Weiss Associates Environmental and Geologic Services

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May 28, 2004

Tom Bauhs
Chevron Products Company
P.O. Box 5004
San Ramon, California 94583-0804

RE: **Corrective Action Plan**
Former Chevron Service Station #9-5607
5269 Crow Canyon Road
Castro Valley, California
Weiss Job #4-1129-4

Dear Mr. Bauhs:

On behalf of Chevron Products Company (Chevron), Weiss Associates (Weiss) has prepared this Corrective Action Plan (CAP) for the above referenced site. This CAP was prepared to satisfy the second and third action items in the January 13, 2000 letter from Scott Seery of Alameda County Health Care Services Agency (ACHCSA) to Brett Hunter of Chevron. The action items are:

- Explore source removal options and propose the best available technology (BAT); and,
- Evaluate plume length and potential impacts to Crow Creek.

The plume characterization and technology evaluation are presented below. A future action plan for plume monitoring and source removal is included.

PLUME CHARACTERIZATION

Separate-Phase Hydrocarbon Source

Between March 5 and March 21, 1985, Groundwater Technology Incorporated (GTI) of Concord, California installed groundwater monitoring wells C-1 through C-8 (Figure 1). GTI measured separate-phase hydrocarbon (SPH) thickness in wells C-1 and C-3 and immediately began bailing SPH from those wells. On May 31 1985, GTI installed well RW-1. GTI measured SPH in well RW-1 after installation and began SPH bailing on a bi-weekly basis. GTI also connected a groundwater extraction system to well RW-1 consisting of a submersible pump and carbon treatment. As of September 1987, product recovery records showed that at least 32 gallons of petroleum hydrocarbons were recovered due to SPH bailing.

On September 13, 1989, Chevron initiated groundwater monitoring and SPH bailing, if SPH was found, on a quarterly basis. As of November 1, 1999, SPH was found in well C-3 during 5 of 44 monitoring events since sample collection began. The largest SPH thickness in well C-3 was 0.7 ft on July 23, 1999. The SPH thickness ranged from 0.01 ft to 0.03 ft during the other 4 SPH events. Between September 13, 1989 and July 23, 1999 SPH was not found in any monitoring well except C-3.

Product recovery data indicates that most of the recoverable SPH was removed as of September of 1987. A small pocket of SPH may remain in the vicinity of well C-3. The pocket is likely located between 23 feet (ft) and 32 ft below ground surface (bgs) based on the depth to water during the 5 SPH events. Additionally, 4 out of the 5 SPH events occurred during the dry months of July through October, when the water table was low.

Dissolved-Phase Plume

Dissolved petroleum hydrocarbon concentrations are highest on the west side of the former UST complex. On November 1, 1999, the concentration of benzene in groundwater was 23.9 mg/L in well C-3. Dissolved hydrocarbon concentrations attenuate rapidly in the westward (downgradient) and southward (cross-gradient) directions. Benzene concentrations in groundwater in the vicinity of the Forest Creek Townhomes residential properties range from less than 0.0005 mg/L near Crow Creek to approximately 7 mg/L near the entrance to Waterford Place. Dissolved benzene concentrations decline in the downgradient direction and are near or below 0.0005 mg/L before groundwater reaches Crow Creek. Dissolved benzene concentrations are near or below 0.0005 mg/L between the former service station and the commercial property to the East and the privately owned open space to the North.

Evaluation of Plume Length and Potential Impacts to Crow Creek

Crow Creek is a natural surface water creek that flows into San Lorenzo Creek and discharges into San Francisco Bay. The nearest downgradient distance between the former Chevron USTs and Crow Creek is 270 ft (Figure 1).

The relationship between benzene concentration and downgradient distance was evaluated for plume centerline wells C-3, C-6, C-9, and C-15. Well C-3 was assumed to be located at the center of the source, and wells C-6, C-9, and C-15 were assumed to lie along the plume centerline at locations 40 ft, 96 ft, and 203 ft respectively downgradient of the source. A plot of dissolved benzene concentration vs. distance, based on November 1, 1999 monitoring data, is presented in Figure 2. The concentration vs. distance data were fit with a first order exponential trend line. Weiss used the first order exponential equation of the trend line to extrapolate the downgradient distance that the concentration declines to 0.001 mg/L. The extrapolated distance was approximately 300 ft. Based on this extrapolation, the concentration of dissolved benzene may have been approximately 0.0029 mg/L at the edge of Crow Creek.

