PACIFIC
ENVIRONMENTAL
GROUP, INC.

93 SEP -8 PM 4:30

Date September 7, 1993
Project 305-79.01

S36

To: Mr. Barney Chan
Alameda County Health Care
Services Agency
80 Swan Way, Room 200
Oakland, California 94621

9/8/94
BC

We have enclosed:

Copies	Description
1	Letter dated January 4, 1993 (without attachments).
1	Mathcad Linear Regression Printout, Influence Study.

For your:
___ Use
___ Approval
___ Review
X Information

Comments: Barney, Thank you for your call on August 30, 1993. Per your request, I am forwarding PACIFIC's letter dated January 4, 1993 which includes Figure 2, showing predicted zones of influence for the site vadose wells. Also, please see page 3 of the Mathcad printout for the 58.6 feet predicted zone of influence, based on an earlier pilot test performed by Converse Environmental West. Call if you have any questions. Thank you.

Mark W. Boyd

cc: Mr. Dan Kirk, Shell Oil Company

2025 Gateway Place, Suite 440, San Jose, California 95110 (408) 441-7500 FAX (408) 441-7539

PACIFIC
ENVIRONMENTAL
GROUP, INC.

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To Mr. DAN KIRK	From JUSTIN HAWKINS
Co. Shell Oil	Co. PACIFIC
Dept. —	Phone # —
Fax # 510 675 6072	Fax # —

January 4, 1993
Project 305-79.01

Mr. Dan Kirk
Shell Oil Company
P.O. Box 5278
Concord, California 94520

9:30 SENT
☐ MAILED ☐ BY HAND
☐ FED EX ☐ COURIER
☒ FAXED ☐ FINAL
☐ UPS ☐ DRAFT
Date 1-4-93 Init JY

Re: Shell Service Station
285 Hegenberger Road at Leet Drive
Oakland, California
WIC No 204-5508-5504

Dear Mr. Kirk:

This letter provides an overview of a proposed interim remedial system developed by Pacific Environmental Group, Inc. (PACIFIC) for implementation at the above referenced Shell Oil Company (Shell) site. A site location map and site plan are provided as Figures 1 and 2. This effort is required as a result of two directives issued by the Alameda County Health Care Services Agency (ACHCSA). Copies of these ACHCSA correspondences are provided as Attachment A. Upon approval by Shell of the general remedial approach outlined in this letter, PACIFIC will finalize system design plans and begin system permitting.

CURRENT SITE CONDITIONS

There are currently no separate-phase hydrocarbons present at the site. Detectable levels of total petroleum hydrocarbons calculated as gasoline (TPH-g), benzene, toluene, ethylbenzene, and xylenes (BTEX compounds), and TPH calculated as diesel (TPH-d) have been reported on- and off-site. During the fourth quarter 1992 groundwater sampling event TPH-g, benzene, and TPH-d concentrations were detected up to 63,000 parts per billion (ppb), 21,000 ppb, and 1,900 ppb, respectively. The fourth quarter 1992 site monitoring report and a November 18, 1992 PACIFIC report on off-site groundwater investigation activities are included as Attachment B.

Soil sampling was performed by Converse Environmental West (Converse) during on-site soil and groundwater investigation activities. During these activities TPH-g, benzene, and TPH-d concentrations were reported up to 31,000 parts per million (ppm), 14 ppm, and 440 ppm, respectively. Geologic cross-sections for the

site and a summary of reported on-site soil sampling results are provided as Attachment C.

CURRENT REMEDIAL ACTION

Currently there are no remedial activities in progress at the site.

PROPOSED INTERIM REMEDIAL ACTION

Based on site lithology, hydrogeology, and petroleum hydrocarbon distribution below the site interim remediation via soil vapor extraction is proposed. This action will address TPH-g and benzene concentrations in soil and groundwater below the site and will address the volatile fraction of TPH-d. TPH-d is not specifically addressed in this proposal since diesel was never sold or stored by Shell at the site and investigation activities suggest that TPH-d concentrations may be due to an off-site or regional problem. A SVE pilot test was performed in January of 1991 by Converse. The results showed this method of remediation as being viable for this site. A copy of the Converse SVE pilot test report is included as Attachment D. Groundwater extraction is not proposed for this site due to the low permeability of the saturated zone soil.

