ENVIRONMENTAL RESOLUTIONS, INC.

May 25, 1999
201003MG.L13

Ms. Marla D. Guensler
Exxon Company, U.S.A.
P.O. Box 4032
Concord, California 94524-4032

Subject: Biodegradation Monitoring Program, Reduced Monitoring and Proposed System Shutdown at Former Exxon Service Station 7-3006, 720 High Street, Oakland, California.

Ms. Guensler:

At the request of Exxon Company, U.S.A. (Exxon), Environmental Resolutions, Inc. (ERI) is proposing on-site activities to address the following: a biodegradation monitoring program, discontinued monitoring of wells MW9 through MW11, and shutting down of the existing remediation system. The location of the site is shown on the Site Vicinity Map (Plate 1). The locations of selected site features are shown on the Generalized Site Plan (Plate 2).

Biodegradation involves the use of aerobic and anaerobic microorganisms to naturally attenuate hydrocarbons. As microorganisms consume hydrocarbons, particular molecules are either decreased or increased in groundwater. Dissolved oxygen levels generally decrease as the rate of aerobic biodegradation of hydrocarbons increases. Aerobic biodegradation, utilizing dissolved oxygen, is the most energetically preferred degradation pathway. As the amount of dissolved oxygen decreases, a corresponding increase in the amount of dissolved carbon dioxide is observed because carbon dioxide is a metabolic by-product of aerobic biodegradation. As the level of dissolved oxygen decreases, or becomes anoxic, the rate of anaerobic biodegradation increases. At this point nitrates are consumed by anaerobic biodegradation thereby decreasing the amount of nitrates in the groundwater. The increased rate of anaerobic biodegradation leads to an increase in the dissolved metabolic by-products of anaerobic biodegradation: dissolved ferrous iron, dissolved hydrogen sulfide, and dissolved methane. Monitoring for these constituents can provide a description of the activity and state of microorganisms in the groundwater (EPA, 1996).

ERI proposes monitoring existing on-site wells MW1, MW2, MW4, MW9, MW10, MW12, and MW13 for the following constituents: dissolved oxygen (by EPA Method 360.1), nitrates as nitrate (by EPA Method 300.0), dissolved ferrous iron (by EPA Method 6010 Modified), dissolved hydrogen sulfide (by EPA Method 9030), and dissolved methane (by RSK 175 (preservation) and ASTM 3416 Modified (analysis)). A reduction/oxidation (Redox) potential measurement will be collected as well to indicate the activity of chemical degradation of hydrocarbons at the subject site. Monitoring wells MW1, MW9, and MW10 will be used for collecting information about biodegradation conditions outside of the hydrocarbon-impacted groundwater area. Monitoring wells MW2, MW4, MW12, and MW13 will be used to collect data from within the hydrocarbon-impacted area. A comparison of the data from within and outside the hydrocarbon-impacted area will provide evidence for biodegradation.

73 Digital Drive, Suite 100, Novato, California 94949-5791 415-382-9105 (FAX 415-382-1856)
Lake Forest • Novato • Seattle

In addition to the biodegradation monitoring, ERI proposes continued quarterly groundwater monitoring of wells MW1, MW2, MW4, MW12, and MW13 for total extractable petroleum hydrocarbons as diesel (TEPHd), total purgeable petroleum hydrocarbons as gasoline (TPPHg), benzene, toluene, ethylbenzene, and total xylenes (BTEX), and methyl tertiary butyl ether (MTBE).

ERI also proposes discontinuing sampling of MW9, MW10, and MW11 for TEPHd, TPPHg, BTEX, and MTBE because the wells are up-gradient and exhibit a trend of decreasing concentrations of the above-mentioned constituents.

