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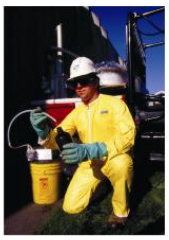

Investigation of Potential Landfills in the Menaul Area

Presented to:

City of Albuquerque

Environmental Health Department

Room 3023
PO Box 129
Albuquerque, NM 87103
(505) 768-2633

Presented by:

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July 2010
File No. 07209112.01

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Investigation of Potential Landfills in the Menaul Area

Presented To:

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Environmental Health Department
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Table of Contents

1 INTRODUCTION

This report provides a summary of work completed regarding the Investigation of Potential Landfills in the Menaul Area. The City of Albuquerque (COA) requires developers and/or owners of properties that are near and/or on landfills to follow the City of Albuquerque's Interim Guidelines for Development within City Designated Landfill Buffer Zones (Interim Guidelines). The COA is aware of possible landfill areas in the Menaul area between the North Diversion Channel and I-25. This report investigated properties could contain landfill materials, could be a potential source of landfill gas, and makes recommendations on how the Interim Guidelines apply to these sites.

In order to complete this investigation, SCS performed the following tasks:

- Reviewed existing reports
- Contacted local geotechnical and drilling firms
- Reviewed aerial photographs obtained at the University of New Mexico's Earth Data Analysis Center (EDAC)
- Performed limited fieldwork utilizing a GEM 2000 landfill gas meter and a four gas meter.

2 REVIEW OF EXISTING REPORTS

SCS reviewed seven geotechnical and landfill gas survey reports for five properties located in the Menaul Boulevard area (see Figure 1 – Location Map for Investigated Properties). The suspected landfill properties were assigned a site ID number and plotted on the appropriate City zone atlas map. These reports were obtained from the COA's Environmental Health Department's (EHD) files. Table 1 contains a summary of the reports reviewed. Where soil gas samples were collected a CME-55 drill rig and Geoprobe soil vapor sampling equipment was utilized. The samples were screened in the field using either a MultiRAE Plus multiple gas detector and/or a Riken Keiki RI-85 monitor for carbon dioxide. The number of sample points and the depths are summarized in Table 1. Table 2 summarizes the zone atlas map location and whether the reference was a reviewed report and/or information obtained by interviews of various geotechnical firms.

More than one report was prepared for several of the properties - Map IDs 1, 2, and 3 (Table 1). Review of the reports for Map ID 1, located near the southeast corner of Vassar Drive and Phoenix Avenue (Vinyard 11/8/2008), showed lower explosivity levels (LEL) ranging from 0.0 to 43% and volatile organic compounds (VOCs) ranging from 0.0 to 22.9 meter units. Landfill debris was encountered to approximately 20 feet below ground surface (bgs) at this location.

Soil boring logs prepared by Western Technologies, Inc. (2007) for Map ID 2, located near the northwest corner of Phoenix Avenue and Girard Boulevard, were reviewed and they indicated debris from approximately 5 to 25 feet bgs. A landfill gas survey was prepared by Vinyard and

Associates, Inc. for this location in 2008 and LEL levels ranged from 0.0 to greater than 100% and VOCs ranged from 6.6 to 85.5 meter units.

A geotechnical investigation report and a draft landfill gas survey report prepared by Vinyard and Associates, Inc., both prepared in 2007, were reviewed for the Map ID 3 location. This site is located near the northwest corner of Phoenix Avenue and Vassar Drive. The soil boring logs included in the geotechnical report indicated debris ranging from approximately 4 to 21 feet bgs. Monitoring for methane was performed during the drilling activities and one soil boring was terminated due to unsafe levels of methane. The results of the landfill gas survey showed LEL levels ranging from 0.0 to 23%, hydrogen sulfide (H_2S) concentrations ranging from 0 to 5 ppm, and VOCs ranged from 0.0 to 25.8 meter units.

A landfill gas survey report prepared by Vinyard and Associates, Inc. in 2008 was reviewed for Map ID 4 located on the north side of Phoenix Avenue between Vassar Drive and Princeton Drive. The results did not show any LEL levels above 0.0 and VOCs ranged from 0.0 to 1.7 meter units.