The proposed SVE system will consist of five SVE wells and a soil vapor extraction and treatment unit. The location of the proposed SVE wells and predicted zone of influence are indicated on Figure 2. Construction of the proposed SVE wells will be identical to that of existing Well VEW-1 (Figure A-2 in Attachment D). A process flow diagram for the proposed soil vapor extraction and treatment system is included as Figure 3.

Soil vapor will be extracted and treated by a King, Buck & Associates, Model MMC-5AT Catalytic Oxidizer (Cat-Ox). This unit has a nominal 100 standard cubic feet per minute (scfm) capacity with a maximum allowable total volatile hydrocarbon (TVH) inlet concentration of approximately 3,000 parts per million by volume (ppmv). The catalyst section for this unit consists of three stages of platinum catalyst fixed on a ceramic monolith substrate. The typical TVH destruction efficiency for this unit is rated by the manufacturer to be 97 percent. Specifications for this unit are included in Attachment E.

The SVE wells will be connected to the Cat-Ox by a common 4-inch diameter Schedule 80 PVC vapor conveyance line buried in a trench 18 inches below grade. The piping will emerge from the trench and elbow into a standard 8 feet x 20 feet x 8-1/2 feet high steel shipping container which will house the Cat-Ox. The shipping container will provide noise abatement, protection from the elements, sight break, and security for the Cat-Ox. Holes will be cut into the container in three places; one on the top for the Cat-Ox discharge stack, one on the rear wall for the vapor conveyance piping, and one on the side wall for connection to the temporary utility pole power feed.

IMPLEMENTATION

Implementation of the proposed interim remedial system will begin upon authorization from Shell. It is projected that system startup will occur approximately four months after Shell approval.

If you have any questions regarding the contents of this letter, please call.

