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TO: MR GIL WISTAR
ALAMEDA COUNTY DEPARTMENT OF
ENVIRONMENTAL HEALTH
80 SWAN WAY ROOM 200
OAKLAND, CA 94621

DATE: 12/14/90
PROJECT NUMBER: 69028-4
SUBJECT: ADDENDUM TO WORK PLAN

FROM: MARC BRIGGS
TITLE: GEOLOGICAL TECHNICIAN

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1	12/14/90	69028-4	ADDENDUM TO WORK PLAN 69028-1W TO PERFORM A SUBSURFACE INVESTIGATION AT THE ARCO STATION 6113, 785 EAST STANLEY BOULEVARD, LIVERMORE, CA. SITE # 29

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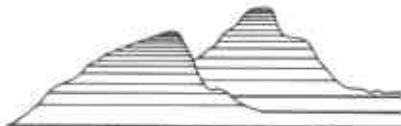
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*Revision Date: 10/15/90
*File Name: TRANSMT.PRJ



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**ADDENDUM TO WORK PLAN
for
ARCO STATION 6113
785 EAST STANLEY BOULEVARD
LIVERMORE, CALIFORNIA**

AGS 69028-4

**Prepared for
ARCO Products Company
P.O. Box 5811
San Mateo, California 94402
by
Applied GeoSystems**



Applied GeoSystems

3315 Almaden Expressway, Suite 34, San Jose, CA 95118 (408) 264-7723

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December 14, 1990
AGS 69028-4

Mr. Kyle Christie
Environmental Engineer
ARCO Products Company
P.O. Box 5811
San Mateo, California 94402

Subject: Addendum to Work Plan 69028-1W to perform a Subsurface Investigation at the ARCO Station 6113, 785 East Stanley Boulevard, Livermore, California.

Mr. Christie:

As you requested, this letter is being prepared to serve as an addendum to the Work Plan (Applied GeoSystems 69028-1W, July 1989) for the subject site. This addendum includes the drilling of one soil boring (B-4), constructing a 4-inch diameter ground-water monitoring well in boring B-4 (MW-4), developing the well, measuring water levels, sampling the new monitoring well, submitting soil and water samples for laboratory analysis, evaluating the ground-water flow direction and gradient, and preparing a report documenting our methods, findings and conclusions. This work is required by the Alameda County Department of Environmental Health (ACDEH) as outlined in the letters to ARCO from Mr. Gil Wistar of the ACDEH dated September 25 and November 16, 1990. This addendum is in response to these letters.

Prior to the ongoing quarterly monitoring at the site, Pacific Environmental Group (Pacific) and Applied GeoSystems performed limited subsurface environmental investigations related to the former underground waste-oil storage tank. Pacific performed soil sampling and observation during removal of the waste-oil tank in January 1989. Our work included the installation of three ground-water monitoring wells (MW-1, MW-2, and MW-3) in September 1989. The results of these investigations are presented in the reports listed in the references attached to this addendum. The locations of the ground-water monitoring wells and pertinent site features are shown on Plate A, Proposed Soil Boring and Well Location. The locations of wells MW-1 through MW-3 were based on a preliminary inferred northwesterly ground-water gradient direction obtained from information provided by Zone 7 Alameda County Flood Control and Water Conservation District and based on local topography.

Four episodes of monitoring the ground-water elevations at the site between September 1989 and September 1990 has indicated a northeasterly ground-water gradient direction, inconsistent with the preliminary, inferred direction of ground-water flow. In addition, static water elevations as measured in wells MW-1, MW-2, and MW-3 have decreased since ground-water monitoring began in September 1989 (see Table 1, Cumulative Ground-Water Monitoring Data) and the ground-water gradient evaluated from ground-water elevation data has fluctuated since September 1989, ranging from 0.023 (2.3 feet drop over 100 feet horizontal distance) to 0.012 (1.2 feet drop over 100 feet horizontal distance) to the east-northeastern or northeastern direction.

Since the direction of ground-water flow appears to be towards the northeast, Applied GeoSystems recommends the following additional work at the site:

- Task 1 ○ Drill boring B-4 and install well MW-4 in the downgradient direction of the former underground waste oil-storage tank to evaluate the lateral and vertical extent of waste-oil hydrocarbons in the soil and the presence of waste-oil hydrocarbons in the ground water. The proposed location of well MW-4 is shown on Plate A.

