INVESTIGATION OF SHALLOW SUBSURFACE CONDITIONS AT 2001 CAVALCADE STREET HOUSTON, TEXAS

Prepared for

Great Southern Life Insurance Company
Houston, Texas

By

William F. Guyton Associates, Inc.
Consulting Ground-Water Hydrologists
Austin - Houston, Texas

January 1984

INTRODUCTION

This report presents the results of an investigation of shallow geologic and ground-water conditions in the vicinity of Great Southern Life Insurance Company's property (hereinafter referred to as the property) located at 2001 Cavalcade Street in Houston, Texas. The objective of this investigation was to try to determine if the activities in the northernmost part of the property of a wood-treating facility that occupied the area in the mid-1950's and early 1960's had contaminated surface soils or underlying sands. The location of the property is shown on Figure 1.

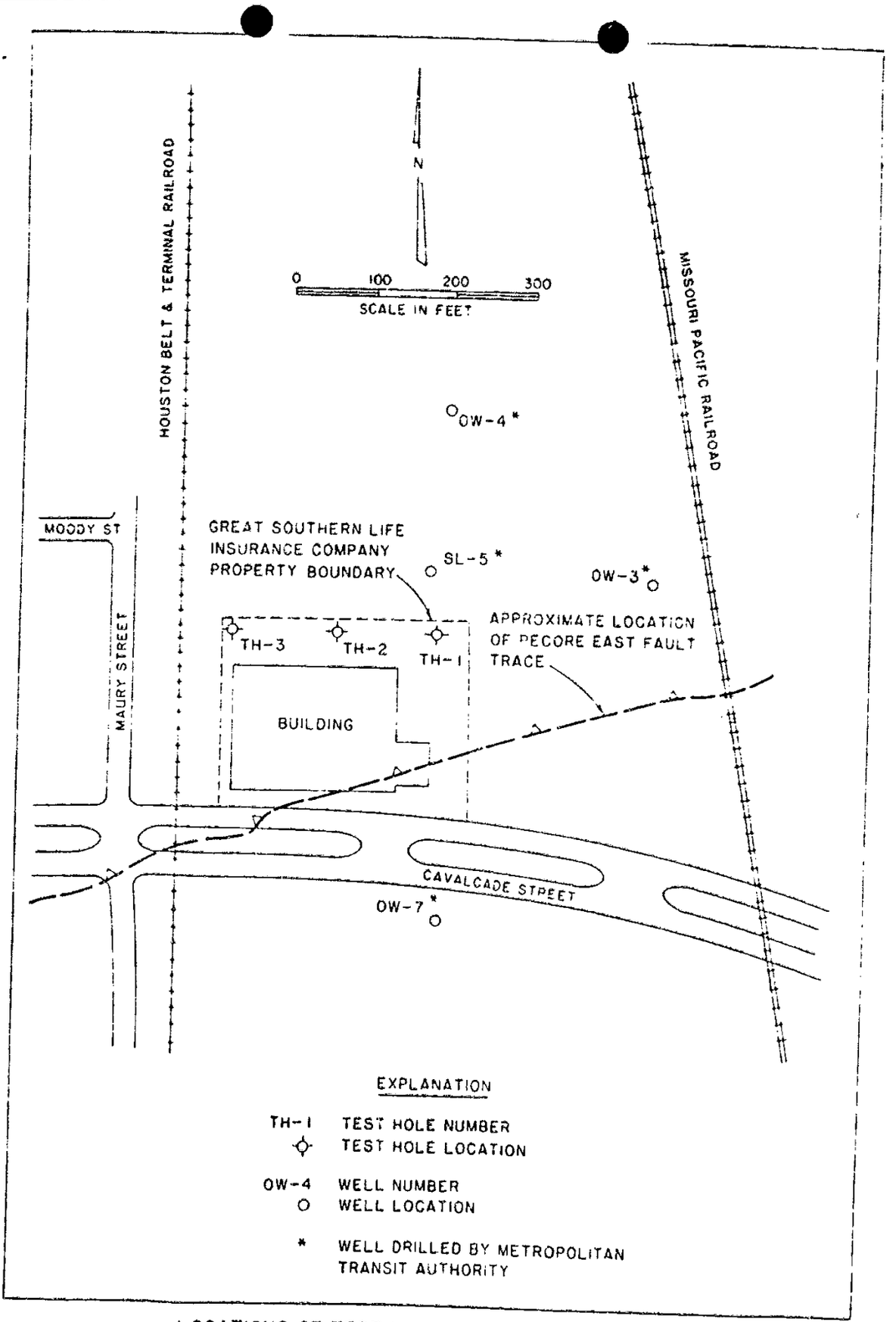
The wood-treating facility, which reportedly used creosote as a treating chemical, was located mostly on land immediately north and northeast of the property, but it also included the very north portion of the property. The facility apparently began operations between 1945 and 1953 and ceased wood-treating operations by about the mid-1960's.

