Cimarex Energy Company
Cottonwood Draw 22 Federal Com #1
Delineation Report

Eddy County, New Mexico

April 6, 2012

Prepared for:

Cimarex Energy Company
600 North Marienfeld, Suite 600
Midland, Texas 79701

By:

Safety & Environmental Solutions, Inc.
703 East Clinton
Hobbs, New Mexico 88240
(575) 397-0510

TABLE OF CONTENTS

I. Company Contacts

Representative	Company	Telephone	E-mail
Terry Ainsworth	Cimarex Energy Co.	575-390-1388	tainsworth@cimarex.com
Bob Allen	SESI	575-397-0510	ballen@sesi-nm.com
David Boyer	SESI	575-390-7067	dgboyer@sesi-nm.com

II. Background

Safety and Environmental Solutions, Inc. (SESI) was engaged by Cimarex Energy to perform site assessment of a release area at the Cottonwood Draw 22 Federal Com #1. The release from the wellhead occurred on July 7, 2011 and consisted of an estimated volume of 20 barrels of produced water, one barrel of oil and one barrel of condensate. The production site is located in the southeast ¼ of Section 22 of Township 25 South, Range 26 East, Eddy County, New Mexico. The surface elevation of the production location is approximately 3,295 feet above MSL.

III. Soils

The surface soils in the area are from the Reeves Series. These soils consist of light colored, well drained, calcareous soils that are shallow to moderately deep over gypsiferous rocks. The Reeves Gypsum land complex 0-3 percent slope occurs on plains throughout the central part of the survey area. This complex is used for native pasture and wildlife habitat. The soils are not easily eroded. Good range management is needed to maintain a cover of desirable forage. Reestablishment of the native vegetation is difficult because temperatures are high and rainfall is undependable.

IV. Surface and Ground Water

Surface water is not present in the area and in general groundwater is hard to locate and, in places, is of poor quality. According to data provided by the New Mexico Office of State Engineer's online database, the closest water well to the Cottonwood Draw site is in the NW/4 NW/4 of Section 22 at a distance of just under one mile with a depth to water of 118 feet measured in 1967. The surface elevation at this location is approximately 3,375 feet with the result that groundwater in this well is at an elevation of about 3,257 feet above MSL. If the water table was flat and groundwater continuous, water would be expected to be present at a depth of 38 feet below the production location.

Typically the groundwater gradient is not flat and follows the surface or topographic gradient which would mean it would be at a depth greater than 38 feet. The topographic map shows a well identified as the "Bailey Well" south of the location at a distance of 0.3 miles. This well is located adjacent to the dry Cottonwood Draw drainage. There is no readily available information on this well including depth to water. However the surface elevation of the well is at 3,245 feet, 50 feet lower than the Cottonwood production site. The well is not flowing artesian water therefore water is lower than the surface elevation. The difference between the surface elevation at the Cottonwood production site and the water well is 50 feet so water at the Cottonwood site is at a minimum depth of 50 feet. As the groundwater surface is sloping to follow the surface gradient, depth to groundwater is more likely to be in the 80 to 100 foot range at the Cottonwood production location.

V. Work Performed

On March 22, 2012, Mr. Sergio Contreras, SESI representative, arrived at the Cottonwood Draw 22 Federal Com #1 at 0845 for field chloride testing on the surface of the location pad, as requested by Bureau of Land Management (BLM) representative Ms. Terry Gregston, in her email dated February 28, 2012. A 50 ft. grid was mapped and chloride field testing was conducted onsite to delineate chlorides on the location pad. As stipulated by Ms. Gregston, all samples less than 250 ppm chlorides were to be properly preserved and transported to Cardinal Labs for confirmation. Ms. Gregston was not onsite for the sampling procedure, but was notified 48 hrs prior to sampling by Mr. Contreras; he was directed to sample without a BLM witness. The weather was 90 degrees with clear skies 5-10 mph winds. Mr. Contreras contacted Ms. Gregston via cell to advise her that SESI had started sampling on location on March 22, 2012.

On March 23, 2012, Mr. Contreras, SESI supervisor, was onsite at 0800 to complete surface chloride testing on the location pad. The weather was 80 degrees with the wind blowing 5-10 mph with clear skies.

A total of 28 surface samples were obtained from the location pad. As a result of the field chloride testing Surface Sample # 12 was the only sample less than 250 ppm and was properly preserved and transported to Cardinal Labs for confirmation as presented in the table below.

Date	Time	Surface Sample	Field Results Chlorides (ppm)	Analytical Results Chlorides (mg/kg)
03/22/12	0948	SS #1	>25,340	-
03/22/12	1007	SS #2	16,444	-
03/22/12	1025	SS #3	22,484	-
03/22/12	1039	SS #4	4,188	-
03/22/12	1105	SS #5	25,340	-
03/22/12	1124	SS #6	1,260	-
03/22/12	1140	SS #7	1,880	-
03/22/12	1208	SS #8	688	-
03/22/12	1225	SS #9	8,660	-
03/22/12	1237	SS #10	688	-
03/22/12	1253	SS #11	388	-
03/22/12	1312	SS #12	184	192
03/22/12	1328	SS #13	1,344	-
03/22/12	1345	SS #14	9,432	-
03/22/12	1358	SS #15	3,020	-
03/22/12	1401	SS #16	312	-
03/22/12	1420	SS #17	6,752	-
03/22/12	1435	SS #18	1,640	-
03/22/12	1514	SS #19	4,908	-
03/22/12	1527	SS #20	2,004	-
03/22/12	1544	SS #21	1,752	-
03/23/12	0834	SS #22	1,016	-
03/23/12	0845	SS #23	2,144	-
03/23/12	0907	SS #24	3,864	-
03/23/12	0916	SS #25	5,752	-
03/23/12	0930	SS #26	5,752	-
03/23/12	0945	SS #27	7,328	-
03/23/12	1010	SS #28	12,340	-

The SESI supervisor mapped and photographed all sample points that were field tested.

VI. Conclusion

The results of the sampling reported above indicate almost the entire location pad currently exhibits elevated levels of chlorides. Due to the large area of contamination on the pad, Cimarex Energy Co. feels that to excavate the contaminated pad material would result in creating preferential pathways that may allow any future releases to penetrate deeper and thus creating a greater threat to the groundwater in the area. In lieu of excavation, Cimarex proposes that the pad be further delineated for vertical extent of contamination using boreholes instead of test trenches. The vertical extent of contamination will be documented and the contamination will be addressed upon the abandonment of the location.