- Task 2 ○ Survey the new wellhead for elevation control; and develop, measure water levels, purge, and sample the new ground-water monitoring well.

- Task 3 ○ Conducting a well search of all wells within a 1/2-mile radius of the site.

- Task 4 ○ Prepare a report summarizing our methods, data, findings, and conclusions.

- Task 5 ○ Continue monitoring and sampling of ground-water monitoring wells at the site every three months to evaluate trends in the ground-water gradient and gasoline hydrocarbon concentrations in ground-water.

Work proposed in this addendum to Work Plan will be performed in accordance to the protocol in the Work Plan (AGS, July 1989). A Preliminary Time Schedule (Plate B) to perform tasks 1 through 5 has been attached to this addendum. Subsequent addendums to the Work Plan will be prepared and submitted to regulatory agencies as necessary to

describe future work to delineate the extent of hydrocarbons in soil and ground water at the site.

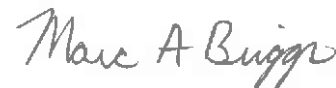
We recommend that copies of this letter be forwarded to:

Mr. Gil Wistar
Alameda County
Department of Environmental Health
80 Swan Way, Room 200
Oakland, California 94621

Mr. Tom Callaghan
Regional Water Quality Control Board
San Francisco Bay Region
1111 Jackson Street
Oakland, California 94607

If you have any questions or comments regarding this report, please call Mr. Greg Barclay at (408) 264-7723.

