the spill

9:30 AM Contacted Toole County Sanitarian, Toole County Sheriff's office, North Toole County Sheriff's representative, Liberty County Sheriff of intent to conduct a controlled burn.

Conducted safety meeting with all personnel

**03/02/04 Continued**

- 10:00 AM Start burning the oil in Fred & George Creek
- 10:30 AM Bill Halvorson arrived on location to monitor the fire. Burned the creek and burned the creek bank edges with torches.
- 2:15 PM Bill Halvorson left site
- thru 6 PM Crew monitored the fire and cleaned up the area.
- 6-8 PM Control burn area and make sure all the hot spots are extinguished, snow falling and temperature dropping
- 9:00 PM Leave site

**Crew on site:** Mark Hesta, Mike Miller, Tim Roark, Dan Kaleva, David Hofer  
Prewett - 2 operators, 2 roustabouts, 1 supervisor  
Rocky's Welding - Rocky and 1 helper  
Fugle - 2 vac truck operators

**Cost estimate:** Prewett - \$3,192.00  
Rocky's Welding - \$942.50  
Fugle - \$2,250.00

**03/03/04**

- 8:00 AM Arrive at Fred and George office. Temperature +5 F
- 8:30 AM Go to site and enlarge and smooth out the containment dike. Build  
thru 5 oil containment barriers on creek bed with tube style absorbent  
7:30 PM pads and regular absorbent pads. Rinse creek bed with fresh hot  
water and patrol creek bed with absorbent pads to try and contain  
any visible oil accumulation, removed burnt debris from creek bed
- 7:30 PM haul fresh water to supply tanks to heat for the next day's rinsing  
thru  
10:30 PM
- 10:30 PM Left site

### 03/03/04 Continued

**Crew on site:** Mike Miller, Mark Hesla, Tim Roark, David Hofer, Dan Kaleva,  
Rick Raulston  
Prewett – 1 operator, 2 roustabouts  
Rocky's Welding – Rocky and 1 helper  
Fugle – 2 vac truck operators, 1 dump truck operator

**Estimated cost:** Prewett - \$1,761.25  
Rocky's Welding - \$845.00  
Fugle - \$4,080.00

### 03/04/04

- 8:30 AM Flushed creek bed with hot fresh water, removed ice and debris thru 5:30 PM from creek bed, ice varied from 8" to 12" thick
- 12:30 PM Mark called Dick Beatty regarding communications with Bryan Ratzburg concerning increasing the stream flow in Fred & George Creek, Beatty advised that Mike should make a call to Bryan
- 1:00 PM Mike called Bryan to inform him of the progress of the project and request increasing the stream flow, Bryan told him that most of the available water was already going down Fred & George Creek, Mike then inquired about using water from Fey Lake, because it is closer to the site and they can load water much faster there than from WSW #3 at SASU. Bryan said he would think it over and then come to the site to discuss it with Mike and Mark. Bryan's general demeanor was NOT hostile. Mike informed Bryan of how many people and hours were being dedicated to cleaning up the spill.
- 1:30 PM Mark went 1 mile downstream on the creek, to the next road crossing East of the site and noted that the creek was dry at that point
- 2:00 PM Bryan and Ernie arrived at the site, took some pictures and told Mike that 1/2 of the lake belongs to Albert Fey, so he didn't feel he could authorize taking water from it, however, Bryan said that they could take water from Alkali Lake.
- 2:20 PM Bryan and Ernie left the site

**03/04/04 Continued**

5:30 PM Continued with clean-up, removed 30 used absorbent pads and replaced with new pads

6:00 PM Hauled more water for tomorrow's final flushing of stream bed

**Crew on site:** Mark Hesla, Mike Miller, Tim Roark, Rick Raulston  
Prewett - 1 operator, 2 helpers  
Rocky's Welding - Rocky and 1 helper  
Fugle - 2 vac truck operators, 1 dump truck operator

**Estimated cost:** Prewett - \$2,033.75  
Rocky's Welding - \$325.00  
Fugle

**03/05/04**

9:00 AM Will finish with the last 1/3 of washing the creek banks today, project will be completed this afternoon

Mark will call in with final hours progress and costs later this afternoon

**Crew on site:** Mark Hesla, Mike Miller, Tim Roark, Rick Raulston  
Prewett - 1 operator, 2 helpers  
Rocky's Welding - Rocky and 1 helper  
Fugle - 2 vac truck operators, 1 dump truck operator

**Estimated cost:** Prewett - \$1,991.25  
Rocky's Welding - \$300.00  
Fugle

**03/08/04**

9:00 AM Reclaim site

5:00 PM Leave site

**03/08/04 Continued**

**Crew on site:** Mike Miller

Prewett crew: 1 operator, 1 helper

**Estimated cost:** Prewett - \$923.75

**03/09/04**

Build oil trap for siphon and install

**Crew on site:** Rocky's Welding: Rocky, 1 helper

**Estimated cost:** \$1,109.00