ERI proposes shutting down the existing soil vapor extraction system, due to low removal rates and cost of operation. As a proactive measure, Exxon installed the system in January of 1995 to address hydrocarbon-impacted soil and groundwater. During the first quarter 1999 monitoring event, approximately 91 pounds of hydrocarbons were removed. Approximately 5 pounds of hydrocarbons have been removed during the first month of the second quarter. A removal rate of approximately 15 pounds per quarter, for the second quarter, is estimated. To date, approximately 5,132 pounds of hydrocarbons have been removed by the system (ERI, 1999).

ERI is initiating the collection and evaluation of biodegradation data to facilitate the process of achieving case closure at the subject site after four quarters of data have been collected. ERI will present results of biodegradation at the subject site under separate cover. It is ERI's understanding that biodegradation data are a necessary element for low-risk groundwater case closure.

LIMITATIONS

This report was prepared in accordance with generally accepted standards of environmental practice in California at the time this investigation was performed. This report has been prepared for Exxon Company, U.S.A. and any reliance on this report by third parties shall be at such party's sole risk.

ERI recommends forwarding copies of this report to:

Mr. Stephen Hill
California Regional Water Quality Control Board
San Francisco Bay Region
1515 Clay Street, Suite 1400
Oakland, California 94612

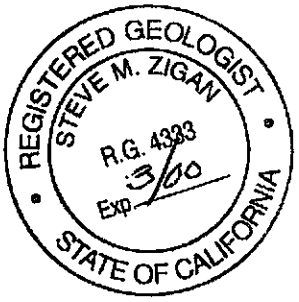
Mr. Barney Chan
Alameda County Health Care Services Agency
Department of Environmental Health
1131 Harbor Bay Parkway, Room 250
Alameda, California 94502

* Closure cannot be recommended until:
1) concentrations show a decline in conc vs time plot
2) FP / sheen is removed
3) HRA shows no HHR (T.ei 1/2 RBCA)

Q. What areas of soil tow are not captured w/ existing systems, le this significant?
Wells not showing a decreasing GW concentrend: MW 2, 3, 4, 6
* 8, 12, 13, 14

If you have any questions or comments regarding this report, please call Mr. Joe Giller at (415) 382-4309.

Sincerely,
Environmental Resolutions, Inc.