A landfill gas survey report prepared by Vinyard and Associates, Inc. in 2003 was reviewed for Map ID 8, Lot 4A1 of the Menaul Development Area located north of Menaul Boulevard between University Boulevard and Princeton Drive, did not show any levels of LEL or VOCs. The report indicated that 244 loads of concrete and asphalt were removed from the site.

3 CONTACTED LOCAL GEOTECHNICAL AND DRILLING FIRMS

Several firms were contacted and interviewed regarding whether they had encountered landfill materials and/or landfill gas in their investigations within the Menaul Area. Below is a summary of these interviews:

SCS met with Ken Hunter of Vinyard & Associates, Inc. to discuss his experience in the project area. For Map ID 5, Mr. Hunter indicated that 30-feet of trash was drilled through at the southeast corner of the intersection between Princeton Drive and Claremont Avenue and the existing building was constructed on piers (Figure 1 – Location Map of Investigated Properties,). For Map ID 6, Mr. Hunter indicated there were reports of dead animals being disposed of at the southwest corner of Princeton Drive and Claremont Avenue. While installing a cellular tower near the Super 8 Motel, the contractor noted household trash at 30 feet below ground surface (Map ID 7). Mr. Hunter also confirmed the areas near Phoenix Avenue and Vassar Drive mentioned above (Map IDs 2 and 3).

SCS contacted Rodney Hammer, driller with EnviroDrill, Inc., and he indicated that he had dug holes at the vacant lot (Unit 3 of the Brunacini Industrial Park) located at the northeast corner of Menaul Boulevard and Vassar Drive and encountered waste to approximately 10 feet below ground surface (Map ID 1). The waste consisted mostly of construction debris but there was also some household trash.

SCS also contacted Charlie Miller, geotechnical engineer for Geo-Test, Inc. and he indicated that the area is a landfill where the former Arroyo del Embudo, located to the north of Menaul Boulevard from the southwest to the east, northeast, was filled in.

SCS also contacted a Western Technologies and a Kleinfelder geotechnical engineer, however neither had any experience in the area.

4 REVIEWED AERIAL PHOTOGRAPHS OBTAINED AT THE UNIVERSITY OF NEW MEXICO'S EARTH DATA ANALYSIS CENTER (EDAC)

SCS reviewed historical aerial photographs from EDAC for the years of 1996, 1991, 1989, 1982, 1973, 1967, 1964, 1959, 1954, 1951, and 1935. Copies of select aerials are included in Appendix A. From 1935 to 1967, the Arroyo del Embudo crossed the area from the southwest to the east and northeast. In the 1973 photograph, the arroyo had been mostly filled in. The present day North Diversion Channel is present in the 1973 aerial photograph. Menaul Boulevard was present on the 1951 aerial photograph and Carlisle Boulevard was present on the 1954 aerial photograph. The Menaul Boulevard area between Carlisle Boulevard and University Boulevard was mostly vacant in the 1954 photograph with an airport located to the north, a drive in theatre to the east (Carlisle), and subdivisions to the east and south (across present day I-40). Disturbed soil, from apparent construction activities, in the area was noted in most of the aerial photographs reviewed. SCS did not identify any areas of obvious land filling activities at the eight locations shown on Figure 1. Construction debris and /or household waste may have been used during the filling of the arroyo as indicated by Mr. Miller of Geotest, Inc.

Map ID 1 did not appear to be developed in the past and is vacant today. Map IDs 1, 2, 3 and 4 appear to have been located in the arroyo corridor prior to 1973. The 1959 aerial photograph shows soil disturbance in the area of Map IDs 5 and 6. The 1973 aerial photograph shows a structure at Map ID 5 and the 1964 aerial shows a structure at Map ID 6. Map ID 7 was vacant in 1982 and was developed in 1989 and Map ID 8 appears to be partially developed in 1982.

