GeoStrategies Inc.

ALCO
HAZMAT
94 MAR 28 PM 1:48

March 24, 1994

Alameda County Health Agency
Department of Environmental Health
80 Swan Way, Room 200
Oakland, California 94621

1059

Attention: Mr. Barney Chan

Reference: **UNOCAL Service Station No. 5325**
3220 Lakeshore Avenue
Oakland, California

Mr. Chan:

As requested by Mr. David DeWitt of UNOCAL Corporation, we are forwarding a copy of the Work Plan dated March 22, 1994, for the above referenced location. This work plan proposes three additional monitoring wells at this site to evaluate the extent of petroleum hydrocarbons in soil and groundwater.

If you have questions or comments, please call.

GeoStrategies Inc. by,

Cliff M. Garratt
Project Manager

CMG\rcm

enclosure

cc: Mr. David DeWitt, UNOCAL Corporation
Mr. Richard Hiett, RWQCB - San Francisco Bay Region

814final.wpl

GeoStrategies Inc.

WORK PLAN

UNOCAL Service Station No. 5325
3220 Lakeshore Avenue
Oakland, California

781402-17

March 22, 1994

GeoStrategies Inc.

March 22, 1994

UNOCAL Corporation
Post Office Box 5155
San Ramon, California 94583

Attention: Mr. David DeWitt

Reference: **WORK PLAN**
UNOCAL Service Station No. 5325
3220 Lakeshore Avenue
Oakland, California

Mr. DeWitt:

GeoStrategies Inc. (GSI), at the request of UNOCAL Corporation, presents this Work Plan for additional subsurface investigation at the above referenced site (Plate 1). GSI proposes installing three additional monitoring wells to further investigate the extent of petroleum hydrocarbon impact to soil and groundwater and assess groundwater flow conditions beneath the study area. Locations of the proposed monitoring wells are shown on Plate 2.

SITE BACKGROUND

In May, 1990 GSI drilled three exploratory soil borings adjacent to the underground storage tank (UST) complex to depths ranging between 10 and 12.5 feet below ground surface (bgs). Three samples were collected from each boring, at depths between 4.5 and 12.5 feet bgs. Soil samples were analyzed for Total Petroleum Hydrocarbons calculated as gasoline (TPH-Gasoline) and for benzene, toluene, ethylbenzene, and xylenes (BTEX). TPH-Gasoline was detected in each sample at concentrations ranging between 2 and 7,500 parts per million (ppm). Benzene was also detected in each sample, at concentrations ranging between 0.14 and 13 ppm. Results of this investigation were presented in a GSI report dated June 12, 1990 (*Soil Boring Report*, report no. 7814-1).

781402-17

Two 10,000-gallon, gasoline, underground storage tanks (USTs) and one waste-oil UST were replaced in June, 1990 (Plate 2). Approximately 850 cubic yards of soil and imported backfill were excavated during UST replacement activities. Stockpiled soil was aerated onsite to less than 100 parts per million (ppm) and hauled to an appropriate disposal facility. Groundwater was encountered at approximately 7.5 feet bgs.

Petroleum hydrocarbons were detected in confirming sidewall and bottom soil samples from the UST excavation. TPH-Gasoline and benzene concentrations from these samples ranged from 12 to 2800 ppm and from 0.008 to 11 ppm, respectively. TPH-Gasoline and benzene concentrations in soil samples from the product line trenches ranged from 12 to 60 ppm and 0.62 to 1.7 ppm, respectively. The results of these tank replacement activities are presented in GSI reports dated August 31, 1990 (*Report No. 7814-3, Tank Replacement Report*) and October 18, 1990 (*Report No. 7814-4, Soil Stockpile Sampling and Removal*), respectively.