Joe A. Giller
Staff Geologist

Steve M. Zigan
R.G. 4333
H.G. 133

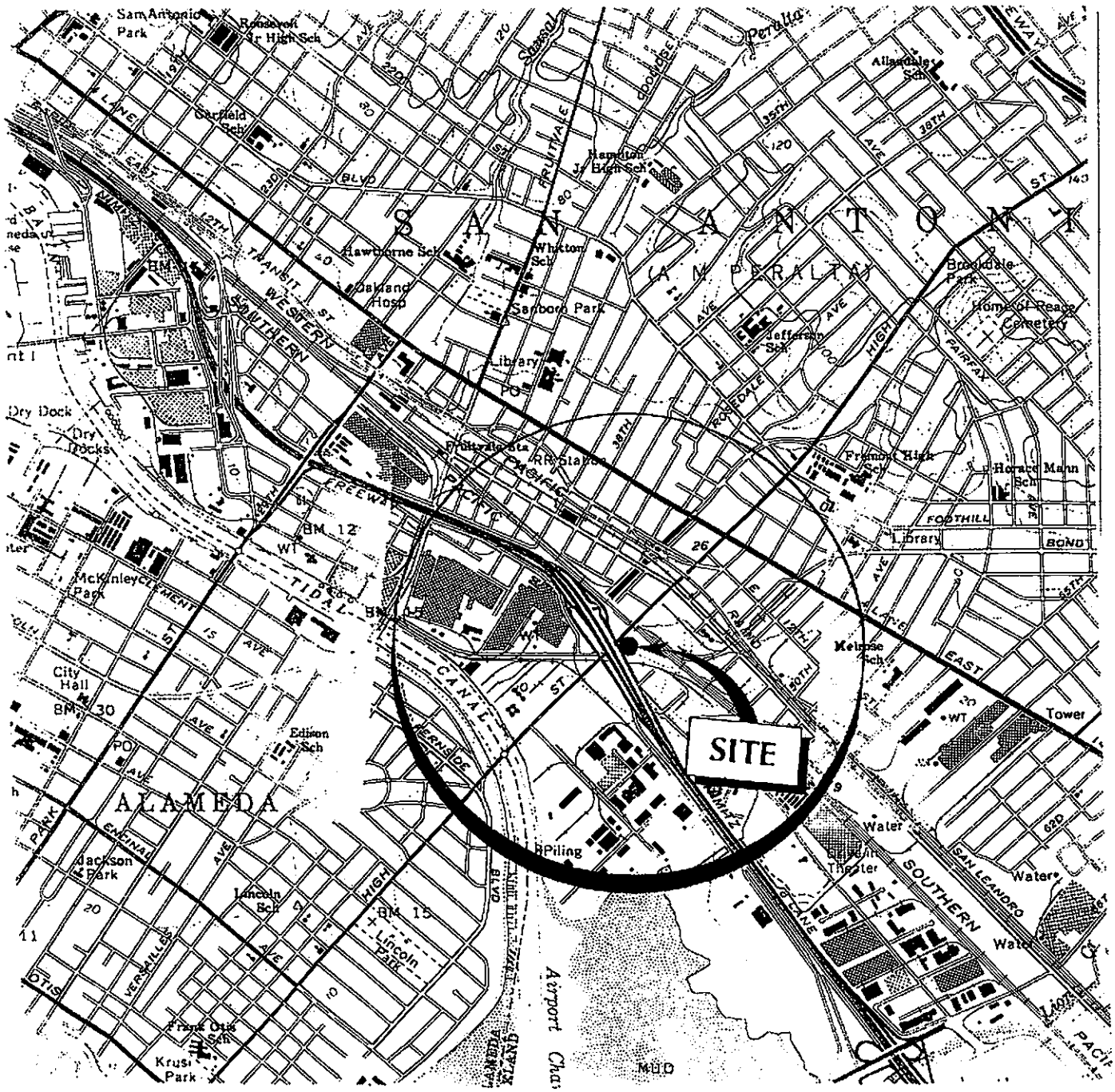
Attachments: References

Plate 1: Site Vicinity Map
Plate 2: Generalized Site Plan

REFERENCES

Environmental Resolutions, Inc. May 6, 1999. Quarterly Groundwater Monitoring and Remediation Status Report, First Quarter 1999, Former Exxon Service Station 7-3006, 720 High Street, Oakland, California ERI Job Number 201011.

U.S. Environmental Protection Agency. August, 1996. BIOSCREEN Natural Attenuation Decision Support System User's Manual Version 1.3.



20100001

N

APPROXIMATE SCALE

0 1/2 1

MILE

Source: U.S.G.S. 7.5 minute topographic quadrangle map Oakland/San Leandro, California Photorevised 1980

ERI ENVIRONMENTAL RESOLUTIONS, INC.