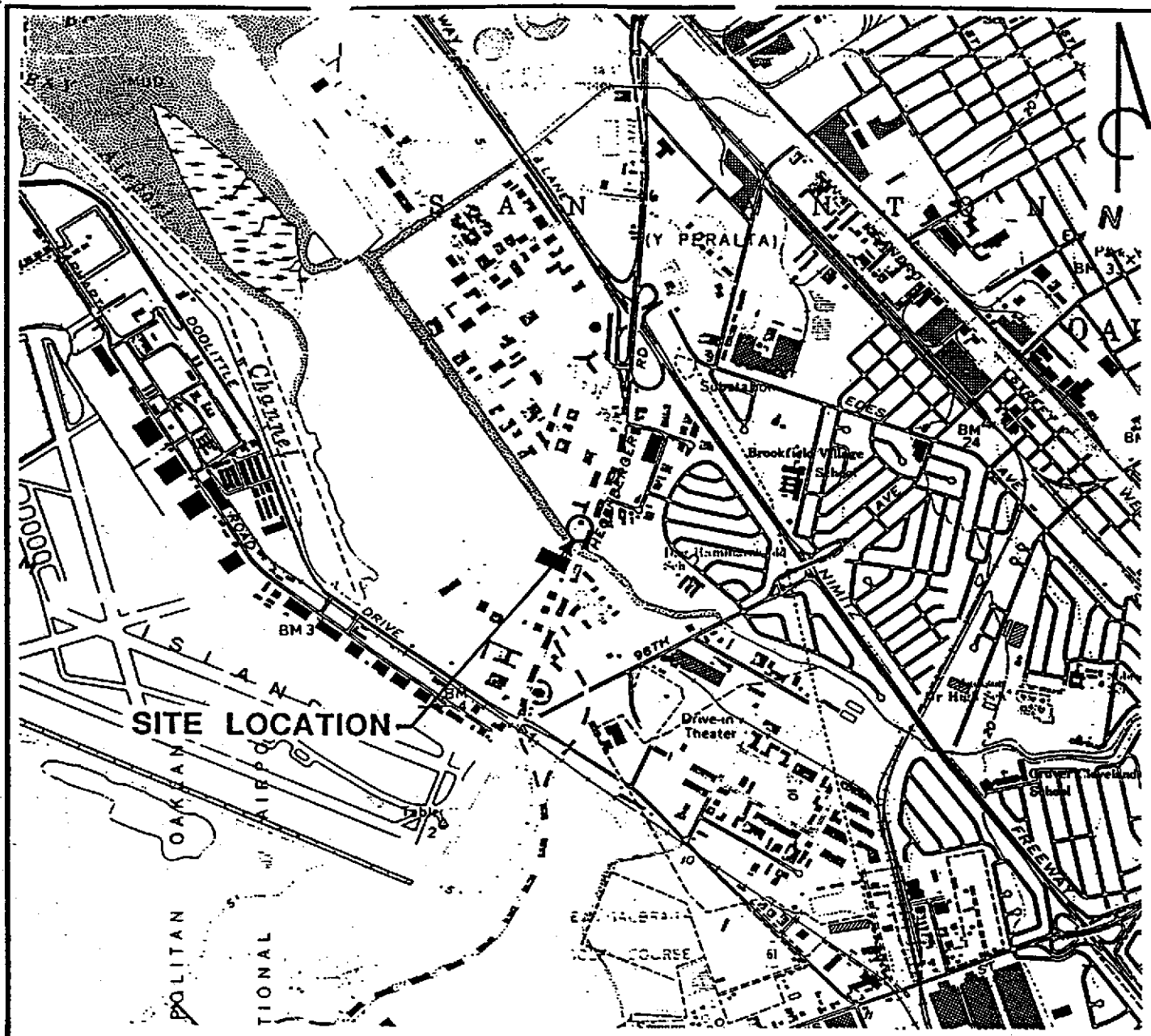
Sincerely,

Pacific Environmental Group, Inc.

Mark Boyd
Staff Engineer

Justin L. Hawkins
Project Engineer

Attachments: Figure 1 - Site Location Map
Figure 2 - Site Map
Figure 3 - Process Flow Diagram
Figure 4 - Common Utility Trench Profile
Attachment A - ACHCSA Correspondences
Attachment B - Fourth Quarter 1992 Site Monitoring Report
Attachment C - Soil Sampling Summary
Attachment D - Converse SVE Pilot Test Report
Attachment E - Equipment Manufacturer Specifications



QUADRANGLE LOCATION

REFERENCES:
USGS 7.5 MIN. TOPOGRAPHIC MAP
TITLED: SAN LEANDRO, CALIFORNIA
DATED: 1959 REVISED: 1980
TITLED: OAKLAND EAST, CALIFORNIA
DATED: 1959 REVISED: 1980

SCALE
2000 0 2000 FEET

PACIFIC ENVIRONMENTAL GROUP INC.

SHELL SERVICE STATION
285 Hegenberger Road at Leet Drive
Oakland, California

SITE LOCATION MAP

FIGURE: 1
PROJECT: 305-79.01

REORDER NO. AS4081

N

SOIL REMEDIATION SYSTEM COMPOUND (SHIPPING CONTAINER, 8' x 20' x 8.5' HIGH)

PREDICTED SOIL VAPOR EXTRACTION ZONE OF INFLUENCE (TYP)

TEMPORARY UTILITY POLE (100A, 240V, SINGLE PHASE)

ACCESS DOORS

P01

MW-3

WASTE OIL TANK

STATION BUILDING

MW-5

MW-2

VEW-4

UNDERGROUND FUEL STORAGE TANKS

CANOPY

VEW-5

MW-10

MW-1

4" Sch 80 PVC (SEE COMMON UTILITY TRENCH DETAIL, FIGURE 4)

VEW-1

VEW-3

VEW-2

MW-4

MW-7

MW-9

MW-8

PLANTER

SIDEWALK

PRODUCT ISLANDS

TRUCK STORAGE AREA

CHANNEL

LEET DRIVE

KING

HEGENBERGER ROAD

SIDEWALK

LEGEND

MW-7 ⊗ GROUNDWATER MONITORING WELL LOCATION AND DESIGNATION

VEW-1 ▲ EXISTING SOIL VAPOR EXTRACTION WELL LOCATION AND DESIGNATION

VEW-2 ✛ PROPOSED SOIL VAPOR EXTRACTION WELL LOCATION AND DESIGNATION

P01 ◑ EMISSION POINT LOCATION AND DESIGNATION

--V-- VAPOR CONVEYANCE PIPING

NOTE: SHIPPING CONTAINER SHED HAS HOLE CUT IN ROOF FOR CAT-OX UNIT EMISSIONS, AND HOLE CUT IN REAR WALL FOR VAPOR CONVEYANCE PIPING ENTRY POINT.

APPROXIMATE DIRECTION OF GROUNDWATER FLOW

PACIFIC ENVIRONMENTAL GROUP, INC.