Dissolved benzene data from well C-15 indicates that the concentration has fluctuated periodically between <0.0005 mg/L and 0.071 mg/L since monitoring began at that location. A plot

of dissolved benzene concentration vs. distance during the most recent low cycle is shown in Figure 3. Based on October 13, 1998 data the plume was approximately 200 ft long at that time.

Discharge of benzene in groundwater to Crow Creek likely fluctuates at concentrations near the State of California Maximum Contaminant Level of 0.001 mg/L. Based on the extrapolation generated from November 1, 1999 data, the concentration of benzene in groundwater may have been as high as 0.0029 mg/L at the edge of Crow Creek. Yet, October 13, 1998 data, collected during a low concentration cycle, indicated that dissolved benzene was below the MCL at a location 70 ft upgradient of the creek.

TECHNOLOGY EVALUATION

Recommended Separate-Phase Hydrocarbon Source Technology

The best available technology for this site is one that will remove the remaining SPH from the source area located in the vicinity of well C-3. Technologies that are capable of removing SPH include active skimmers/pumps, passive skimmers and hand bailing. These three technologies are applicable to SPH quantities that vary from continuous SPH recharge to thin layers of SPH occurring in a well on an occasional basis. The technologies and their applications are:

1. Active skimmers/pumps apply to continuous or frequent SPH recharge;
2. Passive skimmers are applicable if small amounts of SPH enter the well on a frequent basis; and,
3. Hand bailing is applicable if SPH enters the well on an occasional basis.

Based on the source characterization presented above, SPH is occasionally entering well C-3 during summer or fall when the depth to water is approximately 30 ft bgs. **The frequency of SPH at the site indicates that hand bailing between July and October appears to be the most appropriate approach.** In addition, SPH is more likely to become available for bailing when the water table is approximately 30 ft bgs in C-3.

Recommended Dissolved Plume Technology

The results of previous evaluations by Chevron[1] and Weiss[2] indicate that the hydrocarbon plume is currently undergoing biodegradation. If dissolved oxygen concentrations are increased along the plume centerline, then biodegradation will likely reduce the plume length and prevent discharge of dissolved benzene to Crow Creek. Therefore, **we recommend installing ORC socks in plume centerline wells C-3, C-6, C-9, and C-15 to raise the dissolved oxygen concentration and**

[1] Chevron Research and Technology Company, August 13, 1992. Interoffice Memorandum, Predictions Concerning the Fate and Transport of Dissolved Benzene at Chevron Service Station #9-5607, 5269 Crow Canyon Road, Castro Valley, California.

[2] Weiss, 1997c. Soil Vapor Survey and Risk Assessment Results, Chevron Service Station #9-5607, 5269 Crow Canyon Road, Castro Valley, California. January 20, 1997.

enhance biodegradation of the plume between the source and Crow Creek. ORC treatment will not likely be necessary after the SPH source is removed.

FUTURE ACTION PLAN

SPH Source Remediation

We recommend allowing the water table to drop below 30 ft bgs before attempting to induce SPH into well C-3. When the water table declines below 30 ft bgs in C-3 or if SPH appears, the site should be visited to measure and bail SPH. If the water table is below 30 ft bgs and SPH is not present, then the well could be purged several times in an attempt to dislodge SPH. SPH should be bailed daily if it is encountered.

We recommend visiting the site to measure and bail SPH during the first week of each month between July and October of 2000. If SPH is not present during the monthly visit, then the technician should bail the well and return to inspect for SPH on the following day. Bailing should be discontinued for the month if SPH is not present after two consecutive daily visits. If SPH is found in the well during three consecutive daily visits, then the technician should install a passive skimmer and return one week later to measure and remove SPH. The frequency of site visits thereafter would be determined based on maintenance requirements for the passive skimmer.

We recommend that SPH removal volumes be summarized in a table at the end of October 2000, and evaluated to determine whether bailing activities are complete. If little or no SPH is encountered during bailing activities in 2000, then SPH measurement and bailing should only occur during the regular quarterly monitoring visits in the future. Otherwise, SPH skimming and/or bailing activities should continue as long as SPH is found in C-3 on a frequent basis.

Dissolved Plume Remediation

We recommend installing ORC socks in plume centerline wells C-3, C-6, C-9, and C-15 in June of 2000. The ORC should remain in place through October 2000, except in well C-3 during bailing or if SPH is present. After October 2000, the use of ORC socks should be re-evaluated. The recommended ORC replacement frequency is once per 6 months. We recommend using ORC for as long as SPH remains present in well C-3. If SPH is no longer present in the vicinity of well C-3, then the plume will likely retreat without the need for additional dissolved oxygen.