5 PERFORMED LIMITED FIELDWORK UTILIZING A GEM 2000 METER AND A FOUR GAS METER

SCS performed limited fieldwork within the street right-of-way at all of the eight locations identified on Figure 1 and Table 1 Visual inspections of the properties was performed to identify any obvious areas of subsidence, distressed vegetation, or visible landfill debris. The fieldwork included monitoring any obvious subsurface cracks, water meter manholes, storm drain inlets, and holes in the ground within the street right-of-ways utilizing a GEM-2000 landfill gas meter and an Industrial Scientific M40 four gas meter. Both instruments were calibrated prior to each day's monitoring activities. The GEM was calibrated to 2.5 parts per million (ppm) methane. The four gas meter was calibrated to 25 ppm hydrogen sulfide, 100 ppm carbon monoxide, 25% LEL pentane, and 19.8% oxygen.

The sampling was performed in the afternoon to allow readings to be taken when atmospheric pressure was at a low. Tubing from the meters was inserted in cracks (greater than ½ inch deep), water meter manholes, storm drain inlets, and holes in the ground. The GEM was operated for approximately five minutes at each sample location and the readings were recorded in the field on a log sheet. None of the areas investigated contained methane gas or hydrogen sulfide gas. Results of the limited fieldwork are presented in Table 3. Two of the eight locations, Map IDs 5 and 6 showed potential evidence of subsidence. A small amount of apparent construction debris was noted at Map ID 1.

6 CONCLUSIONS

Based on the review of previously prepared geotechnical and landfill gas survey reports and interviews with local geotechnical and drilling firm personnel, potential landfill debris and/ or vapor readings were identified near the northwest, northeast, southwest, and southeast corners of the intersection between Vassar Drive and Phoenix Avenue. Based on an interview with Ken Hunter of Vinyard and Associates, Inc., potential solid waste and/or methane readings were identified at the southwest and southeast corner of the intersection between Claremont Avenue and Princeton Drive (Map IDs 5 and 6). These two areas (Map IDs 5 and 6) also had signs of subsidence identified during the fieldwork. Also based on the Ken Hunter interview, landfill debris was encountered during the installation of the cellular tower identified as Map ID 7. A landfill gas survey report prepared by Vinyard and Associates, Inc. in 2003 for Map ID 8, located north of Menaul Boulevard between University Boulevard and Princeton Drive, did not show any levels of LEL or VOCs; however, it is unknown at this time the total extent of any buried landfill materials in this area.

7 RECOMMENDATIONS

Based on the results of the investigation, SCS recommends the areas around Map ID 1, 2, and 3 contain a 1000 foot buffer as required by the City's Interim Guidelines due to the significant landfill gas detected by others as described in this report.

Based on the results of this investigation, Map IDs 5, 6, 7 and possibly Map ID 8 contain landfill materials but no known landfill gas at this time, SCS recommends that at least a 500 foot buffer be considered at this location.

The results of this investigation took into account work performed by others, as well as a very limited field investigation performed by SCS. One time investigation of surface features (cracks in sidewalks, holes in water meter valve boxes, etc.) monitoring provides a very limited picture any landfill gas that may exist in an area. In addition, any landfill gas that could enter a utility corridor/trench can migrate well beyond the suggested buffer recommendations made in this report. SCS recommends that landfill gas monitoring probes be installed throughout the buffer zone areas identified in this investigation. These monitoring probes should be read on a quarterly basis for a minimum of one year to determine whether landfill gas actually does exist in these areas. In addition, these areas should be visibly monitored on a yearly basis to determine

whether surface features (i.e. surface subsidence, ponding of significant amounts of water, foundation subsidence, etc.) of the properties have changed that could cause landfill gas to be generated and/or increase landfill gas generation.