SCALE

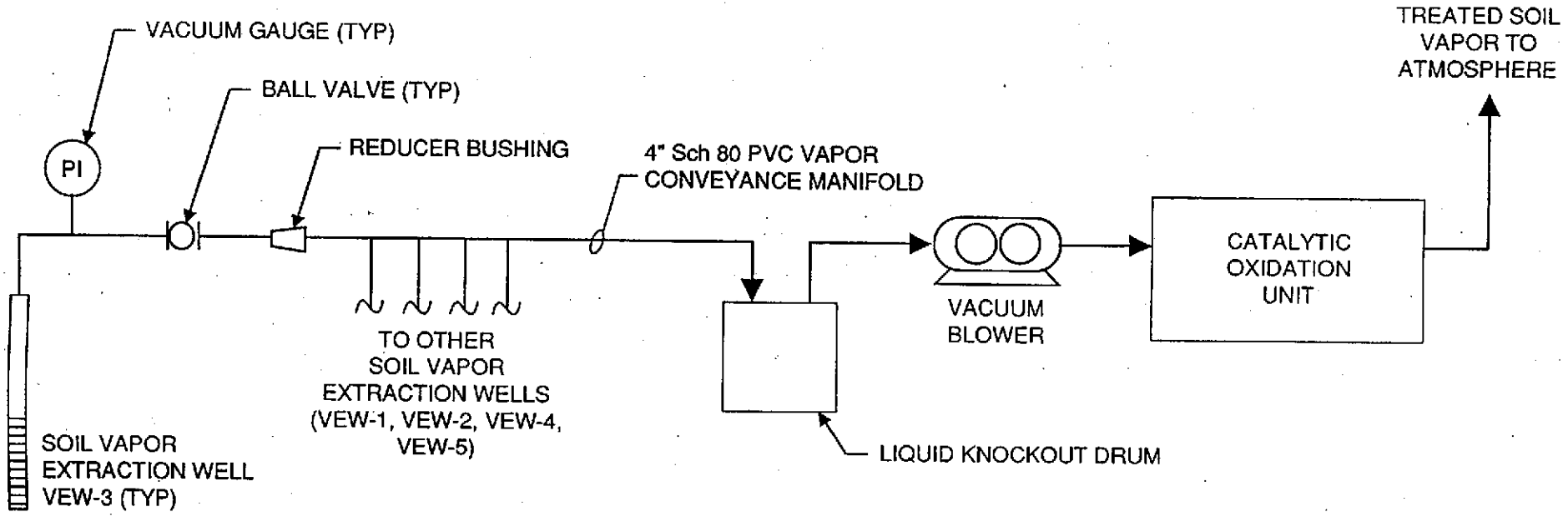
0 40 80 FEET

SHELL SERVICE STATION
285 Hegenberger Road at Leet Drive
Oakland, California

SITE PLAN

FIGURE: **2**

PROJECT: 305-79.01



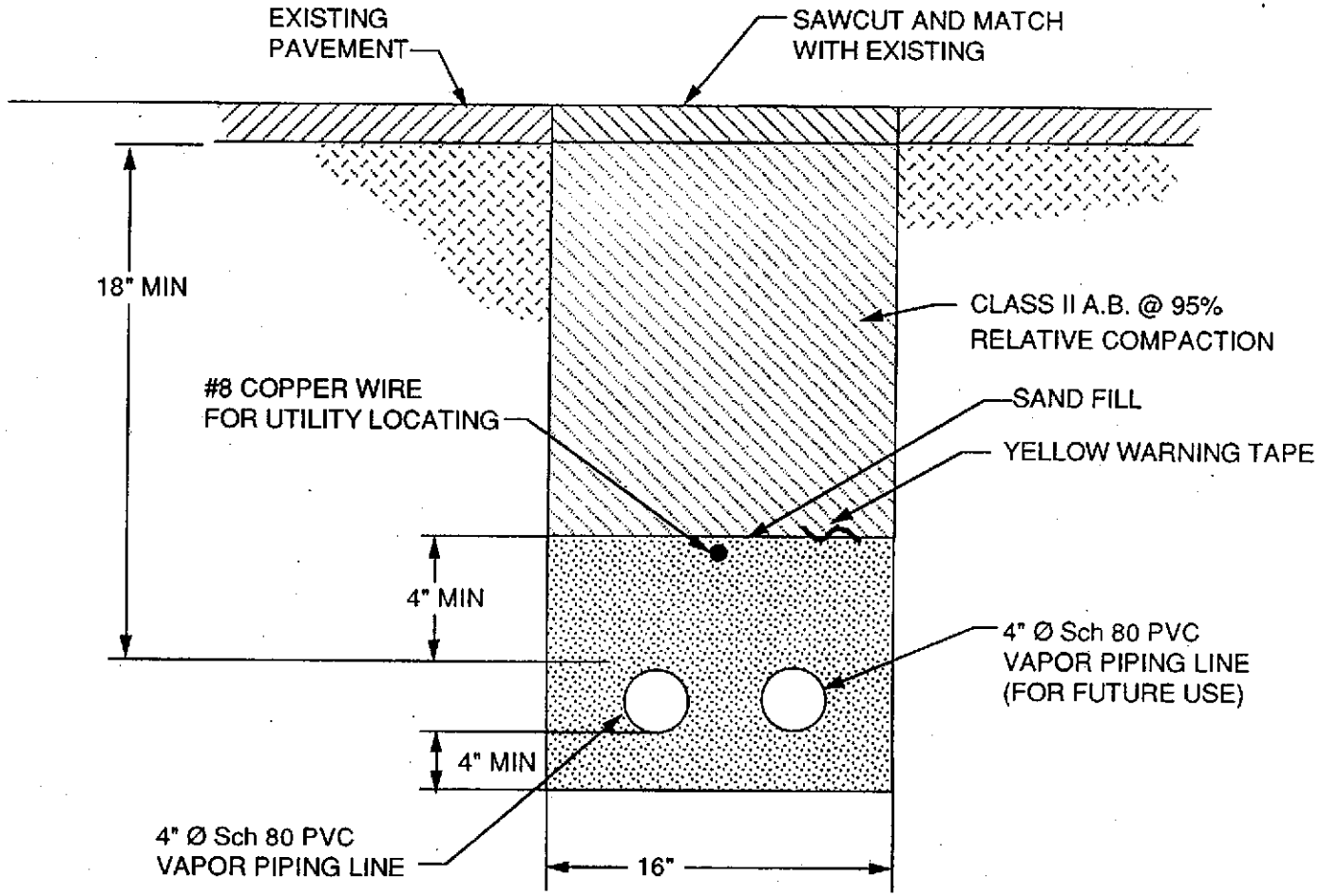
PACIFIC ENVIRONMENTAL GROUP, INC.

SHELL SERVICE STATION
285 Hegenberger Road at Leet Drive
Oakland, California

PROCESS FLOW DIAGRAM - PROPOSED SOILVAPOR EXTRACTION SYSTEM

FIGURE: 3

PROJECT: 305-79.01



PACIFIC ENVIRONMENTAL GROUP, INC.

SHELL SERVICE STATION
285 Hegenberger Road at Leet Drive
Oakland, California

COMMON UTILITY TRENCH PROFILE

FIGURE:
4
PROJECT:
305-79.01

WELL VEW-1 EFFECTIVE RADIUS OF INFLUENCE

This program is designed to determine an effective radius of influence of a vapor extraction well. Data from feasibility tests or an operating system may be entered. A best fit line is generated to fit raw field data. For more details on this technique please read: Timothy E. Buscheck, P.E. and Thomas R. Peargin, R.G., November 1991, Proceedings of the Petroleum Hydrocarbons and Organic Chemicals in Groundwater: Prevention, Detection, and Restoration, Houston, Texas Summary of a Nation-Wide Vapor Extraction System Performance Study

BASIC PARAMETERS

n := 5 — Number of monitoring points

m := 5 — Number of data points per well

i := 0 ..n — Matrix array size for pressure data

j := 0 ..m - 1 — Matrix array size for number of data points per well

P (i,j) = Well vacuum pressure, inches of H2O

Pn (i,j) = Normalized well vacuum pressure, inches of H2O

R (i) = Radial distance from extraction well to monitoring point, feet

FIELD DATA

Well Pressure (inches of water vacuum)

VEW-1 P 0,j	VM-1 P 1,j	VM-3 P 2,j	MW-6 P 3,j	VM-4 P 4,j	MW-1 P 5,j
10	5	0.85	0.005	3	0.005
53	16	3	3	10	4
75	30	6	5	17	11
75	30	6	4	17	10
95	40	7	5	20	13