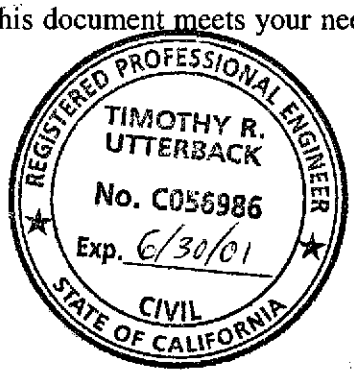
Groundwater Monitoring Plan

Groundwater monitoring should continue in wells C-3, C-6, C-9, and C-15 on a quarterly basis, until SPH is no longer present in the vicinity of well C-3. The monitoring frequency should be evaluated in October 2000, when SPH bailing and ORC remedial actions are being evaluated. If SPH is no longer present, then monitoring should be reduced to wells C-3 and C-15 on a yearly basis.

Wells C-5 and C-8 should be monitored on a yearly basis to detect potential releases at upgradient properties. Groundwater monitoring should be discontinued when data from wells C-3 and C-15 indicate that the benzene concentration is steadily declining to the MCL.

All other wells should be abandoned.

We trust this document meets your needs. Please call Weiss at (510) 450-6000, if you have any questions.



Sincerely,
Weiss Associates

Tim Utterback P.E.
Project Engineer

Enclosures: Figure 1. Site Plan View
Figure 2. Dissolved Benzene Concentration vs. Distance, November 1, 1999
Figure 3. Dissolved Benzene Concentration vs. Distance, October 13, 1998