Groundwater monitoring wells U-1, U-2, and U-3 were installed on September 24, 1990. Groundwater was first encountered between 10 and 10.5 feet bgs. TPH-Gasoline was detected in soil samples from borings U-1 (6.5 feet bgs) and U-2 (6.0 feet bgs) at concentrations of 110. and 480. ppm, respectively. Benzene was detected in only one of these soil samples (boring U-1 at 6.5 feet bgs) at a concentration of 4.5 ppm. TPH-Gasoline and benzene were not detected in soil samples collected from boring U-3. Soil samples submitted for analysis from above 7 feet bgs are considered to be from the unsaturated (vadose) zone. Groundwater samples collected from monitoring wells U-1 and U-2 on October 8, 1990 contained TPH-Gasoline and benzene at concentrations 690 and 780 parts per billion (ppb), respectively. Benzene concentrations in these samples were 38 and 27 ppb, respectively. TPH-Gasoline and benzene were not detected in the groundwater sample from Well U-3. Well installation and sampling data are presented in the GSI Report No. 7814-5, *Monitoring Well Installation Report,* dated December 19, 1990.

Quarterly monitoring of the three newly installed monitoring wells began during the fourth quarter of 1990. Historical depth-to-water levels in the wells have ranged from approximately 8 to 12 feet bgs. Groundwater flow direction has ranged from southeast to west-southwest at calculated hydraulic gradients of between 0.002 and 0.02. Historical chemical concentrations of TPH-Gasoline in groundwater samples from Wells U-1 and U-2 have ranged between 140 and 34,000 ppb. Benzene concentrations in samples from these wells ranged between 1 and 2,400 ppb. TPH-Gasoline was detected in groundwater samples from Well U-3 once in August, 1993, at a concentration of 210 ppb. Benzene was detected in Well U-3 in April, 1991 and August, 1993 at concentrations of 1.0 and 5.0 ppb, respectively.

SUBSURFACE CONDITIONS

The site is situated on estuarine deposits northeast of the Lake Merritt basin and southwest of the Piedmont Hills. These deposits consist primarily of unconsolidated, water-saturated, dark plastic clay and silty clay rich in organic material. Locally, lenses and stringers of well-sorted silt and sand as well as beds of peat are observed (Helley, et. al., 1979).

Based on the previous subsurface investigations by GSI, clay, silt, and sand underlie the site to depths of approximately 15 feet below ground surface. The soils contain abundant peat material (approximately 25%). Clay appears to be the predominant soil-type beneath the site. Sand is observed within the clay and silt (sandy clay and sandy silt) at up to 25%. Sand is also observed as sand layers (<2.5 feet) at depths of approximately 6 to 9 feet bgs.

The upper-most water-bearing zone material consist primarily of a sandy silt, silty sand, sand with gravel, and a clayey silt with sand. Clay was encountered at approximately 14 feet bgs and extends to the total depth explored of 21.5 feet bgs. This clay layer appears to be laterally continuous across the site.

Local topography suggest that groundwater flow beneath the site is toward the west-southwest. The groundwater flow direction beneath the site has varied from the southeast to the west-southwest since quarterly monitoring began in October, 1990. Groundwater flow direction variations may be due to tidal influence from nearby Lake Merritt.

TECHNICAL RATIONALE

Petroleum hydrocarbons have been primarily detected in soil and groundwater adjacent to the UST complex, the dispenser islands, and in Wells U-1 and U-2. Horizontal extent of the dissolved hydrocarbon plume has not been delineated to the west, north, and east of the UST complex. Groundwater flow directions calculated from monitoring data have varied and have not correlated with the west-southwest direction indicated by local topography. To further delineate the dissolved hydrocarbon plume and gain additional groundwater flow direction data, GSI proposes to install three groundwater monitoring wells at this site (Plate 2).

Two wells will be installed onsite, west and east-southeast of the UST complex. These wells will assist in delineating the extent of dissolved hydrocarbons in groundwater for the entire range of groundwater flow directions previously observed. One well will be installed offsite on Lakeshore Avenue to evaluate dissolved hydrocarbon plume upgradient of Well U-1. All three wells will be utilized to collect additional groundwater level data for the calculation of flow direction. To complete the well installation outlined above, GSI proposes the following scope of work:

TASK 1: Prepare a traffic plan for the installation of the offsite monitoring well, prepare a health and safety plan, and secure all necessary permits.