PROJECT ERI 2010

SITE VICINITY MAP

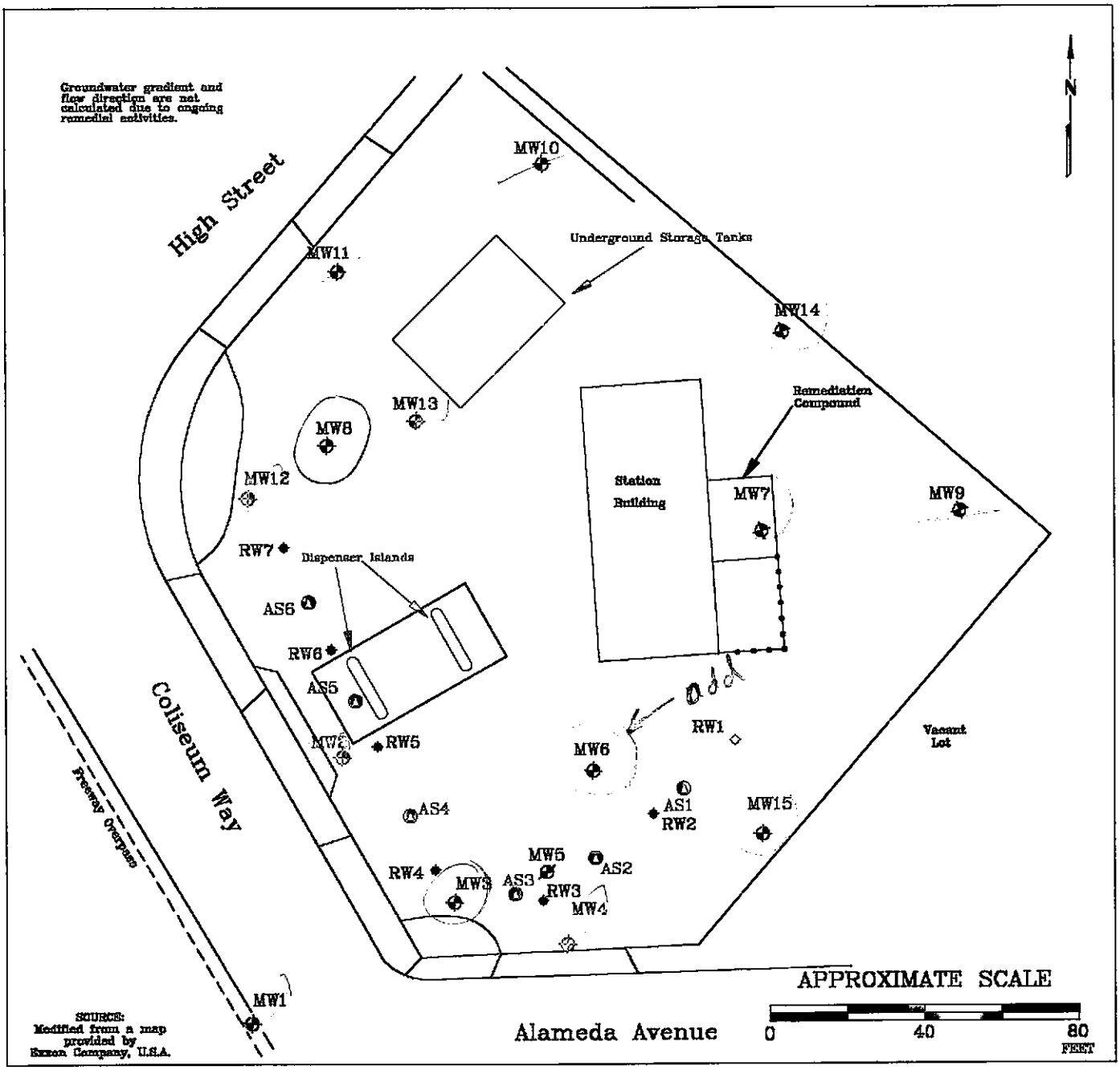
FORMER EXXON SERVICE STATION 7-3006

720 High Street

Oakland, California

PLATE

1



FN 2010bio2

EXPLANATION

MW15 ◆ Groundwater Monitoring Well
Groundwater Elevation in feet above mean sea level

MW5 ◆ Groundwater Monitoring Well (Destroyed)