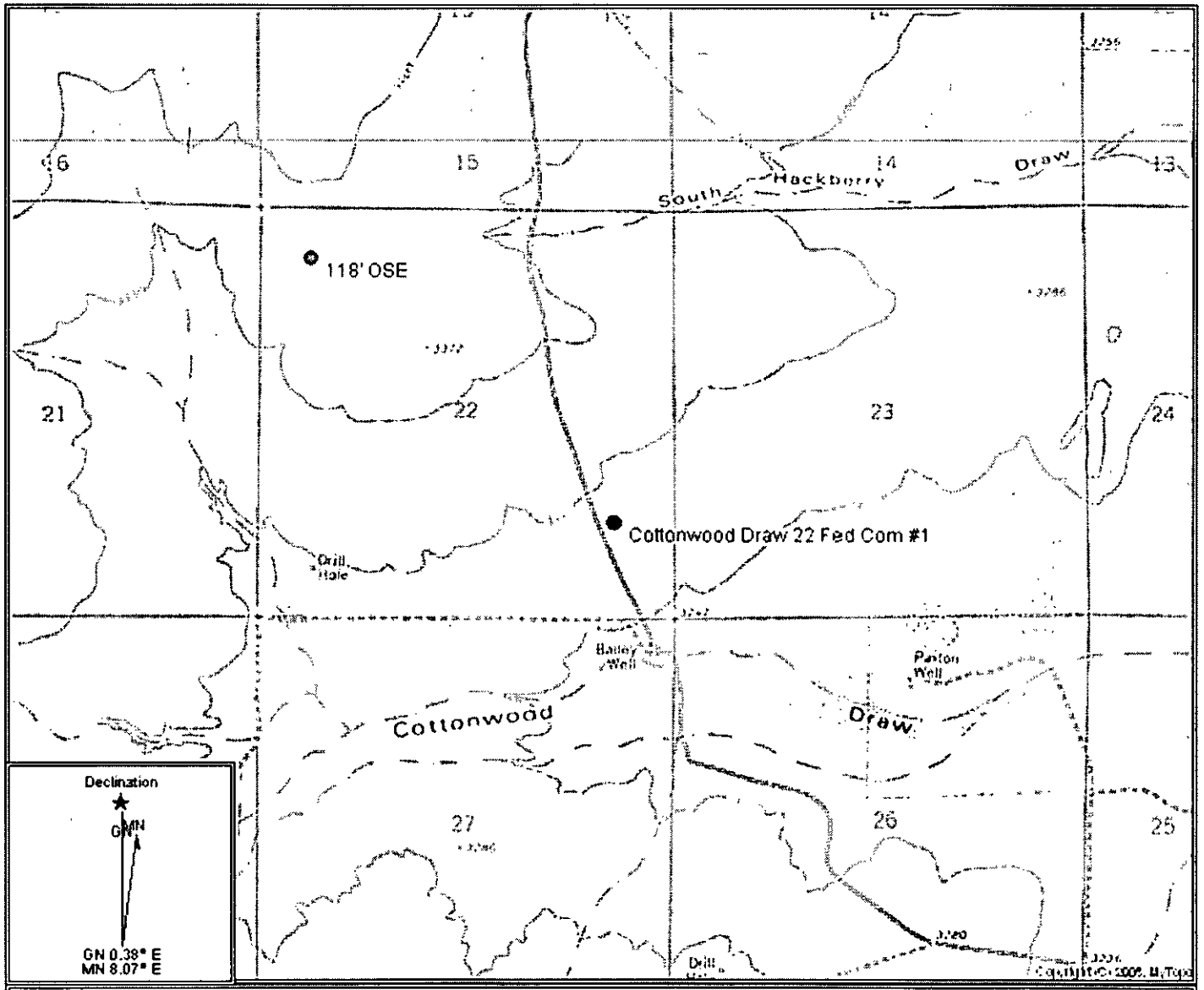
In the interim, Cimarex proposes a lined shallow stormwater pond be constructed at the southeast corner of the pad to capture rainfall runoff from the pad. It should be engineered to contain the maximum amount of runoff from a single severe rainfall event as predicted by the weather service. Following the event, it should be emptied and the water disposed of at an approved facility. In addition to the pond, the berm surrounding the area should be inspected and repaired as necessary to prevent rainfall not captured by the pond from exiting the pad. Any standing water following a rainfall event should also be removed.

At closure Cimarex will address the most highly contaminated material by scraping and removal. In the case that the delineation reveals chloride contamination that is presenting a threat to the groundwater in the area, action would be taken to prevent further migration of the contamination in those areas.

VII. Figures & Appendices

Figure 1 – Vicinity Map
Figure 2 – Site Plan: Location of Chloride Samples
Appendix A – Analytical Results
Appendix B – Site Photographs

Figure 1
Vicinity Map



Map Name: JUMPING SPRING, Map Center: 032.1125478° N 104.2750I UTM Zone: 13
Scale: 1 inch = 2,000 ft. Horizontal Datum: WGS84 Map Type: Topographic

New Mexico Office of the State Engineer
Water Column/Average Depth to Water

(A CLW##### in the POD suffix indicates the POD has been replaced & no longer serves a water right file.)

(R=POD has been replaced, O=orphaned, C=the file is closed)

(quarters are 1=NW 2=NE 3=SW 4=SE)

(quarters are smallest to largest)

(NAD83 UTM in meters)

(In feet)

POD Number	POD Code	Subbasin	County	Q 64	Q 16	Q 4	Sec	Tws	Rng	X	Y	Depth Well	Depth Water	Water Column
C 01388	C		ED	1	1	22	25S	28E		567261	3554059*	143	118	25

Average Depth to Water: **118 feet**

Minimum Depth: **118 feet**

Maximum Depth: **118 feet**

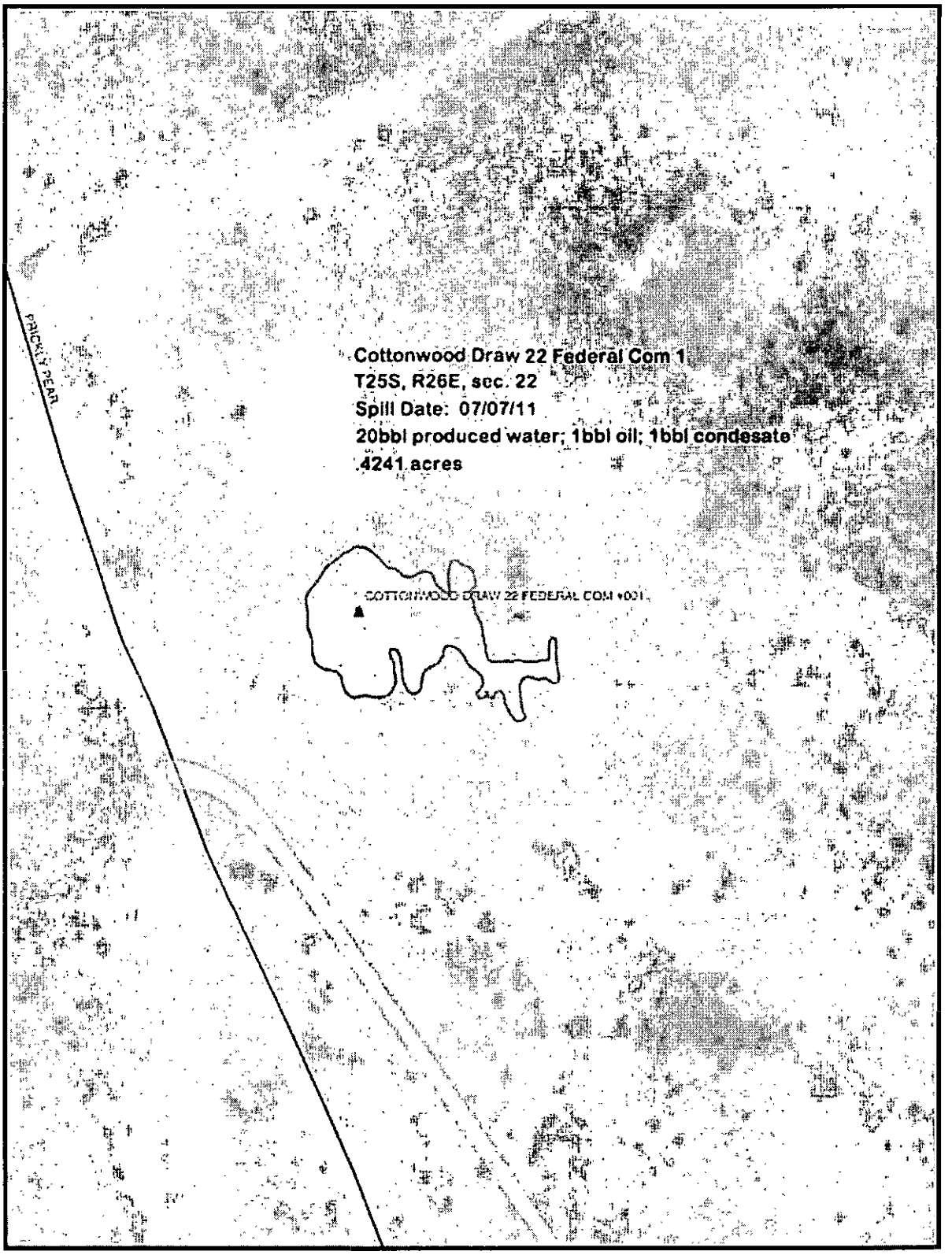
Record Count: 1

PLSS Search:

Section(s): 22 **Township:** 25S **Range:** 28E

*UTM location was derived from PLSS - see Help

Figure 2
Site Plan

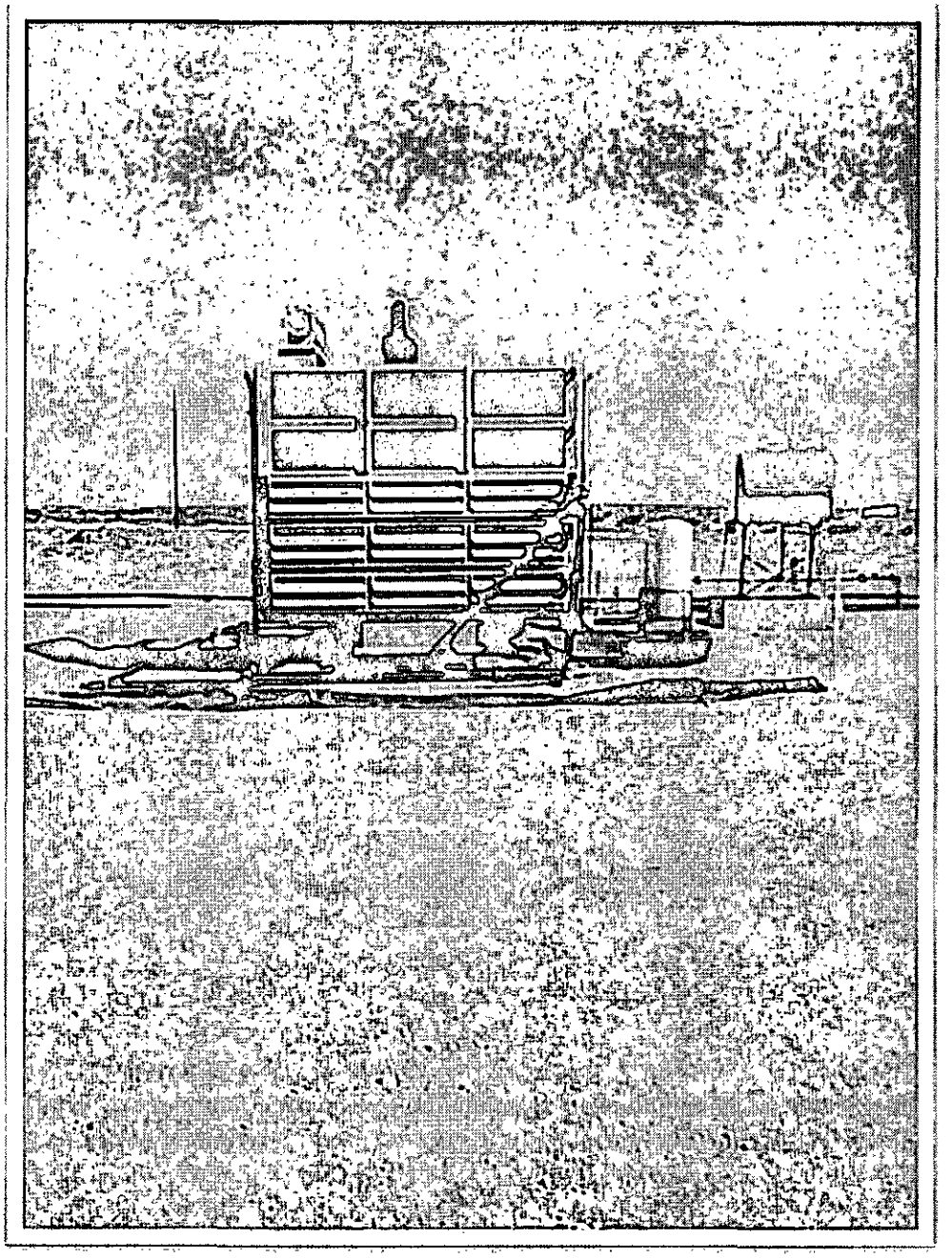

Cottonwood Draw 22 Federal Com 1
T25S, R26E, sec. 22
Spill Date: 07/07/11
20bbl produced water; 1bbl oil; 1bbl condesate
.4241 acres
PRICKLY PEAR
COTTONWOOD DRAW 22 FEDERAL COM #001


SS-6
SS-11
SS-10
SS-7
SS-27
SS-28
Berm
SS-5
SS-26
SS-12
SS-9
Location pad
SS-1
SS-25
SS-24
SS-8
SS-2
Inj. Well
SS-4
SS-13
SS-15
SS-23
Fence
SS-16
SS-14
SS-3
SS-20
SS-19
SS-17
SS-21
SS-22
SS-18
Image USDA Farm Service Agency
© 2012 Google
Google earth
127 ft
Imagery Date: 7/25/2011
lat 32.111334° lon -104.274366° elev 3295 ft
Eye alt 3845 ft