TASK 2: Well Installation: Install three groundwater monitoring wells at the locations as shown on Plate 2. Well borings will be drilled using 10-inch-diameter hollow-stem augers for the onsite wells, and 8-inch-diameter hollow-stem augers for the offsite well. **The well boring will be drilled to a maximum anticipated depth of 20 feet bgs.** A GSI geologist will observe the drilling of the well borings and prepare a lithologic log for each boring.

The onsite wells will be constructed using 4-inch-diameter Schedule 40 PVC. The offsite well will be constructed using 2-inch-diameter Schedule 40 PVC. the screened section of each well will extend from the total depth drilled to approximately two-feet above first encountered groundwater to allow for seasonal and diurnal fluctuations in groundwater levels. Well screen placement will be based on site specific data, and shall be compatible with existing onsite wells. Each well will be surveyed to Mean Sea Level referenced to the top of the box and thetop of the casing, by a California State licensed land surveyor.

The well sandpack will extend across the entire well screen to a minimum of 1-foot above the top of the screen. A minimum one-foot-thick bentonite seal will be placed above the sandpack and hydrated with clean water. Concrete grout will be placed above the bentonite seal. The wellhead will be protected by a locking waterproof well cap, lock, and traffic-rated vault box set in concrete.

Soil Samples: Soil samples for chemical analysis and lithologic description will be obtained from the borings at five-foot intervals, at a minimum. Soil samples for chemical analysis will be collected with a split-spoon sampling device fitted with clean stainless-steel tube liners. Although the actual number of samples submitted for chemical analysis will depend on site conditions and field screening data,

approximately two samples from each boring will be submitted for analysis. Samples will be analyzed as described in Task 4.
Soil samples will be screened in the field for the presence of volatile organic compounds using an Organic Vapor Meter (OVM) photoionization detector (PID). These data will be collected for reconnaissance purposes only, and not to verify the presence or absence of petroleum hydrocarbons.

Drill Cuttings and Rinsate: Drill cuttings will be placed on and covered with plastic sheeting. One composite sample of all drill cuttings will be collected and analyzed as described in Task 4. Steam cleaning rinsate water will be stored onsite in drums pending proper disposal.

TASK 3: The newly installed groundwater monitoring wells will be developed by Gettler-Ryan, Inc. and sampled by MPDS, Inc., a UNOCAL subcontractor. Groundwater will be analyzed as described in Task 4.

TASK 4: Soil and groundwater samples will be submitted to Sequoia Analytical, a California State-certified analytical laboratory. Soil and groundwater samples will be analyzed for TPH-Gasoline according to Environmental Protection Agency (EPA) Method 8015 and BTEX according to EPA Method 8020.

TASK 5: Following receipt of all data, the extent of soil and groundwater impact will be evaluated. A technical report will be prepared which discusses the installation of the monitoring wells and results of soil and groundwater chemical analytical data.

If you have questions or comments, please call.