Table 1
Summary of Review of Available Reports

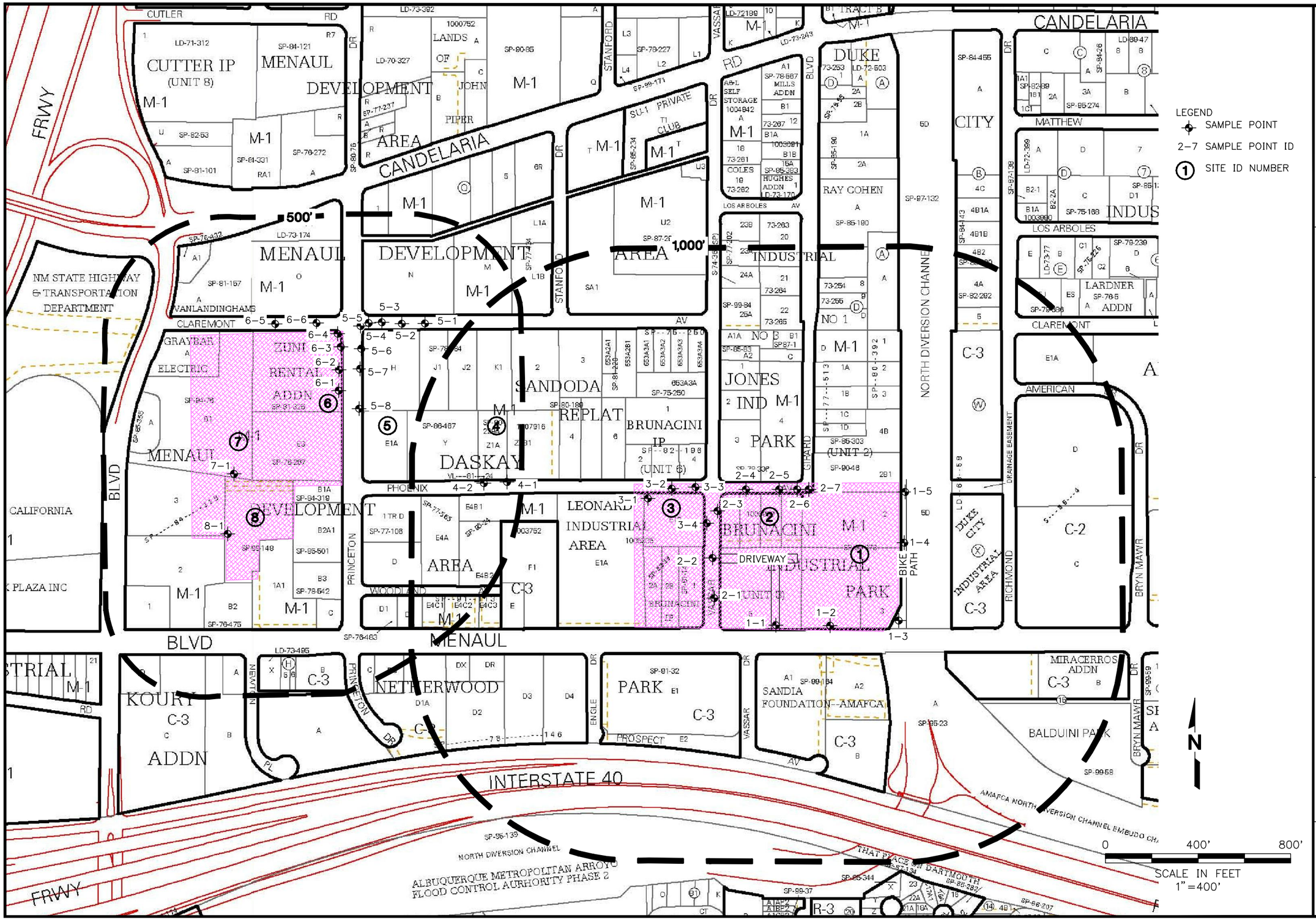
Author of Report	Summary	Map ID
Vinyard & Associates, Inc. 12/20/2005	Tracts 2-4 Brunacini Industrial Park Unit 3 (Phoenix Avenue) 9 vapor samples, 3-5' BGS 0.0-0.4 meter units VOCs 0% LEL	1
Vinyard & Associates, Inc. 11/18/2008	Tracts 2-4 Brunacini Industrial Park Unit 3 (Phoenix Avenue) 4 boreholes - landfill debris to 20.5' 7 vapor samples, 6-10' BGS 0.0-22.9 meter units VOCs 0-43% LEL	1
Vinyard & Associates, Inc. 8/20/2008	Lots 1-A through 1-D Brunacini Industrial Park Unit III aka Tract 1 Shops at Hotel Row (SEC Phoenix/Vassar) 12 vapor samples, 5-28' BGS 6.6 - 85.5 meter units VOCs Readings from 0 to greater than 100% LEL	2
Western Technologies, Inc. Soil boring logs 11/9/2007	Tract 1 Shops at Hotel Row aka Lots 1-A through 1-D Brunacini Industrial Park Unit III 5 soil borings, 36.5-41.5' SB-1 - debris 5-25' SB-2 - debris 5-6' and 18-20' SB-3 - debris 5-15' SB-4 - debris 17-25' SB-5 - debris 7-25' Information obtained from boring logs	2