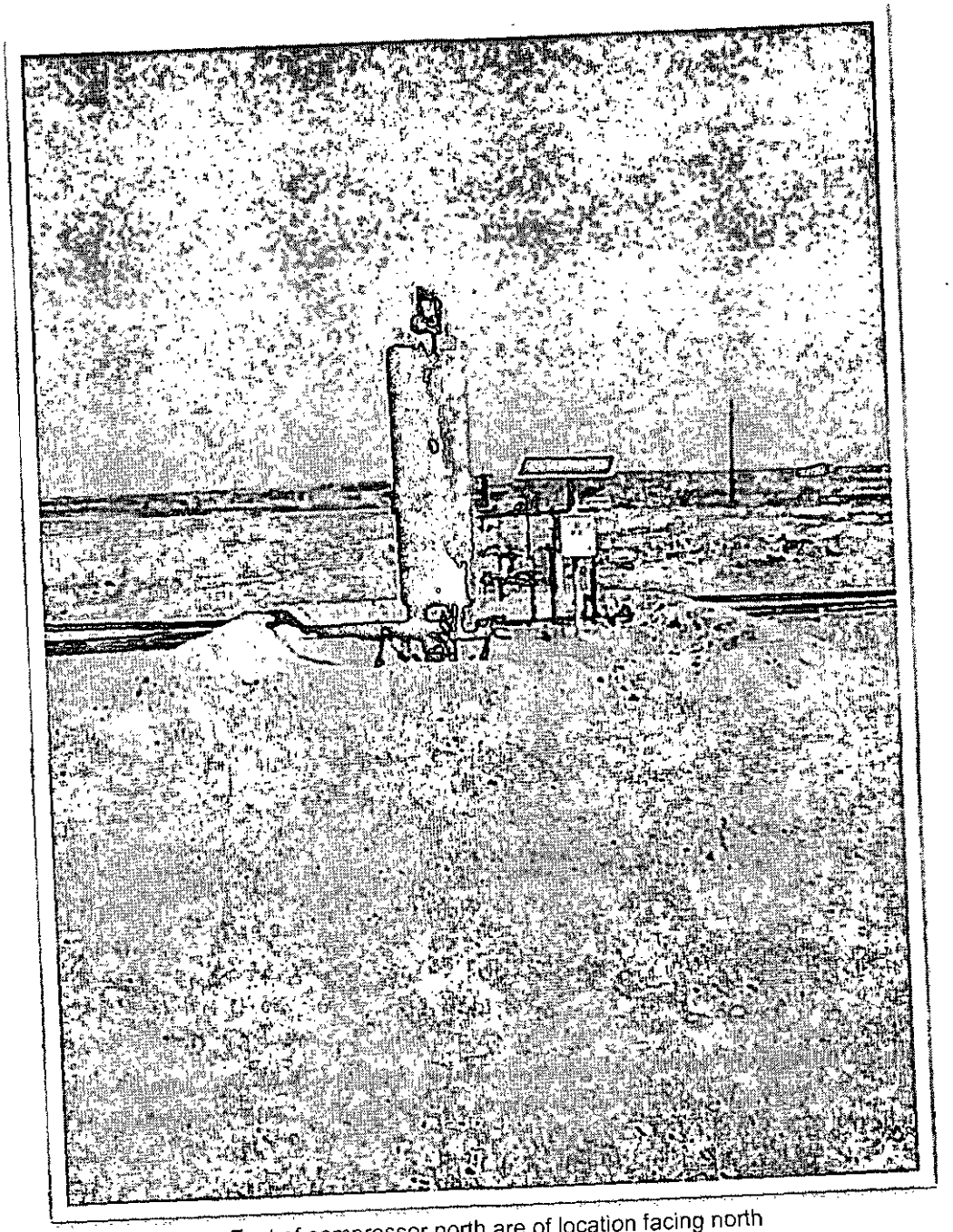
Appendix A
Analytical Results

Appendix B
Site Photographs

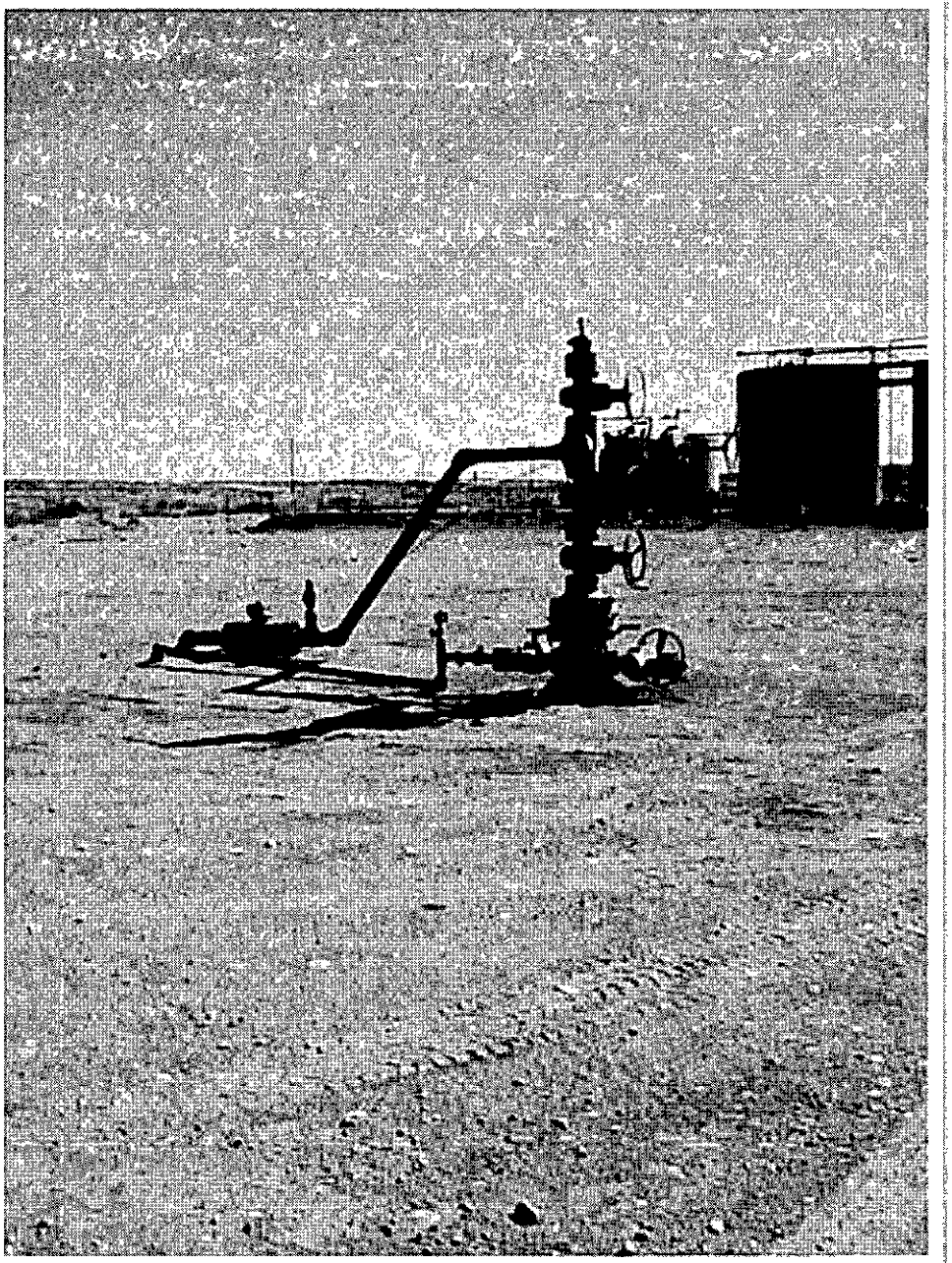
Photolog – Cottonwood Draw 22 Fed. Com #1, March 22-23,2012