Sincerely,
Applied GeoSystems

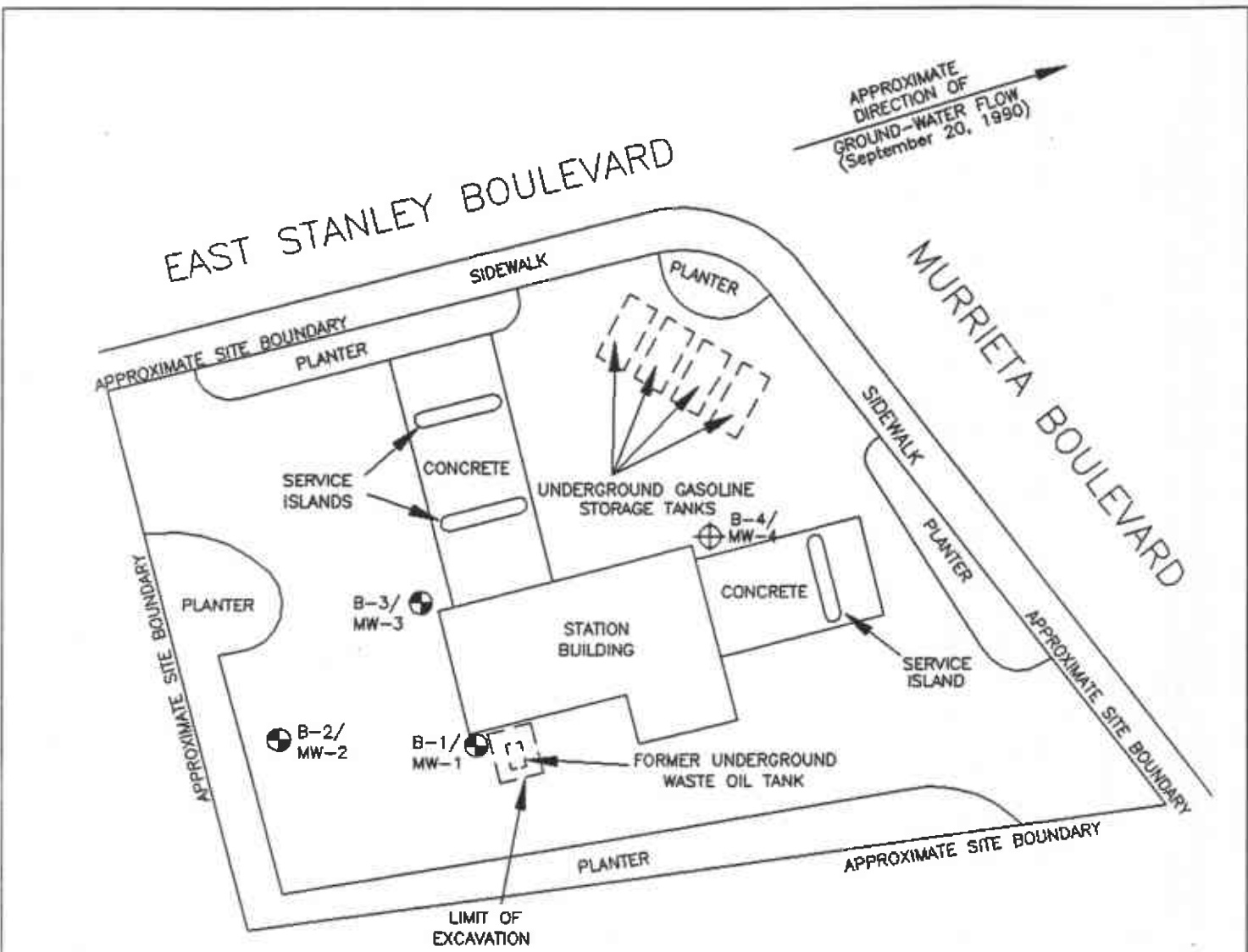


Marc A. Briggs
Geological Technician

Enclosures: References
Plate A, Proposed Soil Boring and Well Location
Plate B, Preliminary Time Schedule
Table 1, Cumulative Ground Water Monitoring Data

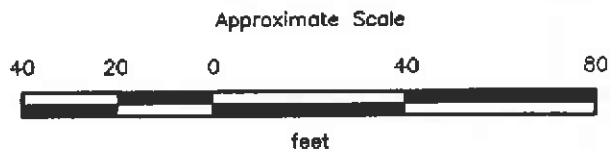
REFERENCES

- Applied GeoSystems. July 18, 1989. Work Plan-Limited Subsurface Environmental Investigation at ARCO Station 6113, 785 East Stanley Boulevard, Livermore, California. AGS Report 69028-1W.
- Applied GeoSystems. December 6, 1989. Limited Subsurface Environmental Investigation at ARCO Station 6113, 785 East Stanley Boulevard, Livermore, California. AGS Report 69028-2.
- Applied GeoSystems. August 29, 1990. Letter Report, Quarterly Ground-Water Monitoring Second Quarter 1990 at ARCO Station 6113, 785 East Stanley Boulevard, Livermore, California. AGS Report 69028-3.
- Applied GeoSystems. November 2, 1990. Letter Report, Quarterly Ground-Water Monitoring Third Quarter 1990 at ARCO Station 6113, 785 East Stanley Boulevard, Livermore, California. AGS Report 69028-3.
- Pacific Environmental Group. April 25, 1989. ARCO Station 6113, 785 E. Stanley Boulevard, Livermore, California. Project 330-53.01



EXPLANATION

- = Boring/monitoring well
 B-3/MW-3 (Applied GeoSystems, Sept. 1989)
- = Proposed boring/monitoring well
 B-4/MW-4



Source: Modified from plan supplied by Ron Archer, Civil Engineer Inc., October 1988.



PROJECT 69028-4

PROPOSED BORING/MONITORING WELL LOCATION
ARCO Service Station 6113
785 East Stanley Boulevard
Livermore, California