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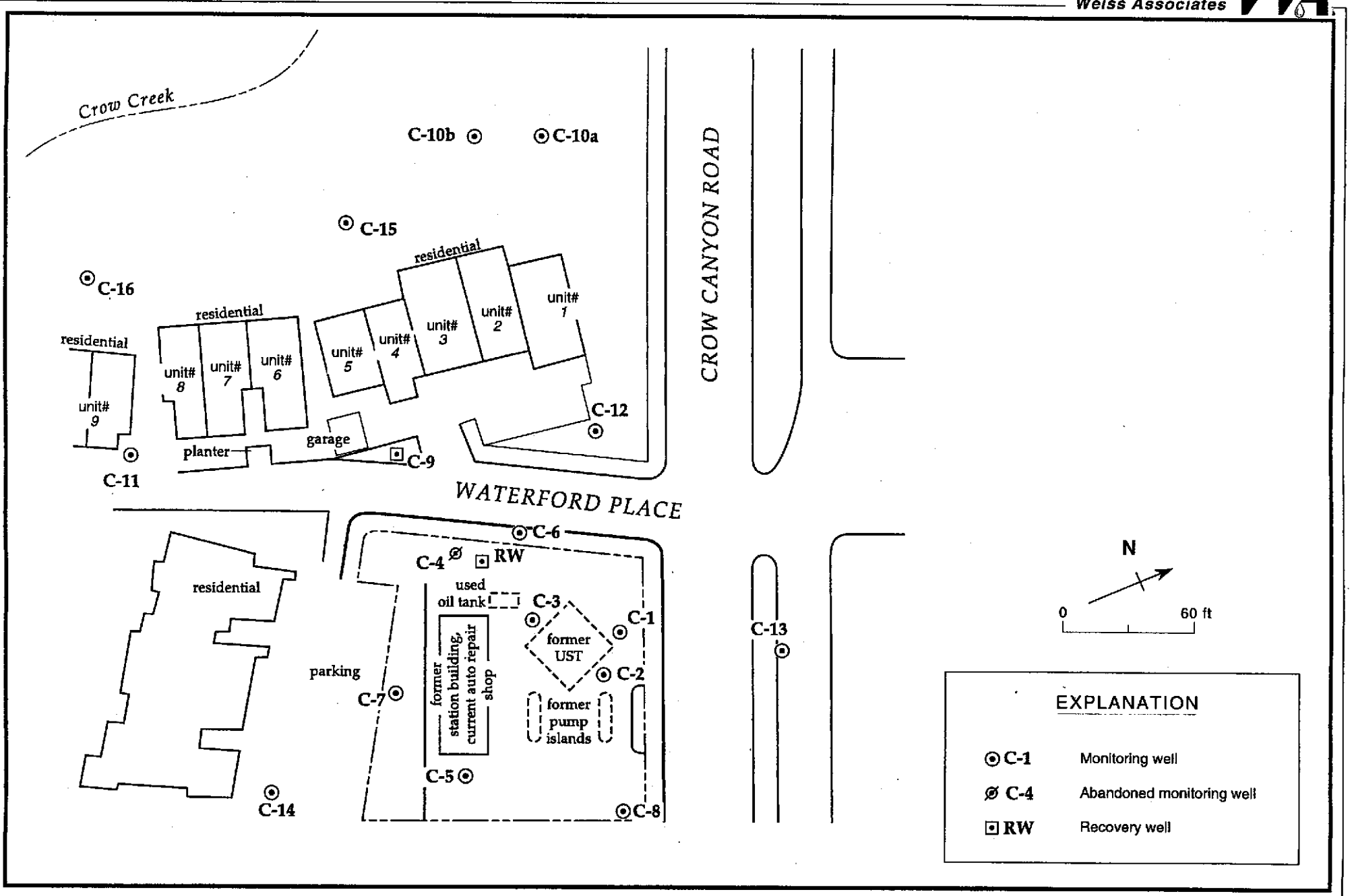
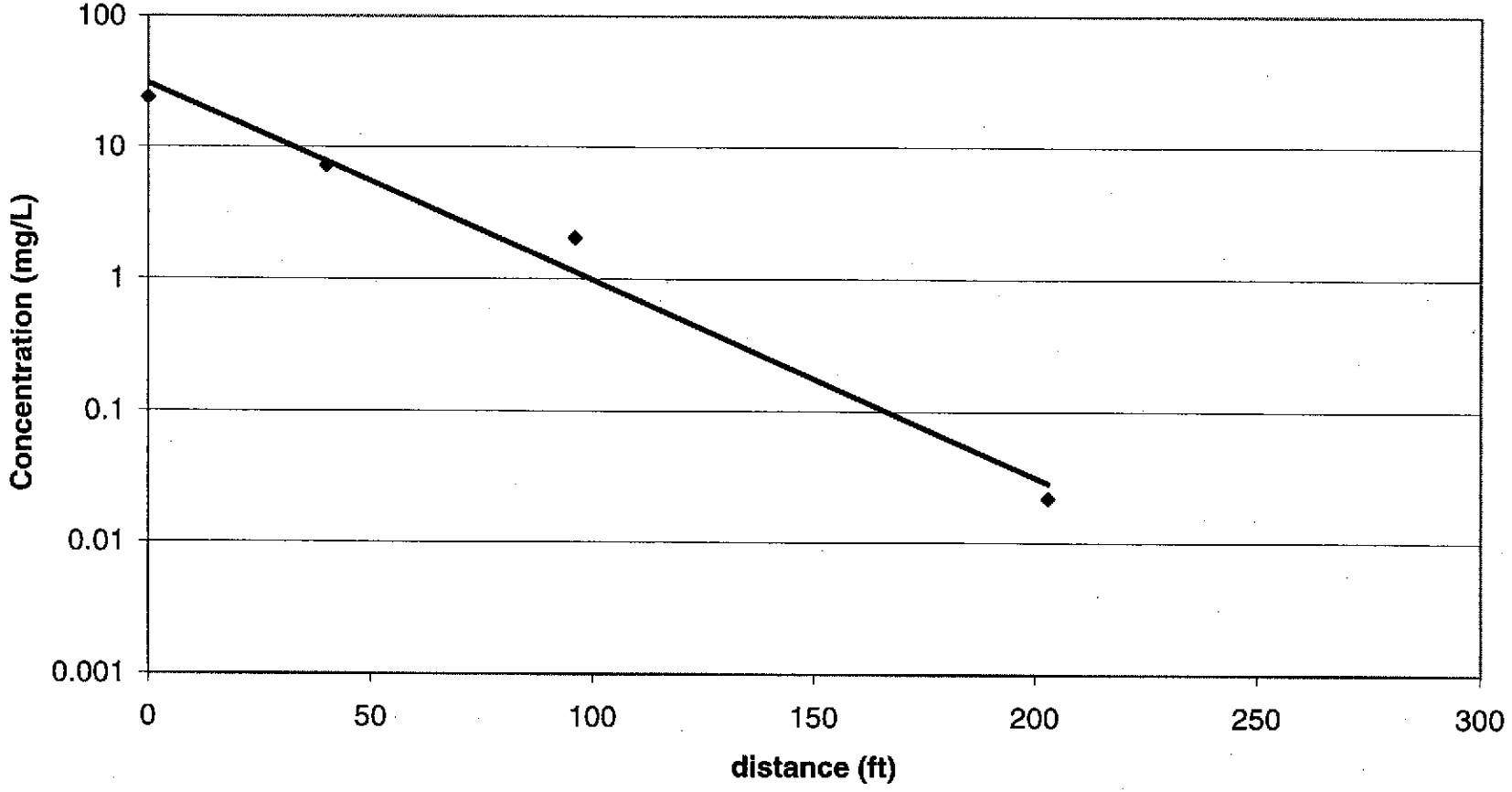