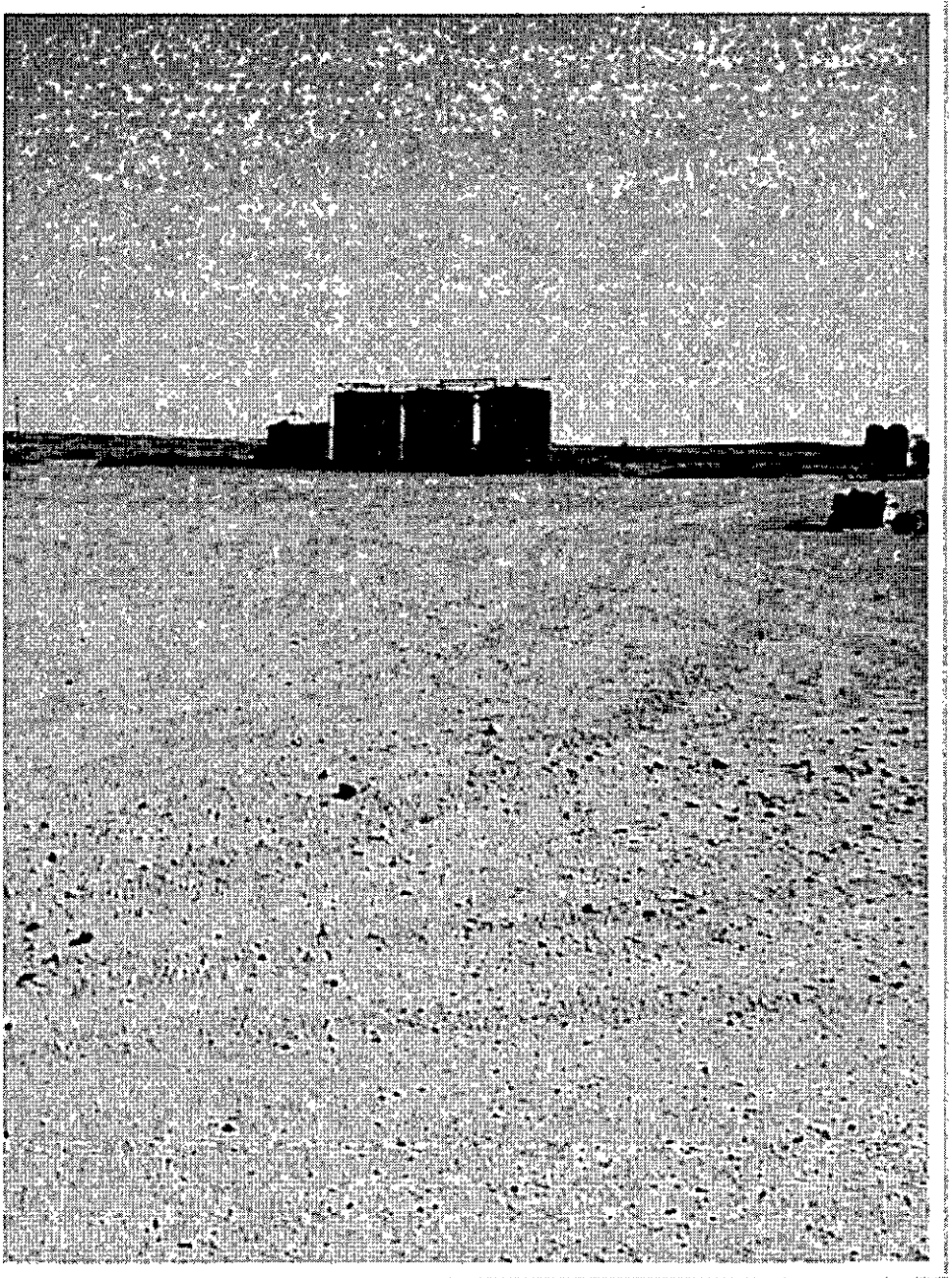
Compressor north area of location facing north



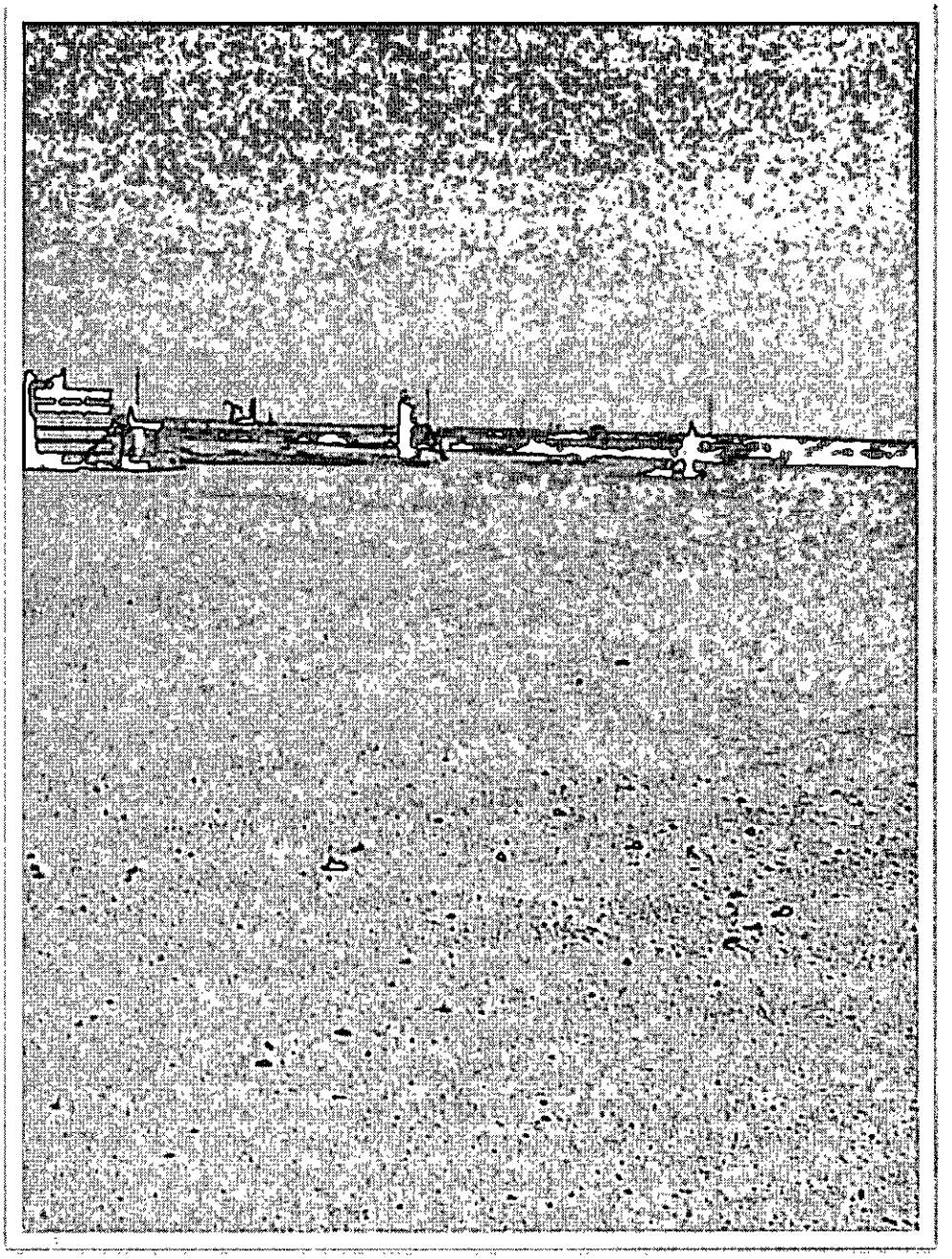
East of compressor north are of location facing north