PLATE
A

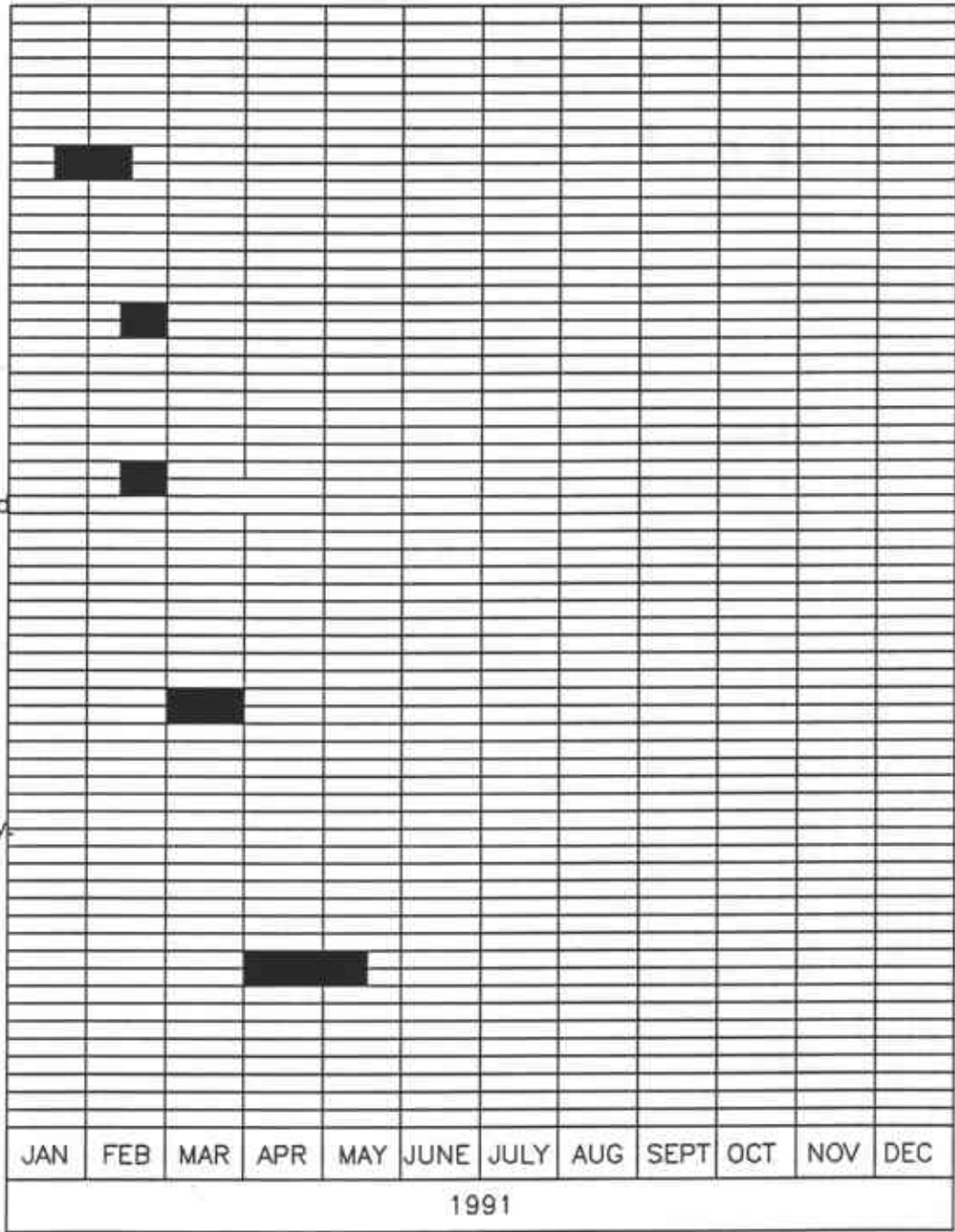
TASK 1:
Update the existing site safety plan, and permit proposed monitoring well.

TASK 2:
Well research.

TASK 3:
Drill soil boring, collect soil samples, install, and develop monitoring well.

TASK 4:
Survey well, measure ground-water levels, collect water samples, analyze selected soil and ground-water samples in approved state-certified laboratory.

TASK 5:
Prepare a report, summarizing our findings & conclusions.



PROJECT 69028-4

PRELIMINARY TIME SCHEDULE
ARCO Service Station 6113
785 East Stanley Boulevard
Livermore, California

PLATE
B

TABLE 1
CUMULATIVE GROUND-WATER MONITORING DATA
ARCO Station 6113
785 East Stanley Boulevard
Livermore, California

<u>Well</u> Date	Elevation of Wellhead	Depth to Water	Elevation of Ground-Water	Floating Product
<u>MW-1</u>				
09/20/89	457.04	21.03	436.01	NONE
10/12/89		19.64	437.40	NONE
06/21/90		21.72	435.32	NONE
09/20/90		19.79	437.25	NONE
<u>MW-2</u>				
09/20/89	457.74	20.67	437.07	NONE
10/12/89		18.98	438.76	NONE
06/21/90		21.88	435.86	NONE
09/20/90		19.90	437.84	NONE
<u>MW-3</u>				
09/20/89	456.97	20.98	435.99	NONE
10/12/89		19.66	437.31	NONE
06/21/90		21.72	435.25	NONE
09/20/90		19.72	437.25	NONE

Wellhead Elevation based on benchmark: Top of pin set in concrete in the most westerly monument at the intersection of East Stanley Boulevard and Fenton Avenue. Elevation taken as 455.896 mean sea level, City of Livermore datum. Measurements in feet.