GeoStrategies Inc.,

Robert C. Mallory
Geologist

Stephen J. Carter
Project Geologist
RG 5577

REGISTERED GEOLOGIST
STEPHEN J. CARTER
No. 5577
STATE OF CALIFORNIA

RMC/SJC

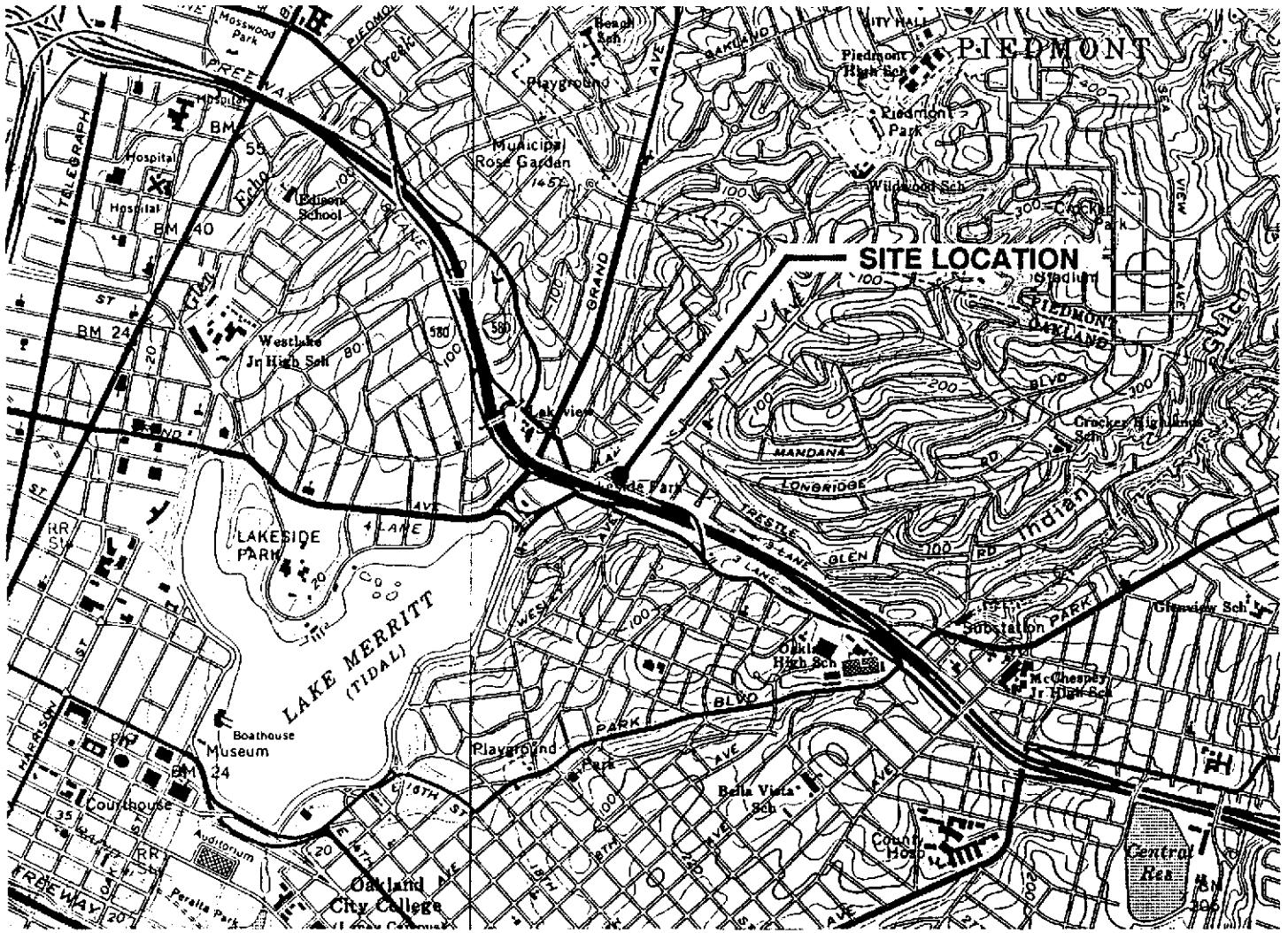
Plate 1. Vicinity Map
Plate 2. Site Plan

QC Review:

781402-17

REFERENCE

Helley, E.J.; Lajoie, K.R.; Spangle, W.E.; and Blair, M.L., 1979, Flatland Deposits of the San Francisco Bay Region, California - their geology and engineering properties and their importance to comprehensive planning, U.S. Geological Survey Professional Paper 943, pp. 20-22.



Base Map: USGS Topographic Map

Approximate Scale: 1" = 2000'

GeoStrategies Inc.