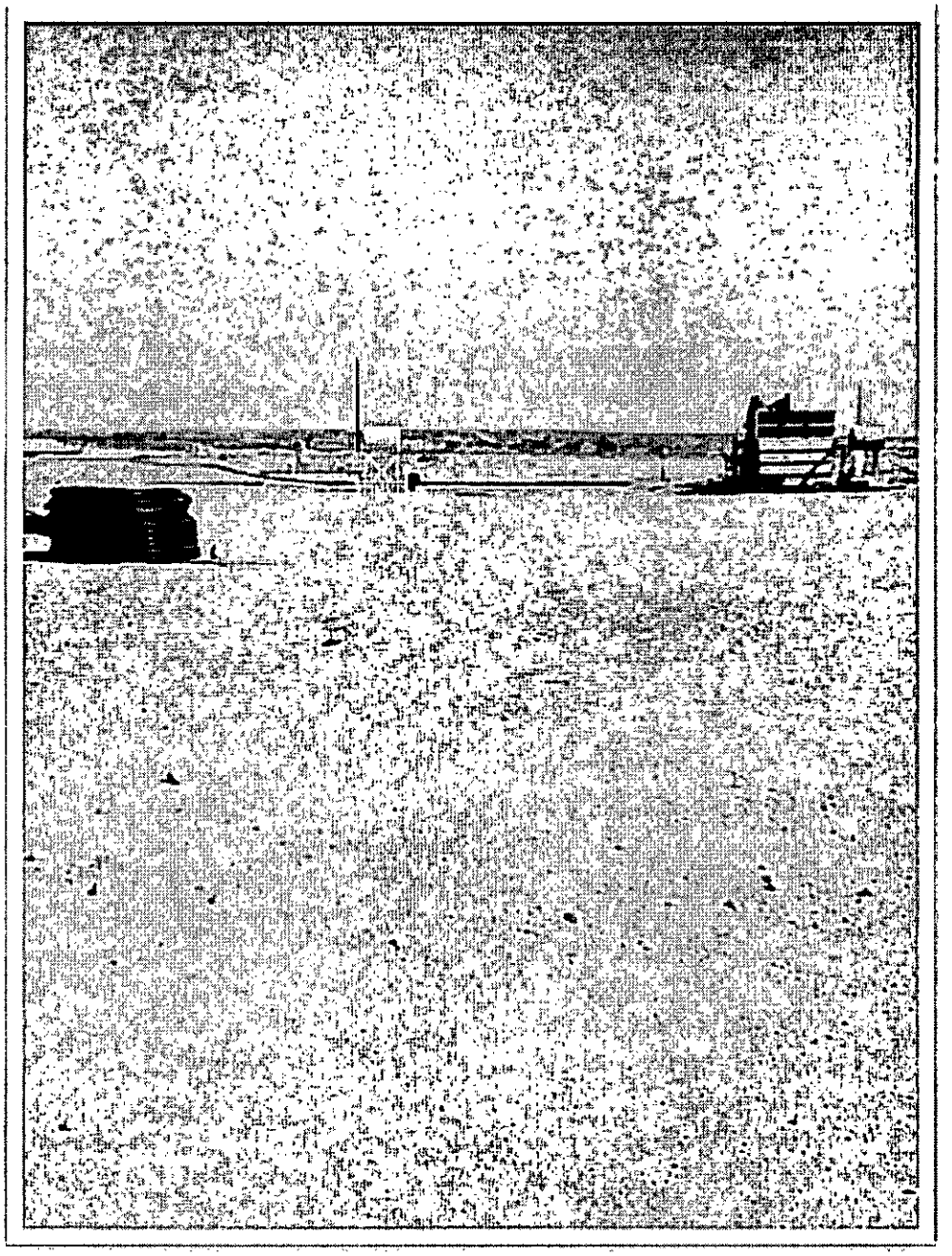
Injection well facing northeast



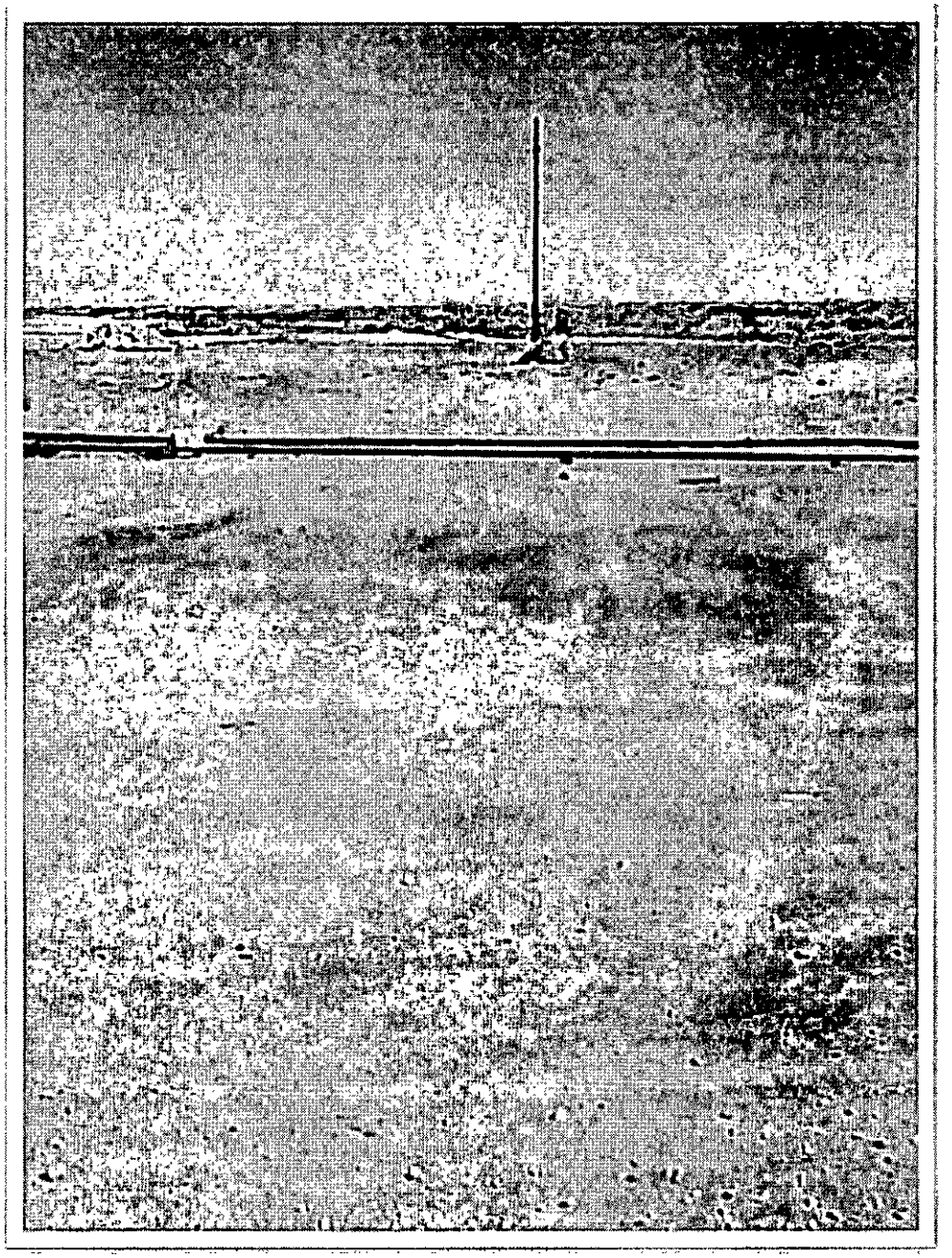
Location facing east