Radial Distance (feet)

R i
0.0
10
19.5
29
29.7
30.5

Calculate the normalized vacuum:

$$Pn_{i,j} := \frac{P_{i,j}}{P_{0,j}}$$

$$Pn = \begin{bmatrix} 1 & 1 & 1 & 1 & 1 \\ 0.5 & 0.302 & 0.4 & 0.4 & 0.421 \\ 0.085 & 0.057 & 0.08 & 0.08 & 0.074 \\ 5 \cdot 10^{-4} & 0.057 & 0.067 & 0.053 & 0.053 \\ 0.3 & 0.189 & 0.227 & 0.227 & 0.211 \\ 5 \cdot 10^{-4} & 0.075 & 0.147 & 0.133 & 0.137 \end{bmatrix}$$

Calculate the average values for normalized data:

$$Pave_i := \sum_j \frac{Pn_{i,j}}{m}$$

$$Pave = \begin{bmatrix} 1 \\ 0.405 \\ 0.075 \\ 0.046 \\ 0.231 \\ 0.099 \end{bmatrix}$$

LINEAR REGRESSION OF VACUUM DATA

Convert an equation of the form $Y = e^{ax} + b$ into linear form:

$Ln(y) = ax + Ln(b)$

$Plog_i := ln[Pave_i]$

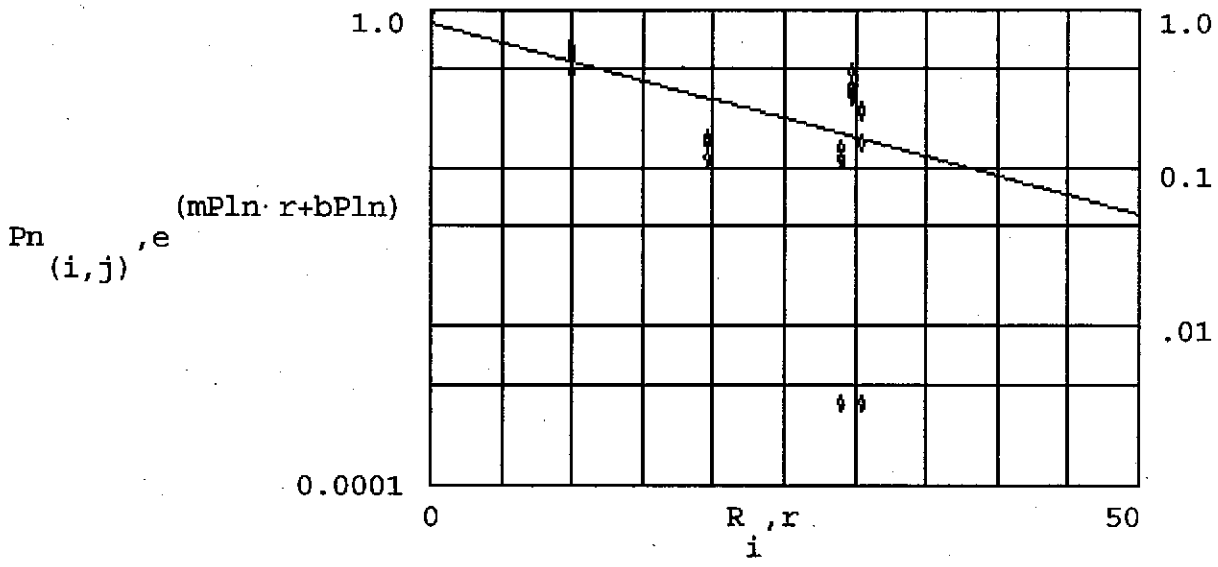
$$Plog = \begin{bmatrix} 0 \\ -0.905 \\ -2.589 \\ -3.08 \\ -1.467 \\ -2.317 \end{bmatrix}$$

Calculate the slope, y - intercept and the correlation coefficient:

mPln := slope(R,Plog)	mPln = -0.074	linear regression slope
bPln := intercept(R,Plog)	bPln = -0.261	linear regression intercept
rPln := corr(R,Plog)	rPln = -0.805	correlation coefficient

Plot the field data and the regressed curve in semi-log form:

r := 0 ..50



Calculate the effective radius of influence at 1% of total vacuum:

$$Re := \frac{ln(0.01) * bPln}{mPln}$$

Re = 58.634 Feet