Vinyard & Associates, Inc. 10/9/2007	Lot E-1-B Leonard Industrial Area aka 1.3-Acre Parcel (Phoenix Ave. and Vassar Dr.) 7 vapor samples, 11-20' BGS 0.0-25.8 meter units VOCs 0 - 5 ppm Hydrogen Sulfide (H_2S) 0.0-23% LEL	3
Vinyard & Associates, Inc. 10/8/2007	1.3-Acre Parcel aka Lot E-1-B Leonard Industrial Area (Southwest corner of Phoenix and Vassar) 5 soil borings, 10-31.5' SB-1 - debris 9-10' SB-2 - debris 18-21', gas odor at 14' SB-3 - refusal at 10' SB-4 - debris at 7', TD at 10' due to unsafe level of methane SB-5 - debris 4-5' Monitoring for methane was conducted during the drilling activities	3
Vinyard & Associates, Inc. 1/17/2008	Lot Z1A Dasky Subdivision 2231 Phoenix Avenue 4 vapor samples 6.5-7.5' BGS 0.0-1.7 meter units VOCs 0% LEL	4
Vinyard & Associates, Inc. 10/13/2003	All Suites Hotel 2019 Menaul Blvd. 4 vapor probes, 5' BGS 0.0 meter units VOCs 0.0% LEL 244 loads of concrete and asphalt were removed from the site	8