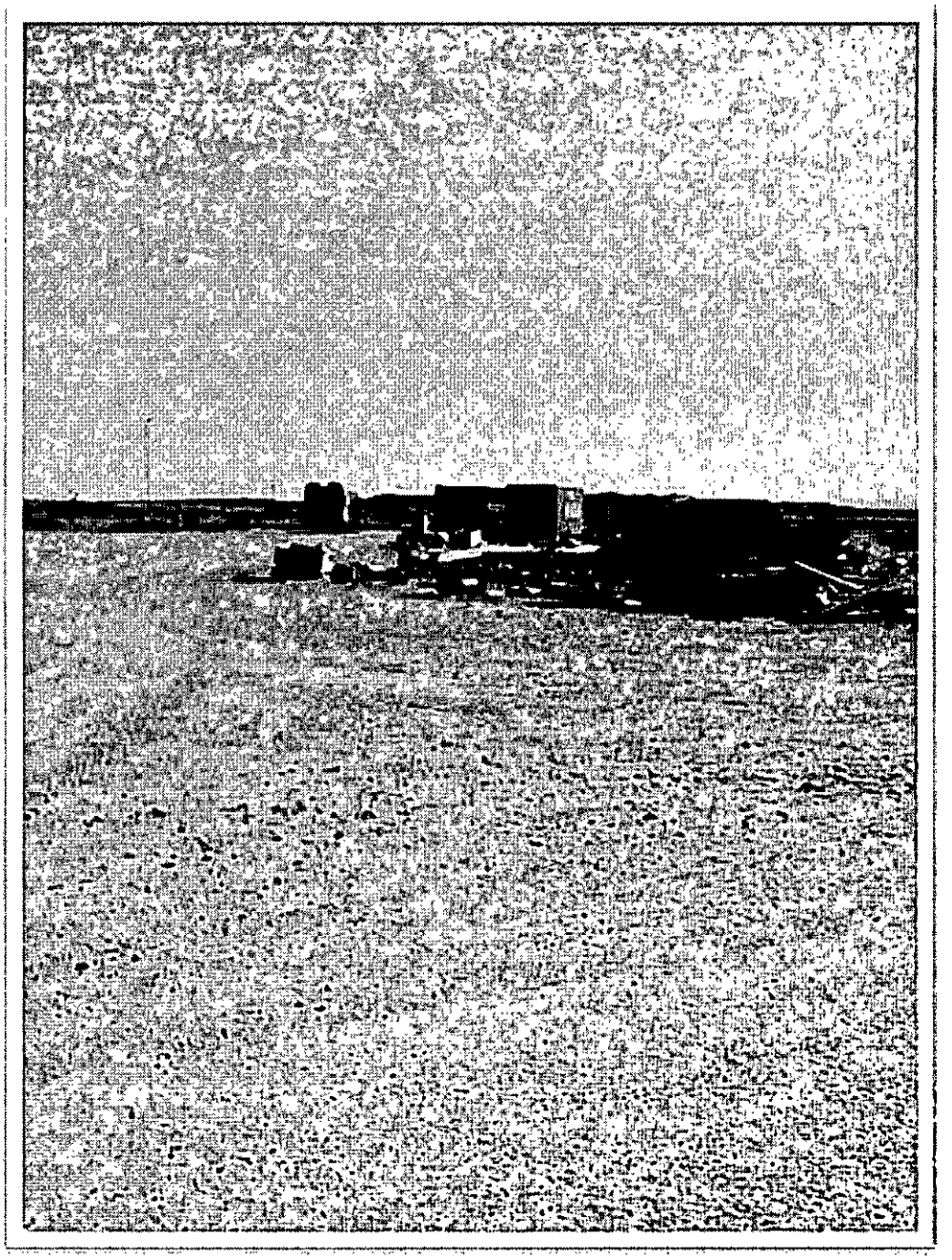
Location facing northeast



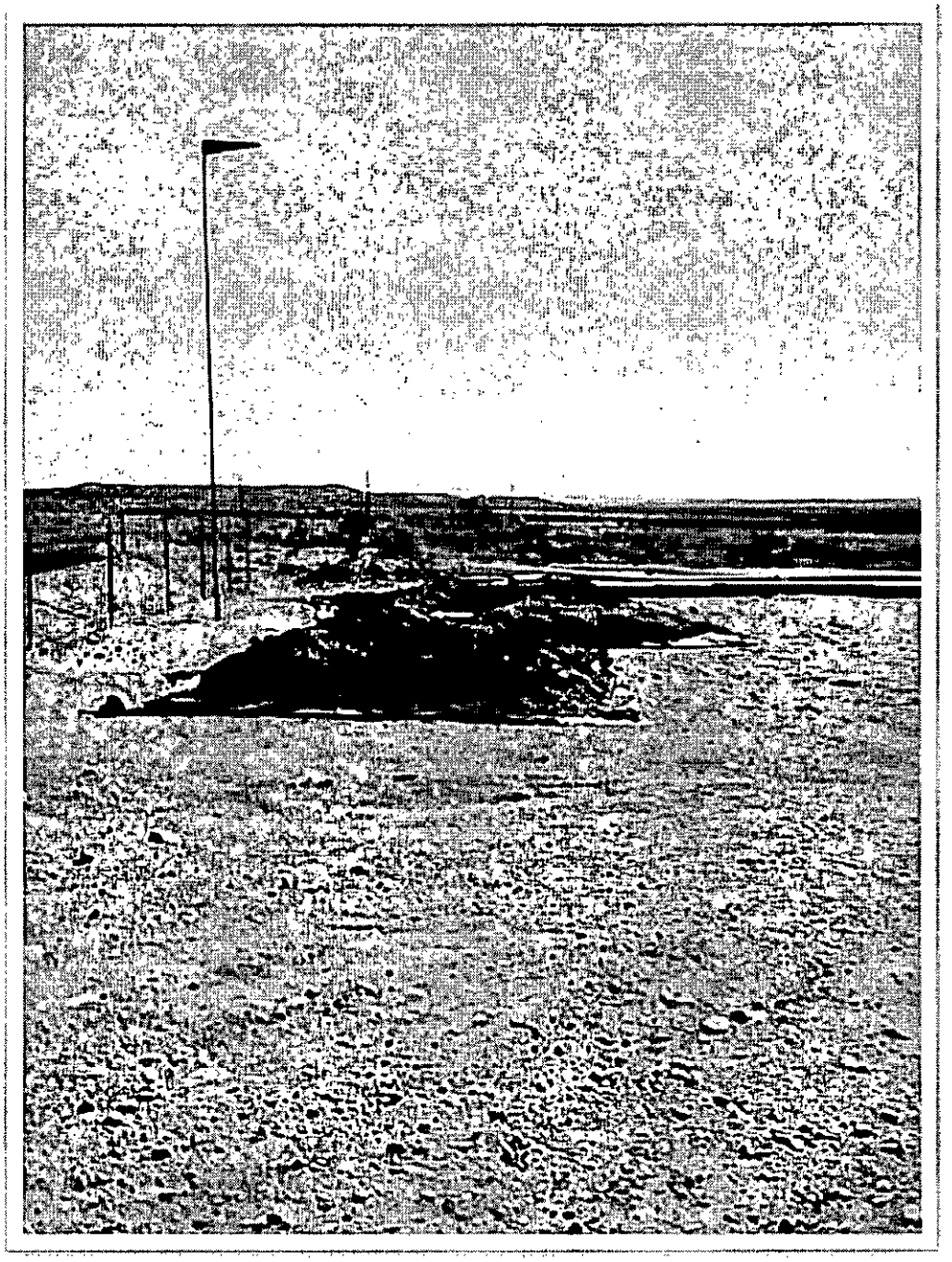
Northwest corner of location facing north