Information for the wood-treating facility was developed from examination of aerial photographs of the property area taken in 1935, 1945, 1955, 1964, 1970, 1979, and 1982, a review of data obtained from the Texas Department of Water Resources (TDWR), and visits with local residents. The TDWR data included a report, "Contamination Survey, Cavalcade Yard and Shop," that McClelland Engineers, Inc. prepared for the Metropolitan Transit Authority (MTA) in 1983. Based on aerial photographs and conversations with local residents, an office and

a few small buildings for the wood-treating facility were located on the very north part of the land now owned by Great Southern Life Insurance Company. It also appears that the wood-treating area for the facility (the area in which the treating cylinders were located) was about 200 to 300 feet east-northeast of the northeast corner of the property. The aerial photographs also indicate that a lagoon or holding pond was located about 150 to 200 feet north of the north boundary line of the property. These observations were confirmed by discussions with people who live just northwest of the property.

Data presented in the report prepared by McClelland Engineers, Inc. for MTA show that creosote contaminants are present in varying concentrations in some of the formation samples and water samples collected from monitor wells located north and northeast of the property. Therefore, three test holes ranging in depth from 13.5 to 21.5 feet were drilled on the property to determine if any shallow creosote contamination existed and if it resulted from past wood-treating activities on the property. Deep test holes were not drilled because had contamination occurred as a result of past wood-treating operations on the property now owned by Great Southern Life Insurance Company, it would still be detectable in the shallow materials. Locations of the three test holes, designated TH-1, TH-2, and TH-3, and locations of nearby monitor wells for which data from the McClelland Engineers report are presented or discussed in this report are shown on Figure 1.

Drilling of Test Holes 1 through 3 and laboratory testing of selected formation samples were performed by Southwestern Laboratories, Inc. (SWL) of Houston, Texas. Personnel of William F. Guyton Associates, Inc. were present during the drilling and sampling operations. Complete descriptions of the formation samples obtained from the test holes and the results of laboratory testing are contained in a report that SWL submitted to Great Southern Life Insurance Company. Information from the report by SWL has been used in evaluating shallow ground-water and geologic conditions and in preparing this report. Selected parts of data from the report by SWL are reproduced herein.



LOCATIONS OF TEST HOLES AND MONITOR WELLS

Figure 1

TABLE 1. SUMMARY OF TEST HOLE LOGS
(See geotechnical and environmental testing report by Southwestern Laboratories, Inc. for complete test hole logs.)

Boring Number: TH-1

Depth (feet) 1/	Summary of Detailed Log
0-0.5	Asphalt and limestone.
0.5-5	Clay, gray and tan, becoming silty with depth.
5-12	Clay, sandy, tan and light gray.
12-13.5	Sand, silty and slightly clayey, gray and tan.

Boring Number: TH-2

Depth (feet) 1/	Summary of Detailed Log
0-0.5	Asphalt and limestone.
0.5-2	Clay, dark gray and black, becoming silty.
2-13.5	Clay, sandy, gray and light tan.
13.5-20.5	Sand, silty and slightly clayey, light gray and tan.
20.5-21.5	Clay, light gray and red-brown.

Boring Number: TH-3

Depth (feet) 1/	Summary of Detailed Log
0-12	Clay, sandy, brown and light gray, becoming light tan and yellow.
12-14	Sand, clayey, gray, tan, and brown.

FOOTNOTE: 1/ Depth datum is land surface. Boring drilled on September 17, 1983.