Table 2
Map ID Numbers

Site	Map ID
Tracts 2-4 Brunacini Industrial Park Unit 3 (Vinyard and Associates, Inc. report)	1
Lots 1-A through 1-D Brunacini Industrial Park Unit III (Southeast corner Phoenix/Vassar) aka Tract 1 - Shops at Hotel	2
Lot E-1-B Leonard Industrial Area - (Southwest corner Phoenix/Vassar) aka 1.3-Acre Parcel (Vinyard and Associates, Inc. report)	3
Lot Z1A Dasky Subdivision - 2231 Phoenix Ave. (Vinyard and Associates, Inc. report)	4
Southeast Corner Claremont / Princeton (conversation with Ken Hunter)	5
Southwest Corner Claremont / Princeton - Zuni Rental (conversation with Ken Hunter)	6
Cell Tower Near Super 8 Motel (conversation with Ken Hunter)	7
All Suites Hotel 2019 Menaul Blvd. (Vinyard and Associates, Inc. report - 244 loads of concrete and asphalt removed)	8

Table 3
Summary of Limited Fieldwork Results

Map ID	Date	GEM 2000 Methane Reading (% by volume)	H2S Reading (ppm)	LEL Reading (%)	Comments
1-1	May 12, 2010	0.0	0.0	0.0	Hole in expansion joint of concrete a Menaul driveway entrance
1-2	May 12, 2010	0.0	0.0	0.0	Crack in sidewalk near Menaul driveway entrance
1-3	May 12, 2010	0.0	0.0	0.0	Crack in bike path asphalt near Menaul
1-4	May 12, 2010	0.0	0.0	0.0	Crack in bike path near first light pole from Menaul
1-5	May 12, 2010	0.0	0.0	0.0	Crack in bike path near second light pole from Menaul
2-1	May 12, 2010	0.0	0.0	0.0	Water meter first manhole on Vassar from Menaul
2-2	May 12, 2010	0.0	0.0	0.0	Water meter second manhole on Vassar from Menaul
2-3	May 12, 2010	0.0	0.0	0.0	Water meter third manhole on Vassar from Menaul
2-4	May 12, 2010	0.0	0.0	0.0	Crack between asphalt and concrete at driveway entrance
2-5	May 12, 2010	0.0	0.0	0.0	Second water meter to east from Vassar on Phoenix
2-6	May 12, 2010	0.0	0.0	0.0	Third water meter to east from Vassar on Phoenix
2-7	May 12, 2010	0.0	0.0	0.0	Fourth water meter to east from Vassar on Phoenix (at end of Girard)
3-1	May 12, 2010	0.0	0.0	0.0	Second storm drain entrance to west from Vassar on Phoenix
3-2	May 12, 2010	0.0	0.0	0.0	Water meter manhole
3-3	May 12, 2010	0.0	0.0	0.0	First storm drain entrance to west from Vassar on Phoenix
3-4	May 12, 2010	0.0	0.0	0.0	Crack between curb and sidewalk (1/2 way between Phoenix and Driveway access)
4-1	May 13, 2010	0.0	0.0	0.0	Crack in expansion joint in sidewalk by power pole
4-2	May 13, 2010	0.0	0.0	0.0	Water meter manhole in front of building
5-1	May 13, 2010	0.0	0.0	0.0	Water meter manhole in front of building
5-2	May 13, 2010	0.0	0.0	0.0	Space between curb and sidewalk ~5 feet west of 5-1
5-3	May 13, 2010	0.0	0.0	0.0	5th storm drain inlet going east on Claremont from Princeton
5-4	May 13, 2010	0.0	0.0	0.0	3rd storm drain inlet going east on Claremont from Princeton
5-5	May 13, 2010	0.0	0.0	0.0	1st storm drain inlet going east on Claremont from Princeton
5-6	May 13, 2010	0.0	0.0	0.0	Old fence post hole ~15 feet south of Claremont on Princeton
5-7	May 13, 2010	0.0	0.0	0.0	2nd storm drain inlet going south on Princeton from Claremont
5-8	May 13, 2010	0.0	0.0	0.0	Crack between sidewalk and curb ~ 2 feet south of 5-7
6-1	May 13, 2010	0.0	0.0	0.0	Hole at fence post (11th post from south end of property)
6-2	May 13, 2010	0.0	0.0	0.0	Water meter manhole at south side of driveway entrance
6-3	May 13, 2010	0.0	0.0	0.0	Water meter manhole at north side of driveway entrance
6-4	May 13, 2010	0.0	0.0	0.0	2nd storm drain inlet going south on Princeton from Claremont
6-5	May 13, 2010	0.0	0.0	0.0	1st storm drain inlet going west on Claremont from Princeton
6-6	May 13, 2010	0.0	0.0	0.0	2nd storm drain inlet going west on Claremont from Princeton
7-1	May 13, 2010	0.0	0.0	0.0	Crack in asphalt at fence line in the southeast corner of property near cell tower
7-2	May 13, 2010	0.0	0.0	0.0	Crack in asphalt in parking lot near southwest corner of property



LEGEND

- SAMPLE POINT
- 2–7 SAMPLE POINT ID
- ① SITE ID NUMBER

CLIENT
CITY OF ALBUQUERQUE
ENVIRONMENTAL HEALTH DEPARTMENT
P.O. BOX 1293
ALBUQUERQUE, NM 87103

LANDFILL BUFFER ZONE

MENAUL AREA LANDFILL INVESTIGATION

PROJ. NO. 07.209112.01
DWN. BY: TOM
Q/A R/W BY: MAP
CHK. BY: MAP
APP. BY: MAP
DSN. BY: MAP

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CADD FILE: FILE NAME
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SCALE: AS SHOWN
FIGURE NO. 2