Figure 1. Site Plan - Chevron Station 9-5607, 5269 Crow Canyon Road, Castro Valley, California

Figure 2. Dissolved Benzene Concentration vs Distance, November 1, 1999



$y = 30.833e^{-0.0344x}$

$R^2 = 0.9825$

Concentration = 0.001 mg/L when distance = 300 feet

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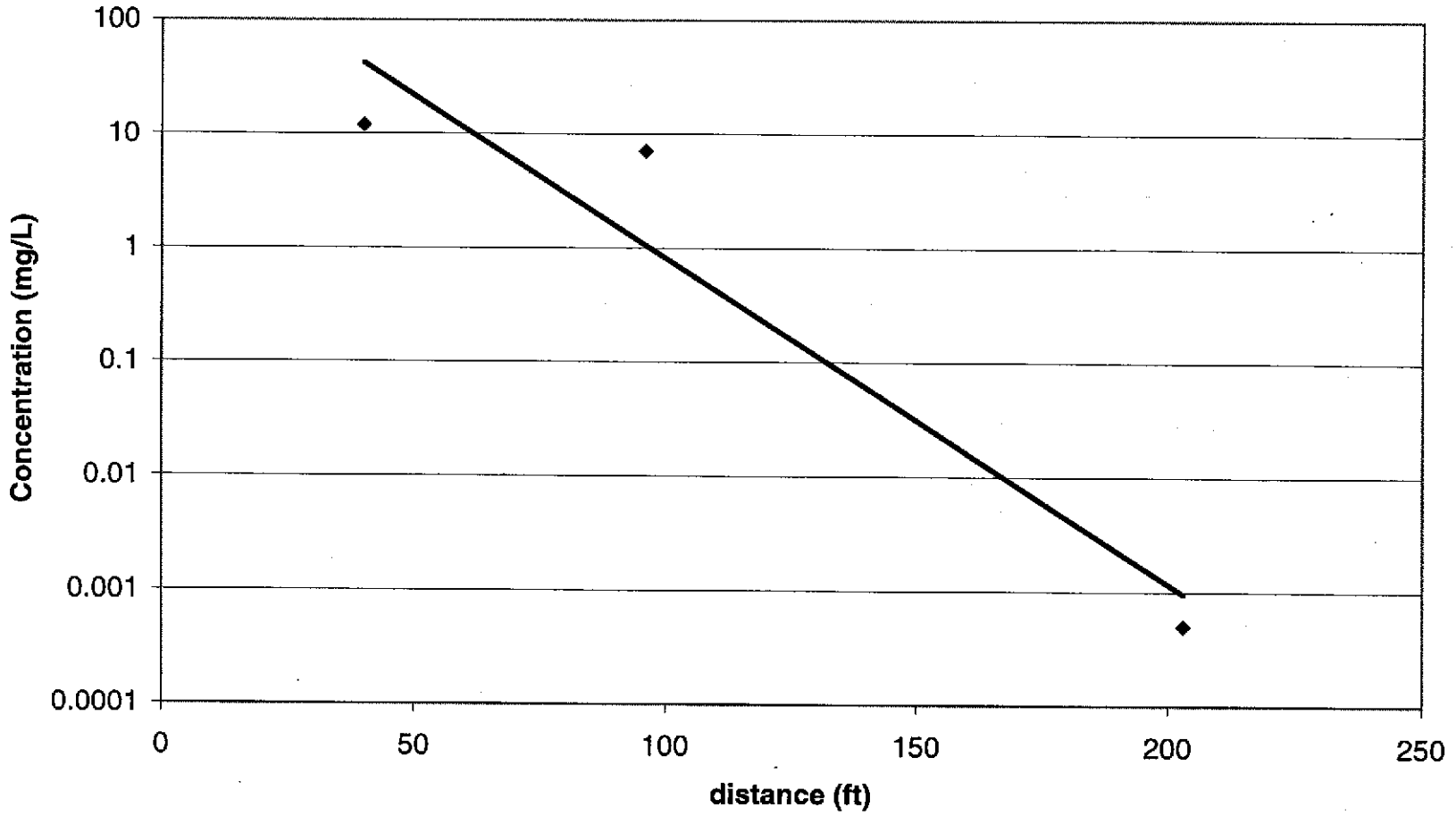
Figure 3. Dissolved Benzene Concentration vs Distance, October 13, 1998



$y = 573.51e^{-0.0655x}$ Concentration = 1 ug/L when distance = 200 feet

$R^2 = 0.9134$

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