SHALLOW GROUND WATER

Data from the three test holes drilled during this investigation and water-level data presented in the McClelland Engineers, Inc. report show that the shallow sand or silty and clayey sand that is present in the area is saturated with water. While fluid levels in the open holes at Test Holes 1 and 3 were five feet or less below land surface, accurate fluid levels could not be obtained because of the large amount of sand, silt, and clay that was mixed with ground water during augering. An accurate fluid level could not be obtained at Test Hole 2 because water was used to drill the lower part of the test hole. Three monitor wells (OW-3, OW-4, and OW-7) that McClelland Engineers drilled for MTA in the vicinity of the property screen the shallow sand. No water-level or completion information was given for Well SL-5 in the McClelland report. Screened intervals, depths to water, and water-level elevations for the three shallow monitor wells are shown on Figure 2. The water levels shown on Figure 2 were reported to be measured on May 17, 1983.

Based on the information presented on Figure 2, it appears that the hydraulic gradient slopes downward generally to the west. Thus, the direction of ground-water flow also is generally to the west.

A fault, called the Pecore East Fault, has been mapped by the U. S. Geological Survey as passing through the property in an almost east to west direction. The fault is evident at

the surface, and its approximate location is shown on Figures 1 and 2. Displacement along the fault is not known, but the water-level data and stratagraphic correlation of data for monitor wells and test holes in the area indicate that the fault has little, if any, effect on shallow ground-water or geologic conditions.

Contaminants entering the shallow sand zone would be transported down-gradient with the ground water. Since the direction of ground-water movement is generally in a westerly direction, the source of any contaminant that is present in this sand zone probably would be located in the area east of where it is detected. In addition to down-gradient movement, dispersion and diffusion also would take place and widen the down-gradient path in which contamination might be detected. If the specific gravity of the contaminant is greater than that for water in the sand zone, the contaminant would tend to settle to the bottom of the sand zone and move down-gradient along the floor that is provided by the underlying clay.

CONTAMINATION

Continuous Shelby tube samples were taken of all materials penetrated by the three test holes. The samples were examined as they were collected and again in the laboratory to determine if there was visual or olfactory evidence of creosote contamination. A formation sample from each test hole was also analyzed in the laboratory for any phenol or polynuclear aromatic compounds.

Field and laboratory examination of soil samples from the test holes show there was no contamination of the clays and sandy clays encountered to depths of 12 to 13.5 feet. This is confirmed by the results of chemical analyses that were made of one shallow soil sample from each of the three test holes. The results of these chemical analyses which were made by SWL and show no detectable contamination are given in Table 2. A detailed description of sample preparation and analytical procedures is included in the report submitted by SWL.

The only indication of contamination was for a sample collected from between the depths of 19.5 and 20.5 feet in Test Hole 2. A slight creosote odor was detected for this sample which was taken from the base of the shallow sand zone. There was no visual or olfactory evidence that contamination was present in soil samples from shallower or deeper depths in this test hole.

As noted earlier, if past wood-treating activities on Great Southern Life Insurance Company's property resulted in contamination of subsurface materials, evidence of contamination would be expected to be found in the materials near the land surface. Since none of the near-surface samples show the presence of contamination, it is concluded that there has been no detectable contamination as a result of past wood-treating activities on the property. While the level of the contamination that was detected at the base of the shallow sand zone at Test Hole 2 was not determined, it is believed that the source of this contamination is located outside Great Southern Life Insurance Company's property, possibly to the northeast, and that through dispersion, diffusion, and ground-water movement, it has been transported to beneath the property. Had the contamination originated on the property, it would have been detected in samples taken from shallow depths in the test holes.

TABLE 2. CHEMICAL ANALYSES

Southwestern Laboratories, Inc.
Houston, Texas
GREAT SOUTHERN LIFE INSURANCE COMPANY
SWL Project No. 54-1155
September, 1983
Analyses of Soils for Phenols and
Polynuclear Aromatic Compounds