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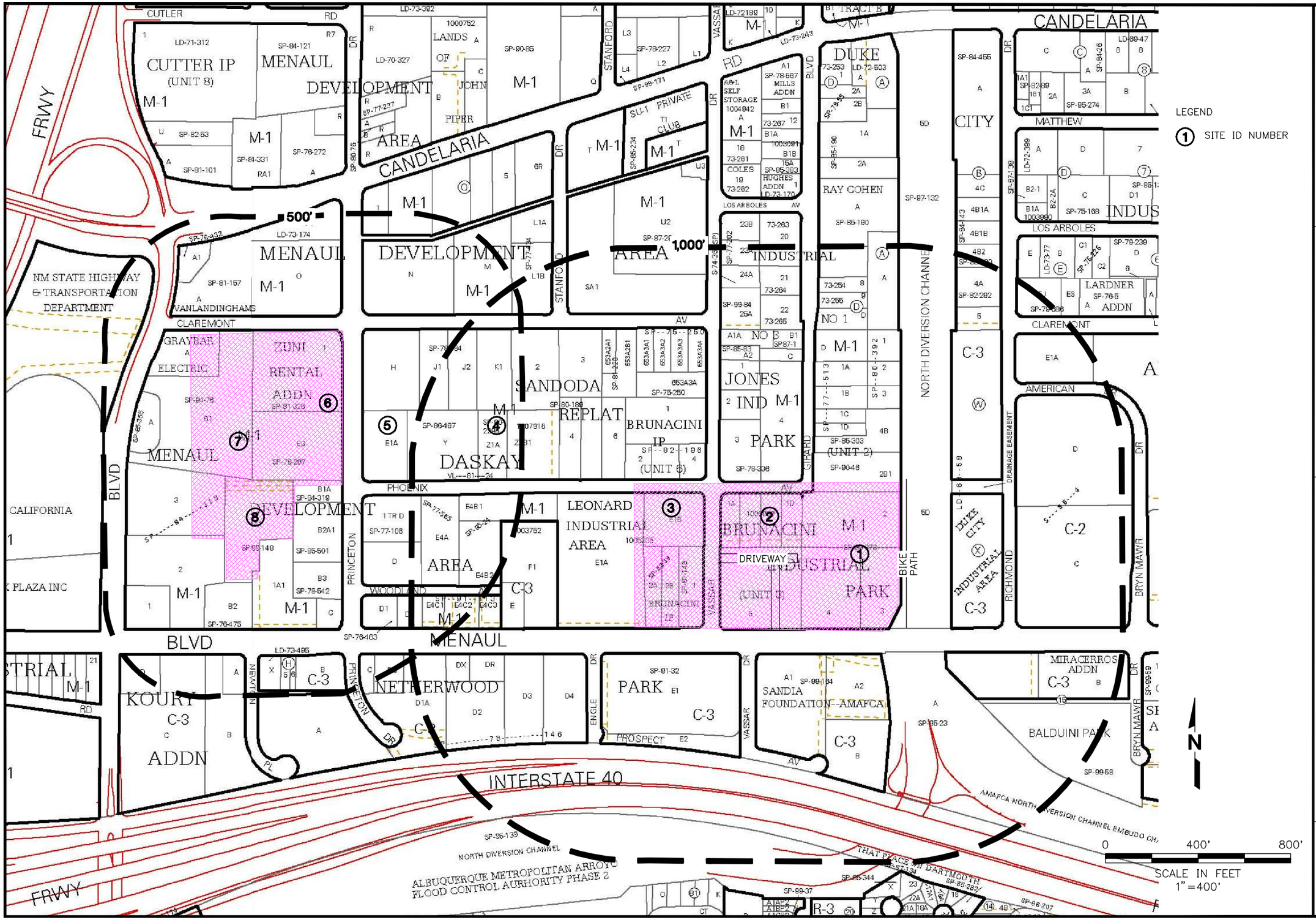

LEGEND

(1) SITE ID NUMBER

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ALBUQUERQUE
ENVIRONMENTAL HEALTH
DEPARTMENT
P.O. BOX 1293
ALBUQUERQUE, NM 87103

LANDFILL BUFFER ZONE

MENAUL AREA
LANDFILL INVESTIGATION

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CADD FILE: FILE NAME
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FIGURE NO. 3