Vicinity Map
UNOCAL Service Station #5325
3220 Lakeshore Avenue
Oakland, California

PLATE
1

JOB NUMBER	REVIEWED BY RG/CEG	DATE	REVISED DATE
7814		6/90	

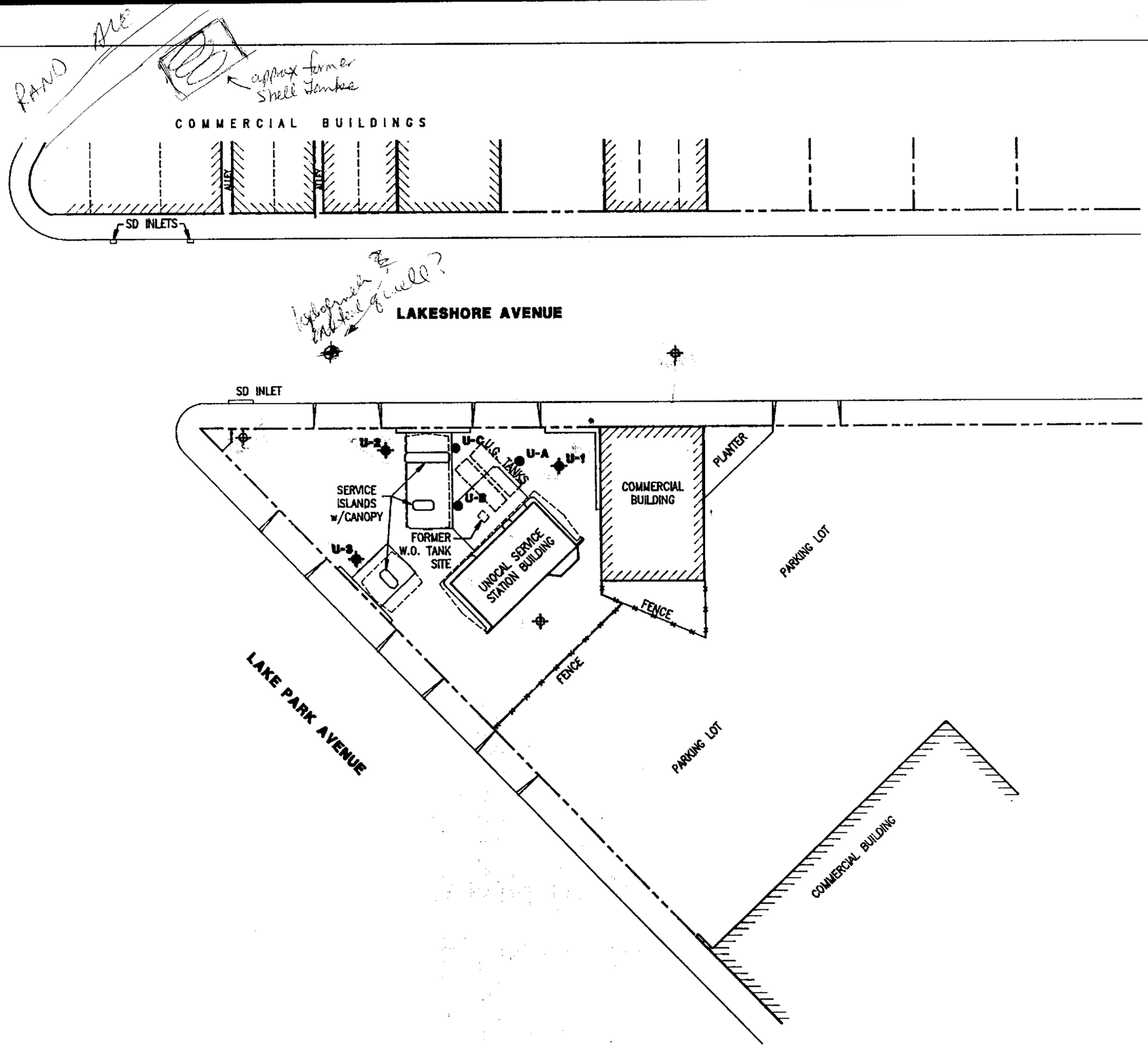


PLATE **2**

EXTENDED SITE PLAN
UNOCAL Service Station #5325
3220 Lakeshore Avenue
Oakland, California

REVISED DATE

DATE 2/94

GeoStrategies Inc.

REVIEWED BY RG/CEG

JOB NUMBER 7814