RW7 ◆ Recovery Monitoring Well

MW1 ◆ Perimeter Groundwater Monitoring Well for Biodegradation

MW4 ◆ Interior Groundwater Monitoring Well for Biodegradation

AS6 ● Air-Sparging/Vapor-Extraction Well

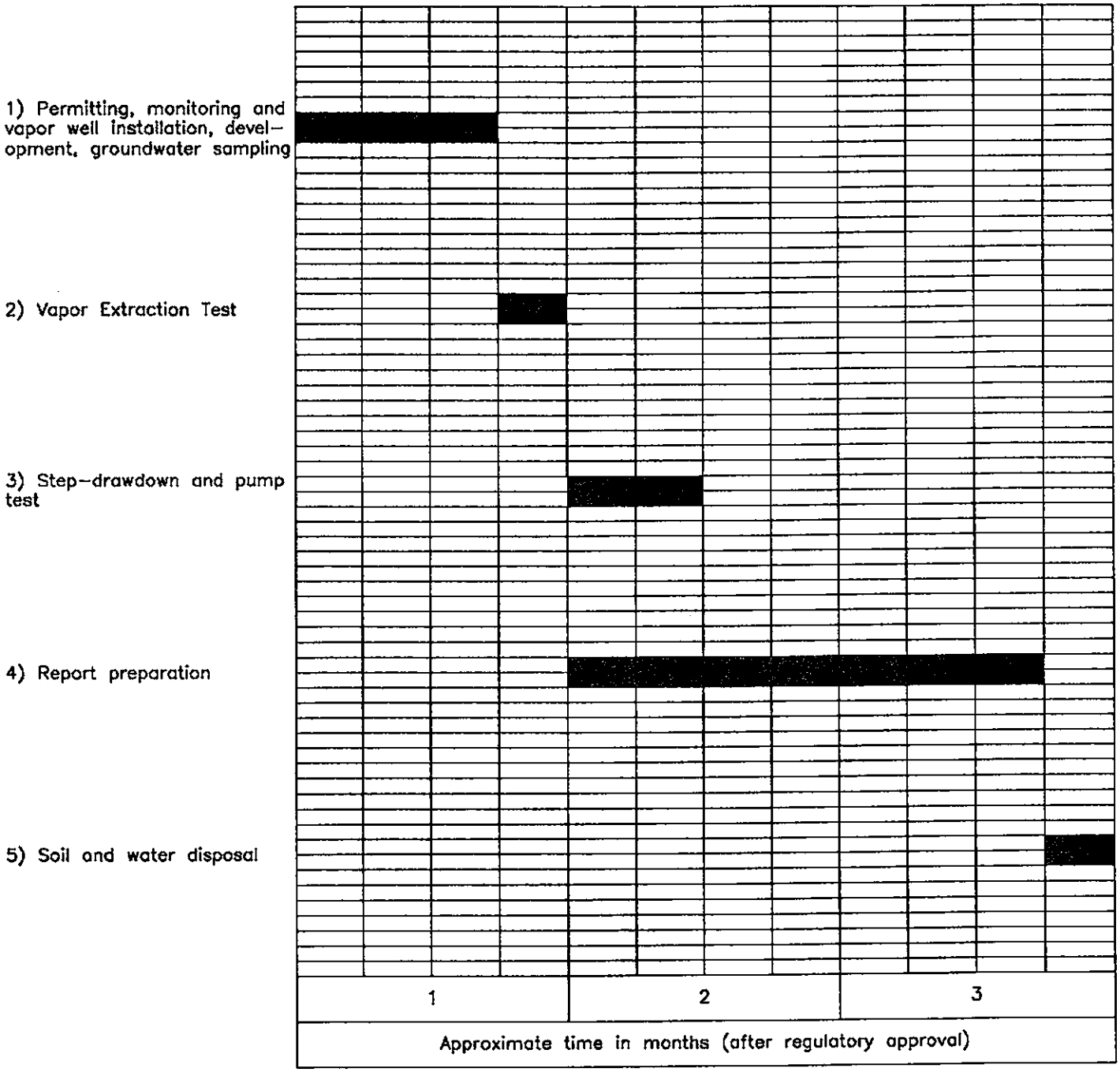
ERI ENVIRONMENTAL RESOLUTIONS, INC.

GENERALIZED SITE PLAN

FORMER EXXON SERVICE STATION 7-3006
720 High Street
Oakland, California

PROJECT NO. 2010

PLATE 2



RESNA
Working to Restore Nature

PROJECT 62034.01

PRELIMINARY TIME SCHEDULE
Exxon Station 7-3006
720 High Street
Oakland, California

PLATE
C