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Appendix A

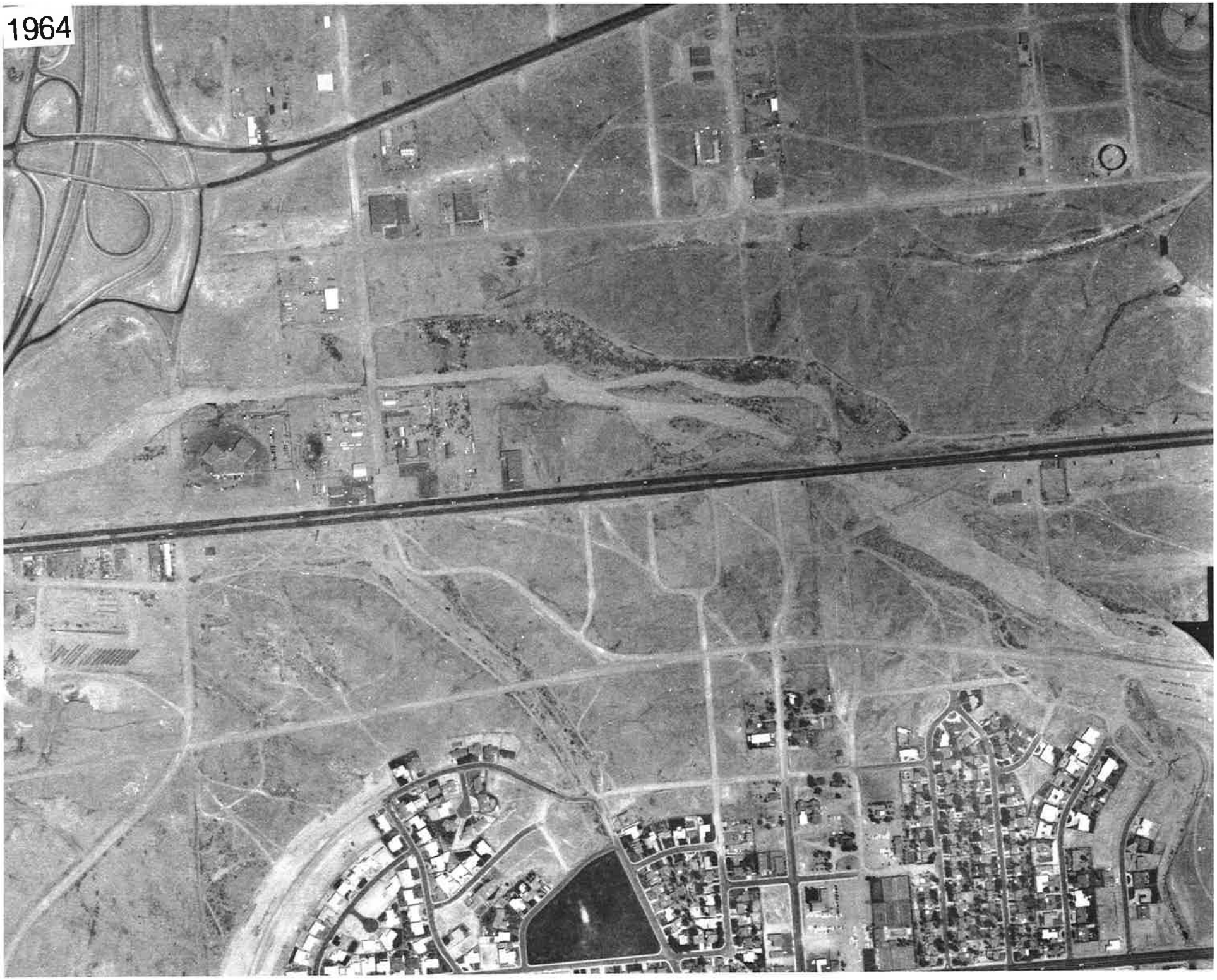
Aerial Photographs


1989


1982


1973


1967


1964


1959


1954
MENAUL