GREAT SOUTHERN LIFE

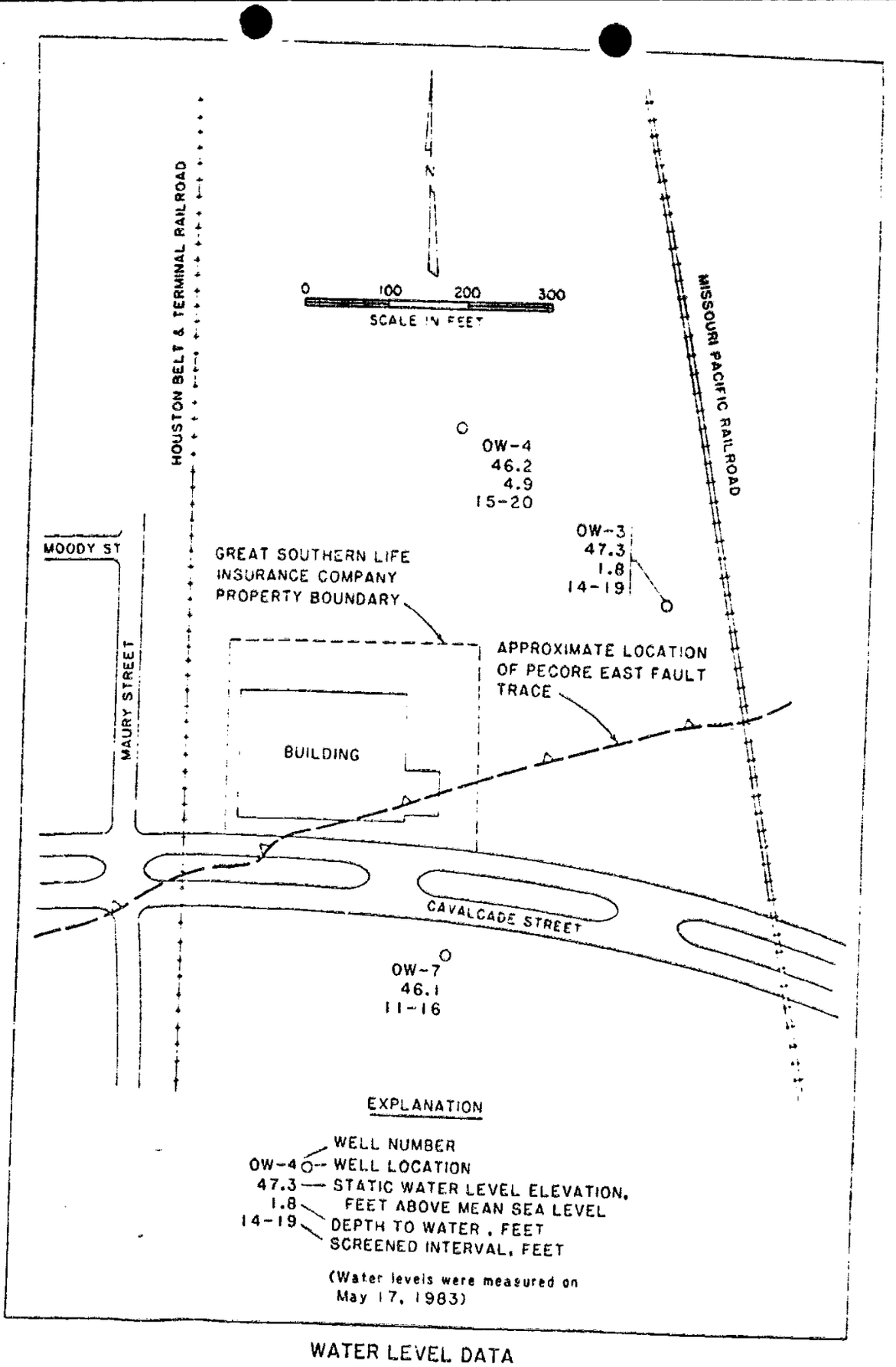
Phenols and PNA's Analyses
October 10, 1983

	PHENOLS ppm (wt.)								POLYNUCLEAR AROMATICS ppm (wt.)									
E NO.	A	B	C	D	E	F	G	PCP	A	B	C	D	E	F	G	H	I	J	K
. 13'	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
5830 TH-2 13.5/14	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
5829 TH-3 8.5/9	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1

LEGEND:

PHENOLS: A = phenol, B = 2-chlorophenol, C = 2,4 dimethyphenol, D = 2,4 dichlorophenol, E = 4-chloro 3-methylphenol, F = 2,4,6 trichlorophenol, G = 2,4 dinitrophenol, PCP = pentachlorophenol

POLYNUCLEAR AROMATICS: A = naphthalene, B = acenaphthalene, C = phenanthrene, D = anthracene, E = fluoranthene, F = benz(a,h)anthracene, G = chrysene, H = benzo(b)fluoranthene, I = benzo(a)pyrene, J = indeno(1,2,3) c,d pyrene, K = dibenz(a)anthracene



WATER LEVEL DATA

Figure 2