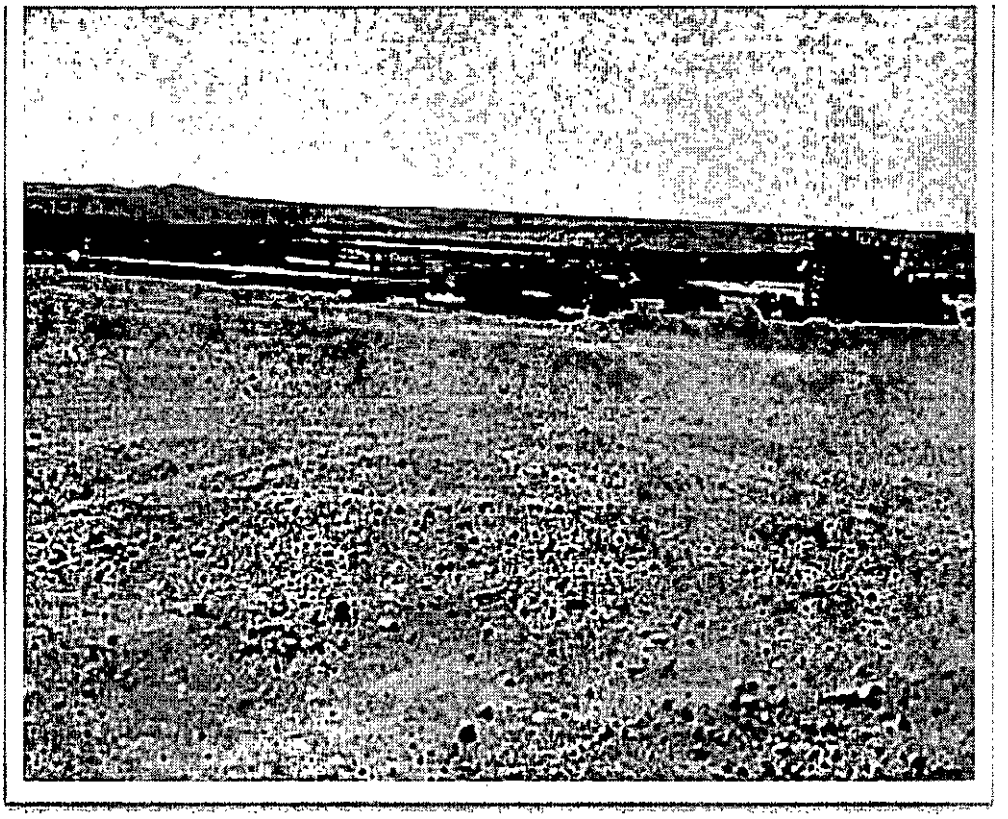
Pad west of compressor facing north



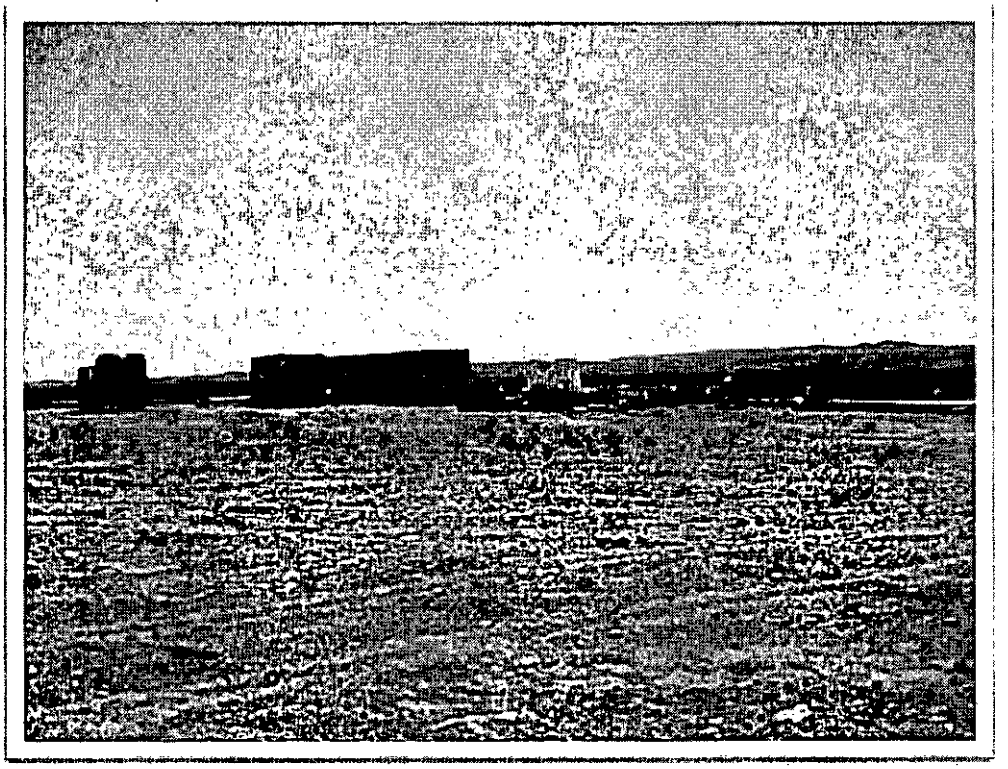
South area of location facing east



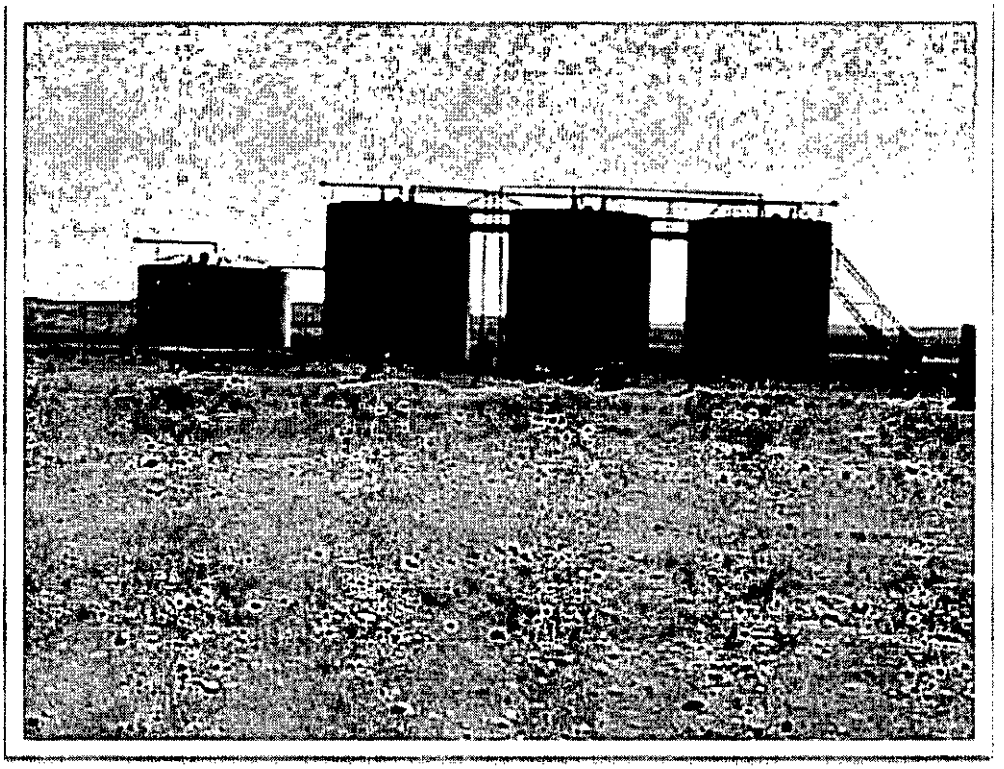
Spoils pile on liner south of tanks facing east



Staged supplies south of location facing south



Staged supplies south of location facing south



Tanks east of location facing east